



# harvesting rain

*a timeless tradition*



the native wisdom  
of Rajasthan's desert  
communities in harvesting rain  
for tomorrows is an inspiration  
to all facing mounting fresh  
water shortages.

this book is a tribute to the  
people of Thar desert in  
Rajasthan, India.





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## a word

“The next world war will be fought over fresh water” or “Water will be a major source of conflict between nations and communities in this century” are statements heard in different permutations in practically every freshwater related event or gathering. Water is an essential source for the sustenance of all life forms in our planet and with every passing day the demand for freshwater outpaces its availability. This growing scarcity is alarming but such doomsday predictions are not a solution. Science and technology is looking for ways to increase the supply of freshwater BUT we must also pause & reflect on the ways of our forefathers in harvesting freshwater that sustained them through millenniums in various ecological systems.

Historically Indians have been the world’s greatest water harvesters. Be it rainwater, groundwater, floodwater or water from streams & rivers, Indians over centuries developed a wide range of systems for harvesting, storage, utilization and ground recharge in different ecological regions. These systems beautifully blended & complimented the culture of the concerned regions. But for various reasons they were abandoned. Today, in our country, with each passing day the need to sensibly harvest & use freshwater is increasing manifold. For this we all have to, in the words of Maude Barlow, “radically restructure our societies and lifestyles to reverse the trend of depleting freshwater from earth”.

Freshwater is a basic human right and the prime responsibility for it’s preservation falls on humans. Rain harvesting is one system for replenishing freshwater that is within our control. In Rajasthan the human ingenuity in harnessing rain is an inspiration for all. Over the years we have observed repeatedly that in villages or households where people practice their traditional rain harvesting systems normal droughts do not have much impact on their lives and livelihoods but where ever people have neglected or abandoned rain harvesting they face water shortages even in years when rainfall is normal by desert standards. For more than 20 years now SCRIA has been motivating people in its outreach villages to readopt the practice of harvesting rain. From time to time we face an uphill challenge when irrational and ecologically destructive political promises of bringing water in the region from the perennial Himalayan rivers are made. In keeping with our belief in empowerment of village communities for efficient management of water we continually convince the communities to instead opt for self managed, self sustaining, time tested & tried systems. At the moment the traditional wisdom and systems are winning. We, at SCRIA, are resolved to increase this momentum.

Sunder Lal





## introduction

Water was a symbol of significance in the history of ancient civilizations that prospered close to it. Unlike the urban industrialized civilizations of 21st century most humans throughout history knew that freshwater resources would run out unless water is harvested and conserved. Available fresh water is only one half of one percent of total fresh water available on earth, still modern day humans, convinced of their supremacy over nature, have failed to revere water though the dependence on it, of all life forms, for sustenance is still as much as it was in ancient times.

Freshwater is renewable only by rainfall and continental rain can be harvested in the form of runoff that goes into groundwater, ponds, streams, river and oceans. In India, the desert communities in Rajasthan have been harvesting rain since people established settlements there during antiquity. The desert communities not only created the various technologies for harvesting rain but also evolved community systems for its management. These technologies and management systems were cost effective, ecologically sustainable and involved people from all walks of life. This tradition of water keeping was generously promoted by ruling dynasties also who during severe drought periods undertook massive projects for harvesting and storing rainwater. Such projects not only created additional infrastructure for rain harvesting but also provided critical livelihood opportunities to the local communities. Various invaders and colonial rulers too never interfered in the established community systems for water security. Post independence the government, in its effort to speed up the process of development in the country, introduced centralized planning for all community development initiatives. For a country of 15 ecological regions one standard plan was designed to be applied uniformly all over the country. Technocrats brimming with confidence in 'modern technologies' were put in charge. This new process had no place or respect for indigenous knowledge systems that were evolved through centuries of experience & observation. It also did not factor in communities' role in development processes. The ownership of all natural resources & commons was taken over by government and penalties were imposed on communities if they so much as tried to fix a broken down facility. All this put a spanner on centuries old sustainable community systems and nearly destroyed the sacred relationship between people and water. Now the overtly centralized 'modern' system also does not reliably provide people in the desert with water for their basic needs.

The present peripheral role of citizens' in the management of water, calls for systemic changes with thrust on strengthening people's technologies & institutions. A qualitative & quantitative improvement in the status of water can be brought about through citizens' active participation & ownership. In order to create an enabling environment for an effective and sustainable management of water resources SCRIA since 1987 has been making efforts for empowering village communities through capacity building & infrastructure development. Its program on Natural Resources Management called 'Sampada Prakritik' facilitates initiatives on rain harvesting, water conservation and ground water recharging in its outreach areas in southern Haryana & northern Rajasthan. Harvesting rainwater for drinking & other purposes is promoted through training, sensitization campaigns, organizing people for participation in decision making processes of governance, facilitating multi stakeholder partnerships, open forums for dialog on status of water resources/ policies and infrastructure development. No initiative is undertaken without active participation of all stakeholders especially women. In every village of outreach women groups, known as Sakriya Sangathans, act as initiators of development processes and SCRIA assists women groups in developing appropriate skills, capacity and confidence. The groups are part of a three tier federating structure that is fundamental in decision making processes for every development program undertaken and for initiating local initiatives collectively. Women groups are exclusively involved right from conception & planning stage, are responsible for work plan, purchasing of material, selection of people to be involved in work, management of day to day implementation and post completion care. Men are involved in supportive role.

In Rajasthan for the past ten years SCRIA has been intensively working for the revival of traditional rain harvesting systems and management practices. It facilitates repair/ renovation of village ponds known as 'Talai', promotes covered traditional tanks called People in the desert have observed that when ever this Kheep bush dries in March or April, the rains have been good in that particular year 'tankas', have revived the technique of slope bunding known as 'Kanabundi' for moisture based farming and is aiding the development of pastures in common land through moisture harvesting technique of 'Chowka bundi'. For this SCRIA promotes low cost designs, provides technical training & financial assistance. To ensure people's ownership of water resources and an equitable distribution of water SCRIA encourages communities to revive and readopt the traditional community management systems. SCRIA also actively



**For the farmers the height at which this 'Kaali chidi' black bird, builds her nest at the onset of summer is an indication of the height the crop would grow upto. Higher the nest, better the rainfall.**

promotes cost sharing by the outreach community thus further establishing community's ownership and cost efficacy in initiatives. For the management and upkeep of developed community assets village level maintenance funds are established by women groups through community contributions. Women groups have the overall responsibility for managing the developed assets while village Panchayat provides meaningful support. SCRIA lends technical & management support when required whereas a huge group of volunteers, both women & men - young & old, wholeheartedly participate in campaigns and events for promoting traditional rain harvesting practices.

In desert water along with lives sustains livelihoods too. Rain harvesting in SCRIA's outreach villages has promoted agriculture and livestock also. To further aid this SCRIA regularly organizes interactive trainings and initiatives on regeneration, management & sustainable use of native vegetation; seed treatment; bio pesticides; traditional and improved cultivation practices; agro forestry; vegetable & fodder cropping; seed bank and livestock management. Over the years the efforts for revival of rain harvesting systems have borne tangible results. In Churu district alone more than 200 villages are actively engaged in sustainable rain harvesting for drinking, agriculture, vegetative regeneration & other purposes. Communities are once again taking responsibility for the management of its rainwater. The state government too is now supporting some rain harvesting initiatives. The availability of water in the villages is ensuring that even during a season of scarcity [borderline drought], not many village residents migrate to commercial centers in search of livelihoods. This book is an attempt to document the timeless tradition of harvesting rain and SCRIA's efforts in its revival. The region covered is Churu district of Rajasthan, including Sri Dungargarh block that has lately been included in neighboring Bikaner district.

Senoo Rawat



People in the desert have observed that when ever this Kheep bush dries in March or April, the rains have been good in that particular year.







## *dhoran wala desh* land of dunes

bajre ka sogra, mothan ki daal, akde ki jhopdi, phogan ki baard  
dekhi Raja Maan Singh teri Marwaar

Upon being asked to share the impression of Marwaar a court poet in Akbar's entourage touring the region in the late 16th century AD replied, "pearl millet's bread, moth lentil, hut of aak bush with fence of Phog reeds is what we saw Raja Maan Singh of your Marwaar". This description of Marwaar, a region that includes modern day districts of Bikaner and Churu in northwest Rajasthan is apt and relevant in the beginning of 21st century also. Nothing much has changed here. It seems that time has barely moved since. The landscape is still dotted with Jhopa huts made from stems of Aak, *calotropis procera*, the staple food is pearl millet and moth lentil is widely grown & consumed by all.

Since antiquity the region of north west Rajasthan was known as 'Marwaar' or 'Marusthal', literally the land of death, though in records it was called 'Jangladesh' due to its barren wilderness. The region of modern day Churu & Bikaner districts were then inhabited by 'Jat' clans, ruled by their own chiefs and largely governed by their own customary law. In the second half of 15th century AD a Rajput king, Rao Bika, consolidated power and named the region Bikaner. After independence the districts of Churu & Bikaner from the erstwhile princely state of Bikaner came into being.

The district of Churu is a desert district of Rajasthan in northwest India. It is a gateway to Thar Desert. The district, located 286.2 meters above mean sea level, is liberally dotted with sand dunes 20 feet to 100 feet high. In this arid zone temperatures range from +50 degrees Celsius in summers to below 0 degree Celsius in winters. The summer sets in March with strong desiccating winds, high intensity sunshine with a solar radiation of 450 to 550 calories per cm<sup>2</sup> per day and an evaporation rate of 6 mm per day. Churu & Bikaner share the dubious distinction of being the dustiest place on earth!

