COASTAL SALINITY PREVENTION CELL
Kharash Vistarotthan Yojana

Progress Report

2008 - 2010

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Water harvesting structure constructed to reduce the adverse effects of salinity

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View from the top

Getting a multi-dimensional picture

While much has been said about the cultural and linguistic diversity of India, we also need to note the geographical diversity, ranging from the snow-covered Himalayas to the hot-arid deserts of Rajasthan! One important part of this diversity is the coastal region of India – a region which helped India in establishing trade links with the rest of the world centuries ago. This also earned India the title of The Gateway to the World.

Gujarat has the largest coastline (1,600 km) in the country with a rich 'past' of sea-trade and agriculture. However, its 'present' is troubled and the 'future' uncertain. This is because of excess use of groundwater, both by farmers and industries, which has led to salinity ingress.

The Aga Khan Rural Support Programme (India) started its work in the Junagadh district in 1986 – during the drought years. Over time, it initiated work for the coastal villagers who were facing the problem of saline groundwater. To seek context-specific solutions, it learnt from NGOs like Utthan in Bhavnagar and Gram Vikas Trust in Dwarka. It soon realised that salinity was a regional issue, and while many stakeholders – government, communities, research agencies and NGOs – were doing their bit, the problem was too large to be addressed in isolation by these agencies.

Hence, the idea of the Coastal Salinity Prevention Cell (CSPC) emerged, which would try and involve the government, NGOs and research agencies. This idea was supported by other agencies like Ambuja Foundation and the Sir Ratan Tata Trust who agreed to 'seed' this idea. CSPC was thus formed as a joint creation of these three agencies. It is registered as a non-profit company under Section 25 of the Companies Act. CSPC has a diverse Board, which represents the multiplicity of stakeholders involved i.e. the government, the practitioners and the researchers.

The overall philosophy of CSPC is to promote greater interaction and learning between practitioners, researchers and policy makers so that the unique problem of coastal salinity is understood, solutions tried out and analysed and policies and programmes modified or formulated to scale up the solutions.

The rural communities in the coastal region face two types of problems – the water quality decline affecting drinking water and agriculture and land displacement caused by industries and ports which requires different approaches from civil society.

CSPC has chosen to focus its efforts in piloting and scaling up innovative solutions to the problems posed to rural communities by saline groundwater. This report, which seeks to share about its work over the last five years, highlights the wide range of initiatives piloted by CSPC. Some of these are now being scaled up, through banking support or linkage with larger government programmes. Farm ponds, river linking, stone bunds and well sealing are a few ideas which have been scaled up for increased fresh water recharge. While promotion of drips and sprinklers and cultivation of sugar beet and other saline-resistant fodder crops

have emerged as solutions. In drinking water, the partnership with Water and Sanitation Management Organisation (WASMO) has helped scale up drinking water and sanitation interventions to 300 villages in partnership with 10 field Non Government Organisation (NGOs). While much has been done, the problems of coastal salinity are immense, both in Gujarat and in India.

Coastal salinity is a national problem, and many habitations in Maharashtra, Andhra Pradesh, Tamil Nadu, Kerala, Orissa etc. report salinity problems. To ensure that its lessons from Gujarat are shared, CSPC now plans to take up work in Tamil Nadu. Preliminary visits have already been held.

Let me take this opportunity to acknowledge the support from the Sir Ratan Tata Trust (SRTT), the many NGO partners along the coast and the Government of Gujarat (GoG) for the work done so far. Above all, let me salute the communities along the coast who despite their problems, remain cheerful and optimistic.

As we look ahead, many challenges remain; these will only be addressed if the problems and solutions are evolved in partnership with the communities. Let me end with this favourite quote, which is still relevant in the present context for all marginalised communities.

Go to the People;
Live among them;
Love them;
Learn from them;
Start from where they are;
Work with them;
Build on what they have.

But of the best leaders,
When the task is accomplished,
The work completed,
The people all remark:
"We have done it ourselves".

– Lao-Tsu

Apoorva Oza
Chairperson, CSPC

Fund for thought

Providing resources to save natural resources

Increasing salinity of land and water resources in coastal areas is a serious environmental problem in Gujarat. The state Government commenced addressing this problem in the early 1970s. The problem of salinity is complex in nature and approaches to mitigate the problems need to be more systematic and demand driven. In 2002, in an effort to facilitate a solution to these environmental problems, the Trust, along with its partner organizations, launched the "Kharash Vistarotthan Yojana (KVY)", earlier known as the "Gujarat Coastal Salinity Prevention & Mitigation Initiative". Subsequently, over eight years, the initiative gave genesis to an umbrella organization called the Coastal Salinity Prevention Cell (CSPC), its uniqueness further enhanced by the state government joining in as an active partner.

Since inception, CSPC has put in efforts to network and collaborate with different institutions in salinity affected villages whilst successfully providing inputs for enhancing impact. CSPC's partnership with the state government to address drinking water and sanitation issues in coastal areas of the Gujarat, through the Coastal Area Development Project (CADP), has been one of its success stories whilst attempting to influence policy at state-level. Another innovation showcasing the farm pond model has effectively optimized utilization of available natural resources. Most importantly, CSPC also has also been playing an instrumental role in channelizing the collective strengths of the government, civil society organisations and the communities, for a more effective application of new ideas.

The changing environmental patterns have brought new challenges in the coastal regions; consequently, an integrated approach to cope and adapt to these changes, especially in agriculture sector, is the need of the hour. It is also important to consolidate the learnings from the past to create widespread impact over a larger area. The learnings of this initiative have encouraged the Trust to strengthen its involvement with CSPC as it gears up to replicate efforts across other parts of the country.

Arun Pandhi
Sir Ratan Tata Trust

Socially Responsible

Giving back to nature and its people

As an on-field implementer of initiatives on prevention of coastal salinity and as a promoter of the Coastal Salinity Prevention Cell (CSPC), I am immensely pleased to learn about the first progress report of the collaboration. I am sure the report will contain a comprehensive collection of the work of CSPC and will provide a window into the projects undertaken and the possible learning from them. The report is sure to be a valuable resource to all stakeholders working on the issue of salinity prevention and mitigation.

The publication of the annual report is an important step in the dissemination of information about the CSPC and its work. I am confident that in time, this publication will grow in its scope and will reach out to a larger audience.

I congratulate the CSPC team on bringing out this progress report.

Pearl Tiwari
Ambuja Cement Foundation

Birth of the Cell

Understanding salinity ingress: The need for interventions

Salinity is an issue that is silently eroding the lives and livelihoods of nearly one-fifth of Gujarat's population. This adds up to 10 million people living in 1,500 villages. Salinity ingress has adversely affected underground water aquifers, making it unfit for human consumption. Moreover, usage of saline water for irrigation has led to decline in agricultural and horticulture productivity and soil fertility, thus rendering land unsuitable for future cultivation. All this has forced people to migrate in search of livelihood.

This is a result of prolonged rapid seawater ingress along the coastal belt of Gujarat over the last two decades. At some places, it is as deep as 10-15 km from the sea coast. This is mainly due to unplanned use of ground water for agriculture and industrial purposes combined with mining activity giving way to sea water intrusion.

This problem has a nationwide presence and impact. Considering the enormous scale of the problem, a massive public investment is required.

Further, the problem of salinity is a consequence of several economic development activities that go beyond the purview of a single department or agency of the government. The convergence and coordination among several government departments, which include Irrigation, Agriculture, Horticulture, Environment and Forest, Industries and Revenue is critical for substantial impact. If these steps are not taken, then isolated efforts will result in no cumulative effect.

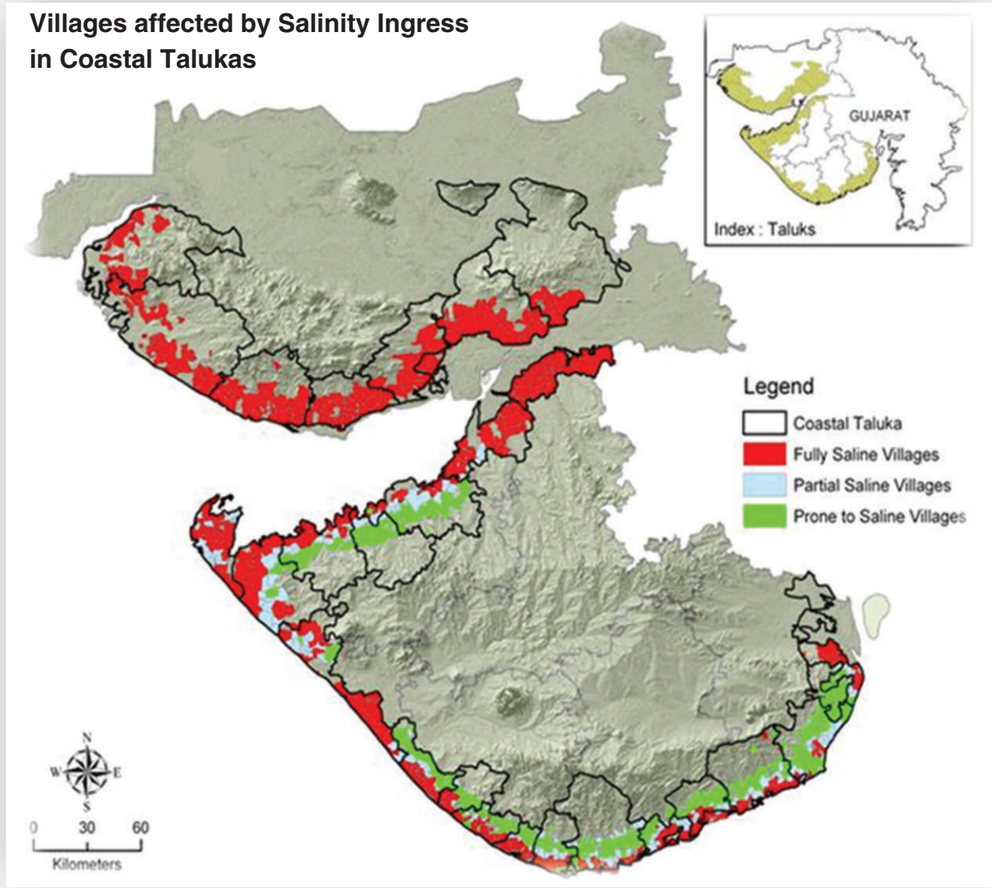
However, an issue of such magnanimity demands help and contribution of all its stakeholders. At present, in the absence of other livelihood options, communities are extracting groundwater for agriculture, which increases salinity ingress. There is a need to shift focus from immediate economic gains to long-term sustainability of the natural assets.

Therefore, the issue of salinity ingress looms large as it has led to hundreds of villages along the coastline becoming saline. Not just the land even the drinking water wells have been rendered useless. This has led to large-scale migration and severe health problems. It can be restricted by addressing it at different levels. This calls for a joint effort by the government, NGOs, academicians, researchers and the affected themselves.

