Water Matters

Annual Report 2017

DHAN Foundation


Celebrating
25
years of
Vayalagam Tankfed
Agriculture Development

Water Matters

Perspectives, Principles and Practices of DHAN's Water Initiatives

"The greatness of a nation and its moral progress can be judged by the way people treat the environment".

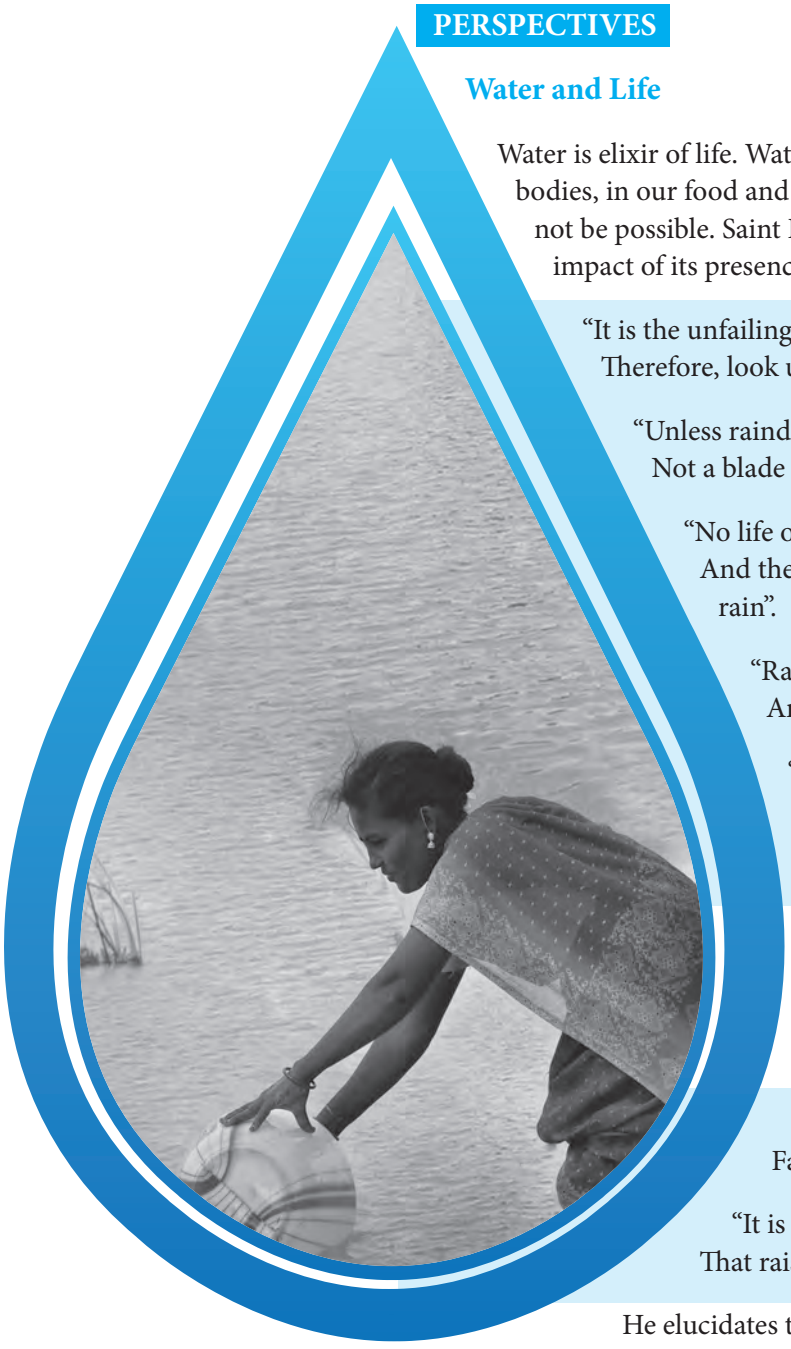
- Mahatma Gandhiji

"Anyone who can solve the problems of water will be worthy of two Nobel prizes, one for peace and one for science."

- John F. Kennedy

PERSPECTIVES

Water and Life



Water is elixir of life. Water is everywhere on our planet, in the air, in our bodies, in our food and in our breath. Without it life as we know it would not be possible. Saint Poet Tiruvalluvar wrote about the water and the impact of its presence and absence 2000 years ago in the following lines:

"It is the unfailing fall of rain that sustains the world.
Therefore, look upon rain as the elixir of life".

"Unless raindrops fall from the sky,
Not a blade of green grass will rise from the earth".

"No life on earth can exist without water,
And the ceaseless flow of that water cannot exist without rain".

"Rain produces man's wholesome food;
And rain itself forms part of his food besides".

"Though oceanic waters surround it, the world will be deluged
By hunger's hardships if the billowing clouds betray us".

Monsoons are the primary source of water for sustaining life in the Indian context. Also, the monsoon causes problems to human life here. Saint Poet Thiruvalluvar further says,

"When clouds withhold their watery wealth,
Farmers cease to pull their ploughs".

"It is rain that ruins, and it is rain again
That raises up those it has ruined".

He elucidates the nexus between the terrestrial and marine water ecosystems, and how do they interact to sustain the ecological balance.

> "The very nature of oceans, though vast, would diminish,
> If clouds ceased to take up water and give back rain's gifts".

Illuminating the social, cultural and spiritual functions of water Tiruvalluvar says,

> "Unless the heavens grant their gifts, neither the giver's generosity
> Nor the ascetic's aloofness will grace this wide world".
>
> "Should the heavens dry up, worship here of the heavenly ones
> In festivals and daily rites would wither".

Access to water is an imperative for public health, whether it is used for drinking, domestic use, food production or recreational purposes. Improved water supply and sanitation, and better management of water resources, can accelerate economic growth and can contribute greatly to poverty reduction. In 2010, the United Nations General Assembly explicitly recognized that access to water and sanitation is a human right. It reinforces that everyone has the right to sufficient, continuous, safe, acceptable, physically accessible, and affordable water for personal and domestic use.

Water, a Global Development Priority

Under the Millennium Development Goals, the target of reducing the proportion of the world's population without sustainable access to safe water (MDG 7), was measured by the indicator of the population using improved drinking-water sources, but without taking into account the location, availability, or quality of the water. Whereas the Sustainable Development Goal target 6.1 calls for universal and equitable access to safe and affordable drinking water. The target is measured with an indicator of "safely managed drinking water services" – drinking water from an improved water source that is located on premises, available when needed, and free from faecal and priority chemical contamination.

According to World Health Organisation, in 2015, 5.2 billion people had access to safely managed drinking-water services, that is, they used improved water sources located on premises, available when needed, and free from contamination. The remaining 2.1 billion people without safely managed services included:

- 1.3 billion people with basic services, meaning an improved water source located within a round trip of 30 minutes
- 263 million people with limited services, or an improved water source requiring more than 30 minutes to collect water
- 423 million people taking water from unprotected wells and springs
- 159 million people collecting untreated surface water from lakes, ponds, rivers and streams.

Sharp geographical, socio-cultural and economic inequalities persist, not only between rural and urban areas; but also, in towns and cities, where people living in low-income, informal, or illegal settlements usually have less access to improved sources of drinking-water than other residents.

Water and Poverty

Poverty is complex, multidimensional, and is the result of myriad interactions between resources, technologies, institutions, strategies, and actions. The multidimensional character of poverty has been reflected in a wide array of approaches, poverty reduction strategies, and policies. Although water provides only a single element in the poverty equation, it plays a significantly powerful role through its wide impact on such factors as food production, hygiene, sanitation and health, vulnerability/food security, and the environment. Indeed, development agencies, groups, and experts worldwide are increasingly recognizing the important role that water can have on poverty.

Meeting the needs of the poor has too often been seen as simply providing safe drinking water. Quite important as this is, it is not the only challenge facing

poor women, men, and children around the world. They also need access to water for productive use to provide a livelihood, and water is critical to the ecological services on which many of the poor depend.

Water is indeed a significant key to sustainable development. The problems with water and its use pervade the lives of the poor. The link between poverty and the familiar issues of health, food security, and environmental integrity are well understood and widely documented and there is common agreement that poverty and water are inextricably linked. The details of this connection vary greatly, but the impact of water on the lives and prospects of the poor is clear.

Pro-poor actions in water service provision and resource management for improved health and well-being should be the central element of any programme to tackle poverty. While it is true that globally, things have improved at a faster rate than at any time in human history and developments such as broader and improved irrigation, increased water supply coverage, better primary health care and education systems have improved the lives of many, it is also true that the poorest and most vulnerable remain untouched by this progress and will remain so, however well we make conventional approaches work.

As things stand, if we continue to rely solely upon traditional approaches, the best we can hope for is improvements that will help more poor people significantly, but still leave a significant proportion of the poor with few or no prospects of ever improving their water security. Above all, there can be little optimism that the approaches of the past century can be replicated to reach the hundreds of millions of the poor who live in societies and environments where large-scale infrastructure investments will not work. For these people, new approaches are needed for water management that more closely reflect their conditions of poverty and optimize the opportunities that exist to reduce this poverty.

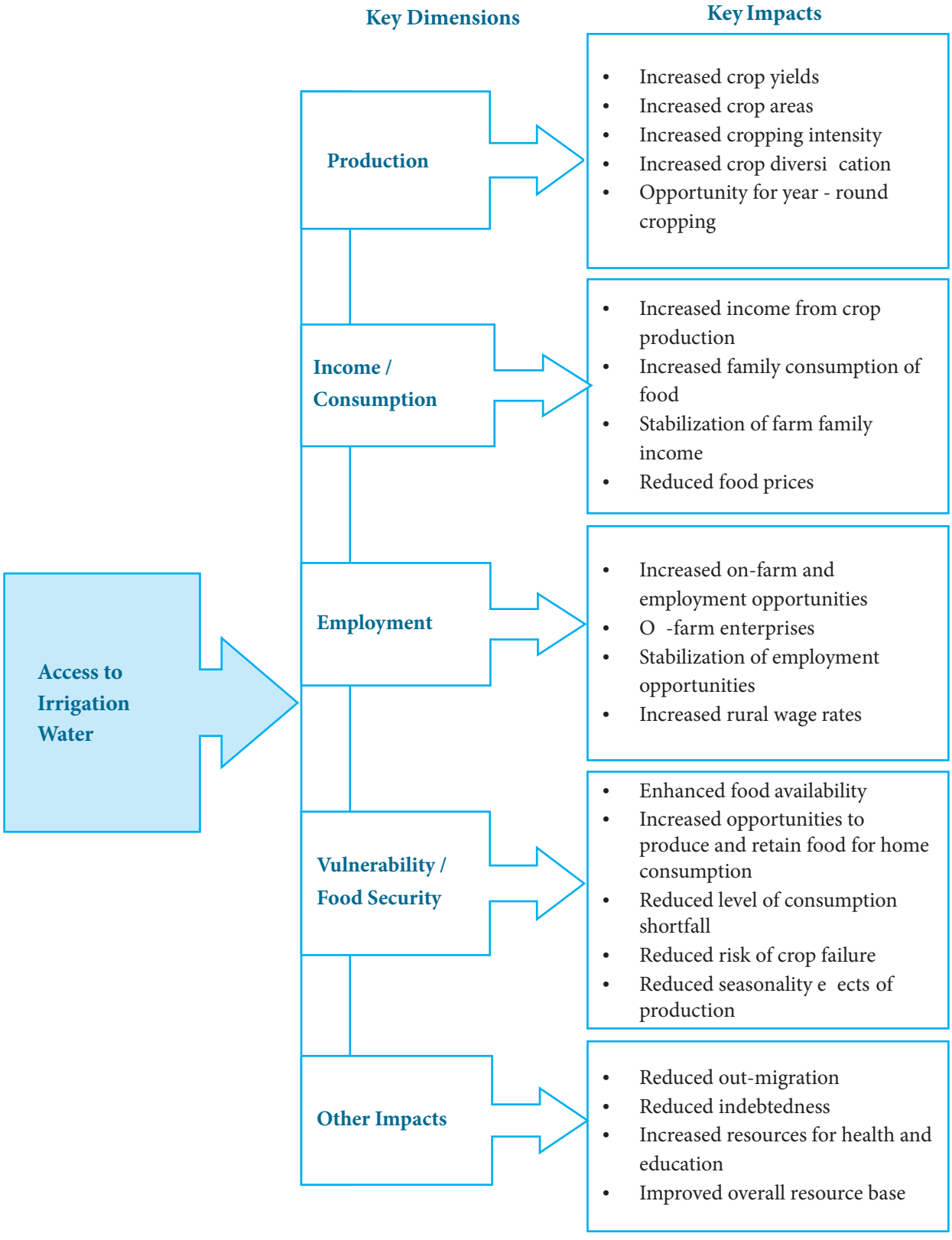
Identifying such innovative approaches and processes should be one of the main goals of development. There is need to create more pro-poor water governance, improve access to quality water services, mainstreaming gender in all aspects of water management, involve and empower the poor and develop their capacity in making decisions that affect their water management and their water-related livelihoods, strengthen their ability to cope with disasters, manage the water resources sustainably and improve the health and well-being of the poor. There are no easy prescriptions, no panaceas, or universally applicable solutions. However, there are some fundamentals that apply everywhere, including the need to create fair and representative governance conditions and means of participation for all, ensuring efficient and sustainable levels of service provision. There is also the need to ensure that water is mainstreamed into wider national and international development approaches such as the poverty reduction strategy papers. Water can-and often does-make a major contribution to poverty reduction but water management alone will not solve poverty problems and poverty will not be reduced without improved water security.

Water, Agriculture and Poverty

Within the water and poverty debate, agricultural water holds a unique place. While solutions to other dimensions of the water and poverty problem such as sanitation, hygiene, and potable supplies, generally call for increased expansion of services, the agricultural water/irrigation problem requires drastic improvements in existing services. Furthermore, agriculture is now the world's largest user of water, consuming 70–80% of annual utilized supplies and providing livelihood for most of the world's poor.

Within agriculture, water is a vital resource for many productive and livelihood activities and many developing countries have promoted water resources

Water, Agriculture and Poverty: Key Dimensions



development over the last five decades to improve social outcomes. Huge investments have been made in water resources to achieve such broad objectives as economic growth, rural and agricultural development, national food security, famine protection, and land use intensification. While irrigation development can have negative impacts on the poor under some circumstances, agricultural water/irrigation has been regarded as a powerful factor for providing food security, protection against adverse drought conditions, increased prospects for employment and stable income, and greater opportunity for multiple cropping and crop diversification.

Access to reliable irrigation can enable farmers to adopt new technologies and intensify cultivation, leading to increased productivity, overall higher production, and greater returns from farming. This, in turn, opens up new employment opportunities, both on-farm and off-farm, and can improve income, livelihoods, and the quality of life in rural areas. Overall, irrigation water—like land—can have an important wealth-generating function in agriculture, specifically, and in rural settings in general.

There are five key interrelated dimensions of the relationship between access to good agricultural water, socioeconomic uplifting in rural communities, and poverty reduction. The dimensions are production, income/consumption, employment, vulnerability/food security, and overall welfare.

In general, access to good irrigation enhances opportunities to diversify their income base, reducing vulnerability caused by the seasonality of agricultural production as well as external shocks. Thus, access to good irrigation has the potential to contribute to poverty reduction and the movement of people from ill-being to well-being.

As with direct benefits, the indirect benefits of irrigation services will also not accrue evenly across household sectors. To the extent that irrigation increases crop production, food prices will decline due to increased overall supplies. For both categories of the landless, any fall in prices will result in an increase in real incomes and food security as well as increased employment and other opportunities via the multiplier effect in both local and regional economies. Smallholders will also receive indirect benefits from price declines to the extent that they are net food buyers, whereas large holders—net food sellers—may experience low or negative indirect impacts. While the exact distribution of irrigation benefits among these various classes within any agricultural system is an empirical question and will be dependent on equity in land distribution, the important point is that direct and indirect effects must be considered to comprehensively understand the impact of irrigation on the rural poor.