Rainfall in the region is scattered and is from 80 to 200 mm per annum. The variation in rainfall is so erratic that locally it is said that sometimes only one horn of the cow is in rain while the other is not. There is no perennial river here and drainages are internal that get lost in desert sand a short distance from their originating point. Groundwater is generally saline & brackish at 200 to 1000 feet below surface. Due to general scarcity of water this land of dunes is a perennial drought area with surface runoff drought, soil moisture drought, aquifer drought and meteorological drought. Through experience of ages the inhabitants here observe that in every period of 100 years 7 are of 'Akal' drought, 27 of 'Jamana' good agricultural yield, 3 of 'Gheesla' very severe drought and 63 years of 'Kara Kachcha' scarcity or below normal yield. Locally people start preparing for migration to commercial centers in search of livelihood if it does not rain till the day of 'Raakhi', a Hindu festival celebrated on the last day of 'Sawan', a period from mid July to mid August that is considered as monsoon month according to Hindu calendar, for that's the day the deadline for sowing monsoon crop is considered to be over.

Churu has a typical mechanically disintegrated, coarse desert soil with low water retention capacity, low nutritive content and a mean aridity of 80%. The soil has soluble salts that range from 500 to 10000 part per million. This desert landscape has been inhabited through the ages by man's endeavors and nature's regenerative capacities. The area has large sand dunes ringed by small dunes stabilized by cultivation or tenacious shrubs, weeds, grasses, cacti and creepers. The landscape is liberally dotted with 'Khejdi', *Prosopis cineraria*, a tree venerated by the locals as it provides food, fodder and fuel wood and is beneficially compatible with field crops. Land here is primarily owned by government who gives it on perpetual lease to individuals for farming & dwelling and to village Panchayats as common lands.



**Agriculture in this region is rain fed, subsistence oriented and highly labor intensive. It is concentrated in short cultivating season with low and uncertain productivity making farming virtually a gamble.**

Agriculture in this region is rain fed, subsistence oriented & highly labor intensive. It is concentrated in short cultivating season with low and uncertain productivity making farming virtually a gamble. In this rain fed mixed crop agrarian economy people are fully dependent on agriculture & livestock husbandry for livelihood. All castes are involved in cultivation & animal husbandry while some follow their traditional caste occupations as well. The region is industrially backward though craft based small scale cottage industries are functioning in some clusters. During continuous drought periods many people migrate to commercial centers in search of livelihood.

As per the census in 2001 the density of population in the area is 114 persons per square km with a literacy rate of 52% among men and 18% among women. There are people of all communities and castes living here though Jats, Rajputs & Meghwals are in large numbers. The region has a traditionally limiting and rigid patriarchal society governed by the laws of 'Manu', the codifier of ancient Hindu law. The rigid caste and communal distinctions breakdown during drought periods with all working collectively on various drought relief measures. The role of women is defined by their place within the socio economic system. Women in this society are, naturally, affected by the dominant ideology of the society wherein men socialize women into accepting a culture of domination thus making compliance a matter of accepted behavior and attitude. But this does not completely insulate women against an awareness of their subservient position. In villages of SCRIA's outreach this awareness among women is now slowly translating into an



agitational consciousness resulting in numerous local initiatives for the greater good of many.

Traditional social structures like joint family system, extended family 'panchayat' council and caste based councils govern the society. All scrupulously follows their unwritten laws. In the political arena too the strong patriarchal control over the political process effectively marginalizes the participation of women, though guaranteed in the statute books. Their participation in local decision making bodies like Panchayat & Gram Sabha is still negligible. In almost every sphere of life men take decisions affecting all.

Basic infrastructure like roads, public transportation, health centers, means of communication etc. are far and few. A "village" here usually comprises of 10 or more hamlets spread over an area of 20 or more sq. kms. The hamlets usually have their distinct cultural characteristics & are at some distance from the main village. The quality of life here is generally of frequent scarcities. As mentioned earlier, Bajra, pearl millet, is the staple cereal in the region, which is partaken with local legumes, potatoes, onion, chilies and milk or milk products. If it rains then leafy vegetables like spinach, fenugreek, carrots, radish, etc. are available locally and included in a family's diet. Women in the household traditionally eat only after men & children finish their meal. They usually have to make do with leftovers. Fruits, except for local varieties of berries & melons, are a rarity in household diet. The area though has a rich variety of medicinal plants.

The desert communities have strong traditional social values that are transmitted through generation to generation and are interwoven in the cultural systems. Even though the region has a very low literacy rate it is rich in native wisdom. Chuki Devi, of village Balera, is over 75 years old and is not familiar with mechanical timepieces but can tell exact time by just looking at the position of sun & length of shadows during daytime and by the position of stars at nighttime. And she is not the only one who can do so. People of this drought prone area are quite adept in accurately predicting condition of weather, rain, crop yields, etc. through a combination of indicators involving shape & size of moon, sun, placement of stars & planets in the night sky, wind direction and behavior of animals & plants. This native wisdom evolved through

***saawan mein suryo bhalo  
bhadure purvai  
asuja mein paschim chaale to  
santoon dhaan savaain***

during rainy month north  
easterly winds are good  
after which easterly  
in the next month if westerly  
blows then all seven crops  
will have a yield of one & a  
half times more than normal

**People in this drought prone area through generations of experience and observations are quite adept in accurately predicting condition of weather, rain, crop yields, etc. through a combination of indicators involving shape & size of moon, sun, placement of stars & planets in the night sky, wind direction and behavior of animals & plants.**



**‘Hanumaanji’ is the presiding deity of all water harvesting structures.**

Rain god in this region behaves like a very possessive miser who parts with his treasure of rain in very miserable quantities. Hence to please rain god his most ardent devotee Hanumaanji, is revered by local desert inhabitants.

generations of experience and observations is part of folklore. This wisdom has also made people resourceful in making the best use of their environment. In the absence of surface water resources and extremely constrained groundwater potential, both in terms of quality & recharge capacity, people in the region have evolved highly ingenious systems of harvesting rain to cope with the consumption needs of humans, animals and to some extent of vegetation. Historically people of Churu & Bikaner have met their water needs in the middle of desert by harvesting rain and have never ever, in the recorded history, evacuated a place because of water shortages. Water here is revered and accorded a status only second to god. And a very close second at that. Every water harvesting structure has a ‘devalya’ altar where the presiding deity is ‘Hanumaanji’. Among Muslim families some install a stone for ‘Samansa Pir’ a local water saint, while all offer prayers to Allah for keeping the structure full of water. Faith & a rational approach to deal with aridity have made Churu a region rich in water harvesting with systems not only for harvesting water but also for its judicious management.





***suraj kundala, chaand jhalera  
aathon pohra tore tiba,  
bhar de dheri***

when sun's halo is visible &  
moon's light is diffused then  
within twenty four hours rain  
will wash away dunes and  
leave standing water  
in the fields

## harvesting rain since antiquity

Once upon a time there was a sea here in place of a sandy desert. So claim many a popular folklores pointing to the presence of shells of sea organisms in the desert sands. There are no records to prove if there really ever was a sea here or when & how that sea turned into a desert. Once again only folklores tell about the cataclysmic change in the landscape. It is said that many millenniums ago demons attacked gods to capture a pot of nectar that had made gods immortal. During the battle this pot of nectar fell into the sea. To retrieve nectar gods decided to churn the sea. People living on the shore pleaded with gods not to do so as churning will turn their sea into desert and without water their lives and livelihoods will be adversely affected. At this Lord Krishna granted two boons to the affected communities. The first promised that no inhabitant of the region will ever die for want of water and the second blessed the people with wisdom that will help them to fulfill their water needs on their own. There are many variations to this story and their veracity cannot be tested. However the fact remains that among all the desert communities of the world the desert communities of western Rajasthan have a unique culture of water harvesting and in recorded history there is no mention ever of any inhabitant dying for want of water.

Rain is being harvested in India since antiquity. There is evidence of advanced water harvesting systems even from prehistoric times. Ancient texts, inscriptions, traditions and archaeological remains bear testimony to the fact. Great Indian epics like Ramayana & Mahabharata along with Vedas and texts from Buddhism and Jainism contain references to it. The political, economic & administrative treatise 'Arthshastra' by Kautilya, the chief advisor of India's first emperor Chandragupta Maurya in 321–297 BC, repeatedly mentions in detail about water harvesting systems and their management as per rainfall regimes, soil types and specific micro ecological concerns. Near western Rajasthan several reservoirs for collecting rainwater runoff have been found that date back to Indus valley civilization of 3000 BC. Elsewhere in India many hydraulic engineering marvels from the period before Christ have been found during archaeological excavations.