Genesis

Along the Gujarat coastline, salinity of land and its rapid ingress by the waters from the Arabian Sea, due to human abuse of natural resources, is a well accepted phenomenon. Over the years, environmental degradation of the coastal area has led to migration of the agrarian communities, decline in cattle population and acute scarcity of potable drinking water. AKRSP (I), which had been working in Junagadh district since 1986, started work on combating salinity ingress in groundwater. As part of this initiative, AKRSP (I) joined hands with the SRTT in 2002 to tackle this salinity-led environmental catastrophe. This led to the formation of the Kharash Vistarotthan Yojana (KVY) initiative. Later under KVY, other local organisations involved to develop and implement projects in different regions.

Simultaneously, the government, communities, research organisations and NGOs were working to address the issue at their level. The cumulative impact of these



A map indicating the salinity-affected villages

efforts was not visible as the task ahead was colossal. In recognition of the complexity and the multi-faceted nature of the problems, it was felt that to make a substantial impact, joint efforts of both – government and civil society organisations – were required. This led to the formation of the CSPC that could coordinate and provide technical inputs to ongoing salinity projects in the state as well as develop innovative programmes and initiatives. As a result of a dialogue process between civil society organisations and other partner NGOs, the Government of Gujarat issued a circular on April 12, 2004, which laid the foundation for the constitution of the Coastal Salinity Prevention Cell (CSPC) and its Steering committee. CSPC was initially housed at Salinity Ingress Prevention Circle (SIPC), Rajkot, a dedicated wing of the Irrigation Department for addressing the salinity ingress problem. Thereafter, it was shifted to Ahmedabad to ensure better linkages with the state administration, promoters and other stakeholders. On April 7, 2008 CSPC registered itself as a Company, under the Section 25 of the Companies Act 1956, with AKRSP (India), ACF and SRTT as the three promoters. ■

Key functions

Act as knowledge bank

The coastal regions of Saurashtra and Kutch in Gujarat have already experienced severe implications of human-made interventions like extraction of groundwater and mining as well as natural issues like land erosion and tidal effects. These have in turn affected the ecological and social integrity of the area and the communities whose traditional livelihoods have come under severe threat. The issue of coastal salinity in the state has been addressed by different government and non-government organisations. However, it has been felt that to ensure an integrated approach, to focus on the issue of salinity more seriously and to bring different stakeholders together to work in a common direction, there is a need for CSPC to work as a knowledge bank. Through various research studies and workshops, CSPC has successfully managed to bring the government, NGOs and the communities together on a common platform. Further, CSPC has developed scientific database which can be helpful to design the interventions in the natural resource management sector.

Network and develop linkages

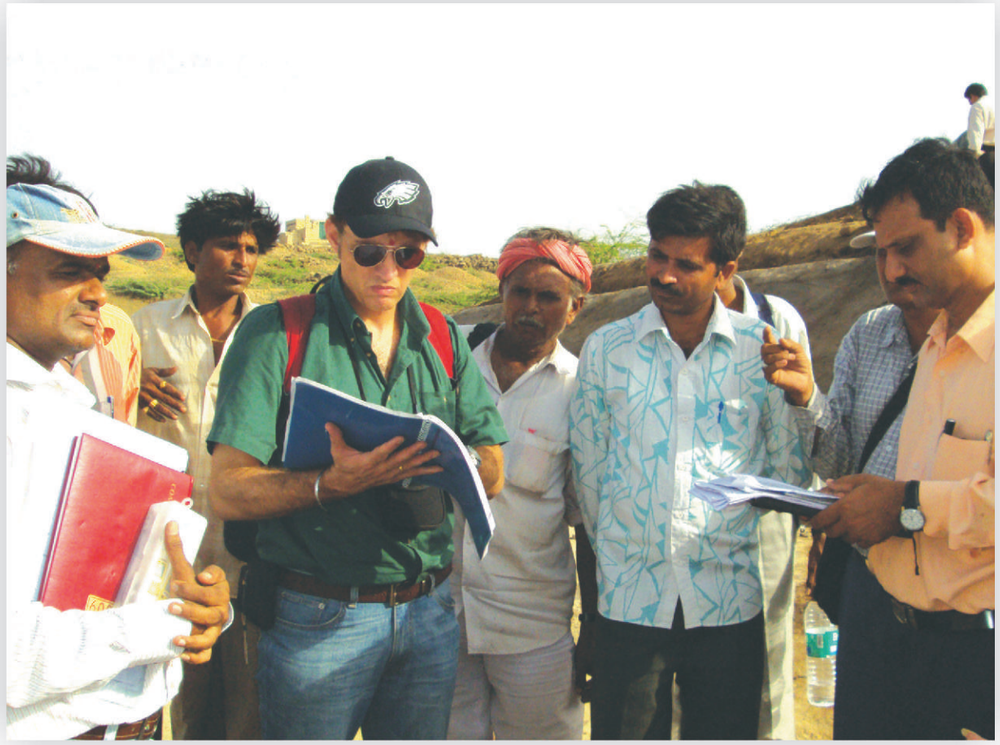
Salinity is a regional issue that has local dimensions to it. Therefore, it calls for an approach of think globally act locally and work on collectively acceptable solutions with region-specific multi-sectoral approach. To tackle this issue with a holistic approach, the collective efforts of the government, civil society organisations and experts need to be simultaneously pooled in at macro as well as micro levels. These efforts should then lead to the formulation of an appropriate policy for salinity control and prevention, at the state and national levels.

Over the last two years, CSPC has played a pivotal role in developing a network with civil society organisations and ensuring they all work on the same wavelength and in the same direction. This has ensured that the issue of salinity is the common agenda for all and they all work by building partnerships. As the government is a key stakeholder in the developmental sector, it is essential to build a partnership with it to mainstream the successful innovations and initiatives. CSPC has worked with various government departments to create a synergy and develop linkages. Partnership with the Water and Sanitation Management Organisation (WASMO) to address issues of drinking water and sanitation in coastal areas as well as the formation of the steering committee by the Water Resource Department have been successful initiatives facilitated by CSPC.

Area-specific innovations and community approaches

The issues related to land and water management, agriculture, forestry and fisheries are unique in nature in the coastal region of Gujarat, so it is equally important to have unique solutions to them. Keeping this in view, CSPC along with partners has been ideating pilots in different geographies to strengthen and sustain the livelihoods of coastal communities. The community being a very important stakeholder of any development action has always been at the focal point of all the initiatives promoted and supported by CSPC.

A youth shows off his catch from a lobster-fattening pit developed along the coast



Villagers interact with officials during a field visit to Shiyal bet village

Operate as the nodal agency for KVY

Since 2002, different partners under the KVY programme have been implementing area-specific activities to address issues related to salinity mitigation and prevention. The range of activities include water and land resources development, drinking water security, enhancing water use efficiency through promotion of drip and sprinklers, promotion of salinity-tolerant crop varieties, etc. CSPC acts as a nodal agency in implementing the KVY programme. CSPC coordinates and monitors the quality of implementation of the projects.

Our reach

Concerned about the salinity ingress in coastal areas, the Government of Gujarat set up the SIPC under the Irrigation Department. SIPC identified nearly 1,200 villages spread across 26 coastal talukas of Gujarat and CSPC primarily focuses its works in these villages. In addition to these districts, the drinking water programme is under implementation in the coastal talukas of Bharuch, Anand and Ahmedabad district. CSPC programme intervention reaches out to around 142, 995 households in 498 coastal villages. ■

Numbers say it all

Sr. No.	Thematic Interventions/ Project name	Outreach	
		Villages	Households
1.	**Natural resource management and agriculture development**		
1.1	**Agriculture extension**		
a)	Use of roof rain water system for drip irrigation in vegetable plots	1	10
b)	Promotion of horticulture for agriculture income diversification	13	157
c)	Vegetable plots	10	69
1.2	**Water resource development**		
d)	Dugwell recharge programme	1	10
e)	Farm pond based agriculture development	6	78
f)	In situ soil and water conservation through farm bund and outlet	10	130
g)	Developing irrigated command area through lift irrigation	1	22
h)	Water resource management / ground water recharge	81	23500
1.3	**Land development**	44	6000
2.	**Drinking water and sanitation**		
i)	Drinking water solutions for salinity affected villages	311	104851
j)	Environmental and household sanitation programme	300	25000
3.	**Fisheries**	**16**	**295**
4.	**Formation and strengthening of village institutions for addressing salinity**	**30**	**1500**

The three pillars: Organisational values at the core

Aga Khan Rural Support Programme (India)

The Aga Khan Rural Support Programme (India) is a non-denominational, non-government development organisation. The organisation works as a catalyst for the betterment of rural communities by providing direct support to local communities to promote activities and develop models for sustainable natural resource management and development of human resources.

The AKRSP (I) is active in over 1000 villages in four environmentally challenged and economically vulnerable regions of Gujarat: the tribal block of Bharuch – Narmada – Surat – Tapi, coastal salinity-affected Junagadh and the drought-prone Surendranagar. It has been five years since the organisation ventured into the remote and poor districts of Khandwa, Khargone and Burhanpur in Madhya Pradesh. In 2008, AKRSP (India) initiated work in Bihar based on studies about the need for intervention in this region.

Sir Ratan Tata Trust

Set up in 1919, a year after the untimely demise of Sir Ratan Tata at the age of 47, the Sir Ratan Tata Trust is one of the oldest philanthropic institutions in India, and has played a pioneering role in changing the traditional ideas of charity and introducing the concept of philanthropy. Through its grant making, the Trust supports efforts in the development of society, through institutional grants in areas of Education, Health, Arts and Culture, Enhancing Civil Society and Governance and Rural Livelihoods and Communities. Besides institutional grants, the Trust also makes individual grants for education and medical relief. Since inception, the Trust has disbursed over Rs 5.58 billion to various institutions in the above mentioned themes, besides individuals. The uniqueness of the Trust is characterised by its practice of giving grants to individuals and organisations engaged in developmental and creative activities, rather than undertaking such activities on its own.

Located at Bombay House, in Mumbai, the Trust is today an embodiment of the humane ideals of its founder, Sir Ratan Tata, and his desire to contribute to the development of India. It has pursued the goal of constructive philanthropy by supporting institutional solutions to social problems and enhancing human capabilities to overcome them.

Ambuja Cement Foundation

The Ambuja Cement Foundation, established in 1993 is the Corporate Social Responsibility wing of Ambuja Cements Ltd. that works with the rural communities living near Ambuja's manufacturing locations. The Foundation is engaged in a variety of people-centric, integrated rural development projects covering 19 locations across 10 states in the country. With the mission to "energise, involve and enable communities to realise their potential" ACF undertakes programmes and projects in line with needs of people in partnership with them.