To the extent these conditions or enabling environments are lacking or imperfect, on-ground benefits of irrigation to the poor would continue to be discounted. For instance, in settings with high degree of inequality in land distribution, irrigation would have lower impact on poverty, as water rights and potent benefits are virtually tied to land ownership. Lack of ownership or formal land titles and poor-insensitive land tenure systems, as is the case in many developing countries, result in self-exclusion for the poor, such that benefits of public irrigation accrue mainly to fewer landholders. Even if landholdings are equitable, when irrigation resources are poorly managed, or access to complementary production inputs (agro-chemicals and credit) is poor, the impact of irrigation interventions on poverty is likely to remain small. Even if the first two conditions are met, but irrigation water supplies are inequitably distributed or inadequate, and opportunities for conjunctive use of groundwater are constrained due to its poor quality or high abstraction costs, possibilities for reaching out to the poor through irrigation will remain minimal.

A shift from low-value subsistence production to high-value market-oriented production is the next step to the road out of poverty, as it is a key driver of income diversification and risk management. Similarly, newer production technologies and crop varieties, geared to suit small farmers and fit small plots, are a must for pulling the poor out of poverty through irrigation. Even if all these aforesaid conditions are met, when poor farmers remain unable to sell their bumper harvests in distant markets, due to market imperfections or high

transaction costs, actual benefits of irrigation to the poor will fall short of their potential. Existence of employment opportunities outside the farming sector, especially in areas with high land-to-man ratios, would further help diversify incomes, minimize risk, and reduce poverty. In short, it is the "package" that matters for effective poverty reduction and not the mere supply of irrigation water.

There are strong direct and indirect linkages between irrigation and poverty. Direct linkages operate via localized and household-level effects, and indirect linkages operate via aggregate or national-level impacts. Irrigation benefits the poor through higher production, higher yields, lower risk of crop failure, and higher and year-round farm and non-farm employment. Irrigation enables small holders to adopt more diversified cropping patterns and to switch from low-value subsistence production to high-value, market-oriented production.

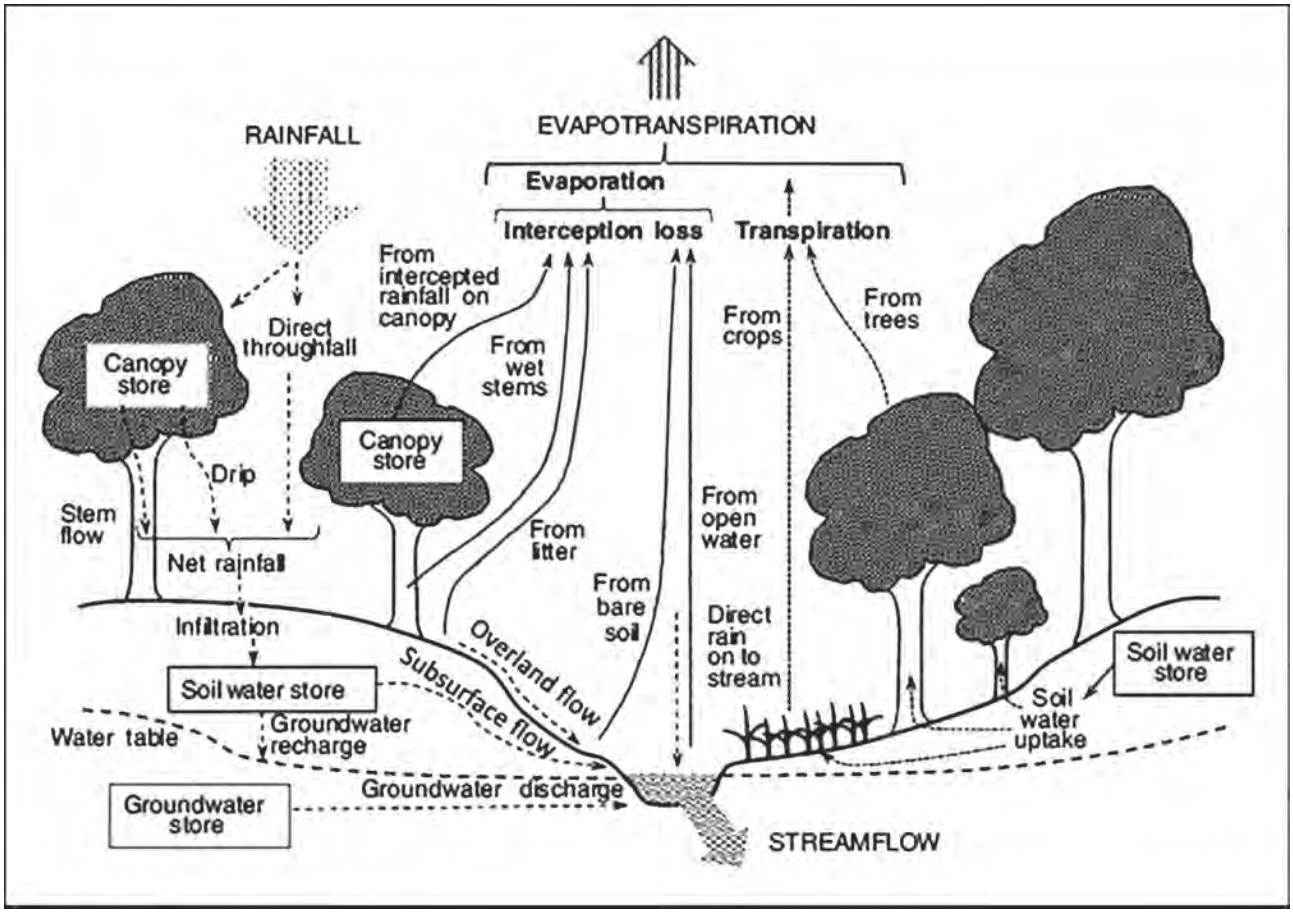
The transition to the market economy integrates the poor into land, labour, and commodity markets and empowers the poor by putting them at a level playing field with other market entities, including the non-poor. Increased production makes food available and affordable for the poor. The poor and the landless are main beneficiaries of low food prices as they are net buyers of food. Indirect linkages operate via regional, national, and economy-wide effects. Irrigation investments act as production – and supply-shifters, and have a strong positive effect on growth, benefiting the poor in the long run. The magnitude of indirect benefits could be many times more than the direct and household-level benefits. Further, irrigation benefits tend to affect the poor and the landless alike in the long run, although in the short run, relative benefits to the landless and land-poor may be small, as the allocation of water often tends to be land-based. Allocating water to the land and not to the households is inherently biased against the landless. In spite of this, the poor and the landless, in both absolute and relative terms, benefit from irrigation investments. Recent advances in irrigation technologies, such as micro-irrigation systems, have strong antipoverty potential.

Water: Agro-ecological Perspective

The water cycle is a biophysical process, heavily influenced by ecosystem functioning. The healthy functioning of ecosystems underpins a multitude of benefits (services) derived from ecosystems. Water is a critical component in maintaining these functions, while keeping them resilient to change (Costanza et al., 1997). The presence and absence of water in the landscape very often determines the characteristics of several supporting and regulating functions, for e.g. preserving nutrients and removing pollutants (Falkenmark, 2003).

The water cycle at the agro-ecosystem scale is illustrated in the following figure. Water is a key factor to be managed to enhance agricultural benefits, whether in rainfed or in irrigated farming stems. In rainfed farming systems, management aims to maximize soil infiltration of rainwater and soil water holding capacity or, in some cases, to drain excess water to ensure good growth. In irrigation, the same management aim is met from water derived from external sources (surface or groundwater sources) at timely intervals for the crop.

The implications of considering water in this ecosystem context are twofold. First, as explained here, water underpins many ecosystem benefits, food production being only one. Although it has long been established that using water in agriculture has implications for other uses, there remains, in many circles, limited understanding of how these impacts are delivered, their importance and how they can be managed. Secondly, water management policies in agriculture can be dominated by considering visible surface water and groundwater (e.g. irrigation), whereas the less visible parts of the water cycle (e.g. land cover and cycling through soils) are important and can often be underemphasized. Molden (2007), for example, noted that while potential productivity gains are available in irrigated agriculture, perhaps the biggest opportunities lie with rainfed agriculture, which largely involves improving rainwater retention by soils. Some ecosystem-driven aspects of the water cycle that merit better attention include:



The ecosystem context of water presents a paradigm shift in how we think about the water–food–environment interface. Historically, the water–environment interface has been largely one of conflict in which the 'environment' (or ecosystem!) has been regarded as an unfortunate but necessary victim of development.

An alternative approach is to view water management as the management of water use and ecosystems in order to deliver multiple ecosystem benefits in a mutually supporting way.

Agro-ecosystems

Agriculture is an ecosystem management activity from which primary and secondary agricultural products are appropriated by humans (Fresco, 2005). An 'ecosystem' can be defined as a dynamic complex of plants, animals, microorganisms and their non-living environment, of which people are an integral part (UNEP, 2009). All agricultural activities depend on a functioning ecosystem, for example, healthy soil or the presence of pollinators, but can also have an impact on the ecosystem beyond the immediate interests of agriculture, for example, downstream water pollution. Defining the management components of ecosystems is largely a matter of scale. Discrete ecosystem types can often be identified (for example, soils, wetlands, mountains, dry-lands, and forests), but although some management activities might focus on these discrete elements (for example, managing soil in a field), the reality is that all these components are interconnected, and particularly so through water.

Certain components of agro-ecosystems are particularly relevant to the scope of water and food security. These include: open water bodies (such as wetlands, rivers and lakes) that can supply water to agriculture but also compete with agriculture over water, and are affected by agrochemicals such as fertilizers and pesticides; and soils, which are the immediate source of water for most crops. Most agro-ecosystems, certainly at the larger scale, contain a mosaic of multiple land use types.

Ancient View of Land and Water

There are numerous ways of classifying the watersheds. The Agricultural Engineering Department has classified the watershed into four grades namely Grade I, Grade II, Grade III and Grade IV watersheds based on soil erosion and order of streams. However, the High-Level Committee report prepared by Dr. V.C. Kulandaisamy and others classified the watersheds into three major groups namely Hilly and Forest dominated, predominantly Irrigated and predominantly Rainfed.

The **Sangam landscape** is the classification of land found in classical Tamil Sangam literature. According to the nature, landscape, people, occupation, culture and social life, they were classified into different tinais or modes. Each tinai was closely associated with a particular landscape, and constituent climate, geography, people, fauna and flora.

- **Krinji** includes hills and hilly landscape. It is characterized by red and black soils with stones and pebbles, streams and waterfalls are the predominant source of water. Gathering of forest produces, hunting of animals were the major source of livelihoods.
- **Mullai** is the land of the forest with predominantly red soils. The forest is rich with lakes, waterfalls, teak, bamboo and sandalwood. In this region, millet grows and wild bees are a source of honey. Pastoral and agricultural occupations are the major source of livelihoods.
- **Marudam** land consists of cultivable plains and valleys, rich in alluvial soil. Lakes and ponds are the predominant source of water.
- **Neidhal** consists of coastal plains and seashore as the primary landscape. Ponds and wells are the sources of freshwater and sea water occupies the major part of this landscape. Fishery and fishery related livelihoods are the major source of livelihood here.
- **The pālai** or wasteland/desert land is not seen as being a naturally occurring ecology. Sangam literature of Tamil, explains that instead, the landscape of the wasteland with which the paalai is associated emerges when other landscapes whither under the heat of the burning sun. Water bodies in this context are dry wells and stagnant water

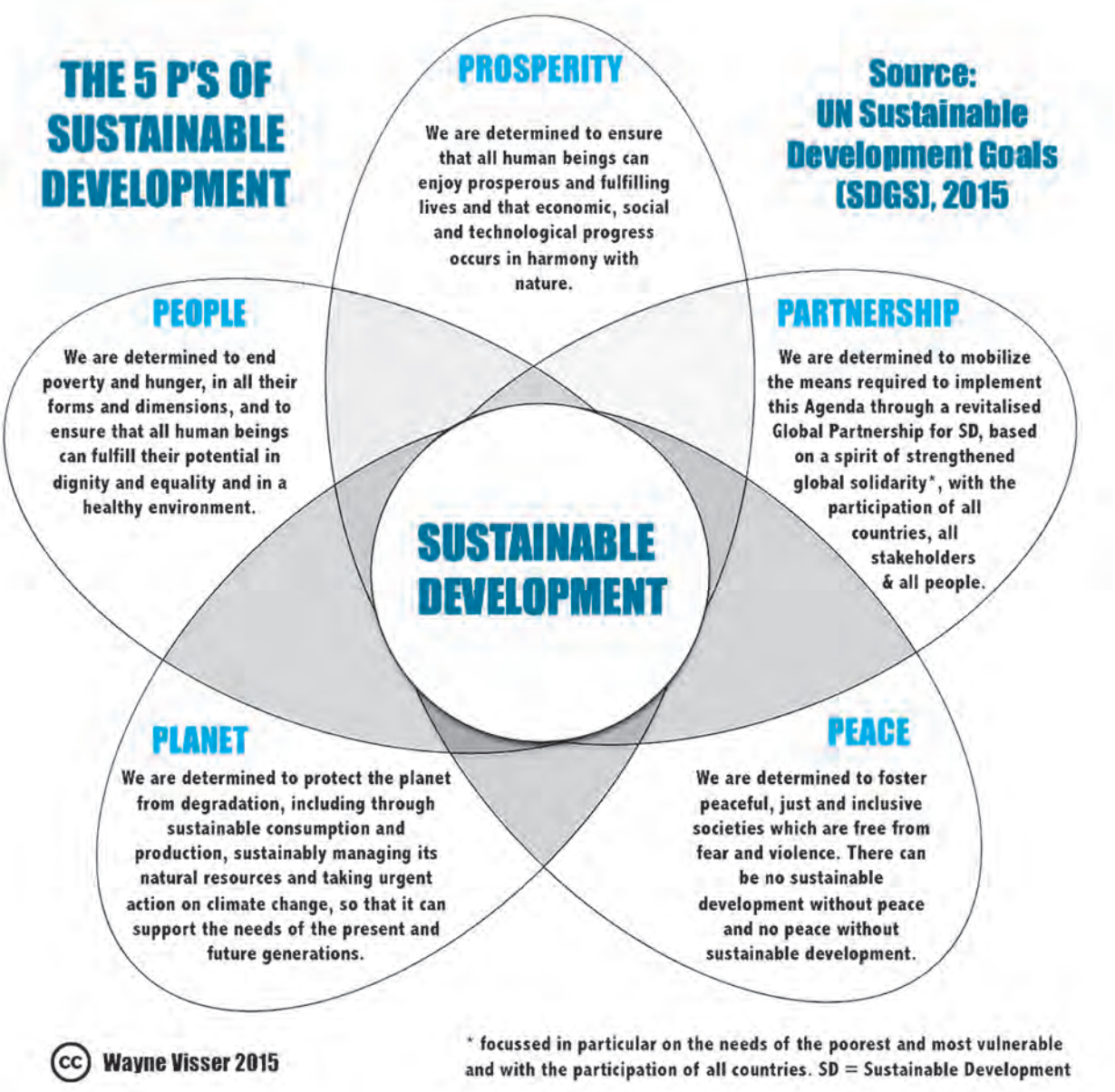
During the early phases of the Sangam period, people depended heavily on rains as the primary source of water for agriculture. However, increasing demand stemming from a growing population led to the development of better methods of irrigation. Since the rivers of the region were not perennial, the primary goal was to procure an adequate and continuous supply of water.