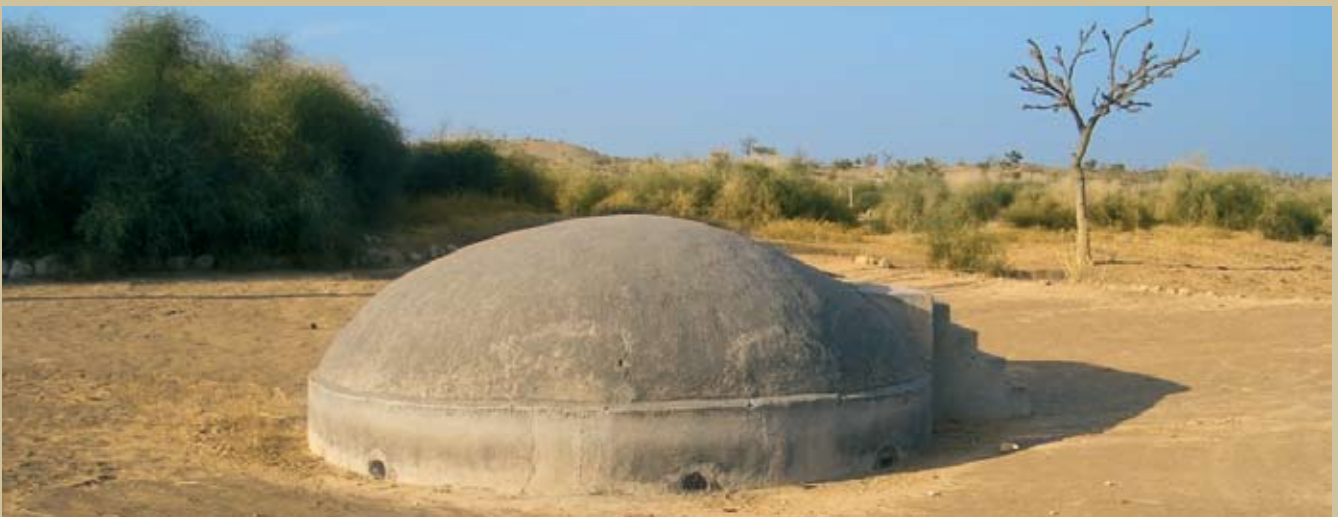
Of all the deserts in the world Thar is the most living desert throughout history. Rainwater has made it so. The desert communities here have coped with aridness since antiquity. With an indomitable spirit and a sense of purpose they have faced frequent famines and scarcities by evolving practices & values for harvesting rain, water usage, drought prediction, drought adjustment, land utilization and judicious use of available vegetation. The ethnogeological knowledge combined with ecological rationality of desert inhabitants have enabled them to keep competing pressures on its natural resource base within manageable limits and in maintaining continuous settlement in the region for more than 1300 years.

Fresh water, a highly scarce and precious resource, is venerated in desert. This reverence is part of folk tradition that celebrates rain and water. After a merciless summer when monsoon clouds come pouring down a new lease of life people through out the desert celebrate it with festivals, fairs, songs, dances & music. Numerous folk songs in the region center around clouds & rainwater alone. Such cultural beliefs have resulted in extraordinary richness and diversity of rain harvesting technologies, systems & judicious use of water over the centuries ensuring survival in an inhospitable terrain. Water harvesting and storage structures are sanctified and temples/ altars are built next to them as a constant reminder of their sacred contents.

Ground water in desert is classified as 'palar' surface water, 'rejwani' sub soil water from seepage or moisture in ground that is not very deep and 'pataal' ground water, usually found 200 to 800 feet below surface. Since ancient times palar and rejwani waters have been harvested in desert. Palar water is usually harvested in sandy tracts in the form of runoff during rainfall and stored in open or closed structures. Whereas rejwani water is harvested either near ponds or in areas where after 10 to 15 feet from surface the soil is hard and impermeable. Structures for rejwaani water are dug wells that are narrow and not very deep. They are locally called 'kui' or 'beri' and are likened to goose that lays a golden egg every day for water in them could be found long after pond or other surface water sources have dried. Traditionally the region of Churu & Bikaner, where highest summer temperatures are recorded year after year, has a rich history of water harvesting, conservation & usage. The most notable water systems from here are 'tanka' tanks and 'talai' ponds. In agriculture 'kanabundi' slope bunding & 'toya' square trenches were widely practiced to conserve moisture.

'Tankas' or 'kunds' are covered underground tanks in which people have being harvesting rainwater from rooftops or from a surrounding structured surface catchment area called "paitan" for hundreds of years. Kunds were primarily privately owned though rich businessmen & rulers of the land as part of their pious contribution built many public kunds for the community. Construction of water structure was also considered to be one of the seven meritorious acts a person was expected to perform during a lifetime. The generosity of a rich family was judged in terms of number of water harvesting bodies sponsored by them. The public kunds built by them in villages served poor in the community who did not have the means to build one for their use. Concerned communities also built public kunds in the villages collectively. Public kunds were constructed in places of religious significance, markets and on trade routes too. During the great famine of 1895–96 kunds were constructed in hundreds, which not only created assets for harvesting rainwater but also provided wage work to the population. Kunds of yesteryears were made of lime & stone with a domed top of 'phog' [*Calligonum polygonoides*] wood & sandstone. The paitan, catchment, was plastered with lime gravel. Kunds belonging to rich had





From far tanks or kunds of yore appear to be giant saucer with a Buddhist stupa like structure in the middle. This underground storage system for rainwater is people's "treasury in which sweet nector from heavens is stored" to quench thirst of humans & animals when other sources dry up. Top – kunda with a devalya; Middle – Twin kunda set, over flow from the main kunda was stored in the smaller kunda for livestock. The two kunds are connected through a channel; Bottom – a simple community kunda





ornamental decorations on them. The water stored in kunds remained fresh for years as being underground it was not exposed to extreme temperatures of the region. The use of lime softened the water by removing hardness, minerals, salts, gases & mineral acids present in water. The instances of water borne diseases, due to biological contamination, that were quite common in other harvesting structures, were remarkably less in kunds.

Talai is a local name for village pond located in natural surface depression with a catchment that received water from various directions. It is an ancient system for harnessing rainwater and predates kunds by centuries. Local communities heavily relied upon talais for human & livestock needs. In the sandy soil of Churu talais were usually structures with masonry work and were either square or round. Only in areas where land was hard with low porosity and the catchment had good water yield potential simple dug ponds or 'kuchcha' talais were made. Unlike kunds, talai suffered from heavy sedimentation, high evaporation & seepage losses. To counteract this talais were deepened in the middle to concentrate storage and for minimizing evaporation. The seepage was harvested through shallow wells dug alongside talais. The catchment was used as pasture that encouraged vegetative cover and reduced siltation. Regular desilting of talais was also carried out. Talais were located away from human settlement to avoid accumulation of 'unclean' water in the structure. Here too the extensive use of lime in construction or treatment of immediate catchment ensured freshness of water over long periods.

Local innovations for water harvesting are also evident in agriculture and regeneration of pastures. To increase moisture retention in sand dunes the technique of slope bunding called 'kanabundi' was used wherein small bunds sodded with vegetation criss cross the slopes. There is not much known about its origin or the evolutionary phase it went through but as Laxman Singh of village Ranasar says his family has practiced kanabundi for generations as all their agricultural land lies on dunes more than 70 feet high. Among the dunes in flat or slightly uneven land 'toyas' or 'chowkas', shallow square trenches, were made all over the field for improving moisture. During rainfall the runoff from the field along with nutrient rich soil deposits in these trenches. Silt was spread across the field while the water in the trenches provided moisture for a long period. Sattu Ram of

**In the sandy soil of Churu generally talais were structures with masonry work. In areas where land was hard with low porosity and the catchment had good water yield potential, simple dug ponds or 'kuchcha' talais were made.**





**Water exuded magical power that brought rich & poor of all castes and religions together. Social divisions in the society existed but in matters related to water all worked collectively.**

Seetsar village is one of the very few farmers who is still making toyas in his field. To use the available moisture optimally in this rain fed region farmers practiced mixed cropping which helped in tapping moisture at different levels of soil through a combination of long and shallow rooted crops.

The hold of water in the psyche of desert communities was such that identities were formed around it. Villages that had fresh water structures added the suffix 'sar' to their name to convey that the village had a 'sarovar' pond. The terms 'khari' salty or 'meethi' sweet were added as prefix or suffix to regular names of places indicating the quality of water available there. More often than not the place of a village in the local power structure too was determined as per the quality & quantity of water there. Families and communities that had technical skills required for water harvesting guarded their knowledge zealously and passed it on only to sons as daughters may pass the secret to their in laws.

Water exuded magical power that brought rich & poor of all castes and religions together. Social divisions in the society existed but in matters related to water all worked collectively. Every caste & community had skills required for harvesting and storing rain. 'Gajdhars' the master architects were from among both Hindus & Muslims. Diggers, iron smith, carpenters, basket weavers, masons, people who 'read the land' for its water harvesting & storage suitability, people who calculated the water pressure on the retaining walls in accordance with the size of structure and type of soil, unskilled laborers all worked alongside for creating water assets. This also helped in developing societal attitudes that fostered egalitarian access to water resources without compromising the frugality of its usage. People from all castes & communities had access to water. No one was refused water. The 'anga' unit, system for water distribution ensured rational distribution. This system calculated the share of a household on the basis of units. Every person in the household was 1 unit, 1 cow or camel too was counted as 1 unit while

10 goats or sheep were regarded as one unit. The anga unit was also used for determining monthly charge for harvesting well that was paid in cash or kind to the family responsible for it.

The spirit of inclusiveness fostered by water was also prominent in the community management of harvesting structures. Once a talai or kund was empty desilting work was carried out as a collective ritual on 'amavasya', new moon day. With the gathering of clouds in the sky a 'hamlo' work on war footing was organized for desilting, cleaning, replastering & repairing of structures & their catchment to receive the blessing from gods. Participation from every household in hamlo was mandatory. Nobody was paid for the work, as it was 'shramdaan', donation of labor. Regular desiltation of village ponds, especially unmortared ones, was part of the social fabric. Newly wed daughters in law desilted one 'tagari' a shallow bucket, silt every day till the birth of their first child. On festive occasions and certain auspicious days it was considered a religious duty to desilt ponds & kunds or clean catchment. Rules governing the usage of water were decided in consultation and without exception were binding on all. These were simple and easy to follow rules like total prohibition on defecating in catchment areas, ban on cattle or livestock grazing near catchment during rainy season, no entry in kund's catchment & structure with shoes, water from community kund, talai or wells to be carried only in pitchers as 'headload' and not by carts or any other mechanical means, etc..

The intensive involvement of people in all aspects of development and management of water systems enhanced communities' capacities and confidence to deal with aridness while ensuring a great degree of accountability in all community works. In this region rulers in different times of history never intervened in the established processes unless it was to assist the efforts. The extremely self reliant, decentralized and inclusive management processes of water harvesting & its supply ensured its continuous success over centuries.