The Foundation is engaged in programmes like natural resource management, agriculture development, livelihood generation, health, education and women's empowerment. Working in partnership with rural communities, local NGOs and government and international organisations, the Foundation is functional in more than 700 villages in 10 states covering a population of 15.8 lakh people across India.

The journey so far

Salinisation of land and water resources, like any other natural resource degradation process, is systemic in nature, adversely affecting the coastal ecosystems. Over time, the problem of salinity is attaining serious proportions and continues to severely affect the lives and livelihoods of about one-fifth of the total population of the state, living in approximately 1,500 villages. Lack of alternatives has forced farmers to use saline ground water for irrigation. This has led to decline in agricultural and horticulture productivity and soil fertility, thus reducing land unsuitability for future cultivation. In response to the problem, Government of Gujarat and civil society organisations have taken up various initiatives on different parts of the coasts of Saurashtra and Kutch. Experiences of both, the Government and NGOs' interventions, have clearly shown that to address this enormous and complex issue there is a need for a systemic response combining efforts at the micro as well as at macro levels.

In 2002, the SRTT, along with its partner organisations launched the KVY to facilitate a solution for environmental problems caused by salinity ingress in the coastal belt of Gujarat. To increase the scope of work and address the multi-dimensional issue of salinity, CSPC was formed.

The ongoing field programmes of CSPC are:

i. Ground water recharge and other natural resource management interventions to enhance the quality of farmers' assets
ii. Regaining the agricultural dynamism by introducing improved practices, salinity-resistant crop varieties and enhancing the efficiency of irrigation
iii. Securing access to safe drinking water and sanitation facilities for the rural communities
iv. Formation of a community-based organisation and enhancing the institutional capacities of the communities to manage their scarce resources

While over the past five years, the major thrust and resources used by CSPC focused on water recharge and management programmes; ample efforts were also made to look at the changes required in agriculture, fisheries and drinking water situation due to salinity ingress. CSPC has put in efforts for idea incubation by implementing small pilot programmes to assess the viability of various technological options like the farm pond model, aquaculture in saline areas, salinity-tolerant horticulture crops, etc. The field trials of salinity-tolerant crop varieties and fodder varieties have been successful and communities are being motivated to adopt them on a larger scale.

CSPC successful initiative on water use efficiency through promotion of use of Micro Irrigation Systems (MIS), use of conveyance pipes vis-à-vis open irrigation channels, adoption of trench irrigation for horticulture crops and soil amendments for treatment of saline soils have brought about encouraging results. Market-based approach to promote village entrepreneurs to configure and market drips and sprinklers were explored, and they have proved to be successful.

Another initiative popularly known as the farm pond initiative - a pilot of loan based approach to resource management has been modified into a larger comprehensive project. Working in close collaboration with civil society institutions and government departments, CSPC is also implementing a model for participatory lift irrigation management in command areas of salinity ingress-prevention structures.

Villagers take responsibility to address salinity issues in their region

Developing sectoral linkages, with the state-supported drinking water programme has been one of the major initiatives of CSPC. This has helped CSPC to collaborate with WASMO, the state-level coordinating agency for drinking water supply and launch a comprehensive drinking water and sanitation programme to cover 300 coastal salinity-affected villages in Gujarat. The project is spread across 21 blocks of nine coastal districts.

CSPC has also developed detailed database of 1,200 salinity-affected villages across coastal areas of Saurashtra and Kutch. CSPC is actively involved in mainstreaming the problems and issues of coastal communities through various forms of information dissemination. Some of these initiatives include field studies (Impact of Micro Irrigation Technologies and Health Impacts due to Consumption of Poor Quality (saline) Water), publishing of a quarterly newsletter – *Kharash Samvad*, website uploads (www.cspc.org.in) and also through a series of farmers' trainings and regional workshops in partnership with civil society organisations and communities. The technical impact assessment studies carried out in the Netravati river basin corroborates the community feedback on the enhanced quality and quantity of groundwater in the project villages.

Meanwhile, CSPC as a nodal agency for KVY has also been supported by the Trust to implement activities related to piloting of specific physical interventions, up-scaling of successful ideas, developing itself as a knowledge bank on issues related to salinity while developing synergies between the various initiatives of government and non-government agencies and networking and coordinating the efforts of the various partner organisations.

CSPC, through the SRTT-supported KVY programme has built partnerships with over 17 partner organisations and through the various salinity mitigation initiatives has presence in over 150 salinity-affected villages of coastal districts.

The decadal work experiences in the coastal areas indicate that unless the issue of coastal area management is made to leave the conference arena and taken to the application arena, to the communities and to the micro-level environs, the threat factors will continue to loom large and become more real. ■

The first few steps

Kharash Vistarotthan Yojana initiative

CSPC has been the result of expanding the reach of the KVY initiative. Way back in 2002, experience has indicated that tackling salinity requires a mixture of demand-and-supply-side water interventions. Therefore, there was a need to encourage farmers to change their crop patterns and switch over to equally remunerative, less water-consuming crops, leading to a decrease in groundwater extraction. Sporadic success stories arising from this initiated an organisational-processes consolidation resulting in the unique initiative called Kharash Vistarotthan Yojana (KVY). The partner organisations for the first phase (2002-2005) were AKRSP (India) and ACF. In the second phase, which began in 2005, two new partner NGOs – Vivekanand Research and Training Institute (VRTI) and Tata Chemicals Society for Rural Development (TCSRD) – joined the programme. In 2007, VIKAS – Centre for Development through its Salinity Resource Centre (SRC) initiative joined in as the fifth partner. Cumulatively, all the partners directly intervened in 120 salinity-affected villages of coastal Saurashtra and Kutch with the aim of developing area-specific models for managing salinity, which could then be scaled up or replicated.

As the nodal agency of KVY, CSPC has been working with partners on region-specific projects.

Spreading awareness and developing models to prevent salinity ingress

Aga Khan Rural Support Programme (India) has been working to mitigate and prevent salinity ingress along the Mangrol coast of Junagadh district. The organisation worked to assist village institutions to evolve and implement tried and tested strategies. This partnership led to wider awareness about the deteriorating conditions resulting from salinity ingress and its solutions. This led to the adoption of water-efficient agronomic practices and devices, development of replicable models for community-managed economically sustainable drinking water schemes and a model on the principles of river basin treatment to augment the water resources.

A woman draws water from a RRWHS constructed in Kodinar taluka of Junagadh district

Villagers during an on-field training session

Developing integrated packages and models for efficient utilisation of water

Ambuja Cement Foundation worked to mitigate and prevent salinity ingress in Kodinar and Sutrapada talukas of Junagadh district and Jafarabad taluka of Amreli district. The project resulted in an integrated package to combat salinity with active participation of local communities. The people developed a cost-effective and innovative demand-and-supply water management as wells as an agriculture model for efficient utilisation of available water. The organisation also worked to develop a network with government and development agencies for faster replication of successful interventions with active participation of various stakeholders.

Setting up a Salinity Resource Centre to tackle salinity issues

VIKAS – Centre for Development, set up SRC in Talaja taluka, Bhavnagar, to develop an entrepreneurial model to tackle salinity issues. As a service centre, the SRC provides complementing services to various stakeholders like primary producers engaged in agriculture, animal husbandry, fisheries, etc. The SRC conducts comprehensive studies on the extent, trends and impact of salinity on the lives of local people. It also disseminates information on salinity to villagers and helps develop a common understanding on the extent, trends, causes and impacts of salinity.

A man strikes a pose as he works to develop the shelter belt to ward off the impact of salinity

Increasing agricultural productivity and strengthening people's organisations

Tata Chemicals Society for Rural Development has implemented the Okhamandal Samridhha Gram Pariyojana (OSGP) in 20 salinity-affected villages of Okhamandal taluka. The programme resulted in enhanced economic returns for farmers by increasing agricultural productivity through agriculture diversification to alternative crop practices and reducing input costs. The efforts towards enhancing people's knowledge about improved water management strategies through mass awareness resulted in attitudinal changes towards effective use of water and adopting water-saving technologies. The programme led to construction of water-harvesting structures to reduce salinity ingress and ensure drinking water security. The effort has resulted in establishing and strengthening village-level community-based organisations, which effectively manage their resources and promote marketing of agricultural produce.

Restoring the shelter belt and reducing the impact of salinity ingress

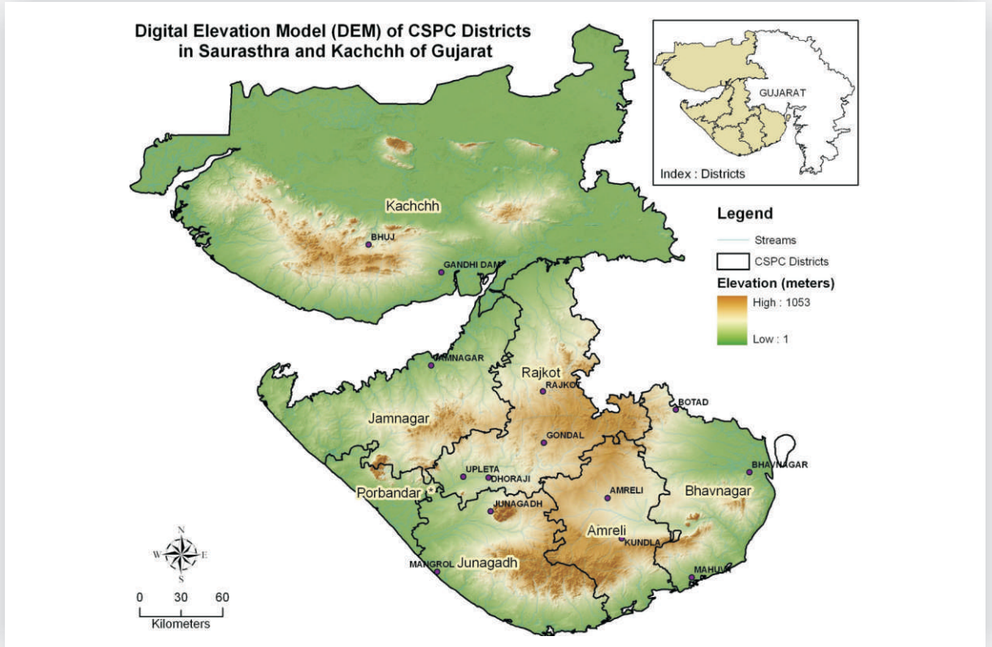
Foundation for Ecological Security (FES) to restore the shelter belt in six villages across Khambhat taluka in Anand district. The project aims to evolve a sustainable and people-centric model to reduce the impact of salinity ingress on agriculture and, consequently, the livelihood of the communities living along the coast. The villagers worked to create a shelter belt to reduce the impact of salt-laden winds and reclaim saline-affected farmland. Appropriate water management practices were adopted by farmers through construction of farm ponds to conserve water, promotion of appropriate technologies and alternatives for drinking water. All this and capacity-building programmes resulted in strengthening institutional mechanisms for sustainable resource management. ■