Tanks, lakes and dams were important water storage systems that were developed for this purpose. Sluices and shutters were constructed for regulating water for irrigation. Sometimes, buckets made of reeds were used for watering the lands. In order to control the flooding of rivers, sand mounds were raised so that water could be diverted for irrigation. Direct irrigation from canals was possible on the river basins of the Cauvery, the Periyar and the Tamaraparani. Kallanai, a dam built on river Kaveri during this period, is considered the oldest water-regulation structure in the world. Kaveri, Pennai, Palaru, Vaigai and the Tamaraparani were the major rivers.

Water stored in tanks and reservoirs was delivered to the fields through channels. There is a considerable amount of spring channel irrigation in the Palar, Kaveri and Vaigai beds. To raise a second crop, well water was very useful. People of this era knew how to divine the spots where there was flow of underground water and dug wells there. Men and oxen were used to irrigate the lands from well water. When water supply was limited and demand was more, it became the duty of the village authorities to distribute the available water in a proper manner. Day and night watchmen were employed to guard the tanks and reservoirs and regulate the water supply.

Water and Sustainable Development Goals

Goal 6 is a dedicated water goal – to "Ensure availability and sustainable management of water and sanitation for all". The agenda will be adopted by Member States at the Sustainable Development Summit in September 2015. Goal 17



deals with different Means of Implementation for the achievement of the objectives. This includes Capacity Development, Financing, Institutions, Policies and Partnerships and Technology as a catalyst for change.

The SDG on Water and Sanitation proposes the following accomplishments by 2030.

- Achieving universal and equitable access to safe and affordable drinking water for all.
- Achieving access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.
- Improving water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated waste water, and increasing recycling and safe reuse globally.
- Substantially increasing water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity.
- Implementing integrated water resources management at all levels, including through transboundary cooperation as appropriate.
- Protecting and restoring water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

- Expanding international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.
- Supporting and strengthening the participation of local communities for improving water and sanitation management.

Access to safe water and sanitation and sound management of freshwater ecosystems are essential to human health and to environmental sustainability and economic prosperity. People without access live predominantly in rural areas. Achieving universal access to basic sanitation and ending the unsafe practice of open defecation will require substantial acceleration of progress in rural areas. Effective water and sanitation management relies on the participation of a range of stakeholders, including local communities.

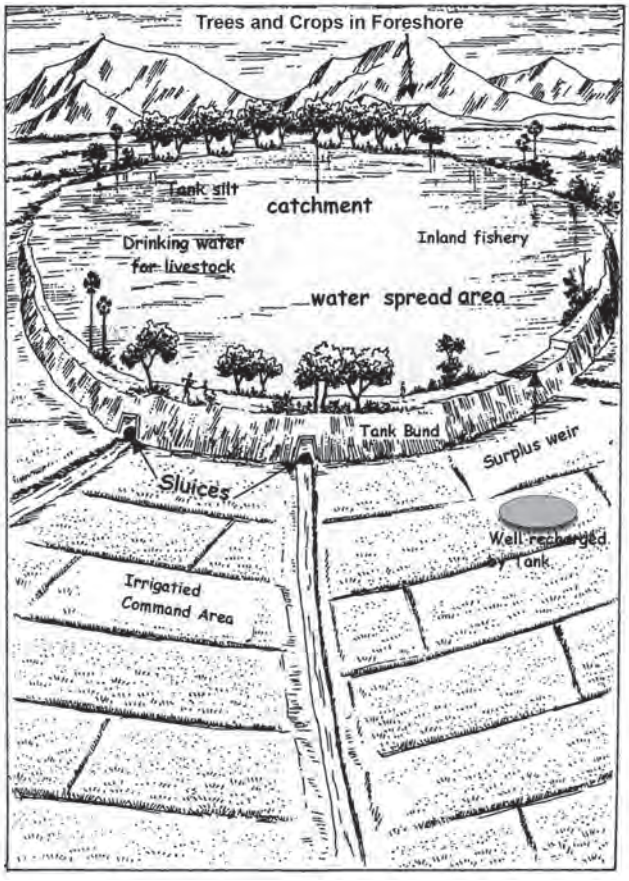
As water moves in time and space consistent with the hydrological cycle, the term 'water management' covers a variety of activities and disciplines. Broadly speaking, these can be divided into three categories: managing the resource, managing water services, and managing the trade-offs needed to balance supply and demand. The management of water is not merely a technical issue; it requires a mix of measures including changes in policies, prices and other incentives, as well as infrastructure and physical installations. Integrated water resources management (IWRM) focuses on the necessary integration of water management across sectors, policies and institutions.

Legacy of Tank Irrigation System

India, with its 17 percent of global population and with only 4 percent of fresh water resources is waging a fierce battle on meeting continuously increasing water demand with the available water supply. The importance of water conservation by every citizen and the State is very vital as of now, the effects of climate change, poor governance, lack of community ownership and participation, either limited or no plans on river basin specific, "bottom-up approach" make the demand on water a finite source more challenging. It is also clear from Sustainable Development Goal 6 which relates water and improved sanitation, reducing water pollution, improving water demand management and making sustained water use. Readers are exposed to grassroots' experience over the two and half decades working on improving livelihoods of small and marginal farmers, women and landless across 20 river basins in six states in India, the insights and learning on water commons.

Tank is a Basin

India has many historical evidences on irrigation structures, systems and management, almost from 8th century AD onwards. The evidences capture India's long history of human interventions in the management of village water bodies. One such intervention is an irrigation tank. A tank is a simple earthen banked rainwater harvesting and storage structure, designed by the early settlers using their indigenous wisdom and constructed with the generous support of native rulers and chieftains. The topography of Deccan Plateau provided a good base



for locating these innovative water bodies. Irrigation tanks are simple technological innovations developed by those people to accommodate their primary needs and adapted to the distinctive Indian climate – intense monsoons followed by protracted droughts.

"Tanks need to be thought of in terms of a wide complex of natural resources, physical facilities, land use patterns and managerial institutions. The tank is not simply an irrigation system that starts from the reservoir down. It is also a collection point for run-off from the catchment area, pond for pisciculture, source of silt for fertilization and construction material, a recharge structure for local groundwater, a location for cultivation on common lands, a source of drinking water for livestock, and finally, an irrigation system for crops. To help keep in mind this multiplicity of uses which spans the administrative ambit of several government departments, it is useful to think of tank complexes as basins rather than tanks, which too often connote only the direct surface irrigation aspects of these systems." (John Ambler, 1994)

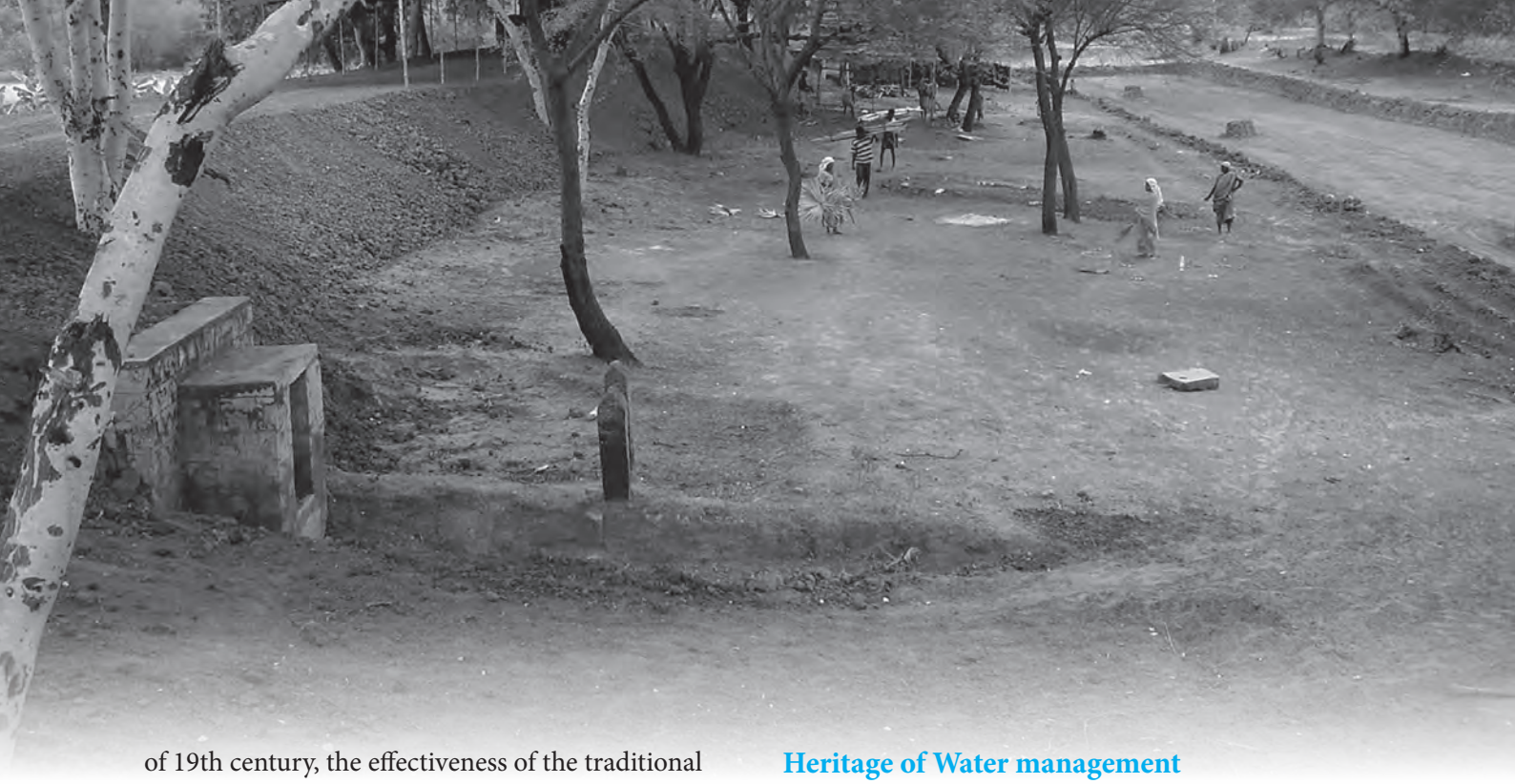
Even now, the tanks in South India and Ahar-Pyne System in Magadh region have very high relevance in practising Integrated Water Resources Management (IWRM). As per minor irrigation census (1994), there exist 500,000 irrigation tanks in the country; of which 150,000 tanks are located in the Deccan Plateau covered by South Indian states. Similarly, there are over 20000 Ahar-Pyne System linking rivers in South Bihar and parts of Jharkhand in Ganga Basin. These irrigation tanks are situated in sequential chains (cascades) with the slope mildly dipping towards the southern coastal plains in the Deccan Plateau. As a result, the rainfall runoff flowing from a sub-basin and/or watershed is effectively impounded and harnessed for multiple uses with irrigation being the major user.

Tanks in the Indian context are inextricably linked to the socio-cultural aspects of rural life and have historically been an indispensable part of the village habitat, sustaining its socio-ecological balance. Tank systems, developed ingeniously and maintained over the centuries, have provided insulation from recurring droughts, floods, vagaries of the monsoon, and offered the much-needed livelihood security to the poor living in fragile semi-arid regions. Of late, the importance of tanks is being realized even more, as the rapidly growing use of groundwater and large surface irrigation systems are proving costly and inadequate to meet the increasing demands for irrigation water. Conserving the tank eco-systems for multiple uses such as irrigation, domestic and livestock use and groundwater recharge is a way to provide a safety net to protect the livelihood of millions in a semi-arid India.

Heritage of Community Management: Kudimaramath

These tanks and ponds were owned and managed by the local communities themselves, they followed a unique system of *Kudimaramath. 'Kudimaramath'* literally means maintenance and repairs ('maramath') by the farmers ('Kudi') themselves. The word on the tradition of 'Kudimaramath' was in vogue in almost all parts of the present Tamil Nadu. In ancient India, water was managed through a system of patronage and community control through village councils, particularly in South India. In Tamil Nadu, during the Chola rule, parts of the Grand Anicut canal system which were maintained by the government were known as 'sarkari'. The lower parts maintained by farmers were known as 'Kudimaramath', i.e. people's maintenance by contributing labour. This was essentially meant for keeping the distribution system under the canals and channels of tank irrigation systems in good conditions by the farmers for their own benefit by a system of contributing labour. The rate of such contribution was usually proportional to the land holding size. Where direct labour could not be arranged, equivalent amount was collected in cash. Desilting the field channels and the feeder channels that carry the flows just before the monsoon starts or irrigation has to be started, reforming the bank, clearing weeds are the essential tasks performed in this way.

The institution of 'Kudimaramath' witnessed a gradual decay with the advent of the British rule as the management of tanks shifted to a centralized channel namely PWD. However, after the introduction of Ryotwari settlements by the middle



of 19th century, the effectiveness of the traditional system deteriorated progressively, resulting in decay of local management. After independence too, successive governments failed in their attempts to revive the 'Kudimaramath' works, where each family would contribute their labour towards the repair and maintenance works. After independence, major irrigation projects such as construction of dams and canals received the government's attention and the neglect of tanks started. Also, the management functions of tanks came under different line departments with neither integral approach nor common purpose. This neglect and continued mismanagement have resulted in the steady decline of the performance efficiency and degradation of these precious small-scale water bodies.

Given that water is generally linked to land, the direct benefits of irrigation, in terms of increased farm output, will tend to accrue in proportion to the size of landholdings, with large holders benefiting more than smallholders, and smallholders benefiting more than the landless. However, the landless can still directly benefit from increased irrigation services. For instance, those working in the agricultural sector can experience an expansion in employment opportunities and agricultural wages, enhancement to livestock and poultry raising, and improved opportunities in other noncrop, water-dependent rural enterprises (e.g., brick making).

Heritage of Water management

Traditional system of water allocation and sharing was based on custom, belief, and the concept of equity, as they perceived. This ensured smooth sharing and minimized conflicts. The structures built with the available technology also contributed towards efficient management. Behind these existing indigenous systems of irrigation, there are thousands of years of tradition. A closer examination of the technology behind these structures indicates that the design that the design principles developed thousands of years ago still holds good and is applicable in future also.

Before the advent of the British rule, the local communities had complete control over the water bodies. The village organizations had well laid out rules and fixed responsibilities to manage

water efficiently. They employed persons to operate sluices (Madaiyaans), distribution of water (Neerani, Neerkatti or Kanduvetti). There were village accountants, village watchmen (Kaval). All these persons and the village artisans were paid from the total produce of the village. Inscriptions of Sangam period contain wealth of information on water sharing, distribution, water rights and responsibilities – the key elements of water management. The traditional water managers played a key role in effective water management

Most of the tanks in South India had water guides/managers to effectively manage the water distribution. Each tank had one or more Neerkattis. There are no accurate estimates as to how many Neerkattis would have been involved in such tank management in the region. One of the estimates says there are around 4000 Neerkattis in Gundar Basin, one of the dry river basins measuring around 5,500 sq. km of geographical area with around 2500 small and big tanks. They are still working in the tanks providing irrigation and other services to the dependent farming communities.

The Neerkattis had several functions to perform ranging from supply of water to every field at the farm level to safeguarding the tank structures from all natural and manmade calamities. Neerkatti is a mobilizer of the village labour, he undertakes watch and ward of tank assets, he ensures water management according to the available water and need of the crop, he would forecast the monsoon and water availability, and he manages the water at times of scarcity and demand.

Tanks Serve as an Ecosystem

In rural India, tanks have been playing very vital role in socio, cultural, economic and environment development.