***ghee dul jaye to kuch na jaye  
paani dule to jee jale***

it's ok if butter oil spills but my  
heart burns when water spills

Till today in the households of Bigha, Ramsarai & other villages of Sri Dungargarh Panchayat Samiti, spilling of water invites a sharp rebuke while that of milk or ghee, butter oil, is often looked over.

Furthermore, in many more villages making optimum use of water, kids are bathed on rope woven cots and the used bath water is then utilized either for livestock's drink, cleaning house or construction work.





## ignored legacy

Through ages villages in the region were like little republics self governing their water resources. The kings financed big structures and as they did not have public works department or an army of engineers they encouraged local people to construct & maintain water systems. During British rule the colonial rulers established centralized systems of administration and state ownership of commons in most parts of the country but this did not affect the desert region. Here the village communities continued to play an important & crucial role in the management of their water and other common natural assets.

Post independence profound changes came that had no place or respect for communities' role in development processes or in native knowledge systems that were evolved through centuries of experience and observation. The new system put a spanner on centuries old sacred relationship people had with water.

Profound changes in the state of affairs came post independence with the state becoming universal landlord by staking ownership of all commons and natural resources. The introduction of centralized structure of administration that bypassed traditional village leadership and completely excluded common citizen rounded off the transformation. All this centralization led to centralized planning for all development initiatives. The government claimed that this would speed up the development process while ensuring regional parity. In a country with 15 ecological regions one standard plan was designed to be applied uniformly all over the country and technocrats confident in 'modern technologies' were put in charge. This new way of doing things had no place or respect for communities' role in development processes or in native knowledge systems that were evolved through centuries of experience & observation. The inherent inflexibility in the new system distanced and discouraged communities from responding to any local crisis and penalties were imposed on people if they so much as tried to fix a broken down facility. A spanner was thus put on centuries old community life, unity and sustainable systems and on the sacred relationship people had with water.

After taking ownership of all commons and natural resources government redistributed it among its various departments. The new political masters and their administrative executors, in their own wisdom, embarked on bringing water in the region from the perennial Himalayan rivers through an irrational and ecologically destructive mega project of Rajasthan canal costing public 8 billion rupees. Decades later and after enormous waste of public money, few years back few villages

in the district received water from this ambitious project. Meanwhile many other villages in the district were brought under the ambit of tap water scheme that tapped ground water through deep bore wells and supplied it in the villages through pipelines. The advent of piped water supply signaled the decline of traditional water harvesting systems. The centuries old reliable and sustainable tradition of water was abandoned in favor of a convenient water system planned and managed by outsiders. Kunds and talais lost their appeal among people and these fell into total neglect, disrepair & disuse. After sometime people stopped caring for agriculture based rain harvesting processes too and in the lean season depended on government handouts.



The piped water supply scheme, an instant favorite among people, is totally dependent on erratic electricity supply and local politics while its maintenance is entrusted upon different line departments who have no visibly demonstrable coordination among them.

The piped water supply scheme, an instant favorite among people, is totally dependent on erratic electricity supply and local politics while its maintenance is entrusted upon different line departments who have no visibly demonstrable coordination among them. This coupled with rampant corruption, indifferent attitude of officials and nearly nil accountability has resulted in an extremely inefficient infrastructure & supply mechanism that governs public water system. This overtly centralized 'modern' water system does not even take care of people's basic water needs. The regularly irregular supply of water is at times in the middle of night or in some places the supplied water is so saline that while making tea with it when milk is added it curdles. This scheme's total reliance on groundwater has further compounded the regional problem of water availability & its usage. Most of the deep bore wells here are located below the existing rejawani water wells, a largely reliable source of water in the village, thus rendering these water wells out of service and reach of people. Prolonged droughts coupled with increased demand & less sagacious use of water has led to over exploitation of ground water. In more than 30 villages like Bhichri, Charla, Chaaranwaasi, Ghantail bore wells have gone dry while in some like Kodasar Bidawtaan, Aabsar, Alsar, Biraniya, Randhisar people have fiercely refused to share their ground water with other villages. Perverse incentives in the form of subsidies and other short term measures by various government bodies encourage people to sink deep bore wells for irrigation. This has furthered the unabated ground water exploitation in the district, which is a declared 'black zone' by Central Ground Water Authority.

The lack of integrated approach to development of water resources

by government in the region is characterized by its water resource management that is more exploitative than conservationist and ridden with inherent contradictions. And all this is despite heavy investments of taxpayers' money in developing water resources. Water supply planners systematically ignored the simple indigenous low cost sustainable community managed systems that sustained the desert communities for centuries in favor of expensive, unsustainable and ecologically destructive short term solutions which over a short period of 40 years have done more harm than good. The Hanumantha Rao Committee Report of 1994 on drought clearly states that the Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP) have, contrary to the expected benefits, done more damage. In Churu the unsustainable schemes of piped water supply and canal has caused dependency syndrome among self reliant people, turned water judicious people into imprudent water users & managers, led to community conflicts over water sharing and created the problem of waste water leading to malaria epidemics, both hitherto unknown in the region. Furthermore the failure of these water plans has created a crisis of confidence between people and the state. The government cannot cope with the responsibilities but has extreme reluctance in decentralizing 'control'. Its departments are not yet convinced about participatory management so people's meaningful participation remains conspicuous by its absence either in the preparation of plans or in their implementation.

In its zeal for course correction, a few years back government initiated the process of reviving traditional water structures through its drought relief programs and annually provided funds for desilting talais and kunds. This program too met the same fate as most other government promoted public funded schemes. Once again due to sheer lack of imagination on the part of government & its planners a program ended up destroying a timeless tradition, this time it was one regarding community participation through contribution in cash, kind or labor. Had the planners, in consultation with communities, provided a one time – need based support with the proviso that community maintains the revived structure from then on, the results would have been certainly different.



**In the region government's water resource management is more exploitative than conservationist and ridden with inherent contradictions.**



## reviving legacy & wisdom

In the absence of a centralized plan for sustainable supply of fresh water once again the way to water security in desert is through 'catch water where it falls'. Traditional surface water harnessing systems for harvesting rain are the only viable and low cost options for desert communities who in the past, through their ingenuity had evolved ecologically sound cultural patterns to fulfill their basic needs from a precarious natural resource base. Each water harvesting system here is a definite system. People have a clear concept of the respective system, its process of water harvesting, selection of area, preparation of catchment, ground rules governing it & its uniqueness from other systems.

In the villages of Churu & Bikaner districts SCRIA, since 1997, has been encouraging people to embrace their traditional rain harvesting processes for fresh water. SCRIA is actively engaged in the revival of water practices by building upon indigenous knowledge systems. Planning interventions based on folk knowledge has never been easy as the seemingly simple indigenous systems have actually evolved from and are embedded in the local socio cultural environment which has provided inherent support for it to work. Also there is always a temptation to simplify such technologies, which often is a cause for them to lose some of its intrinsic values. Conscious of all this, SCRIA is involved in rejuvenating the whole process of harvesting rain that includes working with communities for the revival of technology along with community management systems. SCRIA works on the principal that where conditions for revival and restoration exist they must be revived with attention on appropriate social cultural relevance. Knowledge base of local communities must be utilized for no 'expert' can match that. And with every passing day the urgency for securing the local knowledge base is increasing as folk knowledge once eroded may be almost impossible to reconstruct and erosion of knowledge was never so rapid as in our generation due to declining inter generational communication.

In the villages, as the crisis grows, people fed up with an unreliable & erratic water supply are once again showing a desire to maintain their water systems and village commons. In an extremely patriarchal set up where women are not given any sincere opportunity to manage and maintain their natural resources SCRIA exclusively involves women in its mission of empowering village communities for sustainable management of water. In the outreach villages women groups are facilitated and it is with them that water harvesting systems and commons like tanka or kund tanks, talai ponds, field bunding & pastures are being developed, all aspects of which are managed by women groups.

### tanka

Locally tanka is also known as kund or kundi, depending on the size. They litter the landscape of Churu and can be found everywhere from temples, homes, schools, fields, common land, fortresses, bus stands, rail crossings, public rest houses to juxtaposing with dish antennas in residential areas of





Among households with limited space mortared roof surface of building is utilized as catchment.

villages. These covered and underground traditional rain harvesting structures with structured catchment surface have a history of hundreds of years and are unique to Churu district. Constructed on private or common lands they are an integral part of the desert society providing fresh water not only for humans but for livestock too. The desert community reveres kunds as sacred. Every structure has a small "Devaalya" altar where usually Hanumaanji is the presiding deity. Some muslim families erect a stone for Samansa Pir, a local saint for water.