Armed with knowledge

Though salinity is a regional issue, it requires thorough understanding of the local dimensions to find appropriate solutions. CSPC works as a knowledge centre on salinity, so it is necessary to have information (quantitative and qualitative) based on the different dimensions of the problem of salinity. Therefore, the organisation has developed baseline information depicting the extent and nature of the problem. This will help in:

- Identifying key issues relating to salinity and its impact on rural livelihoods in the coastal region of Gujarat
- Planning need-based, community-centric appropriate interventions
- Establishing linkages among the government, NGOs and communities
- Measuring the impact of interventions made, and then replicating them

The baseline data is classified into broad regional level information on physical, socio-economic aspects placed on the Geographical Information System (GIS) and primary data of 1,200 salinity affected coastal villages of Saurashtra and Kutch. The broad regional level information on a GIS platform was developed in collaboration with the FES, Anand, while the primary village-level database development was facilitated by Saline Area Vitalization Enterprise (SAVE) Ltd. The survey included the nature and scale of the salinity problem in terms of extent, cause and trend, at the local and regional levels; impact of salinity on people's lives and their livelihood resources; impacts of different initiatives of the government, NGOs and local people; possible ways to synergise resources and efforts of different stakeholders engaged in addressing the problem. It is also a tool for information dissemination and conducting awareness campaign with larger farmers' groups, NGOs and different government departments. ■



GIS maps like these make it easy to understand the issue of salinity

Managing natural resources and innovative agricultural interventions

The coastal regions always provide both opportunities as well as challenges. The opportunities for business and development are immense but the challenges of keeping the fragile ecosystem intact should not be sidelined. In coastal Gujarat, land and water resource-based traditional occupations like agriculture and animal husbandry have been affected by salinity, thus, deteriorating the quality of life of coastal communities. Not just environmental degradation, salinity has also caused social unrest in many coastal villages.

In Gujarat agriculture has primarily been rainfed or based on canal irrigation. The scarce and uncertain rainfall pattern increases dependency on ground water, which furthers the process of ground water depletion and quality deterioration. The over exploitation of ground water has converted many parts of the state into dark zones. The finite groundwater resources in the coastal areas of the state are facing the problem of salinity ingress. To address these issues, CSPC has partnered with various organisations to create models for effective natural resource management. In spite of depleting agricultural conditions due to salinity ingress, farmers continue to grapple with the situation as continuing farming is still considered a sign of prosperity. Therefore, instead of asking them to explore new means of livelihood, it is better to offer them solutions to tackle salinity or work around the existing conditions to get better results.

Agriculture Extension

Promotion of horticulture for agriculture income diversification

Agriculture interventions in command area of the salinity control structures

SIPC of the water resources department of the GoG has constructed tidal regulator structures and *bandharas* to prevent sea water ingress. These *bandharas* have stored water that can be used for supportive irrigation in the nearby areas to enhance crop production. Looking at the erratic behaviour of rainfall and occurrence of natural calamities like drought in coastal areas, need for location-specific agronomic measures to overcome the water stress conditions and sustain agriculture as livelihood options is felt. In this context, the development of the command area of *bandhara* with people's participation would help to develop a strategy to overcome the vagaries of monsoon to a great extent.

Piloting sustainable agriculture intervention programme around command areas of two existing *bandharas* namely Khada and Bhogat, to enhance the agricultural productivity and profitability by addressing water-use efficiency and productivity of the *bandhara* was initiated. The pilot was taken up in Khajudra village of Una taluka with Ravi Foundation and in Bhogat village of Kalyanpur taluka with Kalyani Trust. The project activity included horticulture plantation, cattle camp, exposure visit, vermi composting and demonstration of high yield variety crop. Besides other activities, 2060 horticulture plants, including coconut, sapota, lemon and mango, were planted by 42 farmers.

Horticulture is quite a viable option of saline-resistant crops

Promotion of salinity-tolerant horticulture

CSPC partnered with Gujarat Rural Institute for Socio-economic Reconstruction Vadodara (GRISERV - BAIF) to initiate a project to identify and pilot salinity-tolerant horticultural activity with 65 farmers of Mithivirdi village of Talaja taluka, Bhavnagar. The primary objective of the project was to prevent the soil in the coastal areas of Bhavnagar district from being saline and to improve horticulture in the coastal areas for long-term sustainability and identify salinity-tolerant horticulture plants and their adaptability in the project villages. The plantations were done followed by inter-culture and other plant-tending operations. The plantation stabilised and the growth results were encouraging. On the last count, the survival rate of the plantation was at an impressive 98 per cent. Vermi composting activity was also started under the programme.

Agriculture and horticulture interventions

Addressing the water-use efficiency in agriculture practices was another important objective of the farm pond programme. The programme promoted drip and sprinkler irrigation systems among 35 farmers, 26 individual plots of organic manure as soil conditioner, 69 small vegetable plots and 50 horticulture plantations.

Roof rain water harvesting structures (RRWHS) and drip irrigation-supported horticulture and vegetable plots

A pilot addressing water harvesting, use efficiency and income generation for small land holders was initiated with Saath through constructing RRWHS in Maliya taluka of Rajkot district. As part of this programme, 10 RRWHS were constructed and linked with drip systems for irrigating vegetable plots. The farmers cultivated brinjal, chillies, tomatoes, turmeric, lemon, custard apple, pomegranate, mango, papaya, guava, banana, okra and flowers. The project beneficiaries were encouraged by the assured irrigation water to

cultivate the income generating crops. They did not have to depend on rain as the RRWHS had enough water to irrigate their crop during winter and summer too. During summer, the farmers earned a tidy profit due to high off-season prices. This summer, the families planted cluster bean (*guvar*) for the first time and earned Rs 250 to Rs 300 every alternate day. This experiment was extended to chillies and tomatoes.

Land development

Besides farming, animal husbandry was also adversely affected by salinity. In Jamnagar district, animal husbandry had reduced due to the non-availability of fodder. To reverse the process, a pastureland development committee piloted a pastureland development project on seven hectare public wasteland in Bhatwadiya village in Kalyanpur taluka. The committee leveled the land and constructed a wall for fencing; plants were grown along the boundary to yield biomass. After the monsoon, the local grass species, Jhinjvo, germinated and grew well. The committee spent Rs 3.63 lakh to set up this system and irrigate the land. The grass that was harvested was a boon for those dependent on animal husbandry.

Ground reality

Karsanbhai finds an outlet to stop erosion

Karshanbhai and his wife Manjuben had two acres of land which they leveled. They also made a two-feet-high farm outlet with assistance from Sarvani Charitable Trust. He deep tilled the land, spread fertilizer and sowed cotton before the onset of monsoon. As the rain was good, rainwater accumulated in his field and did not erode the land because of the farm outlet. He stored the water for two days before letting it flow. Though they were planted 5 feet away from each other, the cotton plants grew really thick and the cotton was also really good. He reaped a harvest of 4 ton cotton, which is really a bumper crop. “All thanks to the farm outlet,” he says.

Karsanbhai and Manjuben have reaped the benefits of the farm outlet on their field

A proud owner of a farm pond in Kalyanpur taluka

Water Resource Development

Conserving water through farm ponds

Saurashtra Voluntary Actions (SAVA), Jamnagar, ideated the concept in 2007 with the support of CSPC. This project was designed as a model with the interest-free-loan approach to help people become self-reliant. It is a significant process of public participation, decision-making and public accountability. The project was successful in creating a social impact and providing a cost-effective technology to farmers. It is a remarkable model of optimum utilisation of available resources, self reliance, and most importantly, it includes people's participation, choice and efforts. Farmers of four villages have dug 48 farm ponds with the help of interest free loans.

Based on the experiences and the outcomes of pilot interventions, it was concluded that the programme was viable, financially, as well as in terms of its capability of evolving as a catalytic tool for social engineering. As this project is loan based, it is contingent on a choice made by the individual. There are no monetary or kind pressures, such as mortgage, therefore, there is a sense of security. Thus, these efforts were scaled up to cover 10 more villages in Kalyanpur and Khambhaliya blocks of Jamnagar district. The field implementation of farm pond construction and agriculture diversification was done in partnership with Sarvani Charitable Trust and Kalyani Charitable and Welfare Trust. 78 farm ponds were constructed. The farm ponds enabled 78 farmers to provide crop protective irrigation to 240 acre land using 3.18 mcft harvested water. Based on the revolving fund mechanism, the repaid installment of every five farm ponds would enable the village level *gram vikas mandal* to provide loan for construction of a new farm pond.

In this developmental paradigm, the farm pond has been an effective alternative towards agriculture restructuring. It is a self-sustainable project in terms of financial results, with the prescribed benefits in ecological terms. The project has characteristics of expansion with more discreet options for different subjective

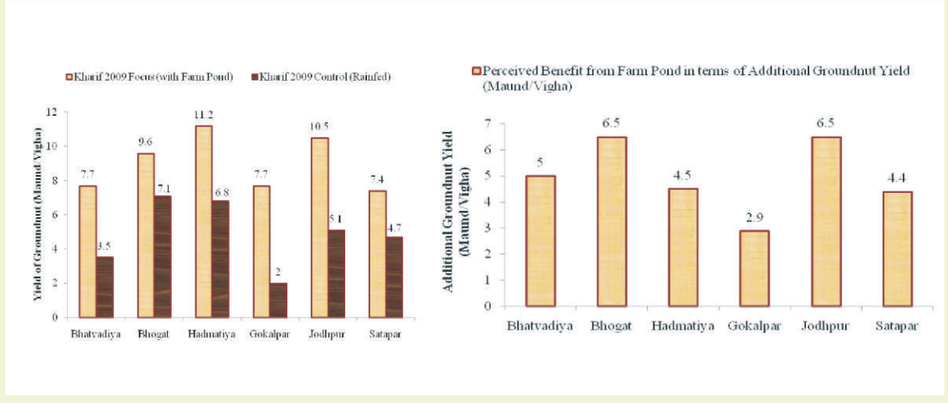
conditions and locations. It also has a strong probability of supplementary resources if horticulture is developed.

The whole concept of socialism due to farm ponds plays a significant role and is of great value because this process is not limited to the mere digging of an individual farm pond but it is an ongoing process of relationship building as the person repays the loan over a period of three years. It also becomes significant because soft loans are provided, specifically in conditions when an attempt is made to reach out to people who are marginalized from access to credit under formal banking system. Social accountability, societal pressure and social relevance through communication hold much more importance than predicted in usual processes and projects.

