



Policy Brief **6**

Cultivation Practices for Improved Tankfed Agriculture



Transplanting of rice in field



Vayalagam Agriculture Development Centre Activity

Executive Summary

Tamil Nadu is a State with a large number of tanks. In many areas, tank is the only water source to harness rainwater. Tanks supply water to crops during their growing season supplementing the rainfall and stabilise crop production. Tank-based agriculture provides close to one-third of total household income for poor households. Poor households, much more than the non-poor, use tanks for other livelihood needs such as fuel wood, grazing and water for livestock.

DHAN Foundation is involved in implementation of tank development through its “Vayalagam” programme. It organises farmers into Tank Farmers' Associations (TFAs). These associations undertake tank rehabilitation works along with a package of practices comprising appropriate agriculture development and water management practices to improve small and marginal farmers' livelihood in Tankfed Agriculture. DHAN provides the much-needed techno-managerial support to the TFAs by enhancing people's awareness of the benefits of tank rehabilitation. On the basis of local context, a set of best practices is recommended under this Vayalagam Tankfed Agriculture Programme.

TFAs play an important role in deciding the best practices based on their felt needs and priorities.

During scanty or deficit rainfall years or during the years of delayed onset of monsoon or early withdrawal, farmers in tank command at times face difficulties in cultivating crops. Vayalagam programme provides community wells wherever needed in the tank command, so that the farmers can supplement well water and practise conjunctive use. Farm ponds are constructed to help the beneficiaries to utilise the harvested water. Alternate cropping pattern or crop diversification is evolved in a number of tankfed areas by shifting from high water requiring crops such as paddy to low water requiring crops like pulses, chillies and minor millets. This enables farmers to plan their cropping pattern based on water availability in tank.

To highlight the benefits of the Tankfed Agriculture, a policy seminar titled “**Cultivation Practices for Improved Tankfed Agriculture**”, was organised in which Farmers, Government Officials, Academicians, Research scholars, Eminent Scientists, NGOs and DHAN Foundation executives involved in water resources management took part

and shared their views. The review of sectoral policies and further deliberations on the recommendations of the seminar highlighted the following issues:

Tankfed agriculture depends on monsoons for water and hence there is some uncertainty in agriculture. The sectoral analysis reveals that there is no policy or package of practices related to Tankfed Agriculture at National and State levels.

There is a need for contingency planning for the Tank based farmers to mitigate the risks in farming as it depends mostly on water availability.

Tank being a unique infrastructure in irrigation water management, there should be a focus on the crop varieties adaptable for tankfed cultivation, and the traditional knowledge that is involved in the water distribution practices. There is a need for a separate Mission on Tankfed Agriculture.

This policy brief brings out the need for a separate package of practices for Tankfed Agriculture and policy and practice, changes that are required in various departments of Central and State Government, Commercial Banks, Research Institutions and the farming community. A summary of recommendations is given below.

Summary of Suggested Changes in Policies and Practices in Tankfed Agriculture and Agricultural Sectors

Existing Policies/Guidelines and Practices	Policy/Practice changes required
1. Agriculture Department: Tamil Nadu State	
<p>Policies and strategies are framed and adopted with the overall perspective of achieving 4% agricultural growth. There are policies for input supply, water management and marketing technology and guidelines for improvements in crop production through Agricultural University and extension department, in the areas such as dry land farming, irrigated agriculture and horticulture. But there is no specific policy for tankfed agriculture.</p>	<p>Emphasis on Tankfed Agriculture as a separate Mission of Agriculture Department and Agriculture University to benefit small and marginal farmers in tank-based system is required.</p> <p>Crop rotation or diversification and enhancement of crop yield with less water use by practicing System of Rice Intensification (SRI) cultivation for rice in tank intensive districts have to be facilitated.</p>
<p>There is no contingency plan to farmers during drought situations in tankfed agriculture</p>	<p>Contingency planning by the State Government for tank-based farmers on par with dry land farmers is needed. Landless agriculture labourers and small and marginal farmers may be permitted to grow vegetables in the tank bed on payment of a nominal fee, without detrimenting the normal functioning of the tank. The TFAs should closely monitor and ensure that such cultivation does not infringe upon the rights of other tank users.</p>