Tankas or kunds vary in size with water holding capacity ranging from 10,000 liters to 150,000 liters. There are kunds that store more than 600,000 liters of water also but such structures are very few. SCRIA facilitates family kunds with water holding capacity of 10,000 to 35000 liters and community kunds of upto 150,000 liters. Family kunds are built in private land at homestead or farms while community kunds are in public land in schools, community centers, village commons or in private land officially donated to village Panchayat for community use. These structures are built in relatively flat lands after the soil is cleared of vegetation. A tanka consists of a structured catchment and an underground tank. The catchment is known as paitan and is usually a square or rectangular platform with a 3% to 4% gradient towards the tank. The platform surface is treated with ash, crushed stone and cement mortar. The tank is built underground either in the center of the paitan or in one corner. It is cylindrical in shape, round bottomed and its roof is at least 2 feet above the level of paitan. Traditionally tank's roof is dome shaped but as the material & skill for it is not easily available at reasonable cost the tanks of today have flat roof. Rainwater from paitan enters tank directly through inlet holes in the tank. Among households with limited space mortared roof surface of building is utilized as catchment. Even though cleanliness in catchment is maintained its not always feasible to stop silt and other debris going in the tank along with rain water. To tackle this SCRIA introduced silt/ debri catchers on paitan for filtering water before it entered the tank. The twin pit silt/ debri catchers are constructed on paitan next to every inlet in the tank and are filled with pebble and charcoal. Filters pits are also used for tanks with roof catchment. These filter pits, to a large extent, have helped in preventing the accumulation of organic & inorganic matter in the tank. Traditionally people use a bucket tied to a rope for taking water out of tankas but SCRIA has been encouraging families and



Contrary to the perception of some development experts that the poor cannot benefit from contribution related activities, as they cannot afford to contribute, the very poor women in SCRIA's outreach villages have shown otherwise. All members of SCRIA facilitated women groups have an annual income of less than Rs.25,000 yet they willingly contribute more than 50% in initiatives like family tankas that benefit individual families!

Going a step further, women groups of village Kadiyan recently proposed that they be provided with interest free loans for constructing tankas so that many more families could be water secure year after year. Kadiyan village has severe water problem and the only water available is extremely saline and comes from a far off village. As there is no alternate they use this saline water for drinking. In the past five years, out of 77 members of six women groups here, only 25 members could avail of grant fund for tankas from SCRIA, due to paucity of available funds, though all members are in need of a tanka. Hence the groups proposed for loan based support.

Kadiyan's women groups are not the only people who are proposing this paradigm shift in development work, in all the villages of SCRIA's outreach group members are willing to adopt tankas through credit support so as to be water secure.



communities to install small hand pumps for water lifting as hand pumps offer a 'cleaner' alternate.

Tankas of yore were constructed mainly from lime stone, stone – ash mortar and phog wood. But today as most of this is not available easily or cheaply SCRIA is promoting a less expensive model made of cement, bricks & stones in a bid to revive the system. Cement does not have water purification properties that lime has so SCRIA promotes coating of inner walls of tank with lime wash along with placing of a pot full of lime at the bottom of tank. As mentioned earlier the use of lime softens the water by removing hardness, minerals, salts, gases & mineral acids present in it. The process of construction is a very meticulous and time bound affair and is very much dependent on the soil type at the place of construction. In Churu district as the soil is sandy and very loose more often than not the construction of inner wall of tank is done from top to bottom along with the digging work. Constructing a tanka of 20,000 liters capacity takes 18 to 20 days and at today's cost Rs.32,000. As the size of tanka increases its per liter construction cost reduces.



**SCRIA tried constructing a tanka using traditional skill and material. As limestone & phog wood, the most widely used material in traditional tankas, was not available SCRIA used cement mixed with lime for plastering the retaining walls and concrete mix for roof. In spite of substituting material it took a month longer and costed 25% more as compared to time & cost for a normal tanka of today!**

In many villages there are extremely good quality old tankas made of limestone that are in a state of utter neglect, disrepair and disuse. Some of these are community structures and some belong to individual families. For the past few years upon the request of concerned women groups SCRIA have been undertaking renovation work on some of these.

In more than 150 villages of SCRIA's outreach in Churu district tanka kunds are conveniently providing clean & sweet rainwater for drinking to people and their livestock for a period of more than three months in a year. Every time a tanka is filled with rainwater a family saves at least Rs.1900 on refill. This cost is steadily going up along with the inflation! As such at current prices a family saves at least Rs.7,600 a year on refill. Apart from this every family also saves up to 30 labor days on account of water fetching which could be utilized in some other gainful wage employment. Once the rainwater is over people fill these tanks with water sourced from other sources like big ponds, government supply or private bore wells.



## talai

Toba, pagbaav, pokhar, nadi, nada, johad, johda, johadi, sarovar, sagar, talab, talai are some of the several names by which desert society has been calling ponds since antiquity. The names reflect essential characteristics like type, size & water storage capacity of a pond. In the mainly sandy tract of Churu the talai version of pond is most popular though wherever a large plot of hard land is available in an area with natural depression johad or johda is made. Johads are simple dug ponds that are bigger & deeper than talais. Most talais here are stone pitched with masonry work on embankment and floor to prevent water seepage into the ground. Such talais are known as pucca talais. In this region where water table is very very low and salty, pucca talais are a boon. In areas where the soil is rocky, non porous and the catchment is small talais without stone or masonry work are made. These are called kutcha talais. Both talais and johads are community owned open water harvesting and storage structures that meet domestic & livestock water needs of desert communities. One or the other can be found in nearly every village. They are usually situated away from villages or human habitation so that its catchment remains clean. Like other water structures talais & johads too enjoy a sacred status and nearly all have an altar or a small temple close by, dedicated to Hanumaanji or Gaaj Mata, goddess of lightening & thunder.

SCRIA since 1996 has been facilitating desilting, repair and renovation work on talais, both water storage structure and the catchment. The focus is on mortared talais though construction, deepening or repair work on kutcha talais is also taken up. The mortared talais in the area are either perfect square or round in shape with an average water holding capacity of 3 million liters. Most of these talais are 100 to 40 years old and are made of lime & bricks with crushed stones & ash mortar. All talais slope towards the middle, which is also its deepest part. Floor of a talai is usually stepped to concentrate storage in the middle and minimize evaporation. In the exact middle of every talai approximately one square foot of area is always left unplastered so that water touches the earth. Locally people believe that when water touches earth, the earth it purifies it for use by all living creatures though for livestock troughs are made next to the talai.







Village communities in the region give preference to the restoration of mortared talais as these can be used immediately once repair work is over. In the case of unmortared talais of desert after renovation it takes at least three years of average rainfall to 'treat' its bed for holding water for longer duration. This does not mean that the rainwater gets wasted for three years or so for almost all unmortared talais and johads have small shallow wells next to them to trap ground seepage from the storage structure. This seepage is available long after the pond dries up. These wells provide 'filtered' water for human consumption as unlike mortared talais animals are allowed inside these ponds.



In the region every talai in use has a catchment area of at least 8 hectares. The immediate catchment area is usually treated with stone gravel while in the rest vegetation helps in checking siltation though it does not stop it altogether. Like tankas talais too have inlet holes for collecting runoff rainwater from catchment. Wherever the catchment is very sandy, velocity of water is high or gullies are channeling water in the pond SCRIA encourages communities to add silt catchers, gully plugs and stone bunds in the system. In large unmortared structures spillways for overflow are made and vegetative sodding on retaining bunds is done.

**In many villages potters and brick makers annually take permission from village Panchayats to desilt ponds. They use the silt for their trade.**

Over the years SCRIA has assisted communities in converting few unmortared talais into johads and one into a sagar. The sagar, with a storage capacity of 15 million liters, is in Balera village and is 200 feet wide, 250 feet long and 14 feet deep with a catchment of more than 150 hectares. The overflow from the sagar goes into talais downstream. This sagar has a 'lakhera' island in it to reduce the pressure of water waves on the retaining bunds. The term lakhera evolved during the late 19th century when the cost of making a pond requiring one small island was around 1 lakh [100,000] Rupees. Hence a pond was named as one lakhera if it had one island, two lakhera if it had two islands and so forth with the cost of pond becoming synonymous with its size. Now a days it costs many more lakhs to build a single island pond but the term lakhera remains.

## kanabundi

In the land of sand dunes the concept & practice of slope bunding,





It all started with them.  
Women Sangathan of village  
Bapeu pioneered Kanabundi's  
revival.

locally known as kanabundi - literally binding of particles, is very old & quite unique. In a region where agriculture is precariously placed due to geophysical conditions kanabundi provided succor by ensuring minimum yield even during years of scarcity. Till early 1990's a handful of families practiced kanabundi but like other traditional practices this labor-intensive practice too was discarded. SCRIA while working for the revival of traditional rain harvesting systems learnt about it from some elderly farmers who recalled following it during their youth. After extensive inquiry in the region SCRIA's team pieced together the technique and its modalities. In 2004 the organization motivated eight families from village Bapeu who had their fields on medium to steep dunes to try it out. The results were amazing. All reported an increase in yield of 400% and above!! And this was when the concerned families otherwise had followed their usual farming practices. Since then SCRIA has been very actively promoting the practice of slope bunding in the district but now with emphasis also on mixed farming, proper seed selection, seed treatment, weed management and use of bio pesticides & properly composted organic waste as manure. For motivating farmers to adopt kanabundi SCRIA organizes campaigns, organizes visits to villages where farmers are practicing it and provides technical & financial support to outreach farming families.



Widely available dry 'Sendia'  
Leptedenia Pyrotechnica, a small  
grass bush, is used for sodding  
bunds in Kanabundi. This grass  
has a high nutritive value and is  
considered quite enriching for  
the soil though it is not used for  
fodder.

Kanabundi helps in making shifting dunes stable and fertile for agriculture by checking rainwater runoff, conserving moisture for a longer period and by preventing erosion of topsoil due to high velocity winds. As the winds in Thar desert blow from west, the bunds are made in north south direction on a slope. These bunds are hence not always across the slope. In kanabundi bunds are not more than one foot in height and are sodded with locally available dried small grass bushes that are not used as fodder or for fuel. The most widely used grass bushes are Leptedenia Pyrotechnica and Crotolaria Burhia. These grasses are considered quite enriching for the soil as they have a high nutritive value. The grasses are sodded upside down with their roots in the air and stems buried in the bund. This is done so that these grasses do not take root in the field for their main purpose is to anchor the bund and provide nutritive organic mulch manure to the field. Depending upon the steepness of the dune bunds are made 10 to 20 feet apart. They are usually made in a linear pattern at an angle of 90 degree. In very steep dunes some farmers make bunds in chequered form also that looks like a gigantic chess board from afar.