Financial impact assessment of farm pond: Looking at the initial response and benefits of farm pond perceived by the farming community;

Key findings of the impact assessment study are as below:

1. Risks related to weather parameters, particularly rainfall, were regarded by respondents as the predominant risk in their agriculture practice.
2. It was evident that farmers with farm ponds harvested better groundnut yield during Kharif 2009 season than farmers without it. The groundnut yield of the focus group farmers was more than twice that of control group farmers in three villages – Bhatvadiya, Gokalpar and Jodhpur. The yield difference between the focus group and control group respondents ranged from approximately 35 per cent to 65 per cent (vis-à-vis the yields of control group farmers) for the remaining three villages. The average yield of groundnut for focus group farmers was 8.7 *man* per *bigha* compared to average groundnut yield of 5.1 *man* per *bigha* for control group farmers. This translated into an actual benefit of 3.6 *man* per *bigha* or 180 kg (1.8 qtl.) per acre.
3. The average requirement of diesel for irrigating one *bigha* of groundnut by farm pond was 2.6 litres whereas it was 4 litres for alternative irrigation sources.
4. Almost 95 per cent of farmer respondents acknowledged the effectiveness of farm pond in control of salinity.
5. Almost 92 per cent of farmer respondents who did not have a farm pond expressed a desire to have one.



Moisture conservation through farm bunds and outlets

The in situ moisture conservation works not only reduce the use of ground water for irrigation but also helps in improving the soil fertility. The performance of farm bunding activity was carried out on 300 ha. agriculture land by 130 farmers in the Khambhaliya taluka of Jamnagar district. As a part of the activity, 102 farm outlets were also constructed. The result of the initial work has motivated the farmers to take up the activity with a contribution up to 60% against planned contribution of 40%.

Ground reality

Kasturben fights against salinity

Kasturben Meghji Rathod hails from a poor family in Beraja village of Khambaliya taluka. When she came to her in-laws' place after marriage, her husband was grappling with the problems of salinity. The agricultural income had decreased considerably due to increase in land and water salinity.

That is when Sarvani Charitable Trust initiated the implementation of the salinity reduction programme. Kasturben participated in the exposure visits on vegetable farming, horticulture, ground water recharge for salinity control and irrigation management through sprinkler and drip system. She used this knowledge on her one *bigha* land and earned an income of Rs 1 lakh against the expenditure of Rs 25,000. She also sealed one of her wells and stopped salinity ingress. Soon, she had access to sweet water and now, her children attend school and she is able to bear her in-laws' medical expenses as they are now a self-sufficient family.

Kasturben with her husband on her land which relates the story of their success

Harnessing run off water through stream treatment

During last five years, the decentralised water harvesting movement supported by the Government programmes such as Sardar Patel Sahbhagi Jalsanchay Yojana was very successful in Saurashtra and Kutch region, which in some cases require enhancement works to enable the communities for its optimum utilisation. In coastal blocks of Kalyanpur and Khambhaliya talukas CSPC identified such structures for further enhancement of the harvesting potential. Under the project eight stream treatment activities led to the storage of 41.97 mcft of rain water creating irrigation potential of 349.4 hectares of land.

Enhanced water resource management

The SIPC has invested huge financial resources in the coastal areas for water harvesting which can act as a sweet water wall to protect sea water intrusion. Many of these SIPC structures have huge potential of using the surplus water through lift irrigation. The use of surface water from these structures would help in reducing groundwater draft and in process keeping the salinity ingress away from fresh groundwater bearing strata. A demonstrative model to promote Participation Irrigation Management (PIM), was implemented on one such reservoir Medha creek with the objectives of (a) efficient use of surplus water from the salinity ingress prevention structure on Medha creek, (b) establish and operationalise community-based lift irrigation scheme and improve the water-use efficiency, (c) enhance the productivity of land as well as per capita income of the farmers through adoption of integrated agriculture practices in the command area.

The ongoing intervention will provide fresh water to irrigate additional 213 acres of agricultural land, benefiting 22 farmers of Premsar village. The farmers would be able to take second crop which will enhance their income by 25 % to 30%.

Experts and community members inspect the lift irrigation structure at Premsar village

Piloting artificial recharge of groundwater

The Government of India, through National Bank for Agriculture and Rural Development (NABARD), launched a centrally sponsored scheme for artifical recharge of groundwater through dug wells. The nodal agency for facilitating the processes at the district level was the respective District Rural Development Agency (DRDA). Porbandar taluka of Gujarat was classified as an overexploited taluka and Porbandar district was identified as one of the districts for implementing this scheme. SAVA was shortlisted for facilitating community mobilisation processes, popularising the scheme and carrying out surveys in villages to identify potential beneficiaries. CSPC partnered with SAVA and DRDA Porbandar to pilot the well recharge activity in an intensive mode in 10 salinity-affected villages. As part of the collaborative initiative 10 demonstration units of well recharge were constructed, intensive information dissemination campaign was organised in 10 salinity-affected villages and 200 farmers were identified to be part of the well recharge programme and facilitate the processes for developing linkages with DRDA.

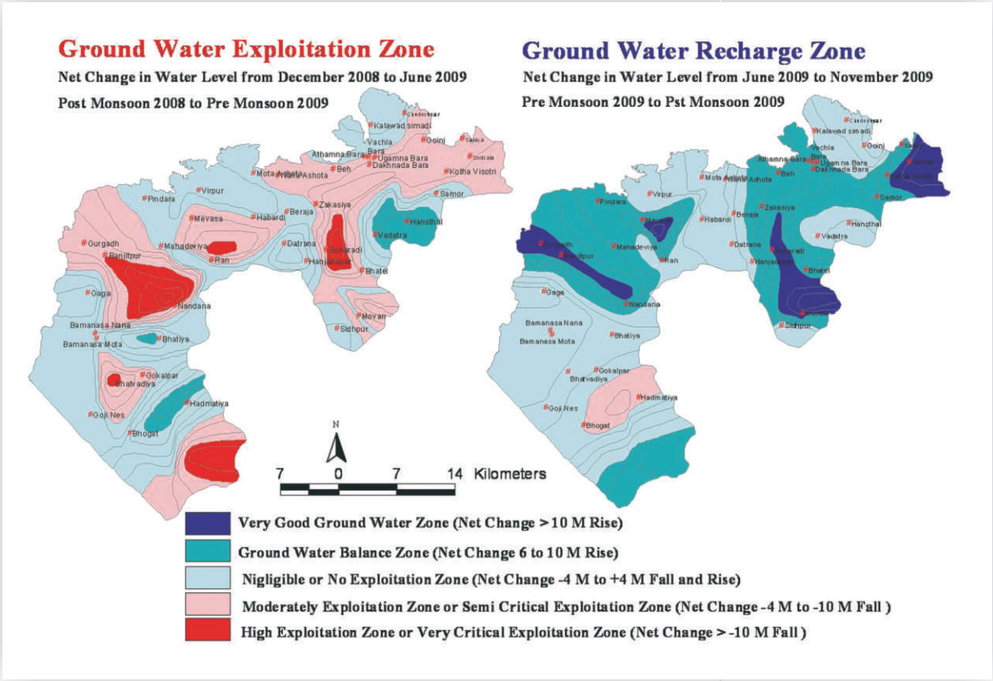
Handing out knowledge

A handbook on Agricultural Salinity Management in Coastal areas of Saurashtra and Kutch was developed as a handy reference for stakeholders of agriculture management. It had information related to the secondary baseline data based on the parameters of current agricultural profile, impact of salinity on agricultural production, land-use pattern, soil resources, climatic resources, water resources, land suitability analysis across the agro-ecological zones for different crops, current cropping pattern, crop-wise details on the package of practices and SWOT analysis of the different districts. This was coupled with proposals to improve the soil conditions, using micro nutrients, employing soil-reclamation techniques, integrated land development, appropriate cropping practices in saline soils, micro irrigation systems and appropriate package of practices.

Geo-hydrological Study: The Kalyanpur and Khambhaliya region have complex geological features which need to be understood before initiating any activity related to water conservation. So, a study aiming at developing the geo-hydrological profile and detailed village action plans of 30 villages of Kalyanpur and Khambhaliya talukas was initiated. This will assist the local stakeholders in taking decisions regarding the type of suitable water-harvesting structure.

Based on primary field and secondary data, various thematic layers on lithology and structure (folds, faults, type of bedding, lineament, etc.), geomorphology (landforms), and hydrology (water bodies, streams, etc.) were generated. The recharge potential zones of the project area were classified into three categories namely poor recharge zone, moderate recharge zone and good recharge zone. Strategies were designed for carrying out water resource development planning.

Another district-wise **handbook on Geo-Hydrological Aspects of Coastal Saurashtra and Kutch** was developed. It contains details about water availability; quality and key features like recharge potential and discharges to help laypersons to identify local names of major geological formations and correlate the details. The book is classified into three major zones according to the geography of the area. The major zones classified are region from Maliya to Okhamandal, Okhamandal to Diu and from



Map indicating groundwater exploitation and recharge zones

Diu to Bhavnagar. The book includes content on geomorphic characterization, geology, lithology, geo-hydrology, salinity in context with Saurashtra and Kutch, groundwater quality, recharge potential zones and decision making tools for water resource planning.

CSPC conducted a **Survey for the Concurrent Monitoring of Micro Irrigation Systems Implemented by Gujarat Green Revolution Company (GGRC) in Junagadh and Jamnagar districts**. The survey provided an opportunity to CSPC to assess the users' perceptions and inputs required for promotion of MIS in coastal areas. The survey revealed that there was an increase in farmers who adopted horticulture crops over agronomic crops. They preferred to take up horticulture with drip irrigation as it is the best suited method of irrigation, which not only saves water but also ensures regular water supply to the crops. Some respondents said that it saved up to 50 per cent water. Drip irrigation substantially increased income as it saves on conveyance losses, use of pesticides and fertilizers, labour on weeding and electricity consumption. The increase in income was mainly associated with lower production cost and increased productivity.

A study on the Socio Economic Impact Assessment of the Salinity Prevention Structures of Saurashtra Region was initiated in collaboration with Salinity Control Division, Bhavnagar. The study covered the Noli river basin, Langdi river basin, Khada bandhara and the spreading channels in Panchpiplava tidal regulator and Sodam. The study was done to understand the impact of government interventions like building tidal regulators, bandharas and check dams as well as spreading channels and reservoirs. It analysed the impact of recharging groundwater and controlling salinity to improve water availability and water quality of coastal aquifers. ■

Access to drinking water and sanitation

People living along the coast have water all around them, but none to drink. Quite an irony, because over usage of groundwater has led to the sweet water aquifers turning salty with the ingress of saline water. Even rainfall in this region is erratic and non-dependable; therefore, the people who were once blessed with abundance of water are now struggling to get easy access to potable water. Walking for kilometers to get clean drinking water and battling with health problems related to consumption of salt water have become a part of daily life here.