In accordance with the proceedings of the Ramsar Convention, such tanks and ponds come under "man-made inland - wetland ecosystem" based on their origin, vegetation, nutrient status and thermal characteristics. Although these water harvesting systems provide multiple services, they are valued mainly for their agricultural, domestic and livestock uses. The various services rendered by the tank eco-system are as follows:

- **Provisioning services** such as freshwater, food fibre, fuel and medicinal plants.
- **Regulating services** such as climate regulation, water regulation (ground water recharge/ discharge), water purification (retention and removal of excess pollutants, diluting the toxicants), erosion regulation, natural hazard regulation (flood control, drought mitigation) and pollination (habitat for pollinators),
- **Cultural services** such as spiritual & inspirational, recreational, aesthetic & educational
- **Supporting services** such as soil formation (sediment retention and accumulation of organic matter) and nutrient cycling.

Even while demands for tank eco-system services are growing, human actions are at the same time diminishing the capability of the tank ecosystem. One of the reasons for this normally could be that people are unaware of important ecological services other than the overt economical services provided by the tank ecosystems.

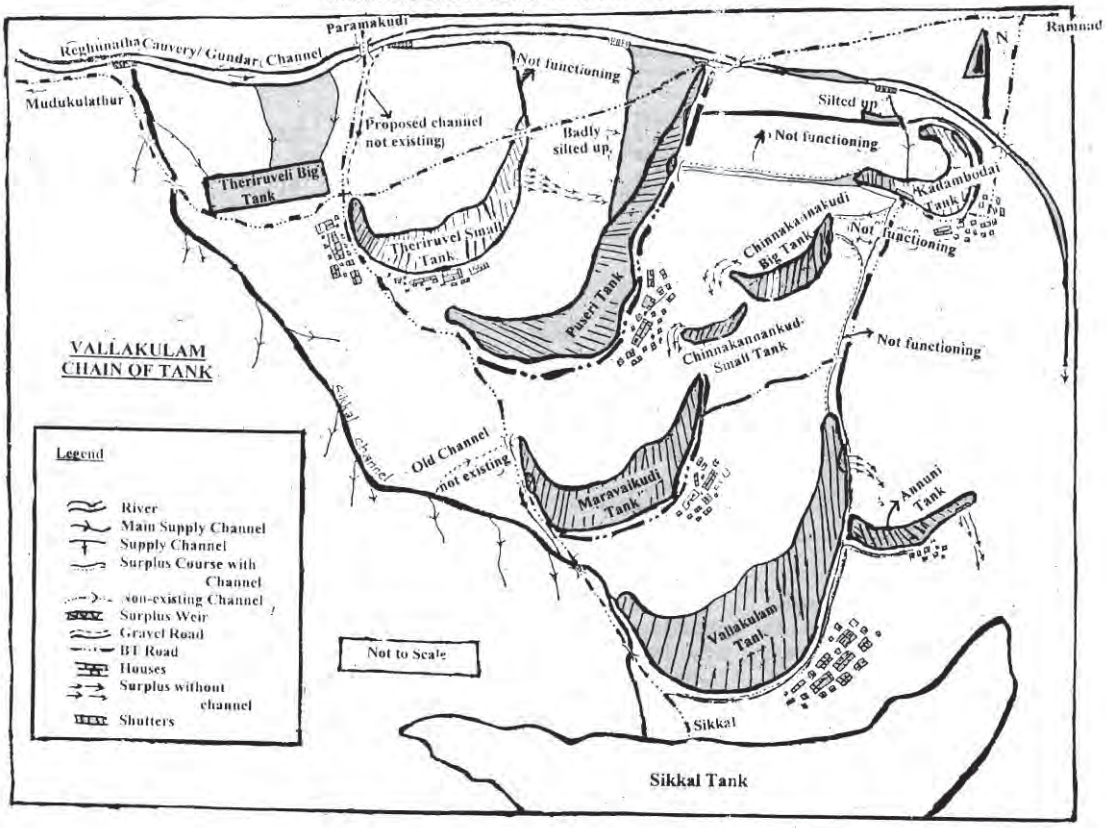
The environmental perspective of tanks

Wetland Eco-system: Tanks are one of the wetland eco-systems, which house many trees, flora and fauna in their foreshore and bunds in addition to agro-climatic zone-specific cropping pattern in command area of the tanks. They generate greater revenue for the people who directly depend on them.

Ground Water Recharge Basins: Tanks are predominantly situated in hard rock area and most of them vary from shallow 1m depth up to 6 metres depth. They store monsoon run-off for more than 4 to 6 months. They facilitate groundwater recharge in their zone of influence and facilitate the groundwater level increase in many places since the pores closed due to siltation opened up after rehabilitation of tank systems.

Better Water Use and enhancing cropping productivity: Tanks in Southern India are situated in Deccan Plateau in cascades. The monsoon

MAP OF VALLAKULAM CASCADE OF TANKS IN THE GUNDAR BASIN OF RAMANATHAPURAM DISTRICT



received in the catchments is equitably distributed among the tanks in cascades based on their capacity and hydrological linkage. There is least amount of conveyance, seepage losses in tank cascade systems as against the canal irrigation systems. The equitable distribution of water and smaller land holding in command area of each tanks facilitate higher productivity if the tank cascade systems perform to their optimum efficiency.

Tanks and Inland fisheries: As the tanks hold water for 4 to 6 months, the village communities take up pisciculture activities as the freshwater ecosystem nurtures the growth of fishes and fetches the community good price when they auction the catch at the time of less water storage in tanks. The poor people and other villagers use some quantity of the reared fishes for their own household consumption.

Tanks and Afforestation: In the context of South India, especially in Tamil Nadu, the Forest Department is allowed to raise social forestry (acacia plantations) in the tank bed; in a period of 5 to 6 years, they mature to a sizeable bio-mass which is cut and sold for fuel and timber. Also, a sizeable amount of resource mobilized from selling woods is likely to be shared by the local institution for managing and maintaining the tanks.

Tanks and Grazing: After rehabilitation of tanks, if foreshore plantation is carried out and grasses are grown under the trees and bunds, then the grasses are used by the livestock as grazing land. As such in Tamil Nadu state, there is no category under Land Use pattern for grazing lands; only the tanks provide source for grazing immediately after monsoon season.

Tanks and Bird Sanctuary: The trees for shelter and availability of sufficient feed in the water make the tanks a better place for residing of birds. In many South Indian tanks, bird sanctuaries are situated. To quote a few, Vedanthangal in Kancheepuram District, Kudakulam in Tirunelveli District, and Chitrakudi tank in Ramanathapuram District serve as bird sanctuaries. The communities even now preserve the sanctuaries by deputing their own watch and ward and impose social norms such as ban on fire crackers use, hunting practices and the like.

Livelihood and Conservation

In the rural Indian context, particularly in drought-prone areas, the minimum livelihood needs that have to be assured would consist of domestic water (including drinking water and water for livestock), food, fuel, folder, some biomass input to the agricultural system to maintain soil productivity and other goods and services that may have to be maintained from the larger system. The last would include needs such as health, education, entertainment, transport, etc. Additionally, since our understanding of livelihood includes the way livelihood is earned, access to resources – whether it is land, water, livestock, or any other resource or facility needed for the production process – is also considered part of the livelihood needs.

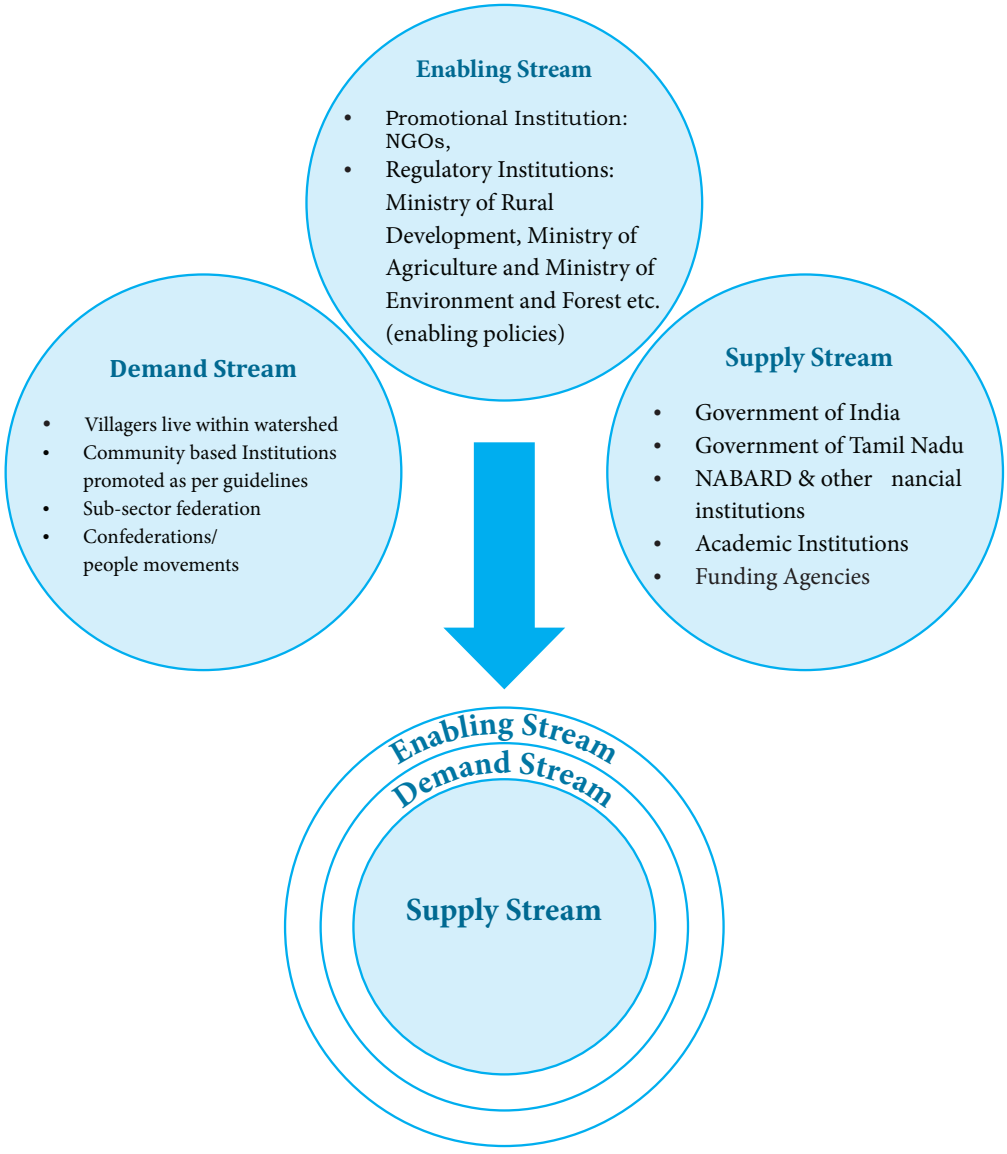
In the context of livelihood needs, one of the important questions is how many of these needs should be fulfilled locally (and to what degree) in kind? For example, it could be argued that if farmers produce sufficient cash crops and get high returns, they could then buy food. In other words, it is not necessary for watershed development to contribute towards food production, if it contributes to raise their cash income sufficiently to buy the required food. The same argument would apply to fuel or fodder. In many of these areas under the high input-based green revolution agriculture, this has already happened. Even in many areas where rainfed cash crops are important, farmers have to produce for the market to have enough cash to meet their food requirements.

However, for a number of reasons, we believe that if the food, fodder and fuel requirement is produced locally and preferably by every farmer, then there is greater self-reliance and dependability of livelihoods.

We should also note that livelihood needs would depend upon the livelihood patterns in an area and for different social sections, in the patterns prevalent among them. For example, the fodder needs of a household that is primarily dependent on pastoral activity as the primary source of livelihood would be quite different from that of a typical peasant household. Watershed development itself could change them significantly in one direction or the other.

Key stakeholders in Water Commons

There exist three distinct streams in the country as far as service sectors are concerned and they are demand stream, supply stream and enabling streams. The demand stream comprises the poor who may either be unorganized or organized and who are often represented by Community Based Organisations (CBOs) such as People Movements and federations. Supply stream comprises the State and Market while the enabling stream consists of promotional agencies such as NGOs, regulatory institutions, government press, research and academic development. We are of the strong view that a proper and sustained networking between these streams would lead to a state of better development as far as service sectors are concerned. However, as of now, there exists a wide gap between these streams.



A closer look at the roles of each of these three streams in building and managing sustainable water solutions carves out unique space in the water sector.

Demand stream

Demand stream includes the farmers and landless communities dependent on water resources who are mainly the unorganized. Organising them into associations, networking them into cascade associations, federations and basin level organizations brings them collective capacity to build smoother working relationship with the supply stream so as to access institutional finances and resources for conservation and development of water resources. It necessitates a strong demand stream. This means not only providing basic skills of leadership, financial management, accounting, etc. but also the positive framework of attitudes and belief systems towards proper fund utilization for sustainable development of water resources to ensure water and food security so that poverty and livelihood issues are addressed in an integrated manner.

Supply stream

Supply stream includes both central and state governments, apex banks such as NABARD and other financial institutions, funding agencies, CSR arms of private institutions and academic institutions involved in facilitating water conservation and development initiatives through project implementing agencies (PIAs) and ensuring adequate funding for physical infrastructure

development focusing soil and water conservation. This supply stream needs a foresight and visioning, perspective building on community centred water conservation, development and management.

Enabling stream

Enabling stream includes the NGOs involved in promotional and development of user groups, functional groups and watershed associations through social intermediation. The regulatory and government bodies and policy-making institutions also form part of the enabling stream as they play a critical role in providing favourable policy framework and supportive environment, which enables the water conservation and development programmes. For achieving sustainability of water conservation and development initiatives, involvement from planning to execution and subsequent management the enabling stream is also sine qua non. The competence level of organizing systems and structures for formation of the groups and identifying the standards for building up the strong and sound demand stream is critical.

Preserve, Conserve and Use: Reversing Priorities

When we take stock of the current status of the water sector, it is revealed that there has been a drastic change in preservation (P), conservation (C) and use (U) of water within a century, more so in the last few decades.

Figure1 shows that preservation becomes extinct, conservation efforts are becoming difficult and 'over use' and 'abuse' of water is the order of the day. Human civilization is now under threat and water wars are going to emerge. The situation is bleak when we look at surface water and groundwater,

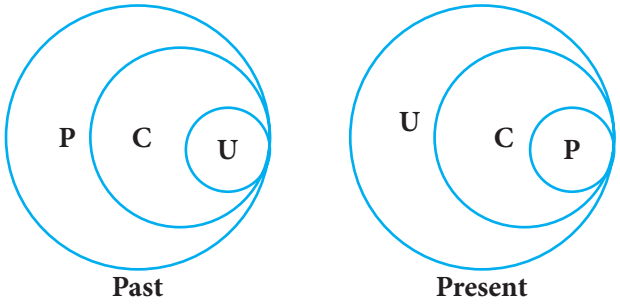


Figure 1. Change in Water Situation

and also green water. Urban settlements are under constant threat because of abuse of groundwater and demand for 'water' from elsewhere. Drinking water demands are in conflict with other uses of water. Quality of water deteriorates drastically due to pollution and groundwater mining which also lead to sea water intrusion. Silent disasters and calamities are 'creeping' in because of 'abuse' of groundwater. Droughts leading to migration both seasonal and permanent are happening in water starved Deccan plateau (Southern India), western India and other parts of India.

All stakeholders, state, market, civil societies and others have to **relook** the present situation of water use, conservation and preservation.

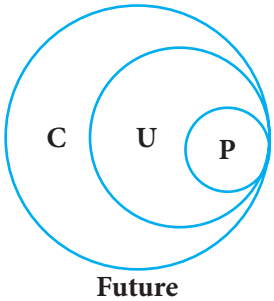


Figure 2. 'CUP' of water for future

Figure 2 suggests a shift to conservation of water on a larger scale and use should be the sub-set of conservation. Further, a critical mass of preservation has to be attempted on a war footing. All future search exercises should include this perspective with long-term focus. Conservation of small-scale water bodies namely tanks, ponds, springs and streams will have to be 'the thrust' of the present generation.