Existing Policies/Guidelines and Practices	Policy/Practice changes required
<p>Input distribution</p> <p>a. Seeds: Supply of quality seeds to farmers as per Seed Replacement Rate (SRR). 43 State Seed Farms, 5 oil seed farms and 74 seed processing units are presently involved in production of quality seeds. They are unable to meet the needs of farmers.</p>	<p>Increase the number of seed farms to increase the productivity of existing seed farms for crop varieties, which are drought resistant, short duration, pest and disease resistant.</p> <p>Community managed seed villages and seed technology training centres are needed with women playing the major role because of their traditional knowledge in seeds and seed management.</p>
<p>Distribution of seeds to farmers through Agricultural Extension Centres.</p>	<p>Besides Agricultural Extension Centres, distribution of seeds to farmers through farmers' federations/WUAs should be made to ensure timely delivery.</p>
<p>b. Fertilizers: There exists a policy about use of fertilizers but not yet put into practice. Application of fertilizers based on soil testing which are site-specific is hardly practiced. Gap exists between recommendations and actual usage of fertilizers and micronutrients.</p>	<p>Emphasis to be given on the application of nutrients or fertilizers based on soil tests. Organic farming, growing of green manure crops, bio-fertilizer application, and silt application to fields have to be propagated by giving training to farmers.</p>
<p>Dissemination of new technologies like INM, IPM through training to farmers by KVKs and plant clinics is limited.</p> <p>Reach is limited in transmission of new technologies to farmers.</p> <p>National Agricultural Policy states that the role of KVKs is not intensive in implementing development programmes.</p>	<p>The demonstration of INM, IPM and training to farmers can be given through KVKs and field schools by farm scientists or by resourceful farmers who have practical experience of these technologies.</p> <p>Cluster approach like Agriculture Development Centres to be promoted to intensify farmers' training in field action.</p> <p>Role of KVKs to be made more intensive. Post harvest technology wings must be added to KVKs and Lab to Land demonstration in the areas of Post harvest technology; Agro processing and value addition to the primary product must be taken up by KVKs to provide skilled jobs in villages to the landless labourers and their families.</p>
<p>2. Water Resources Organisation (WRO) and Rural Development Department (RDD)</p>	
<p>Though there is a policy on participatory approach for involving farmers in water management, it is rarely practiced.</p>	<p>People centred approach should include traditional water management practices and maintenance of tanks, which include desilting, cleaning of channels, shutters, sluices etc. Practicing traditional water management practices including appointment of <i>Neerkattis</i> (traditional water managers) and using improved water saving devices have to be emphasised.</p>

Existing Policies/Guidelines and Practices

Policy/Practice changes required

People centred participatory approach and indigenous water management technologies are not practiced to the required extent in Tankfed Agriculture.

Implementation and execution of tank rehabilitation and water management by people's organisations/Water Users' Associations should be encouraged and facilitated.

3. Agricultural Universities and Research Stations

Though crops that are of short duration and drought resistant have already been developed for rainfed areas, varieties that are suitable for Tankfed Agriculture are missing.

New crop varieties that are drought resistant, short duration and pest and disease resistant should be released. Package of practices for Tankfed Agriculture should be evolved through field research.

Seed rates for semi-dry crops that could be raised in tank commands need to be evolved.

Similarly for cultivation of paddy under semi-dry conditions, a package of practices is required.

The coping mechanism adopted by farmers in tankfed areas, during scanty or uncertain rainfall conditions have to be studied and strengthened.

There is also the need to evolve crop varieties and crop population that are appropriate for cultivation both in system and non-system tanks.

Adoption of micro irrigation in tank and well command areas including the use of modern devices like rain gun has to be studied and demonstrated through action research.

The establishment of an exclusive research station for Tankfed Agriculture to take up such studies is keenly felt.

4. Agricultural Economics and Cooperation Department/ Ministry of Cooperation, Food, Civil Supplies and Consumer protection

Government determines minimum support price for various commodities and fixes the price taking into consideration the farmers' production cost collected from various regions.