A recent study suggested that 3.14 per cent of the population of 30 villages in coastal Gujarat was affected by kidney stones. Not just the total dissolved salt content, even high calcium in drinking water was a suspected reason for kidney stone formation. This significantly higher occurrence of kidney stones along the coast was also supported by results from a previous study (Indu and Rawal, 2007). In that study, an exhaustive survey of two sets of villages close to and away from the coast gave incidence figures of 4.4 per cent and 2 per cent in the saline and non-saline villages, respectively.

Ensuring zero open defaecation

While acknowledging the need to have a special focus on drinking water issues in the coastal salinity affected villages of Gujarat, especially in Saurashtra region, WASMO and CSPC have synergised with a specially designed initiative – Coastal Areas Development Project (CADP) in identified coastal districts. The project aims to establish management systems to secure access to safe drinking water and sanitation facilities in the coastal villages of Gujarat. The project would cover 300 villages across nine coastal districts namely Ahmedabad, Amreli, Anand,

Inauguration of the Coastal Areas Development Project

Bharuch, Bhavnagar, Jamnagar, Junagadh, Porbandar, Rajkot. CADP is a collaborative effort of WASMO, SRTT, CSPC, civil society organisations and communities.

The objectives of the project are:

1. Provide seasonal security and conservation of water supplies with an integrated combination of pipe and local traditional water sources;
2. Provide more hygienic household and community environments with sanitation improvement and increased hygiene awareness in communities;
3. Community-managed implementation of water supply and sanitation improvements with facilitating inputs for community capacity building and empowerment;
4. Provide institutional facilitating support for community-level groups through the independent implementing support agencies;
5. Demonstrate the benefit and rational use of multiple source water supply using technological options and integrated community managed solutions;
6. Ensure participation of communities, especially women at all levels of decision-making processes.

The project commissioned since April 2009 and in the first year of preparatory phase, 300 water committees were formed; 264 detailed technical reports were prepared and accepted by village-level water committees in the gram sabha; more than five per cent of the community contribution was collected in 204 villages and physical work was undertaken in these villages.

The goal of addressing sanitation component under the CADP is to achieve Open Defecation Free (ODF) status of 150 villages aimed to solve problems such as faecal contamination of drinking water sources, the transmission of water / sanitation-related diseases and environmental degradation. Overall objective of addressing issues of sanitation are as under:

1. Establish sanitation as a human right for life with dignity in rural areas in

Ground reality — Women's resolve spins magic in Vav village

Access to drinking water was a major problem faced by the 676 people living in the coastal village of Vav in Vagra taluka of Bharuch district. Though everyone was bearing the brunt of this, no one was ready to initiate the process of finding a solution. That's when the CADP was launched by Vikas – Centre for Development in Vav village. The project was explained in detail to the community. But due to internal dissentions, the project was not accepted wholeheartedly. So, other activities like *gram sabhas*, youth meetings and hamlet meetings were organised to resolve the situation. In spite of the sincere efforts of the field workers, the organisation could not succeed in convincing the people to set aside their differences for the betterment of the village. But the field workers from Vikas – Centre for Development did not give up. They arranged a meeting with the women on the issue of drinking water and initiated a discussion on workable solutions. Here, the details of the CADP were also discussed. This initiative paid off and the women took the lead to solve the drinking water problem.

Vikas – Centre for Development then organised a *gram sabha* with the community to form the *pani samiti* (water committee). The unique feature of this *pani samiti* is that except the *sarpanch* and the deputy *sarpanch*, all the other members are women. These women developed a village action plan to set up drinking water supply systems. Regulations and laws related to the usage and conservation of water were discussed and adopted. Thereafter, the members of the *pani samiti* collected Rs 4,000 as contribution at the initial stage. This encouraged them to continue their efforts, which resulted in the collection of Rs 1.32 lakh as community contribution. All the decisions were taken by the women *pani samiti* members. And they achieved what no one else could – drinking water security and self-sufficiency.

Ground reality — Eradicating defaecation in Kundvi village

Kundvi is a small village in Talaja taluka of Bhavnagar. The village comprising of 110 households is relatively well placed as far as drinking water issues are concerned. However, sanitation is a concern as the community has been facing frequent outbreaks of water-borne diseases. The people strongly believed that it was imperative to stop defaecation in the open to put an end to these disease outbreaks.

Shamalbhai Bhadra and Kalubhai Chauhan emerged as opinion makers in the village and took on the mettle of leadership for creating awareness regarding the linkage between sanitation and health. They encouraged the people to avail the incentives being provided under CADP and with their efforts a beneficiary list was prepared in the village. This list was submitted to CSPC (and Total Sanitation Campaign) and as of now, nearly 90 per cent of the households have been provided with individual sanitation units. It was assessed that within a short period the village will be entirely covered with sanitation and it seems that the community is on the path to achieving the Open Defeacation Free (ODF) status.

Children lead the campaign to achieve the ODF status in Kundvi

coastal Gujarat.

2. Identify strategic intervention for integrating safe sanitation in ongoing drinking water initiative under CADP.
3. Create enabling environment in the project villages for adopting safe sanitation measures at village and household levels.
4. Support ongoing safe sanitation related initiatives of the Government and others to achieve higher impact in project villages.
5. Conduct piloting for appropriate technologies for waste water disposal system and cost-effective toilet designs for individual household.

This project which promises to change the lives of people is estimated to cost Rs 75 crore. Of this, Rs 58 crore will be leveraged from ongoing government programmes related to drinking water and sanitation, CSPC will mobilise Rs 5.15 crore from SRTT and the communities will contribute Rs 12.50 for the various interventions.

Providing potable drinking water

The other significant partnership was with TATA - General Electric (GE) to implement the Special Drinking Water and Sanitation project for the coastal area of Junagadh and Porbandar districts of Gujarat. The project envisaged benefiting 4,221 households (25,000 beneficiaries), of which 40 per cent lived Below Poverty Level (BPL). The Rs 114.13-million two-year project will end in March 2011.

SRTT has provided financial support for the implementation of water supply and sanitation infrastructure; whereas GE Foundation has donated Reverse Osmosis (RO) equipments. CSPC has played a pivotal role of nodal agency to conceive the project and facilitated the coordination among various stakeholders. The implementation of the project has been done by respective Village Water Committees

Villagers have taken on the challenge of getting the ODF status seriously

RO machinery in place at Loej village in Mangrol

whereas local implementation support organisations namely AKRSP (I) in Mangrol block of Junagadh district and SAVA in Porbandar block Porbandar district have facilitated the process of community mobilisation and institutional building to make the system sustainable. Eureka Forbes Limited has provided technical support for installation of RO and other water purification systems and ENV-DAS India Private Limited has provided technical consultancy for implementation of water supply system.

Detailed technical plans for all 10 villages were developed and implementation of physical work was initiated. GE imported all RO equipments to India and they will be installed in the villages. The RO plants would be commissioned by August 2010. The process of construction of individual sanitation units was also initiated in these villages. To make RO system financially viable, a management plan has been developed by pani samiti which will ensure that the revenue would be generated from the sale of water within and neighbouring villages.

Study the impact of poor water quality on health

Research study on Health Impacts of Poor Water Quality along Coastal Areas of Gujarat: State Level Assessment, Policy Implications and Development of an Action Plan was initiated to understand the overall extent of this problem along the state's long coastline, health risks due to consumption of poor water quality, interventions under rural health programmes and need for policy changes. This study conducted with CARE Water group generated a macro-picture along the entire coast of Saurashtra and Kutch area in Gujarat. Eye, skin and renal infections/diseases emerged as the most frequent. The study findings opened eyes about the spread of the kidney stone diseases in salinity prone villages, where the percentage of the population suffering from kidney stone is double than that in non-saline villages. The study suggested need for a preventive health programme designed in tandem with existing government health program like the National Rural Health Mission (NRHM) programme.

Ground reality

Communal harmony ensures water security in Dari village

Peace reigned in Dari village of Veraval taluka where 600 Muslim and 400 Hindu families lived together in harmony. They received drinking water at the stand post in the village chowk through the Regional Water Supply Scheme. Getting access to drinking water was the only reason that led to fights among the communities. The people were fed up of the fights as they escalated during the summer months. They wanted to get water connection in every house.

This concern was topmost on most minds, including Jagdish Bamaniya a 25-year-old Arts graduate who was a panchayat member, his friend Faruq Hasan Aakani, a 22-year-old ITI graduate and AKRSP (I), which had been working in this village for the poor and underprivileged since 2007. Jagdish operated eight self-help groups and a school for poor children with the aim of helping the poor and distressed people. Faruq was keen to help the poor by leveraging private or government schemes. That's when, in 2009, AKRSP (I) introduced CADP in the village. Both the youth were roped in due to their determination. They organised more than 20 hamlet meetings to create awareness about CADP. They also contributed in planning and organising workshops and exposure visits.

The drinking water scheme was designed with the help of Implementation Support Agency (ISA) engineers. The scheme was estimated to cost Rs 17.7 lakh and it would ensure tap connection in each household. Once it was approved, these two young men started the exercise of collecting community contribution. They collected contribution from 350 households deposited the amount in the bank. It was the effort of these two young men that helped solve the drinking water problem of the village. Now, people from 1,000 households avail water from this scheme and once again, Dari village will be an example of communal harmony.

Villagers work in tandem in Dari village to ensure water connection in every house

Fishing for more

Fishery is a traditional occupation of those living along the coastline. Pollution and activity along the coast has disturbed marine life. Therefore, over the years, the marine catch has dwindled and the fisher folk have to venture into deep and unknown waters to make a living. Unlike in agriculture and animal husbandry, the rural folk are not abreast about market needs and change in their occupation. Therefore, there is a need to intervene at this stage and help them catch up with the times.

Cluster-based income generation

Lobsters are highly priced crustaceans in India. They are in great demand as a delicacy in the internal market as well as a foreign exchange earner in the export market. It is observed that the coastal tract of Bhavnagar to Amreli provides ideal conditions for natural breeding of lobsters. Lobster-fattening is found to be feasible in coastal villages of Bhavnagar and Amreli districts. CSPC in collaboration with UTTHAN initiated a pilot programme in 2007 to promote an aquaculture project in two villages of Rajula taluka of Amreli district and Mahuva taluka of Bhavnagar district. The project provided additional income-generating opportunities to poor coastal communities through aqua/mariculture. However, the priority was to rear juvenile crustacean (spiny/rock lobster and crab) by fattening them and marketing high-value adult lobsters/crabs collectively through the self-help groups. A study revealed that lobster fattening was a beneficial

Fisher folk strike a pose with their catch for the day

livelihood activity. The economics of pit-culture was more attractive than those of cage culture. In Akhtariya village of Mahuva taluka, 123.5 kg was obtained. Before the intervention, the market price of the produce was Rs 150-200 per kg. But after the intervention it shot up to Rs 700-750 per kg. In Chanch village of Rajula taluka, a total income of Rs. 54,000 was generated from 65 cages.