PRINCIPLES

- Tank systems are small, spread over numerous villages offering tremendous scope for local management and shall easily be governed by the local villages.
- Local management will be the key to infuse grassroots action and initiate local public works such as tank rehabilitation works.
- There is no reason to allow the decay of tank systems, which have survived several centuries, in the absence of any available alternatives to the communities.

- Tank systems provide multiple uses for various segments such as water, fishery, trees, sand, silt and also used in agriculture, domestic, drinking, groundwater recharge, and ecosystem uses for plants and animals.
- Tank systems are located in comparatively resource poor areas deprived of water resources such as rivers and streams, therefore serving the disadvantaged sections of the Indian masses that deserve such support.
- Tank conservation is a process of undertaking integrated development works such as tank beds, bunds, sluices, streams, and supply channel networks on a cascade basis starting from smaller watersheds to bigger basins.
- Tanks are the biggest existing and surviving commons in the villages and their decline will bring an irreversible decay to the watersheds where human population density is the highest.
- It is possible and achievable with necessary support, to bring an integrated and coordinated action among individuals, intellectuals and research institutions in the country through systematic works.
- Public-Private participation in developing and implementing conservation and sustainable use policies and programmes should be provided for and encouraged in the country.
- Action plans for threatened tanks will be a platform for action from the larger sections of the society involving rural and urban users for a larger cause of maintaining the environment.
- The strategy calls for action to be undertaken at the local, district, state and national levels. The strategy divides the South Indian states into three broad categories as solely tank dependent, conjunctive use of tanks & wells, and groundwater recharges.
- There are variations across the regions, local environments, practices and tank user regimes, and so the conservation and development approaches will vary from place to place.
- People, the local farmers play a key role in successfully implementing most of the components through their existing or promoted organizations at various levels. The research organizations are sensitive enough to appreciate the problems of the local communities and prepare themselves to assist the masses by offering solutions.

Multiple uses of Tanks

Tanks offer solutions for multiple uses of water by the communities. They act as primary source of irrigation, domestic uses, drinking water needs of both human and cattle, habitats for fish and other aquatic resources. They act as reservoirs of bio-diversity at the village level. They act as flood moderators and drought mitigators, and ground water rechargers. Apart from economic value, tanks also support cultural and spiritual functions of the communities. Therefore, integrated use of water for irrigated crops, livestock, poultry and aqua-culture as well as domestic needs and environmental needs can considerably save water and increase productivity of water.

Putting community at the centre

Turnover of ownership of the water resources to the local communities, who had been protecting, conserving, developing and maintaining them for centuries can make them truly own and manage the water resources in a sustainable way. It is critical to route all the interventions through appropriately formed institutions of the water users, keeping in mind gender equity concerns.

Building local capacities

Strengthening of local capacity will enable the local communities to innovate both in methods and processes, while implementing conservation and development of water resources. Innovations in processes will often influence innovations. Communities and people institutions, when empowered and exposed to a wide range of best practices, can adopt and adapt practices that are best suited to their contexts.

Building on indigenous knowledge systems

With extraordinary engineering, managerial and social skills, an extensive system of rainwater harvesting structures such as tanks and ponds had been built and maintained by the people for centuries. The community had complete control

over water. The village organizations had well laid out rules and fixed responsibilities to manage water efficiently. Traditional system of water allocation and sharing was based on custom, belief, and the concept of equity, as they perceived. This ensured smooth sharing and minimized conflicts. The structures built with the then available technology also contributed to the efficient management. Behind these existing indigenous systems of irrigation, there exist thousands of years of tradition. Any effort taken towards conservation and development of water resources shall be designed upon the existing knowledge of the people and combining it with the best in contemporary knowledge systems.

Tanks are one of the living ecosystems in the world, which needs to be preserved

The inter-relationship and inter-activities among water, soil, trees, agriculture and flora and fauna of the tank system are unique. Tanks therefore need to be conserved and developed. Tanks, particularly those in urban areas have to be preserved to maintain the ecosystem of such areas to combat pollution.

Tanks should be viewed as complex system

As one of the oldest man-made wetland ecosystems, the tank system consists of water bodies, tank structures, feeder canals and supply channels, wells, wetlands, semi dry tankfed lands, soils and plants, animals and birds, aquatic plants and fishes. As an agricultural system, it is distinct in cropping practices, varieties and water management. As an engineering system, it is historically one of the oldest in irrigation engineering designs. As a management system, it is capable of becoming administratively and financially self-reliant structure. As a social system, the tank serves and benefits various groups and sections of the village community such as farmers, fisherfolk, artisans, animal herders, especially the women.

Integrated management of Surface and Ground Water

Any management practice that can bring about a balanced use of these resources, without adversely affecting the production potential of the land, will help to meet the competing demands for water from the other sectors such as drinking, industry, livestock, etc. Integrated use of surface and groundwater, wherever possible, is one such practice that could substantially improve land use intensity and agricultural production, besides conserving both the resources. Each source could be used to its optimum capacity and each can become complementary to the other, and thereby produce synergy in the productive use of water. Alternative use, and often, conjunctive use of tank and well water have been found to conserve each source.

Tanks are superior to modern irrigation systems

The indigenous systems of tank irrigation score over the modern large irrigation systems in the following ways:

- They are more eco-friendly, that is, proper management of the system would itself ensure protection and preservation of the environment. They serve both as flood moderators in times of heavy rainfall and as drought mitigators during long dry spells.
- Being widely dispersed, if revived to their full and original capacity, they would ensure groundwater recharge and direct irrigation in rainfed areas. It is a basic life supporting system in rural areas.
- Being innumerable and much smaller in size, they lend themselves to decentralized management which would better ensure their care and upkeep.

- Tank irrigation is far superior in terms of conveyance and water use efficiencies compared to canal system and quite economical in terms of energy utilization than groundwater system.
- Gestation period of tank irrigation to provide benefits is very short as compared to the larger systems, as the irrigation command is already developed.

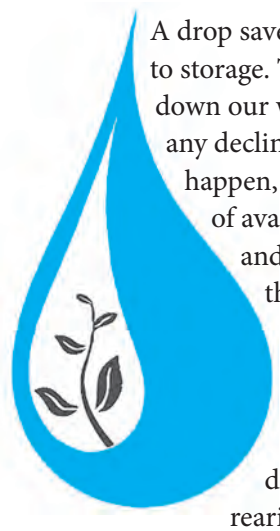
Partnerships yield synergy

Working in partnership with various stakeholders towards a common goal generates new learning and solutions. Collaborative process enables the partners to combine their complementary knowledge, skills, and resources, making it possible to accomplish much more than the efforts of any single organization. Both conservation and development of water resources need long-term sustainable mechanisms and institutional arrangements, which necessitate committed partnerships. The development of partnerships is a continuous process, which demands active participation from both sides that is founded on trust. Effective partnerships foster continuity, consistency and sustainability, which are essential for developmental effort in any sphere.

Community Governance and Professional Management

Community governance grounded on the principles of self-help, mutuality, transparency, ecological consciousness, gender sensitivity, self-reliance, collaboration and collective action is the bedrock of creating sustainable solutions for water conservation and development. Following democratic practices at every stage of the decision-making forms the foundation of community governance. Consensus-based decision making rather than majority-led decision making is essential to ensure sustainability of change. While the governance rests with the communities to preserve their identities and ensure democratic practices, management of those organizations require state-of-the-art systems for planning and coordination, financial and logistical management, technological interventions, as well as for research and development. All this cannot be done without strong professional support.

More crop per drop



A drop saved is equal to a drop added to storage. There is great scope to cut down our water utilization without any decline in productivity. For this to happen, we need to prevent wastage of available water on the one hand and harvest and conserve all the available rain water on the other. Farming, when integrated with other allied enterprises such as dryland horticulture, agro forestry, dairy, beekeeping, silk worm rearing and the like can produce more crops with less water and become sustainable without any external inputs. Contingency crop planning, optimal irrigation practices, water saving micro irrigation methods, mulching, and effective use of water stored at the root zone of the crop plants can ensure more crop per drop of water.

PRACTICES

DHAN's Water Theme

DHAN Foundation, which started evolving poverty reduction programmes with its unique design of community governance and professional management in 1990s (when it was PRADAN), rightly identified that conserving these water bodies and enabling access to water will ensure food and nutrition security.

The Centre for Water Resources Anna University conducted a research study on Alternate Approaches in Tank Rehabilitation. "If Tanks were rehabilitated by the tank ayacutdars, it will be sustainable" was the theme of the project. Ford Foundation provided grant for the research component and the Public Works Department carried out the rehabilitation work. Padianallur Tank near Chennai was the experimental tank. Simultaneously, Agricultural Engineering Department carried out similar research in Pillaipakkam tank. Findings of these experiments led to the European Union to come forward to provide a grant for rehabilitation of the tank. The GOTN launched the Tank Modernization Project but not according to the findings of the

research. However, Ford Foundation supported the modernizing of 12 tanks with farmer participation as a pilot work carried out by CWR, Anna University.

In 1992, DHAN adopted the initiative of rehabilitating tanks with people's participation. Nine system tanks (that receive water from rivers) were identified in Madurai and Ramanathpuram districts. For each tank, DHAN promoted a Water Users Association. The members of the WUA planned and prepared cost estimates and placed 25% as their contribution. DHAN mobilized 75% from various funding sources. The system tanks are assured of receiving water from rivers. If poverty alleviation and ensuring livelihood for the poor and landless form the objective, rain-fed tanks need much attention. Hence, DHAN shifted its focus to rain-fed tanks. Working in systems tanks posed the problem of permission to be sought from the PWD to work. However, the rain-fed tanks were small and villagers themselves had managed them. People came forward to contribute 25% of the cost. As the repairs were prioritized by the people, the total cost was less and more tanks could be repaired. Cordial relationship with DRDA in Madurai and Ramanathapuram districts became a model for "NGO-People-Government" cooperation. The encroachments were removed from water bodies by the people which either the courts or government could not achieve. The Project area expanded to Theni, Villupuram, Tiruvallur and Chittoor (AP) districts. Funding was obtained from NABARD, CAPART and UNDP etc. In a few years, a plethora of WUAs were formed by PWD, AED and NGOs. Hence, DHAN changed the name of WUA to "Tank Association", a more appropriate name.

The EU funded Tank Modernization Project introduced an experimental component of involving the People-NGO and Government together to rehabilitate a chain of tanks (both PWD and Panchayat tanks) or Tank Cascades. Vallakulam Chain of tanks in Mudukulathur taluk was assigned to DHAN. The lessons learnt and the impact led to the work on Tank Cascades. A need for a federation of tank associations in the cascade arose and Tank Cascade Federations were promoted by DHAN. Activities expanded to 19 districts in the states of Tamil Nadu, Andhra Pradesh, Karnataka and Pondicherry. The tank associations were rechristened as "Vayalagams". Micro Finance Groups were promoted in Vayalagams.

DHAN Vayalagam (Tank) Foundation – DV(T)F, the second thematic institution was created as part of the DHAN Collective to take forward the work of deepening and upscaling the programme. The launch was formally done on the tenth foundation day; October 2, 2006, in the presence of the board of trustees of DHAN Foundation by John Ambler, Senior Vice President (Operations) of Oxfam-America.

DHAN expanded its activities of rejuvenation of water bodies from isolated tanks to tank cascades - tank watersheds and Ooranis/Ponds both in rural and urban areas. Temple tanks in the urban areas are also being renovated.

Genesis of DHAN's Work on Water and Poverty

The hydrological characteristics of the Indian monsoon necessitated the creation of storage facilities to hold the rainwater of the monsoon. With extraordinary engineering, managerial and social skills, an extensive system of rainwater harvesting structures such as tanks and ponds had been built and maintained by the people for centuries. Behind these existing indigenous systems of irrigation, there are thousands of years of tradition.

DHAN Foundation initiated an action research project in 1992 for regeneration of farmers' management in the tank irrigation system. Later it took the shape of a scalable 'Vayalagam Tank-fed Agriculture Development Programme', which has expanded its approach of working on isolated tanks to tank-based watersheds, reviving chains of tanks in minor river basins to multiply the impact of the renovation and restoration work. In the process, DHAN has also evolved scalable models for community-led conservation and development of traditional water resources, inland fisheries development, creation of drinking water ponds, as well as low cost and household level water treatment methods.

Tank Conservation and Development: An Evolutionary Approach of DHAN

DHAN Foundation has gained much experience in the last 25 years of its involvement in small scale water resources development. In its pilot (first) phase of three years, the focus of work was on rehabilitation of tank irrigation systems, wherein emphasis was laid on restoring the tank structures such as tank storage capacity, bunds, sluice outlets, and surplus weirs to their original design standard. In the second phase of three years, emphasis was laid on regeneration of farmers' management in addition to rehabilitation. During the third phase, tankfed agriculture was the focus beside rehabilitation and farmers' management.

- Similarly, from taking up isolated tanks for renovation, the planning and implementation was done taking a cascade of tanks as a unit, so as to capture and store the entire run-off flowing down the micro watershed. Now, it follows integrated approach of conservation and development at the river sub-basin level so as to ensure holistic treatment of tanks organized into several cascades in the sub-basin of river ecosystem.
- The feeder channel cleaning and restructuring (removal of wild growth of vegetation and desilting) and removal of encroachments formed an important component of tank rehabilitation. This work was found to be the most cost-effective component for augmenting tank storage, next to the provision of plug and rod shutters to sluice outlets for preventing leakage and conserving the harvested rain water. The philosophy has been "a drop saved is equal to a drop added to storage".
- Another component of work added to tank renovation was the provision of silt traps on the front side of sluice opening to prevent the choking up of the vent way (pipe or barrel).
- Tree planting on the foreshore of tank bed in the belt of land bound by the Full Tank Level contour of the tank up to the government boundary has been introduced, to provide additional income to the people through usufructs and to minimize silt accretion into the tank water-spread. Incidentally, tree planting also serves to identify the encroachments if any and to remove them promptly.
- Yet another innovation made is provision of dead storage within the tank bed to hold water in a selected pocket to facilitate aquaculture, to serve the drinking water needs of livestock and/ or to provide life irrigation to withering crops in times of water scarcity.
- The community wells sunk in the tank complex receive much of their recharge from the tank itself and from the water applied for the crops raised in the tank command and provide supplemental or life irrigation to the crops after the tank gets emptied. This has been a boon to the small and marginal land holders who could not have their own individual wells to practise conjunctive use.
- In some tanks and Ooranis, de-silted under the tank rehabilitation programme, the excavated tank silt was applied to their agricultural lands, thereby improving the texture and fertility status of the soils.
- In quite a few tanks renovated in the rural areas of Madurai district, inland fish culture has been introduced in tank water which fetches the water users a sizeable income ranging from ten to hundred thousand rupees a year per tank depending upon the period of tank storage and the efforts taken by the local people to raise fish.

All these water conservation measures are introduced either on the initiative or with the consent of the users of the water resource and in accordance with their priorities. When the people

get involved intensely in every activity of tank rehabilitation planning, decision making and implementation, they take good care to prevent wastage, preserve the stored water, and distribute it equitably among them. They maintain the structures themselves with their own funds mobilized for the purpose. In times of disaster such as a tank bund getting breached due to heavy rains, the people do not approach the government agencies for help. They undertake breach closing and bund strengthening work collectively, when every able-bodied villager joins the team work. This attitudinal change occurs mainly through each member of the WUA finding strength and confidence in unity. This has been the most important and gratifying experience.