Bhanwari of Soniyasar Shivdaan village tells that before she did Kanabundi the yield from her 1 hectare field was 50 kgs of pearl millet and 25 kgs of moth legume. In 2004 when for the first time she did Kanabundi in her field the yield was 300 kgs of millet & 200 kgs of moth with matching increase in fodder!! Since then she has been slope bunding her field every year and has also added livestock heads.

The manifold increase in food security, both for humans and livestock, has prompted more than 2000 families to adopt Kanabundi, some with support from SCRIA and some on their own after seeing the results in their neighbors' fields.



In 2005 Kaali of village Rajeru had a yield of nearly 400 kgs of pearl millet & 100 kgs of other legumes from a field that had been a "wasteland" for more than 50 years! Her field is a high sand dune and the family never had any crop there. But with the help of Kanabundi for the first time in her living memory they had a bumper crop in their field. The news of crop in Kaali's field after years attracted many people from within & outside the village.

Kanabundi is a yearly process that needs to be repeated year after year as within one cultivation season the grass rots and the bund disintegrates. Every year the bunds are made in a new area in the field to ensure that within a span of 4 to 5 years the whole field benefits from good organic mulch manure. Results from more than fifty villages in the district show that kanabundi increases yield from 250% to over 400%. Santra of Loonch village says that a 10 bigha field without kanabundi & a 4 bigha field with kanabundi gives same amount of yield. To reconfirm the yield results, in two villages with two farming families controlled demos were carried out in adjoining fields of approximately the same size and topography. The two villages were Sajansar and Khaari Chaabri and the fields belonged to Nathu Kanwar & Kamla respectively. In both villages, in one field slope bunding was done while the other field was left plain. Pearl millet was grown in all the four fields that were cultivated as per the usual practice in the area. During the period of experiment the area had 77mm of rainfall. The result showed that in slope banded fields the pearl millet yield was 400 kgs per hectare whereas in the non slope banded fields it was less than 50 kgs!

Inspite of the over whelming increase in yield experienced by most farmers who treated their fields with kanabundi there are around 4% farmers who had zero to negligible increase in yield.

After much investigation farmers and SCRIA's team is convinced that kanabundi works only in sloping land and does not yield results in flat land or in lands that are at the bottom of a dune. Moreover kanabundi must be done by February as it is not very effective if it is done in March & April after sand storms start blowing. Kanabundi also does not work if bunds are not made in north south direction or vegetative sodding is done improperly. For definite results ground rules governing kanabundi must be followed properly as kanabundi is a definite system.

## chowkabundi

In desert livestock farming surpasses crop farming. Livestock here is the mainstay of rural economy and during periods of stress it is livestock that sustains the household. Livestock also gives much more stable income than agriculture. Extensive common pastures and fallow fields ensure the survival of livestock by providing grass, shrubs, bushes, leguminous herbs and tree leaves for grazing. Village common pastureland is called



Inputs in 1 ha without Kanabundi	Cost in Rs.
Kanabundi	-
Ploughing	900
Seeds ('Bajri' Pearl millet, 'Moth' Legume)	420
Fertilizer	1000
Harvesting	2000
Threshing	500
Total input cost	4820

Output	Qty in Kgs	Cost
Grain		
'Bajri' Pearl millet	200	1600
'Moth' Legume	200	4000
Fodder		
'Bajri' Pearl millet	1200	3000
'Moth' Legume	800	4000
		12600



Inputs in 1 ha with Kanabundi	Cost in Rs.
Kanabundi	1000
Ploughing	1000
Seeds ('Bajri' Pearl millet, 'Moth' Legume)	420
Fertilizer	500
Harvesting	2200
Threshing	1500
Total input cost	6620

Output	Qty in Kgs	Cost
Grain		
'Bajri' Pearl millet	800	6400
'Moth' Legume	400	8000
Fodder		
'Bajri' Pearl millet	3200	8000
'Moth' Legume	1200	6000
		28400

**Cost benefit detail in a one  
hectare field without Kanabundi  
and with Kanabundi**





'Taal' and is zealously protected by the community from any form of encroachment or damage to trees and perennial vegetation. In Churu every village has taal though the size varies from 15 hectares to 100+ hectares. During rainy season taals get covered with diverse vegetation belonging to as many as 430 species. Plants here are deep rooted and tenacious, able to withstand extended droughts and gain sufficient biomass rapidly even when rainfall is well below normal. Most of the vegetation is edible, fairly nutritious and rich in minerals. The multi-tiered growth of shrubs, grasses, creepers, bushes along with trees, [mostly *Acacia nilotica* and *Prosopis cineraria*] gives land the carrying capacity for grazing of all types of livestock. Thar desert has some of the best breeds of livestock in the country that produces nearly 50% of the wool in the country.

Since ancient times taals are used by one and all in the village for grazing. Till 40 years back village communities efficiently managed the balance between regeneration and grazing in taals. To prevent overgrazing of taals a blanket ban on grazing was enforced from the time of harvesting of crops till the ploughing of fields. During this period all livestock owners were required to graze their cattle in their personal fields. All landless families without fail were allocated fields for grazing by those who had land in plentiful. Moreover the number of livestock in a village too was kept in proportion of 8 goats/ sheep or 1 camel/ cow=1 hectare of grazing land. The unprecedented social breakdown in society witnessed in the past few decades has adversely affected most community based social management systems including the management of taal. Without social restraints in place in most villages taals have been overgrazed and rendered barren. Yet, livestock represents economic security for the majority in villages.

Looking for ways to rehabilitate taal SCRIA adopted various pasture land development approaches that were being practiced in the country but due to extreme aridity and peculiar geophysical conditions nothing worked. In 2005 while on a study tour in central Rajasthan SCRIA's team in a village called Laporiya, witnessed amazing results of community efforts in developing pastureland. The community there had combined and improvised the two traditional systems of toya, shallow square trenches, and bunding for harvesting rainwater in small trenches & channeling the surplus throughout the pasture to aid vegetative regeneration. They called it chowka bundi - literally square trench bunding. Within a span of three years the results were amazing. A totally rundown village common was bursting with vegetation and that too when grazing was never banned like in other 'standard' pasture development procedures. Impressed and motivated with chowka bundi SCRIA's team shared the experience with women groups' federation. Many sangathans immediately volunteered to experiment with the process, as people in Churu are familiar with toya and bunding. Initially SCRIA facilitated chowka bundi work for rehabilitation of pastures in two villages, Rajeru and Khaari Chaabri.

The process of chowka bundi requires extensive understanding of the topography & water flow pattern of concerned taal. It also requires detail planning prior to the commencement of work on ground. The system of chowka bundi involves making numerous 'chowkas' bundled squares, of 10 to 12 feet in the area earmarked for restoration. In between these bundled squares one-foot deep shallow square pit trenches are dug to collect rainwater. The squares are bundled from three sides only with one side left open for



In chowka bundi during the rehabilitation of pasture grazing of livestock is not banned as every time a sheep or goat or other cattle grazes in 'taal' pasture it leaves behind droppings which provide 'treated seeds' and nutrition to barren pastures.

receiving water runoff from higher ground. The bunds are not more than 2 feet high for the purpose of bunding is to check water runoff, control its velocity, arrest soil erosion and to collect enough water to provide at least 1 foot of percolation so that moisture in soil remains long enough to allow regeneration of grass and other vegetation. Topographically the bundled squares are placed such that water flows into them and the overflow from one chowka goes into another and ultimately flows into a talai.

The placement of chowkas, the height of bunds and the depth of pits is kept animal friendly. One of the most livestock and community friendly feature of chowka bundi is its grounding in the principle of mutually supporting cycle whereby during the period of regeneration grazing of livestock is not banned as every time a sheep or goat or other cattle grazes in taal it also leaves droppings behind which provides 'treated seeds' and nutrition to barren pastures. The chowkas provide critical moisture and in Churu even a little moisture does the trick. The droppings with seeds germinate into weeds, shrubs, grass, etc. which in turn sustain sheep, goat and other cattle. Thus nature's mutually supporting cycle goes on.

Through chowka bundi regeneration of depleted pastures of Churu is a possibility though it will take time and sustained efforts. In the past three years SCRIA has assisted communities in five villages in restoring more than 175 hectares of pasture through chowka bundi and the results are encouraging. Along with the physical restoration of pastures SCRIA also works with communities on the issue of maintaining a balance between regeneration capacity of pastures and its carrying capacity in terms of number of livestock it can support without once again wearing out completely.

Chowka bundi through prudent management of rainwater does not only restore pastures but also rejuvenates the local ecological system involving flora, fauna and micro organisms.

## social management

The ecological rationality of desert inhabitants enabled them to not only create various techniques for harvesting rain but also to evolve social systems for its management. Centuries of experience





Whether they belong to a ten-year-old women's group or a five-month-old group, women from the villages of Churu are proving to be excellent initiators and managers of community rainwater systems. The 39 members of three women groups, all 10 months old, in village Champawaasi have once again proved this by undertaking the rehabilitation of 2 village ponds that were in a state of utter neglect, disrepair and disuse for more than 30 years, while the village was reeling under acute shortage of potable water. These women, from various caste and communities in the village, not only organized themselves for undertaking desilting & extensive repair work on two ponds but also mobilized all village residents to contribute in cash and kind for the purpose, while braving constant ridicule from men. Due to the grit, determination and resolve of these women, today the village has its own water source for drinking and its own management for maintenance.