Two self-help groups – Akthariya and Chanch Bawadiya successfully implemented lobster fattening in pits and sea cage culture, which is a combination of traditional practice and local innovation). This was a positive indication towards replicating it in more coastal areas like Bhavnagar and Amreli. CSPC in partnership with Matsyagandha Sarvangi Vikas Sanstha (MSVS) initiated a project on scaling up of mariculture pilots in coastal areas of Bhavnagar and Amreli districts. The project is being implemented with 216 members from 15 fisher folk groups across nine coastal villages in two districts. 375 fattening pits and 51 stocking pits were prepared. Fish catch of Rs. 884500 was made. The groups together saved Rs. 175840, out of which internal landing of Rs. 60100 was also done.

Piloting aquaculture with fisher folk

Muslim (miyani) communities are traditionally involved in activities related to fishing during the monsoon season. But the fisher folk communities of the region can not survive solely on this livelihood practices. Fishing as a viable livelihood option is a paying business only for those who can crop prawns and store them for a suitable period (between July and October) as that's the only way to command good prices and avoid dealing with traders who presently control both the prices and the business. The common fisher-folk in the area can pursue their traditional occupation only seasonally and that too provided they have the right equipment and some financial support at the right time. Most of them have neither of this support.

The micro project envisaged extending a seed-fund for 31 fisher-folk from five villages, viz. Haripar, Khara Vistar – 1 and 2, Khikli Vadsar and Beg Vistar. The seed fund was utilised vide extending loans to individual families through selected women's self help groups who have already been graded (in terms of performance and managing funds). In other words, the project parked the required amount with the Self Help Groups (SHGs) for which no interest was charged. The SHGs in turn, extended loans to the fisher folk to buy equipments (so that they can crop prawns). Rs 1 lakh was

Ground reality — **Breaking free from the net of harassment**

Rupaiben Gujriya is a single mother with six children whose livelihood depended on fishery. She lived in Akthariya village, Bhavnagar. The biggest occupational hazard she faced was harassment by police who took away her catch for the day for free. They used abusive language and also bothered her children when she was away. That's why the intervention by Utthan and CSPC along the coastal region seemed like an olive twig which she readily held onto. After attending trainings on improved fishing techniques, lobster fattening and administrative roles, she was equipped to improve the means of her livelihood. Now, she earns Rs 5,000 every month which is a cumulative income from lobster fattening, regular fishing and enhanced profit due to direct market linkage. Now, she has a house near the coast, access to clean drinking water and freedom to decide her style of working. She had ensured that she also works to improve the livelihood of other women in the vicinity. In a year, their group of fisherwomen earned Rs 80,000 which is a result of team work that has enhanced the complete chain right from fishing to the market.

Ground reality — **Quite a catch!**

Akbarbhai was dependent on fishing for his livelihood, but he did not have enough capital to invest in equipment to increase his profit. He had the zeal but lacked the resources. He was a member of the SHG formed by Saath. After discussing the options with the other members of the SHG, he took a loan of Rs 5,000 and increased the scope of his work. This helped him eliminate the problems he faced by renting them from traders. Within three months, he was able to generate a net profit of Rs 19,750. As his catch was more, he struck a deal with a trader who would buy his produce. Now, Akbarbhai has found a solution to his problems. He is able to support his family and take care of their needs.

Akbarbhai sells his increased produce from this shop

Creative innovative options

Salinity being a complex issue, there is a need to create innovative solutions to address the problem. Innovations provide scope to deviate from the tried and tested and work out issue-specific solutions. As the damage to the underlying aquifers has had an adverse impact, various partners have come together to share their experiences and thereby come up with solutions that can help break down the intensity at various levels. Over the years, these efforts have yielded favourable results.

Implementing dew rain water harvesting systems

In partnership with the Centre for Management Agriculture, Indian Institute of Management Ahmedabad (IIM-A), Kalyani Charitable Trust and CSPC implemented a dew rain water harvesting system in Satapar village of Kalyanpur taluka, Jamnagar district. The system established helped in field-level demonstration of dew rain harvest potential in the coastal belt along the Dwarka–Porbandar coast, where the villagers face perennial drinking water problems. The system estimated to collect 35–40 litres of water on a good dew night. It also estimated to capture 5,000 litres of dew water apart from the rainwater harvested. The total capacity of the underground tank was 20,000 litres. Though this experience is cost intensive it provides an alternate solution to the problem.

Solar fencing: A blessing for the coastal farmers to say goodnight

Increasing saline wasteland in the coastal areas gave way to the spread of Prosopis Juliflora – abode to the wild animals like Nilgai and wild pigs. Animal raids in the cropped agriculture fields demoralised coastal farmers from adopting or investing in farming. Looking at the gravity of the problem, an innovative technological solution of solar (zatka) fencing that runs on solar energy was installed by 51 farmers of Kalyanpur taluka. The farmers explored solar fencing as one of the innovative solutions to the problem. This is evident by the number of farmers who installed solar machines at their own cost. As the cost of one fence was Rs 49,000, the farmers spent a total of Rs 25.2 lakh. Solar fencing enabled cropping on 918 acres of land. The Kalyani Trust established itself as a local resource agency for providing knowledge regarding solar fencing use to the larger farming community. This is one of the successful model where small intervention lead to large scale replication with manifold impact.

Aerial view of the dew water harvesting structure

An ongoing village institution meeting to chalk out future plan of action

Fighting Salinity while Fighting Poverty

CSPC in collaboration with Vikas – Centre for Development initiated a project on Fighting Salinity while Fighting Poverty – Ecology Development and Land Reclamation Activities through Mahatma Gandhi National Rural Employment Guarantee Act (NREGA). The project focused on agricultural labourers, small and marginal farmers belonging to scheduled tribes living in coastal talukas of Bharuch district. The objective of the project was to combine the process of regeneration of natural resources with economic development of the poor with the help of National Rural Employment Guarantee Scheme.

The project was operational in 40 villages of Jambusar, Amod and Vagra talukas in Bharuch district. The project envisaged to create a model role of NREGA in salinity reduction and planning processes, to generate awareness among people seeking wage employment under NREGA, to create a local support system to assess the status of NREGA and innovative works such as mangrove plantation under NREGA; thereby benefiting 4,500 landless people and small saline agriculture land holders. ■

Sharing and learning

National seminar on crisis in drinking water in coastal regions in India

CSPC in collaboration with Centre for Development Alternatives (CFDA), organised a national seminar on crisis in drinking water in coastal regions in India. The objective of the seminar was to understand the various drinking water problems plaguing the people living along the coast and finding answers to them. Experts from various fields were brought together on one platform to share their experiences and help come out with solutions to address these issues. The output of the seminar was a plethora of suggestions which are being considered and worked upon.

A dialogue on salinity

CSPC re-launched the quarterly newsletter *Kharash Samvad*. The idea was to revive the print forum for greater information exchange among stakeholders as well as sharing experiences and innovative interventions in the context of salinity mitigation across coastal villages of Gujarat. Over a period

of time, CSPC also visualises *Kharash Samvad* as an independent forum for sounding ideas, views and concerns of the communities affected by salinity.

Spreading the word

Information, education and communication material was created as a part of the knowledge management activities of CSPC. Posters on salinity mitigation were developed and shared with villagers in the CADP area and a brochure with details of the TATA-GE programme was developed by CSPC. The objective was to create awareness about the issues of salinity and the possible solutions. Villagers used these posters and brochure at meetings and during gatherings to raise awareness about practices that led to better hygiene and effective salinity mitigation. ■

Image of the brochure and posters developed to spread awareness about salinity issues

Charting the future course

CSPC has been working with various organisations to evolve sustainable approaches to salinity ingress prevention and mitigation as well as enhance livelihood resilience of coastal communities affected by salinity. After having accumulated knowledge, replicable models and experiences, CSPC has charted its future course based on the studies conducted and field experiences consolidated over the years. The learning has been that for any effective solution the approach has to be an integral part of the strategy. Therefore, the approach includes:

- **Addressing salinity as a national issue and concern:** Engagement with the government at the state and national levels, as there is a need to raise the level of debate on the issue of salinity, to draw attention and commitment of policy makers and executives. To take the learnings of Gujarat in other parts of the country facing similar situation of salinity, CSPC initiated a scoping study of Tamil Nadu to identify issues relating to coastal salinity and possible solutions. Gradually, CSPC will expand it's learnings to other states.
- **Inter-sectoral and institutional collaboration:** Working closely with the government to promote efficient and judicious use of natural resources for economic purposes like industrial and infrastructural development. As part of this collaboration, it is important to ensure that the ecological balance and economic needs of the local people are given utmost priority. It would focus on developing institutional synergy with academic and research institutes to develop scientific database which can help effective results through field experiments. The communities living along the coast have battled for their survival and livelihood for centuries. This has drawn considerable strength and support from the resilience of the communities as well as NGOs working in the region.
- **Sharing learning for expansion:** Need for horizontal and vertical knowledge sharing about micro-level initiatives among stakeholders to initiate action and expand the areas of influence and impact. There is enormous learning available in various parts of the country and across the border which on would be internalised through cross learning exercises.
- **Pioneering a people's movement:** As it is the people who are bearing the brunt of salinity ingress it is important to address this issue, keeping them in focus. Initiatives that originate from their resources and knowledge base and go on to strengthen them are most effective and sustainable. Salinity has adversely affected the quality of life and livelihood of the people living in the coastal regions, so it is important to equip them to take on this issue head on and work towards finding solutions. Inclusion of women and vulnerable sections of the society would be one of the major challenges, to be addressed through people-centric approach and to promote village level sustainable institutions.
- **Linking salinity with economic development:** Adopting agricultural practices that arrest and reverse salinity will be sustainable only if it

Promotion of integrated water management and improved agriculture practices in coastal region

makes economic sense to the farmers. Therefore, necessary research, technical and marketing support should be created and made available to primary producers; this will ensure that this initiative is not only economically but environmentally viable.

Just as important as the approach is the focused growth based on detailed research and on-field experiences. CSPC will continue to work on creating analytical databases to help effective intervention, developing itself as a knowledge centre on salinity issues, carrying out studies to assess the impact of salinity mitigation and coping mechanisms, identifying new projects and partners, providing inputs to strengthen partner organisations, networks and the government, mainstreaming problems related to salinity, invoking larger dialogue and developmental interactions on sustainable addressing problems of salinity ingress prevention and mitigation.

Besides these, CSPC has also set some goals and outputs that it plans to achieve by 2011.

Regaining agricultural dynamism: Reclamation of un(der)utilised land resource, improving the natural resource base, diversification of agriculture and agri-business development along with a strong emphasis on the research for newer income generating activities based on the natural resources for specific regions.