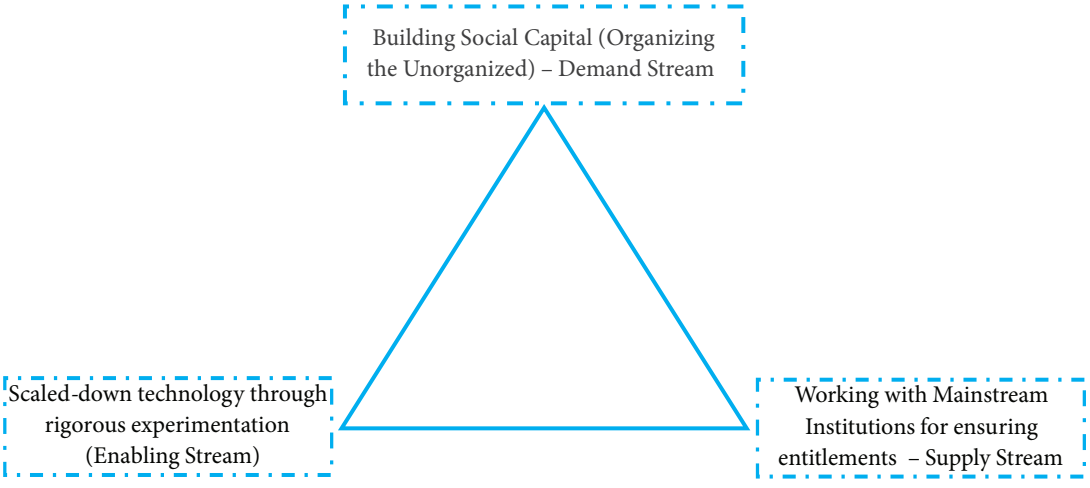
Community Centered Approach

DHAN's livelihood enhancement approach entails a system of inter-linked components. There is a three-way link between technology, people's organizations and environment to promote successful activities for the poor. Technology is not class neutral; hence it has to be adapted so it could be used by the poor. Local organizations are needed to become carriers of the scaled-down technology. However, incentives of the tangible benefits derived from such technology are necessary to build viable and sustainable local organizations. The third factor, the enabling environment, is critical for the other two factors to perform." Diagrammatically, this can be represented thus:

As is obvious, the success depends on the best mix of these factors and all of DHAN's initiatives in water conservation and development have seemingly gone through this experience. This is borne out by the various observations and the success of the initiatives.

There is something else here that is not so obvious, but marks DHAN's approach. It is the basic approach to processes and deriving from that, institutions, knowledge systems and styles of functioning. This is the enveloping function or approach to the above triad. Conceptually, such triads can be attained through the private property approach, whereby everything, including processes are owned privately; or the public/common property approach, in which the processes are owned collectively. DHAN has adopted the latter approach. Under this, the target is enhancing the common welfare of the group, a process that leads to the increase in individual welfare. Also, it is important to note that common property approaches to praxis lead to governance, while private property approaches lead to policing. The former is based on trust, the latter on reinforcing suspicion and distrust. Moreover, the end results of the former are collective empowerment, while the latter leads to the alienation of the masses due to the empowerment of a few. In the former, placing all transactions, including accounts, decision-making processes, conflicts and so on, in the public space, lead to collective empowerment. Nothing is confined to a few individuals.

Local Community organizations to achieve scale and collective learning



Conservation and Development of Tanks – Typical Schema of DHAN

In taking up conservation and development of tank programmes, the DHAN Foundation has adopted four broad approaches depending on the local context and the amount of funds made available under different programmes of government and philanthropic funds. They are as follows:

1. Isolated tank development work
2. Tank cascade development work
3. Tank-based watershed work
4. Holistic development of tanks at river-basin level

The Vayalagam programme has a number of necessary components to ensure that the interventions are sustainable in the long term. The measures that are proposed in the rehabilitation of tanks comprise improvements not only to the physical work, but also institution building and the software aspects such as operation and maintenance of water resources. They comprise the following activities:

1. Selection of Tanks

The tank irrigation systems taken up for rehabilitation are spread over the three states of Tamil Nadu, Andhra Pradesh, and Pondicherry. The development blocks are selected based on the scope for working with the marginal communities in tank-fed agriculture. The villages and tanks are identified in such a way that there is demand and willingness of the farming community to participate in this programme. Some important criteria used for tank selection are as follows:

- Presence of small and marginal cultivators in majority
- Good scope for improvement based on the tank hydrology
- Incidence of poverty (identification of poor families through wealth ranking)
- Good leadership and cohesiveness in the community
- Willing farmers to contribute a part of the project cost through labour and/or money, while the landless will contribute labour
- Willingness of the community to execute the work themselves without involving contractors; maintain and manage the system thereafter
- Participation of both women and men in planning and implementing the programme by and large across all areas

These activities are evolving processes and not rigid across the teams that implement these projects.

2. Rehabilitation of Tanks

Rehabilitation includes not only restoring these components to their originally designed standard but more important, facilitating the efficient water management and improved cropping practices. However, DHAN Foundation's programme components will be limited to the availability of funds and the willingness of farmers to contribute and work together for their tank. This practical approach in taking up the conservation work is followed rather than a technically predetermined level of work in the tanks. The rehabilitation work includes mostly the following:

- Closing of breaches on bunds caused by floods
- Bringing the bund to the standard size by adding new earth to them
- Clearing of bushes and excavating the supply channels and making them free of silt
- Repairs or reconstruction of sluices to reduce the leakages
- Plantation works on the bund and other work needed for managing the tank systems

The process adopted to draw the plans for rehabilitation will be done through a graded approach, as discussed below.

3. Prioritization of Work

The people felt needs and priorities are given importance in formulating detailed work plans and cost estimates, as the planning itself is done with people's involvement. The work included in the tank rehabilitation follow an order of priority, which

the users perceive as most important. They are as follows:

a. Acquisition of Water

- Encroachment eviction
- Cleaning and desilting feeder channels to augment water inflow into the tank
- Clearing of weeds and other undesirable vegetation on the tank bed

b. Tank restoration

- Restoring tank structures such as tank bunds to their original design so that they are strengthened adequately to withstand floods
- Repairing or reconstructing water regulation structures such as sluice outlets and surplus weirs to prevent loss of tank water
- Involving landless under wage employment
- Planting and preserving fodder, fuel, horticulture, or herbal plants in the tank foreshore and on the tank bund

c. Improvements in water use efficiency

- Replacement of damaged or missing shutters in sluice outlets, which prevents wastage and facilitates easy regulation of water to command area
- Restructuring the existing water distribution channels and providing distribution boxes and selective lining in the distribution systems, as may be required in the tank command area, to improve the water use efficiency of the system

Tank-fed agriculture is a gamble as the tanks depend on adequate and timely onset of monsoon rains for their water storage. During deficit rainfall years or during the years of delayed onset of monsoon or early withdrawal, the farmers in the tank command face difficulties. Under this component, DHAN proposes to provide community dug or tube wells in the tank command or in nearby wastelands or in the water-spread areas. These assets help farmers ensure crop production by supplementing tank water and by practising conjunctive use. This is subjected to the availability of funds, technical feasibility of digging wells, and the agreement of the farmers.

Field demonstrations and crop diversification are conducted in a number of areas from high water requiring food crops such as paddy to low water requiring commercial trees such as coconut, cashew, and crops such as pulses or chilli. This approach enables the farmers to build their confidence and strictly plan their cropping pattern based on water availability in the tanks. The farmers are given appropriate advice regarding the crops and cultivation.

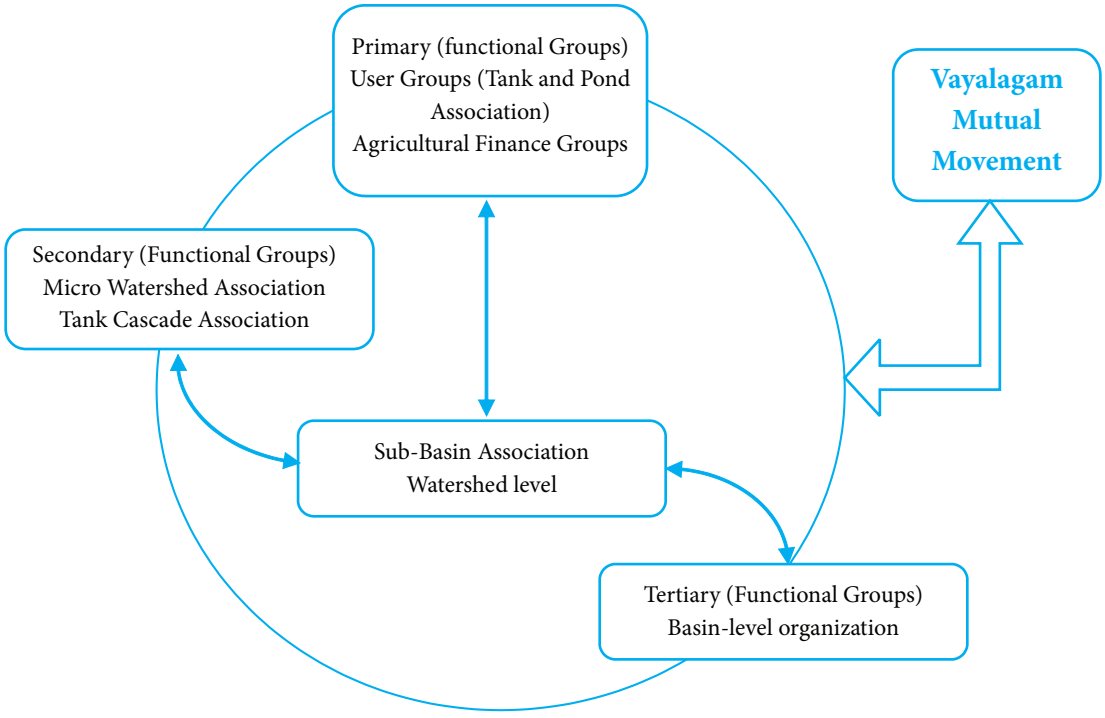
The intensive activities of the tank programme are carried out during rehabilitation work. During this period, which ranges from 3 to 6 months, the farmers participate in meetings, labour, purchases, and problem solving. However, the intensity of their collective action needs to be maintained throughout the year. Therefore, activities of the Agricultural Finance Group are promoted by it as a platform to bring farmers together at frequent and regular intervals with a meaningful purpose. These groups are formed with the tank farmers as members and they are encouraged to save, lend, and take loans from banks to support farmers to meet their farm credit and insurance needs.

Building Social Capital for Conservation and Development

DHAN Foundation believes that the lack of local institutions to run, manage, and govern the tank systems is one of the major reasons for its decline. Therefore, the programme has a major component to build social organizations aimed at conserving and developing tanks. These are nested organizations with clearly defined roles and responsibilities. The 3-layered organizations are formed respectively at the tank, tank cascade, and district levels. They work together in a mode of serving their members' interest in best possible ways.

- **Tank FAs:** Farmers owning land in the command area and other interested groups in the village are enrolled as members. They look after maintenance of the tank systems and their management, including water distribution.
- **Tank cascade associations (TCAs):** TCAs are formed with members of the tank FAs across the cascade. They undertake development

Nested Institutions

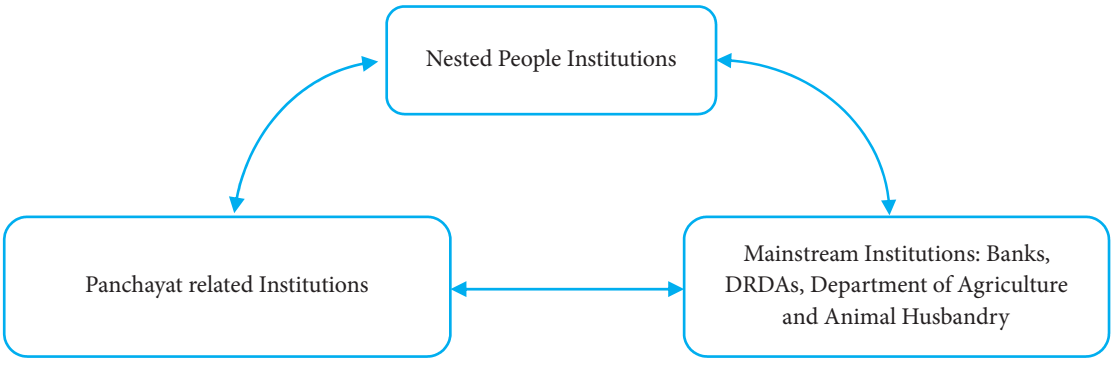


work such as cleaning and excavation of feeder channels and repairs to diversion weirs/ regulators on feeder channels.

- **Tank farmers' federations (TFFs):** TFFs are formed at the district level with tank FAs as members.
- **River Sub-basin-level Confederations:** Sub-basin-level Confederations are promoted by FAs represented by their TCAs and TFFs.

Once the tanks are identified and selected, the TAs are formed at the village level. The members of these associations are involved in planning tank rehabilitation work through Participatory Rural Appraisals and interaction with stakeholders. The office bearers are elected by the members and they are responsible for mobilizing local contributions, planning and implementing, and O&M of the systems. To have a wider impact across locations, TCAs are formed from among the TAs. Tank federations are formed at the district level where all TAs in the respective districts are enrolled as members. The tank federation is a legal entity as it is registered under the Societies Act. The members of the federation are represented by individual TAs. There exists a nested relationship among the various TAs, TCAs, TFFs and Sub-basin level confederations. DHAN Foundation perceives that these arrangements empower the organizations to conserve and maintain tank irrigation systems during the years to come in a sustained manner.

Potential Linkages



The nested people institutions offer space for forging alliance with relevant stakeholders at different levels starting from local Panchayat Raj Institutions to block, taluk and district level mainstream agencies, line departments and other like-minded private and non-profit organizations to achieve the goals of the Vayalagam institutions collectively.

The institutional arrangements try to understand and act on the asymmetry between upstream and downstream communities, and therefore it would emerge as a basin-level regulatory body with clear ground rules that establish the minimum entitlements of the downstream communities. Clearly, the basin-level body would deal not just with watershed development issues, but with all aspects of water use and all forms of water – surface and ground, infiltrated and harvested, return flows, etc.

Vayalagam Movement has emerged as an offshoot for advocacy efforts of tank farmers and their associations at various levels. The activities are essentially targeted to mobilize the participation of tank farmers from different states in the country by getting together and strengthening themselves to better speak out on issues pertaining to the conservation of small-scale water bodies such as tanks and ooranis.

Milestones of 25 Years of Vayalagam Programme	
1992	Initiation of Tank Rehabilitation Project in Madurai District, Tamil Nadu (by PRADAN)
1992 - 1994	Implementation of tank rehabilitation work at system tanks with 75% of contribution from District Rural Development Agency and farmers contributed 25% of the project cost.
1993 – 1994	Submission of proposal for Regeneration of Farmers Management in Tankfed Agriculture to Ford Foundation
1994 – 1995	Initiation of programme in Ramnad district at Kamudhi and Mudukulathur blocks.
1994 – 1995	Completion of 1st phase pilot project at Madurai district.
1994 – 1996	Ramnad District Rural Development Agency's support for pilot tank project at Kamudhi & Mudukulathur blocks with 75% & 25% contribution models.
1995	District level Tank Farmer's Federation concept was evolved and promoted the First Federation at Ramnad district.
1996	Vayalagam Programme was expanded to Theni, Villupuram, Thiruvallur districts with invitation from the district administrations.
1996	Madurai District Tank Farmer's Federation was promoted.
1996 – 1997	Consolidation of tank rehabilitation project, initiation of programme expansion and deepening at South Indian level.
1997 – 1999	Expansion to Kanchipuram, Chittoor districts of Andhra Pradesh. New components such as microfinance, endowment to tank institutions, intensive focus on tankfed farming initiated. Tank based watershed development was evolved.
2000 – 2003	Support from multiple agencies such as Oxfam Novib, Sir Ratan Tata Trust, UNDP (GEF). Took up IWS supported action research on Co-management of tanks for renovation and maintenance of tanks at Gundar basin and shaping farmer's perspective on tank irrigation system management. Tank Cascade atlas was prepared for Adilabad district. Initiation of locations at Northern Andhra Pradesh and Karnataka.
2002, Mar 7	Vayalagam Movement was launched in the presence of Anna Hazare to further the community-led water resources development nationwide
2003	More than 1000 Neerkattis gathered at Madurai Symposium 2003 for sharing their experiences and resolved to revive and stabilize effective water management.