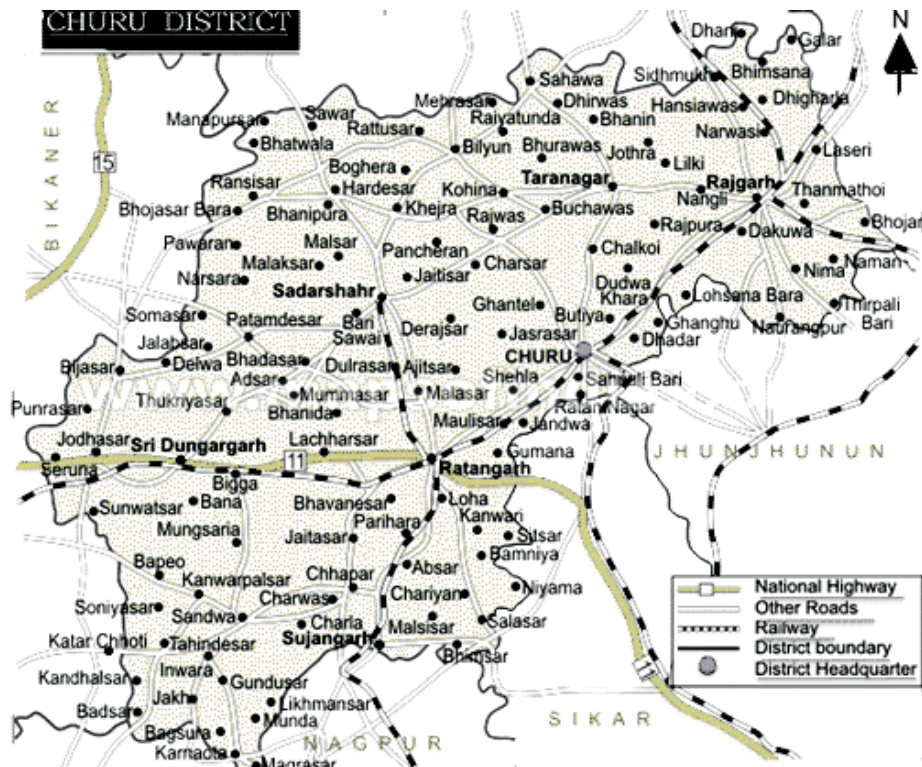
In an extremely limiting patriarchal society where women have been forever within the homesteads, their sitting together with men in the village chaupal, common meeting place, is unthinkable and any such thoughts are considered as blasphemous BUT in SCRIA's outreach villages women holding discussion with men in chaupal is a common occurrence!

proves that the intensive involvement of people in all aspects of development and management of water systems made it cost effective and ecologically sustainable while enhancing communities' capacities and confidence to deal with aridness. The extremely self reliant, decentralized and inclusive management processes of water harvesting & its supply had ensured its continuous success over centuries. Taking lesson from this SCRIA since 1987 has been striving for strengthening people's technologies and institutions. To bring qualitative and quantitative improvement in the current status of water inclusive management is necessary and for that people must transform from being passive recipients to initiators and managers of water systems. For this purpose SCRIA facilitates the process of women and men, belonging to different caste and communities, organizing themselves into groups. These citizens' groups then act as initiators of local initiatives. In all initiatives supported by SCRIA the groups, especially women groups, participate in problem identification, needs assessment, action plan formulation, selection of beneficiaries, implementation and monitoring evaluation. Citizen groups are intrinsically involved in construction management including material purchase, labor management, quality control & financial management of grant and contribution.

Sustainability, community's commitment and ownership in rain harvesting initiatives are further fortified by cost sharing, which also leads to accountability and probity in public work. Community participation through contribution in cash, kind or labor is a timeless tradition of desert and SCRIA is once again promoting it in the outreach community. 'Chanda' donation and 'shramdaan' voluntary labor are integral to all works supported by the organization as it does not provide 100% cost of activities upto 50% of the cost



## SCRIA facilitated rainwater initiatives



- Villages of outreach - 735
- Villages of intensive involvement - 297
- Outreach families in various rain harvesting initiatives - <5000
- Non-outreach families adopting SCRIA promoted various rain harvesting initiatives - <1000
- Village Panchayats adopting social management systems promoted by SCRIA - 6
- Talai pond construction and rehabilitation – 132 in 82 villages with a total water harvesting capacity of 400 million liters
- Tanka tank construction, repair & renovation – 967 in 106 villages
  - Large community size - 37 tankas with a total water harvesting capacity of 2.6 million liters
  - Small family size - 930 tankas with a total water harvesting capacity of 14 million liters
- Kanabundi in 1600 hac of agriculture land in 28 villages
- Chowkabundi in 145 hac of pastureland in 6 villages
- 'Rakhrakhav kosh' water asset management fund in 45 villages
- Traditional management systems in 55 villages
- Development of 4 eco zones





In village Sanwatiya, after the revival of village talai, when rich families started to carry water from talai through water tankers women groups protested and forced village Panchayat to reintroduce a traditional water management practice whereby people are allowed to take water from community systems only through head load. This way all take water only as per their need.

is mobilized as contribution from the concerned community in cash or kind. For effective post program management of the developed water systems women groups manage a village level maintenance fund known as Sampada Prakritik Kosh. Fund for Kosh is raised through donations from the village. Women groups also have the overall responsibility for managing the developed assets which they do so with the help of village residents and Panchayat. During annual maintenance nearly all from village participate. SCRIA lends technical & management support when required whereas a huge group of volunteers, both women and men, young and old, wholeheartedly participate in campaigns and events promoting traditional rain harvesting practices .

Community managed systems for water security bring unity and cohesion in community life, while ensuring a great degree of accountability in all community works. Social audit is encouraged in all water work supported by SCRIA. For every structure constructed or renovated concerned citizens' groups maintain a village level record called 'Transparency File' that contains work proposal, construction plans, total cost involved, details of grant amount & community contribution, copies of muster rolls, etc.. Groups also present these details during Gram Sabha.

SCRIA's effort to create an enabling environment for an effective and sustainable management of water resources also includes reintroduction of values related to judicious use of water. Communities are encouraged to revive and readopt the traditional equitable distribution and prudent usage practices whereby everybody, irrespective of their caste, got water as per their need.

## effects

People, once again are increasingly realizing the benefits of self reliant and sustainable traditional water systems over centralized public schemes that promise convenience and ease but do not deliver. The communities in desert are readopting their abandoned water wisdom. The experience of revival has boosted their morale, confidence and their innate belief in themselves. The tangible results of SCRIA's efforts to revive water legacy are visible and experienced daily in the outreach villages in terms of community capacities and availability of water. Desert inhabitants are transforming from being passive recipients to active managers, creating water systems and demanding efficiency from the established public systems. The once again discovered sense of ownership has led to citizens' groups demanding better service from public facilities, community ownership of common property and equitable utilization of common resources. When public services, like water supply, don't function as they should, public functionaries do not carry out their responsibilities responsibly, benefits - schemes meant for public do not reach public, there is inequitable distribution of resources and services, common resources are exploited to benefit few, community ownership is usurped by the unscrupulous, the groups protest and initiate action for justice. They also do not hesitate to raise their voice through protest demonstrations or give memorandum for action to district officials or hold press conference or get pertinent facts through Right to Information Act.

The enhanced village level organizational capacities of citizens' groups has also led to many successful grass root initiatives for revival of rain harvesting practices, as described in earlier part of this book. In villages where tankas are constructed and talais have been restored the availability of fresh water has increased by more than five months and this too when per village only a limited number of structures have been facilitated by SCRIA. The ease in water availability saves lots of time and effort which people use for other productive work. Level of food security among outreach families too has increased manifold as yields have increased three to eight times through chowka bundi in dune fields even when rainfall has been very much less than normal. The revival of pastures is discernible in the vegetative regeneration taking place



The once again discovered sense of ownership has led to citizens' groups initiating local action for better service from public facilities, community ownership of common property and equitable utilization of common resources.



there. The ease in availability of water and fodder has enabled many a marginal farming families to increase their flock of livestock thereby fortifying their economic security further.



A very perceptible and desirable consequence of SCRIA's efforts in the revival of a timeless tradition is the center stage role of women in it. In this extremely limiting patriarchal society where women have been forever relegated within the homesteads their involvement in community issues was unthinkable and any such thoughts were considered as blasphemous. But as true social change cannot be expected to take place with the participation of only half the population SCRIA has always included women in all its development initiatives and this was true in this instance too. Hence against all social odds women took and are still taking initiative in restoring water harvesting structures and practices. Undauntedly they took responsibility for constructing new structures and for renovating those that were lying in a state of disuse for more than 30 years. Mission impossible was made possible by them and in the process they gained their communities admiration and respect. Now their advice and assistance is sought by others village residents, Panchayat and at times by public service officials on matters not only related to water but other development issues also. Women groups are also prominently involved in conflict management related to utilization of common resources, resolution of petty disputes among village residents and in initiating social action against violence against women. Women in the region are now asserting their rightful place in governance process by participating in village governance institutions in defiance of their deemed social & political subservient position in the society. The demand for regular Gram Sabha meetings has activated many a village Panchayats in the region. People have once again started discussing issues related to water security in common village forums and have also started asserting their independent views that at times are against the official stance. In several villages like Rooplisar, Anadwaasi people have out rightly rejected water systems managed by government agencies and have instead evolved their own water system, which is financially and physically maintained by village residents.



A very perceptible and desirable consequence of SCRIA's efforts in the revival of a timeless tradition is the center stage role of women in it.



Village Kuhariya, like several villages in the district has saline groundwater and since many generations the only sources of potable water are two open dug wells next to the village pond. 15 years back in one well government installed an electric pump for 'fast' lifting of water but within 4 months of pump installation water in the well turned saline. Sub soil water in saline tracts need to be extracted in small quantities for excessive extraction will turn water saline.