Focus on inclusive growth: Inclusion of new regions, new initiatives, revision of existing programmes, targeting specific sections of the rural community, empowering communities through Right to Information (RTI), besides building partnerships with the governments through specific programmes like TSC, NREGA etc. ■

Understanding the monetary angle

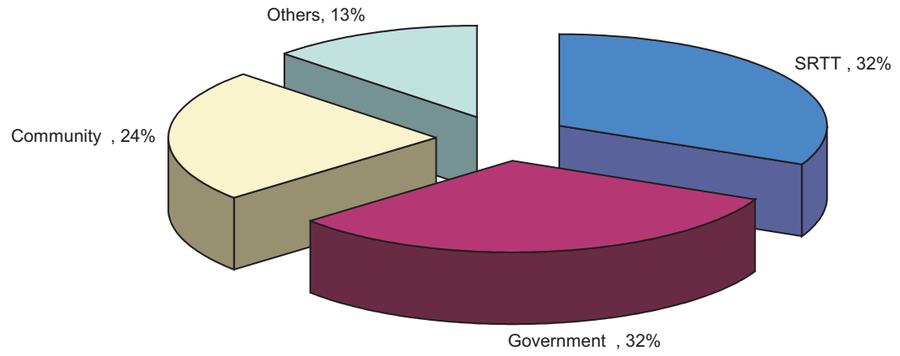
Though the CSPC came into existence in April 2008, earlier during 2005-08 it worked as "Coastal Salinity Cell" an integrated unit of AKRSP (I). CSPC received the core funding from SRTT. CSPC's expenditure for the period 2008-10 was Rs. 293.94 lakh out of which Rs. 233.43 lakh was towards programmatic expenditure and Rs. 60.51 towards operational cost.

Total expenditure (Rs. In lakh)

Expenditure	2009-10	2008-09	Total
Programmatic	170.60	62.83	233.43
Operational	36.49	24.02	60.51
Total	**207.09**	**86.85**	**293.94**

Percentage share contribution

Fund mobilised from various sources (Percentage)



As envisaged, one of the role of CSPC is to work as resource centre and bring various stakeholders including the funding organizations together to work on salinity issues, CSPC played instrumental role in mobilizing funds from other sources by developing thematic projects. During 2008-10, CSPC mobilised around Rs. 3102.56 lakh from various organizations. SRTT contributed Rs. 991.37 lakh, whereas the community contributed Rs. 735.55 lakh. CSPC mobilised Rs. 982.43 lakh from Government and Rs. 393.21 lakh from other sources. ■

Knowing our people

Board of directors

Apoorva Oza	Chairperson and Director
Arun Pandhi	Director
Alok Krishna	Director
Haribhai Mori	Director (Retired in September 2009)
Prof Indira Hirway	Director
Chandrakant Kumbhani	Director (Joined in September 2009)
Prof Sukhpal Singh	Director (Joined in September 2009)

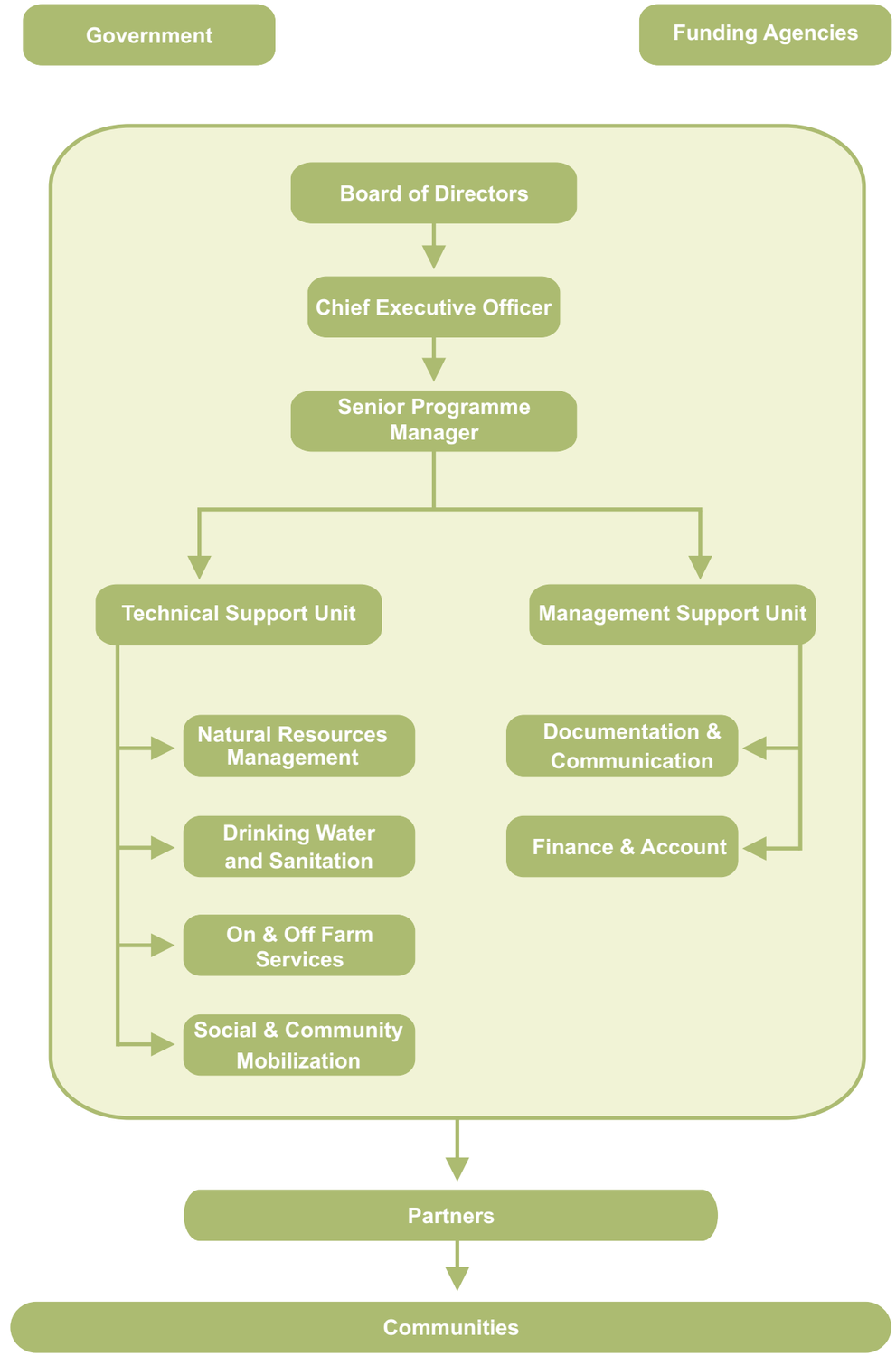
Advisor

Bharat Lal

Team Members

1. Arvind Parmar
2. Divyang Waghela (On deputation from SRTT)
3. Pramod Sahu
4. Ram Mahavadiya
5. Rupesh Shah
6. Sonia Bendre
7. Uday Gaikwad
8. Vishnu Patel

Organisational structure



Our Partners

Joint efforts on the field

1. Aga Khan Rural Support Programme (India), Junagadh
2. Ambuja Cement Foundation, Junagadh
3. Cohesion Foundation Trust, Ahmedabad
4. Foundation for Ecological Security, Anand
5. GRISERV – BAIF, Bhavnagar
6. J. V. Nariya Education & Charitable Trust, Jamnagar
7. Kalyani Charitable and Welfare Trust, Jamnagar
8. Mahiti Rural Development Centre, Ahmedabad
9. Matsyagandha Sarvangi Vikas Sanstha, Bhavnagar
10. Ravi Foundation, Junagadh
11. Saath, Rajkot
12. Sarvani Charitable Trust, Jamnagar
13. Saurashtra Voluntary Actions, Jamnagar and Porbandar
14. Tata Chemicals Society for Rural Development, Jamnagar
15. Utthan, Amreli and Bhavnagar
16. Vikas – Centre for Development, Bhavnagar
17. Vivekanand Research and Training Institute, Amreli and Kutch

Enhancing knowledge

1. Aalekhan Communication Solutions, Ahmedabad
2. Arid Communities and Technologies, Bhuj
3. Care Water Group, Anand
4. CASFOR Development Consultancy Pvt. Ltd., Ahmedabad
5. Central Soil Salinity Research Institute, Bharuch
6. Centre for Development Alternatives, Ahmedabad
7. Centre for Integrated Development, Ahmedabad
8. Charkha, Ahmedabad
9. Government of Gujarat
10. MarketPulse Knowledge Network Pvt. Ltd., Bhopal
11. Sajjata Sangh, Ahmedabad
12. Saline Area Vitalization Enterprise, Ahmedabad
13. Salinity Ingress Prevention Circle (SIPC), Rajkot
14. Water and Sanitation Management Organization, Gandhinagar

Abbreviations

ACF	:	Ambuja Cement Foundation
AKRSP (I)	:	Aga Khan Rural Support Programme (India)
BPL	:	Below Poverty Line
CADP	:	Coastal Area Development Programme
CFDA	:	Centre for Development Alternatives
CSPC	:	Coastal Salinity Prevention Cell
DRDA	:	District Rural Development Agency
FES	:	Foundation for Ecological Security
GE	:	General Electric
GGRC	:	Gujarat Green Revolution Company
GIS	:	Geographical Information System
GRISERV	:	Gujarat Rural Institute for Socio Economic Reconstruction Vadodara
GoG	:	Government of Gujarat
HLC	:	High Level Committee
IIM-A	:	Indian Institute of Management (Ahmedabad)
ISA	:	Implementation Support Agency
KVY	:	Kharash Vistarotthan Yojana
MIS	:	Micro Irrigation System
MSVS	:	Matsyagandha Sarvangi Vikas Sansthan
NABARD	:	National Bank for Agriculture and Rural Development
NGO	:	Non Government Organisation
NREGA	:	Mahatma Gandhi National Rural Employment Guarantee Act
NRHM	:	National Rural Health Mission
ODF	:	Open Defeacation Free
OSGP	:	Okhamandal Samriddhi Gram Pariyojana
PIM	:	Participatory Irrigation Management
RO	:	Reverse Osmosis
RRWHS	:	Roof Rain Water Harvesting Structures
RTI	:	Right to Information
SAVA	:	Saurashtra Voluntary Actions
SAVE	:	Saline Area Vitalization Enterprise
SHG	:	Self Help Group
SIPC	:	Salinity Ingress Prevention Circle
SRC	:	Salinity Resource Centre
SRTT	:	Sir Ratan Tata Trust
TCSRD	:	Tata Chemicals Society for Rural Development
TSC	:	Total Sanitation Campaign
VAP	:	Village Action Plan
VRTI	:	Vivekanand Research and Training Institute
WASMO	:	Water and Sanitation Management Organisation

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