Milestones of 25 Years of Vayalagam Programme	
2004 – 2006	Oxfam NOVIB continued its support. Tank-based watersheds were built for Tamil Nadu Agriculture Department under NWDPRA. Projects for Oorani renovation was initiated in Tuticorin, Kanchipuram and Ramnad districts and started collaboration with Centre for Affordable Water and Sanitation Technology (CAWST), Canada for promoting Bio-Sand Filter.
October 2, 2006	An exclusive institution 'DHAN Vayalagam Tank Foundation' was launched to focus on scaling-up.
2007-2008	Madurai Marathon (Run for Water) was organized to sensitize the public and raise funds. ITC-Rural Development Trust sponsored CSR projects to revive tanks in Sivagangai district in Tamil Nadu was launched.
2008	Centre for Urban Water Resources (CURE) was launched
2009	DEWATS community-government joint initiative in Panaiyur was launched. Launched CSR Project with BPCL and HPCL in Tamil Nadu and Andhra Pradesh. Gundar River Basin level Federation Collective was launched to take up long-term restoration drive.
2010	Launched Conservation and Development of Tank Cascades in Gundar Basin in partnership with Hindustan Unilever Foundation and NABARD to rehabilitate 250 tanks.
2011	Launched DHANA Project with the support from AXIS Bank Foundation to renovate 750 water bodies in Pambar-Kottakaraiyar Basin covering 4 districts
2012	Prepared manual for Ahar-pyne renovation at National Policy seminar as part of India Water Week with the Union Minister Shri Jayaram Ramesh.
2013	Launched Annual Tamil Nadu Water Week in partnership with consortium of TNAU, Anna University and MIDS.
2014	Initiated collaboration with NABARD as a Resource Support Organization for Andhra Pradesh to guide watershed development programme. Initiated Collaboration with Water.Org for promoting Water and Sanitation products through SHGs
2015	Launched a programme for promoting Farmers Producer Organisations with NABARD Support for 19 crops all over India. Vaigai River Pageant was organized as a start for Vaigai River Restoration drive. Water Knowledge Centre was launched in Tata-Dhan Academy
2016	Phase II of Hindustan Unilever Foundation sponsored project in Gundar Basin to renovate 450 water bodies was launched and Phase II of DHAN-Axis Bank (DHANA) project to benefit 75,000 farmers in Pambar-Kottakaraiyar Basin. Expanded Ahar-pyne renovation programme in Munger district, Bihar and Tank-based watershed programme in Khammam district, Telangana with ITC Support.

CONTRIBUTIONS TO THE WATER SECTOR

DHAN Foundation's Vayalagam Tankfed Agriculture Development Programme has reached its 25th year of engagement in promoting community centred conservation and development of small-scale water resources across the country. The programme has contributed significantly over these years to the water sector in many ways. Some of the most important contributions are as follows:

Demonstrating Farmers' Capacity to Plan and Implement Tank Development Work

Tank development and renovation work of various kinds have been implemented. They include restructuring feeder channels, desilting of tank beds, repairs and reconstruction of sluice outlets, surplus weirs, construction of new tank structures, community wells and lining of distribution channels. These works require technical competence, working capital and entrepreneurship. DHAN Foundation observes that it is possible for the Tank User's Association to execute such works with the required techno-managerial support across different locations. The quality of work and frugal use of funds are of high order in this mode of implementation. Though there had been some delays mainly due to seeking permissions and due to court cases on some issues, by and large, these projects were implemented through a time bound programme. DHAN Foundation has demonstrated that TUAs are capable of implementing quality work on a large scale with timely facilitation and support.

Demonstrating that collaboration is possible with government

DHAN foundation's experience shows that collaboration with mainstream agencies is possible and can be substantial with proper efforts. The programme has mobilized substantial public funds from the District Rural Development Agencies (DRDAs), through various employment generation schemes for an infrastructure development programme such as tanks. Such collaborative efforts with government are very much needed because of the nature of property rights in tanks. As the ownership of these common properties is vested with the state, any changes or development efforts need to be made only in consultation with the concurrence of the government agency concerned. DHAN Foundation wishes to strengthen the collaboration further in order to get the needed vital policy changes such as turnover of tank irrigation systems to farmers, sharing usufruct rights from tanks by the Tank Users Associations with the Panchayat, eviction of encroachments from tank complexes and the like. It is gratifying to find that DHAN's methodology in mobilizing people's contribution for tank rehabilitation is now adopted in the government programmes taken up by the District Administrations also.

Institution Building for Tanks

The programme has developed a model for nested Institution building for tanks; DHAN Foundation has enlarged the composition of members of Tank Users Associations (TUAs) starting from exclusive ayacutdhars to all-inclusive villagers. The village level associations are represented in watershed associations and District Federations of Tank Farmers' Associations with defined roles and responsibilities. The District Tank Farmers' Federations have taken up many of the responsibilities such as identifying potential villages

and tanks based on the demand and the need for development. Three of the Farmers' federations promoted in Madurai, Ramanathapuram and Theni districts have become solidarity groups on tank-related issues. The issues related to eviction of encroachers and problems between the villages in sharing water from tanks are attended to and resolved by the federations through facilitation and negotiations. DHAN Foundation envisages that in the long term, the federations will emerge as credible tank Panchayats to address the issues and disputes across the tank villages.

Management of Tank Institutions

The programme has developed an approach, which will make the village tank institutions sustainable in the long run. While there are inadequacies in the villages in managing the common property resources and accounts, the capacity of villagers can be built over a period of time by working closely with the village tank institutions. DHAN's tank programme has evolved a methodology of capacity building of these institutions through training and various enabling processes to plan and implement the works and generate revenue for their sustained upkeep and management. In this regard, the programme has developed innovative procedures for the TFAs to manage and share the usufructs from the tanks with the local Panchayat through agreements drawn up with them. DHAN Foundation has been successful in a few places where it has formed associations in safeguarding the usufruct rights of the TFAs, in fisheries and trees.

Support to Government Agencies

DHAN Foundation has been recognized by various mainstream agencies as a competent organization for consultations on tank irrigation in India. These agencies have requested DHAN Foundation to prepare such documents. The programme has helped many District Administrations in South India to prepare master plans, tank atlases covering the state and other development projects for tank development in the respective districts. The tank teams have also been consulted for policy development, fund mobilization and other issues related to tanks by the governments of Andhra Pradesh and Tamil Nadu. Apart from this, DHAN had organized a series of seminars and workshops to drive the point that the tank development in the country should be given a serious thought. Also, DHAN's members have participated in various conferences, seminars, workshops and consultative forums on themes related to tanks in Andhra Pradesh, Pondicherry, Karnataka Tamil Nadu, Gujarat and elsewhere in India and have shared their experiences.

Funding from the Mainstream

Our programme has demonstrated the possibility of integrating various decentralized non-plan schemes at the district level for the improvement of tank irrigation systems. Normally, tanks are considered only as irrigation structures and are left out of special government grants. DHAN Foundation were able to convince the DRDAs to invest in employment generation funds on productive village assets such as tanks. Based on our discussions and decisions to include tank development as a component of watershed programme, the DRDA of Chittoor in Andhra Pradesh has allocated substantial funds for implementation with people's participation.

Though there are considerable difficulties in raising these funds directly by DHAN Foundation or by the WUAs and Farmers' Federations promoted, the programme has demonstrated the possibility of deploying mainstream funds for these works. This is a great inspiration for the others who look forward to change the government's programme implementation from line departments to NGOs and people's organizations.

IMPACT

Enhancing Access to Water

Through the Vayalagam Farmers' Organizations, over these years, DHAN has facilitated rehabilitation of 2500 tanks and taken up soil and water conservation measures in 105 watersheds, resulting in enhanced water availability to over 140,000 hectares. In addition to restoring the physical structures of the irrigation tanks to their originally designed standard, DHAN has facilitated proper maintenance of the tanks, efficient water

management and improved cropping practices to ensure sustainable crop production. In all these rehabilitation works, the farmers have shared one-fourth of the cost of rehabilitation by contributing either cash or labour. Rehabilitation of irrigation tanks to their original storage capacity has increased availability of water for more area for cropping. Earlier all these tanks and the command area were facing the problem of water shortage towards the end of the cropping period as tank water was inadequate to provide adequate water for even a single full crop.

Farm ponds for life-saving-irrigation

While the tanks serve irrigation water needs of the farmers in the entire command area, creation of farm ponds supplement the irrigation needs of each farm, creating space for the farmers to go in for diversified cropping. These ponds act as 'shock absorber' to the farmers. DHAN facilitates building farm ponds to store water ranging from 500 to 5000 cubic metres depending on the farm size. Besides irrigation, the farm ponds are used in multiple ways such as fodder production for livestock, raise vegetable crop on its bunds and for fish rearing. So far, DHAN has enabled the small and marginal farmers to construct over 4000 ponds in their fields to provide life-saving irrigation to crops during critical phases of water need, thereby securing their livelihoods.

Creating access to drinking water

In the water-starved regions of southern peninsular India, acute shortage of drinking water is a common phenomenon every year. The ground water is saline and unfit for drinking and irrigation. Traditionally, surface drinking water ponds (Ooranis) maintained and nurtured over generations by the local communities have been the source of water needs for the millions of people in this region. Each village has two or three ponds, one for drinking, and another for domestic purposes and for animals. Breakdown of community management and poor maintenance have made these water bodies lose their efficacy pushing women to walk 3-5 kilometres every day to fetch water. Harvesting and storing the rain water is the only way out of this otherwise intractable situation. DHAN has successfully rebuilt drinking water ponds in 300 villages in the drought-prone districts of Tamil Nadu, and over 120,000 people now have access to drinking water.

Building Markets for the Small and Marginal Farmers

Small and marginal landholders are mostly unorganized, characterized by lack of access to capital, technology and market information. They are often subjected to exploitation by the middlemen with deceptive weights and measures, and unfair prices for their produces. Livelihoods of these smallholder farm families could be made sustainable only when their capacity is enhanced to influence the value chain, in which they enjoy little control. DHAN has organized about 60,000 farmers involved in production of various crops into Primary Producer Groups. These groups have been federated into 64 Producer Companies. These companies facilitate collective purchase and distribution of farm inputs at cheaper price, build requisite skills for improved production and productivity, facilitate farm credit from local banks, help them pool their

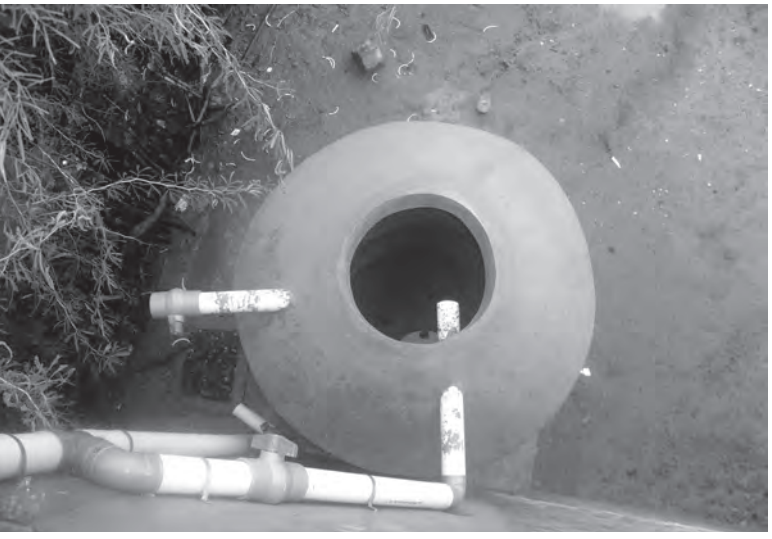
produces and gain better price for their produces through market linkages. Also, DHAN helps farmers to get into value addition of produces, branding and reaching the consumers directly through retail outlets.

Sanitation and Hygiene

Almost 70 percent of households in rural India do not have a toilet. India loses more than 1000 children of less than five years of age to diarrhoea every day; 80 percent of deaths are below the age of two. Apart from affecting their self-esteem, defecating in open has serious impacts on their health, hygiene and sanitation. DHAN's Sustainable Healthcare Advancement programme has assisted close to 70,000 families to construct a toilet in their home and another 20,000 families to establish household water-tap connection, which relieved women from their drudgery of fetching water from distant places. DHAN also works towards reaching another 250,000 poor households in the next two years.

Safe Drinking Water through Household Water Treatment

Next to ensuring access to drinking water, DHAN addresses the issues of quality of drinking water, as more than 80 per cent of the diseases among the poor communities are attributed directly or indirectly to unsafe water, for which at least 25-30 percent of family's income is drained towards healthcare expenses. DHAN promotes low-cost household water treatment technology that has proven its efficacy through a significant improvement in the microbial quality of water and reduction in the episodes of diarrheal diseases. Bio-sand filters, adapted from the traditional slow sand filters have been provided to over 3000 households. Another 10,000 families have been given ceramic candle filters coated with silver, a bacterial-static agent. Over 50,000 people have benefitted from these filters.



Sustaining Efforts through People's Organizations

DHAN never follows 'Delivery Approach. It always believes in 'Enabling Approach' and 'Institution Building Approach' which lays emphasis on self-help, mutuality, community ownership and control over resources and benefits, thereby interventions such as water resources development are just taken as means and not the ends. The ultimate goal is to build People's Organizations using these inputs as vehicles of change and enabling them to sustain the efforts and results for long time, even beyond generations. These People's Organizations provide platform for nurturing innovations at the grassroots, scale-down technologies and contextualizing those technologies for addressing the issues of poverty. The People's Organizations work in collaboration with mainstream institutions such as government departments and banks, as it would provide continuity for the works through local resource mobilization, and help them to negotiate and claim entitlements meant for them in the long run.

Professionalism in Execution

DHAN believes in people's capacities, which continues to attract, groom and place highly qualified and socially concerned development workers in the grassroots works. More than 800 professionals and 2500 field associates are working across 14 Indian states bringing implementation rigour to the programmes. Another prime feature of DHAN is effective decentralization. DHAN has 60 regional offices, also known as DHAN Resource Centres, spread across these states, anchored by Senior Professionals. Each region works with 5 to 10 People's Organizations, managed by the professionals. DHAN resource centres train community members, leaders and field associates.

The entire rehabilitation works of water resources are planned, implemented and monitored by the farmers themselves. In order to ensure effective financial management, the accounts of the People's Organizations are audited by the Independent Chartered Accountants to ensure financial transparency and accountability.

Poverty Reduction at Scale

Following its unique process of promoting localized People's Organizations managed and governed by the communities, DHAN has organized 1.65 million poor households spread over 78 districts in 14 Indian states into 66,000 primary groups and who have been networked into 300 Federations. Also, it facilitates people to self-assess their graduation on the ladder of poverty reduction, declare publicly that they 'Moved out of Poverty'. Every year, on the Foundation Day of DHAN on 2 October, the birthday of Mahatma Gandhi, after a thorough scrutiny, people would declare it with much pride and self-esteem. Out of 1.65 million people, so far 400,000 people have declared themselves Moved out of Poverty.