So, couple of years back when there was talk in the village of installing pump in the remaining well Geeta, Mohini, Manju, Pushpa and 23 other members of two women groups in the village went door to door mobilizing people for opposing the installation of electric pump in the remaining village well, the only source of drinking water. The strong protest from village residents made Panchayat wary of it and forced the line department to withdraw its proposal.

The well is around 60 feet deep and it requires at least four persons to pull water out from it but the people of village Kuhariya are determined to preserve their 'sweet water' source over convenience.





Government's effort for promoting traditional rain based water systems is rife with corruption & incompetence at implementation level which is riddled with faulty selection of beneficiaries & sites, flawed design of structures, substandard construction, abandonment of ongoing work half way through and if structures are completed then in most cases they start disintegrating even before they are put to use.

All these positive outcomes and its impact have not yet brought a revolutionary change in the district as a whole, for out of 900 odd villages of Churu SCRIA's outreach is in less than 300 villages. But the efforts over the years have certainly set in motion the process of revival of traditional water security systems and the easily replicable development processes have been established in outreach villages. Many hundred non outreach families from village communities in the region have been adopting rain harvesting systems like kanabundi and tankas on their own while more than two dozen Panchayats have once again initiated social management practices for community rainwater structures.

The state government too is now promoting rain harvesting by providing subsidy for tankas and supporting the construction of new and restoration of old talais through drought relief programs and the central scheme of National Employment Guarantee. The techniques of kanabundi and chowka bundi have yet to register on their development radar. Government's effort for popularizing traditional rain based systems is laudable but as is usual with most public schemes this too is rife with corruption and absolute incompetence at implementation level which is riddled with faulty selection of beneficiaries, selection of technically impossible sites for construction of ponds, technically flawed design of structures, substandard construction, abandonment of ongoing work half way through and if structures are completed then in most cases they start disintegrating even before they are put to use. And off course meaningful participation by communities and financial transparency in the process is conspicuous by its total absence. This is a very unpleasant state of affairs for not only public money is totally wasted in the name of promoting rain harvesting but peoples' confidence in traditional systems too is adversely affected for they do not see them delivering results. It is utterly despicable that a handful of people's representatives and public officials for their own personal benefits are shamelessly exploiting traditional technology with nary a thought towards long term effects of their actions. People are now realizing that 'government money' is basically their own money that is paid through a myriad of direct and indirect taxes and is utilized for their 'development' through public schemes. This realization is making many citizen groups seek financial details in public works the way they themselves present to Gram Sabha through 'Transparency file'.

## way ahead

A water policy specifically relevant to desert eco zone is urgently required at present. A policy that is inclusive of and accountable to the desert communities is critical for water security in the region. The water planners who are forever interested in mega schemes of bringing water from Himalayan rivers must not consider traditional water practices as supplementary systems. In this a paradigm shift in planning is needed where rain harvesting is regarded as a core system for fulfilling water needs in the desert. For rain stressed times a combination of traditional systems with other water facilities can be planned. But the practice of total reliance on exploitation of groundwater or perennial river systems of other regions must be immediately stopped. Local water needs must be met locally as much as possible without upsetting the sociology and ecology of the region. Harvesting rain where it falls is an answer, a time tested and tried answer.

Cohesion in public schemes and initiatives is another aspect that too must be looked into without delay to stop different agencies of the government working at cross purpose, like asking the poor to harvest rain and practice conservation while providing the rich incentives for installing deep bore wells in this dark zone. Another critical area that requires immediate attention is utilization of water. Judicious use and conservation of water, as per the ecological reality of the region, must now translate into practice. Slogans on the walls, messages on the billboard or once in a year mouthing of ecologically correct speeches by authorities alone will not bring awareness on sensible use of water. For starters a total ban must be imposed on deep bore wells using ground water for non-dry-land irrigation-intensive crops or crop varieties and for commercial purposes like industrial use. All those wanting to utilize water for such purposes must be made to harvest rainwater for their requirement and if they fail to do so then they must not be allowed any right to use a common resource like ground water for their personal profit. Harvesting rain should be made mandatory for every commercial, public and private establishment.

Given the problems posed by centralized planning & ownership government, since past few years, is waking up to the fact that no development initiative can be successfully implemented without participation from community. People's participation is critical for





the success of development and welfare programs. As such the democratization of control over water resources and over its physical and financial management will go a long way in improving the water situation in the region. Communities, in the past, have proved themselves to be good water managers who dealt with its provision and utilization in a much more sustainable and reliable way than the political and bureaucratic managers of today. In the villages Panchayats with the support of Gram Sabha can be entrusted with the supervision of work concerned line departments. Rules & conventions can be established for the purpose. Decentralized management creates a sense of responsibility and accountability in development initiatives as it also eliminates pilfering and mismanagement of finances, a common complaint against public works. Communities can also successfully enforce and monitor provisions for mandatory harvesting of rain.

A paradigm shift in water policy is needed in development sector also but more in relation to the implementation process. The time has come when infrastructure related initiatives, benefiting individual families, are based on credit. The said credit could be either interest free or on very low interest. This way with a limited amount of money a lot more families could be reached year after year. Apart from this the repayable credit system will instill a tremendous sense of ownership and self-reliance among the concerned outreach population.



Continuing in future, SCRIA will continue to popularize rain harvesting systems for domestic and agriculture purposes. SCRIA will also strive to discover anew the forgotten gems of water legacy in desert. Where social cultural relevance for revival and restoration of past technology exist they will be revived and, as mentioned earlier in this book, knowledge base of local communities will be utilized for no 'outside expert' can match that. The quality of water harvested for storing along with prudent usage of this precious life sustaining resource will be assiduously pursued. In its outreach districts in southern Haryana also SCRIA is engaged in popularizing rain harvesting in tanks, ponds and agriculture fields. It is also actively working for safe ground water recharging, conservation in usage and wastewater management. Along like-missioned non government organizations, public institutions and individuals SCRIA will continue to advocate and lobby for rational and region specific water policy that focuses on rain harvesting, community management and decentralization of control over common resources. SCRIA is resolved to promote traditional wisdom and systems for harvesting rain.

<b>Akal</b>	Drought
<b>Anga</b>	A body, per person or per animal
<b>Bajra</b>	Pearl millet
<b>Beri or Kuin</b>	Very narrow and shallow wells
<b>Black zone</b>	A category by Central Ground Water Authority for an area with severe water scarcity
<b>Chowka</b>	A large shallow square trench
<b>Chowka bundi</b>	A system of square trenches and bunds
<b>Gram sabha</b>	A primary unit of self governance in the villages comprising of all residents
<b>Kanabundi</b>	Process of bunding sand dune slopes
<b>Kheep</b>	Leptadenia Pyrotechnica
<b>Kund or Tanka</b>	An under ground tank for collecting & storing water
<b>Moth</b>	A kind of protein rich legume lentil
<b>Panchayat</b>	Village Council – a constitutional body at village level for village governance; its members are elected for a period of 5 years
<b>Phog, phogan</b>	Calligonum poligonoides; a local desert bush plant with medicinal properties
<b>Sampada Prakritik</b>	SCRIA's program on natural resources management
<b>SCRIA</b>	Social Center for Rural Initiative and Advancement
<b>Social audit</b>	Physical & financial audit of initiatives by community
<b>Taal</b>	Pasture land, a village common
<b>Talai</b>	Pond
<b>Toya</b>	Small square trenches in the field for collecting rainwater runoff
<b>Transparency File</b>	Village level record maintained by women groups that contains all physical and financial details specific to a community initiative



# SCRIA at a glance

## Vision

Sustainable rural development by rural communities

## Mission

Building capacities of rural communities for their active & meaningful participation in self governance processes

## Outreach

Villages in the districts of Rewari, Mohindergarh, Jhajjar in Southern Haryana and Alwar, Bikaner, Churu in Northern Rajasthan in northwest India

## Development initiatives

### ***Svashaasan* Self Governance**

Women sangathans for social & economic justice

Women in self-governance processes

Men & youth mobilization for good governance & social change

### ***Samridhi* Prosperity**

Promotion of rural entrepreneurship

Micro credit for livelihood

Promotion of rural craftspeople

Fair trade

Supporting higher & technical education among rural youth

### ***Sampada Prakritik* Natural Resources**

Water harvesting, conservation & ground water recharging

Soil conservation and vegetation promotion

Vegetation -plantation & regeneration

Environmental sanitation

Alternate energy - extension & research

## Partners in progress

\* 12000 volunteers in 730 villages \* Asahi India \* Australian High Commission \* British High Commission \* Canadian High Commission \* Canadian Hunger Foundation \* CAPART \* Canadian International Development Agency \* Department of Science & Technology \* District Rural Development Agency \* CTM- Italy \* Embassy of Federal Republic of Germany \* Embassy of Japan \* Embassy of Sweden \* European Commission \* Friedrich Ebert Stiftung \* GTZ \* Habitat for Humanity International \* Helpage \* Indian Council for Agricultural Research \* Indo Global Social Service Society \* Industrial Development Bank of India \* Ministry of Environment & Forest \* Ministry of Non Conventional Energy Sources \* Ministry of Panchayati Raj \* Ministry of Rural Development \* Misereor \* NABARD \* One Village - U.K. \* Oxfam - U.K. \* Rachna Club - Japan \* Rashtriya Mahila Kosh \* Rotary India Water Conservation Trust \* Royal Norwegian Embassy \* Small Industries Development Bank of India \* Solidar' Monde \* Swedish International Development Agency \* UNDP \* Welthungerhilfe \* Youthreach







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Paaniro barsaade mahra ram re  
Ubi ubi joun thaari baat  
Sawan ri rut mewlo na barse  
Sukha mahra samud talab re

Bless us with rain O rama  
I have been waiting for you since long  
In this rainy season if we are not blessed  
with rain then our ponds will remain dry