Tank-Based Watershed

An individual tank with its own catchment, water spread and command area is an integral part of a watershed within which it is situated. A cascade of tanks forms a micro-watershed by itself as the tanks are interlinked, often by a common stream or by the surplus water of an upper tank feeding a lower one. An existing tank or cascade of tanks within a watershed captures the rain water runoff and conserves it for later use, which would otherwise flow down the gullies and streams and mostly get evaporated or otherwise dissipated. Over the last two decades, DHAN has been constantly advocating inclusion of tanks in the conventional watershed treatment plan. Started on a pilot basis in Chittoor district of Andhra Pradesh in 1997, the tank-based watershed model demonstrated its impact, which has made the government to include it in the revised guidelines for watershed. More than 150 watersheds treated by DHAN have included tanks as an integral component and it has successfully included tanks in the new watershed guidelines.

Promoting Water Partnerships

Vayalagam institutions have demonstrated different models of partnerships for developing tank systems. In addition to state-sponsored programmes with the water resource departments, they have promoted individual philanthropy for water conservation and mobilized support under Corporate Social Responsibility. Reviving the age-old practice of creating endowments for village organizations for regular upkeep of the tanks, DHAN has evolved a concept of endowment from philanthropies with matching contribution from farmers.

DHAN-HUL Water Partnership in Gundar and Vaippar River Basins

With the support of Hindustan Unilever Foundation, during 2010-14, DHAN Foundation undertook renovation of 256 rainfed tanks in the Gundar Basin. The project has benefited 17,696 farmer families, augmented water storage to the tune of 42.56 million cubic metres, serving 6,866 hectares of command area.

Drawing lessons from this project, and continued support from Hindustan Unilever Foundation, DHAN is taking up renovation of 450 more rainfed irrigation tanks in the Gundar and Vaipar River basins in Tamil Nadu, securing water for 17, 243 hectares of lands.

The ultimate goal of this project is to augment the existing water bodies to their designed capacity, building social capital by promoting people's institutions at various levels based on hydrology, Improving the water use efficiency by building on traditional water demand management practices in the tank commands, promoting the community governance on water resource management, empowering the people institutions for effective planning & development of water commons,

sustaining the people's institutions through various livelihood activities and other development interventions and working with stakeholders to ensure favourable policies for conserving the water commons. Long-term and intensive treatment of all the water bodies in a river basin will restore the ecosystem. The water partnership between Hindustan Unilever Foundation and DHAN Foundation is an effort towards this mission.

Situation of Gundar Basin

Gundar and Vaippar basins are among the 17 river basins delineated in Tamil Nadu and lie in the most drought prone districts of the state such as Madurai, Virudhunagar, Sivagangai, Ramanathapuram and Thoothukudi districts.

The Gundar River, a non-perennial monsoon stream originates from Varushanadu hills of Western Ghats. Two other tributaries Goundanadhi and Therkar originate from Eastern Ghats and join the Gundar River. Girudhumal and Kanal odai in the middle reach and Paralaiar in the lower reach are other streams forming part of the Gundar basin. The Vaippar main river sub-basin starts from Vembakottai block in Virudhunagar district and extends up to Pudur block in Thoothukudi district.

There are 2276 tanks spread over the Gundar basin forming the lifeline of the farmers and the Vaippar sub-basin has 28 tanks. These tanks are found in chains in many places. Many of these tanks and their chains are poorly functioning due to heavily silted tank beds, clogged waterways due to encroachment and siltation, poor upkeep of tanks and tank structures.

Gundar and Vaippar basins in Tamil Nadu do not have major reservoirs and major canal irrigation projects. Water needs of the people in these basins have increased significantly due to the growing population and also due to erratic rainfall caused by climate vagaries. Harvesting and storing the monsoon rainfall received in a shorter span of time in the irrigation tanks ad ponds was only the option available to the people to survive. The groundwater is exploited heavily in the upper reaches of the basins. Salinity of ground water in the lower and middle reaches of the basin make it unfit for neither drinking nor irrigation. The water is wastefully drained into sea due to frequent floods and inefficient water holding capacity of the tanks.

People are in desperate need of augmenting the storage capacity of the existing traditional water resources such as tanks and ponds and reviving the

hydrological connectivity of those tanks found in chains or cascades. These cascades and diversion weirs have been absorbing and evenly distributing flood water during the high rainfall years for several centuries. They also helped sharing the water in the deficit rainfall years. This climate smart tank system therefore helped the farmers to achieve more food production through the extended area under cultivation and growing short duration crops such as pulses and fodder as second crop.

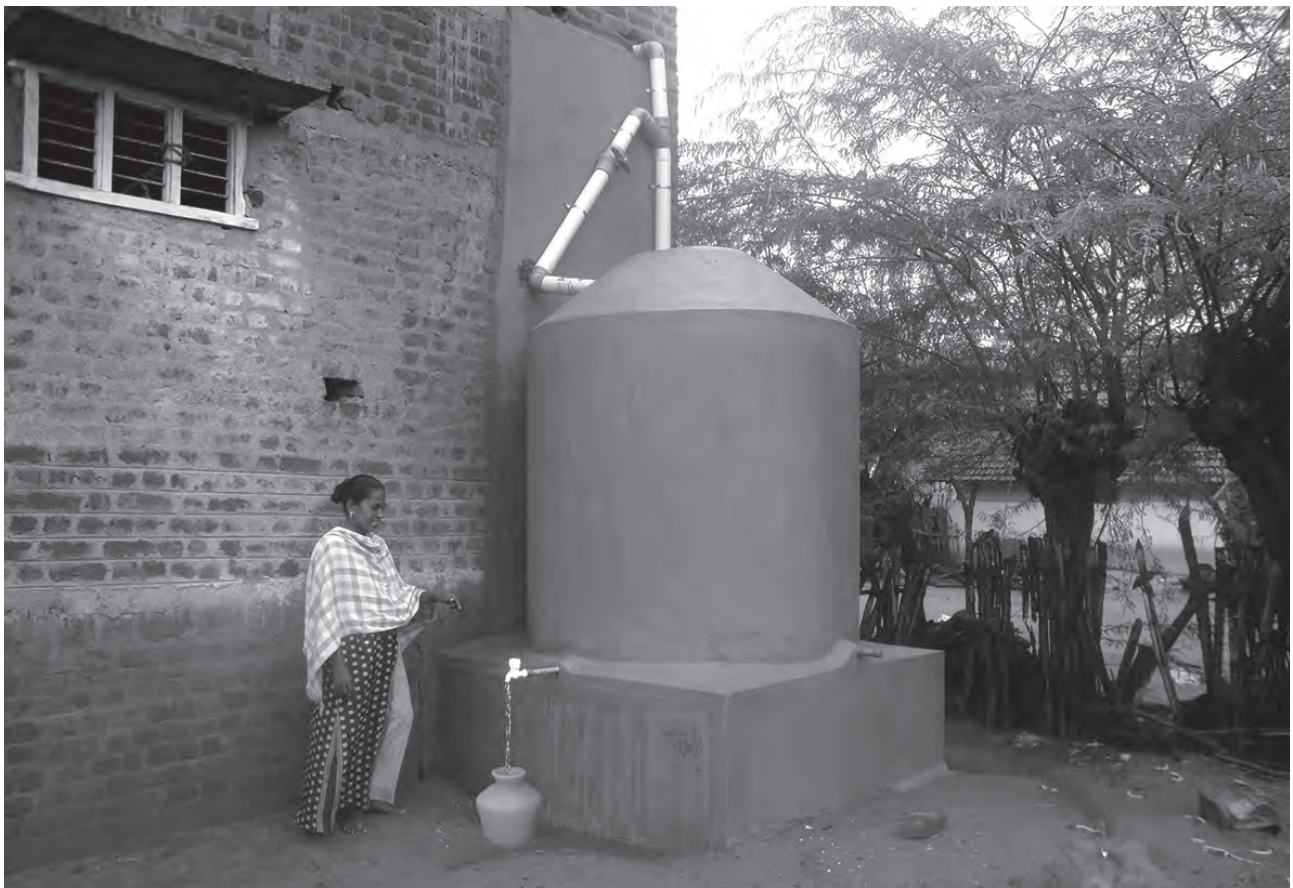
During deficit years, the farmers would minimize loss by choosing low water requiring crops such as millets and reduce the area under cultivation based on water available in the tanks. Equitable water sharing through water managers, sharing of water, collective planning of crop and area based on the available water and regular maintenance of the tank system was in practice traditionally through the village institutions. The need is to revive such social and hydrological connectivity for the health of the eco-system.

Water and Sanitation Partnership with Water.Org

DHAN Foundation's Sustainable Healthcare Advancement (SUHAM) initiative has been promoting water and sanitation products through SHGs. The SUHAM has evolved a Project ACCESS – Access to Credit for Safe Water and Sanitation in partnership with Water.Org.

In the first phase, the Project ACCESS assisted poor women to install tap water connections in their households, otherwise they had to face the drudgery of fetching water from distant places. The project also worked for ensuring safe drinking water through distribution of Bio-Sand Filter, a low-cost water treatment device that needs minimal maintenance and no recurring expenses. In places, where there is an acute scarcity of water, the Project has promoted household level rainwater harvest structures at an affordable cost.

Making affordable toilets socially acceptable and desirable were the cornerstone of the project ACCESS. Through community workshops, the Project teams demonstrated different models of toilets, water filters and rainwater harvesting structures to suit the poor community. Masons were trained to replicate the models. SHGs spearheaded the entire project by way of owning the project, mobilizing financial resources from banks and involving their family members. They met periodically at the Cluster and Federation levels to review and monitor the entire project.



This project had a modest target of promoting loans for 10,000 units of toilets and water connections. With an overwhelming response from Kalanjiam and Vayalagam Groups, the project could benefit a total of 17,135 households, of which 10,975 families constructed toilets and another 6,160 families have installed household water tap connections. The Kalanjiam SHGs have lent Rs. 237 million to their members for this purpose and 78,298 people have been impacted through this project with an improved access to sanitation and safe drinking water. The success realized from this project led to scaling up in the second phase of the project titled "SCALE-UP" for reaching out to another 300,000 households with a targeted disbursal of Rs. 4000 million worth loans for building sanitation and water facilities.

Other Partnership Initiatives

Similar to HUL and Axis Bank Foundation, DHAN Foundation has been partnering with CSR of BPCL to renovate tanks and Ooranis in a large scale in Tamil Nadu and Andhra Pradesh. In partnership with ITC, DHAN has started working on Ahar-pyne systems in Bihar, wherein the local communities are organized to rehabilitate the ahar-pynes. With support from European Union, DHAN has taken up construction of farm ponds assisting farmers in drought-hit southern districts in Tamil Nadu. Under this project, DHAN Foundation has helped the farmers to establish 1074 farm ponds in five districts, after which the dry-land farm production has increased. By making an availability of additional 475 cubic metre of water per acre, the productivity of the land has increased by 25-100% in different contexts. DHAN has also been successful in promoting water partnership with institutions and individual philanthropies in the past and present.

- Sir Ratan Tata Trust, Mumbai
- Oxfam India (Oxfam Novib)
- CARITAS, Switzerland
- Consortium of DEWATS Dissemination Society
- European Union
- Ford Foundation
- Huguenin Ralapalli Foundation, USA
- IIT Madras Alumni Association
- International Water Management Institute – RUAF Foundation

- National Agricultural Innovation Project–ICAR
- National Bank for Agriculture and Rural Development
- Bhabha Atomic Research Centre, Mumbai
- Arghyam Foundation, Bangalore
- Hindustan Petroleum Corporation Limited, Mumbai
- ITC Rural Development Trust
- Madras Atomic Power Station, Kalpakkam
- Rabobank Foundation, the Netherlands
- District Rural Development Agencies in Tamil Nadu
- JalaSamvardhaneYojanaSangha (JSYS), Government of Karnataka
- National Watershed Development Programme for Rainfed Areas
- Central Planning Commission
- Council for Advancement of People's Action and Rural Technology (CAPART)
- Water Technology Centre, Tamil Nadu Agricultural University
- Centre for Water Resources, Anna University, Tamil Nadu

Works on Water Policies

DHAN Foundation has set up a Resource Support Organisation for popularizing community tank management and tank-based watershed models in Andhra Pradesh and Karnataka. DHAN has prepared a strategy for Water Security through Integrated watershed development for the State Planning Commission in 2004. It has been involved in the working committees of the apex planning body of the country, the Planning Commission of India, during 10th Five Year Plan on Minor Irrigation, 11th Five Year Plan on Agriculture and Rural Development, as well as the 12th Five Year plan Working Group on Minor and Medium Irrigation and Water Governance. DHAN's hydrologic-based community Institution model is adopted in the Repair, Renovation and Rehabilitation Guidelines of Ministry of Water Resources. Besides, DHAN is one of the institutional members of World Water Council, Global Water Partnership. It has been inducted in the advisory group for National Water Academy, Pune and National Institute of Hydrology for Hard Rock Areas, Belgaum. DHAN has promoted a Council for Conservation of Small-Scale Water Resources. It comprises eminent thinkers and practitioners, who propagate and promote the conservation and development of small scale irrigation systems in South India. This council engages in periodic interactions with policy makers, planners, administrators and bureaucrats. It also reflects the opinion of the people at the grassroots on matters relating to small-scale irrigation systems through media. Through various tools that it deploys, it helps to shape the government policies related to this sector.

Awards and recognitions

The Arab Gulf Programme for Development (AGFUND) bestowed its International Prize for Pioneering Development Projects for 2012 in the field of food security for the poor to DHAN Foundation. The prize was given in the field of developing the skills and capabilities of the poor for food security in the poor communities. It chose the project "Increased water harvesting and diminished desertification" implemented by DHAN in drought and disaster prone coastal regions of southern India with the support of the European Union.

Sitaram Jindal Foundation honoured DHAN with its "Jindal Prize" in 2011, in the year of its launch. DHAN had received this award for its efforts in building people's institutions as vehicles of change with sustainable results in poverty alleviation. In

2012, DHAN Foundation received "Social Impact Award 2012" instituted by the Times of India for its contribution towards conserving water resources under Environment Category.

Way forward

Consolidating its more than 25 years of experience in conservation and development of water resources spearheaded by the communities, DHAN has expanded its approach of working on isolated tanks to tank-based watersheds, reviving chains of tanks in minor river basins to multiply the impact of the renovation and restoration works. In the process, DHAN has also evolved scalable models for community-led conservation and development of traditional water resources, inland fisheries development, creation of drinking water ponds, as well as low cost and household level water treatment methods. As a result of search conference organized with different stakeholders of the programme, including the farmers, field workers, consultations with the donors and government institutions, who are the partners of DHAN's water initiatives, a strategic plan has been prepared for the next five years (2017-22). During this period, DHAN's Water theme aims to:

- Reach 525,000 farm families in all contexts and graduate 125,000 small and marginal farmers to move out of poverty through water and agricultural interventions.
- Build localized water governance among the communities and groom over 10,000 community leaders and showcase 250 model villages.
- Promote 45 self-sustained federation collectives and 300 cascades centred on water conservation and tankfed agricultural development.
- Rehabilitate and develop 2900 small water bodies, plant over four lakhs trees and treat over 25 tank-based watersheds. Ensure water security to over 47,000 hectares.
- Generate farm-credit worth of Rs. 1530 million through bank linkage.
- Build and disseminate knowledge in conservation and development of water bodies through research, documentation and publication.
- Advocate pro-farmer policies by occupying national and international forums, organizing policy seminars to showcase practice.

References

1. Water-related Ecosystem Services and Food Security, David Coates et al. CAB International 2013. Managing Water and Agro-ecosystems for Food Security (ed. E. Boelee)
2. Water and Poverty, C.R. Shanmugham, Tata–Dhan Academy, Madurai. 2010