Minimum support price should be fixed in consultation with the farmers after an in-depth study of the input costs with them.

5. Planning Commission Central and State

Farmers are not involved adequately in consultation and planning processes on agriculture by State and Central Planning Commissions while preparing their planning documents.

Farmers should be consulted and select farmers' associations should be involved in the planning process.

6. Education Department

School curricula do not have agriculture as a subject from primary to higher secondary classes for students.

The country is dependent on agriculture and hence agriculture has to be made a compulsory subject in schools.

New pedagogic methodologies should be introduced for promoting a learning revolution among students in Agriculture by using Information and Communication Technology (ICT).

7. Commercial Banks

Out of the overall loan allocation of 40% to priority sector, only 10% is allocated to weaker sections. But in reality, the public and private sector banks deliver only around 7 and 1.4%, respectively.

Commercial banks (in Public and Private sectors) should strictly follow the stipulated target allotted to the weaker sections under priority sector lending.

Projects like Farm Pond development and construction of community wells can be brought under new loan scheme for banks.

8. Farming Community

When tanks have plentiful storage, farmers tend to over irrigate their lands and resort to wastage of water, which results in shortage for the second crop.

Avoiding wastage of water that occurs during night irrigation, through leaky sluice outlets and avoiding irrigation up to 4 days after rains; and applying water based on growth phase of the crop will ensure economy in water use. Land levelling and shaping and alternating tank and well water for irrigation will help to conserve water and make it available for an additional crop.

This policy brief would pave the way forward process and mechanisms to bring policy and practice changes for the benefit of small and marginal farmers in Tankfed Agriculture.

Cultivation Practices for Improved Tankfed Agriculture

I. Introduction

Agriculture and its allied sectors form the basis of rural livelihood. About 75% of total population is involved in various activities of agriculture like crop cultivation, post harvest, food processing and agricultural marketing. The contribution of agriculture accounts for 17% of Net State Domestic Product (NSDP). Agriculture meets the food requirements of the population, provides

employment and also produces the raw materials needed for industries. Agriculture continues to be a dominant sector in the economic development of Tamil Nadu. Tamil Nadu has 7% of country's population, but it has only 4% of land area and 3% of water resources of the country.

Land use pattern in Tamil Nadu over the past six years throws light on the nature of the problems confronting the future development of Agriculture.

Land use pattern in Tamil Nadu for the past six years

(Area in ha)

S. No.	Detail	2005-06	2004-05	2003-04	2002-03	2001-02	2000-01
1	Forest	21,10,703	21,22,069	21,22,041	21,31,604	21,31,726	21,33,617
2	Barren and uncultivable land	5,03,255	5,09,275	5,09,378	4,78,237	4,77,381	4,75,821
3	Land put to non-agricultural use	21,38,679	21,24,564	21,13,353	20,12,025	19,98,296	19,85,891
4	Cultivable waste	3,68,661	3,74,026	3,79,439	3,89,289	3,86,806	3,52,154
5	Permanent pastures and other grazing land	1,10,309	1,13,563	1,13,474	1,18,316	1,18,463	1,22,953
6	Misc. tree crops and groves not included in the net area sown	2,74,351	2,90,072	2,82,980	2,77,596	2,71,363	2,55,302
7	Current fallow and other fallow lands	22,76,848	23,96,065	28,16,824	29,93,927	24,34,795	23,62,290
8	Net area sown	52,43,839	50,97,011	46,89,156	45,90,331	51,72,492	53,03,294
9	Area sown more than once	788,879	792,058	6,26,871	6,00,777	10,53,965	10,34,815
10	Gross area sown	60,32,718	58,89,069	53,16,027	51,91,108	62,26,457	63,38,109
11	Cropping intensity (%)	115.0	115.5	113.4	113.1	120.4	119.5

Source: Season and Crop Report of Tamil Nadu 2004-2005, Department of Economics and Statistics

The following inferences are drawn from the above statistics:

1. Because of pressure on land resources for many purposes, the availability of land for agriculture is shrinking steadily.
2. Net sown area and gross sown areas have been declining in the State over the years.
3. The extent of current fallow and other fallow lands are fluctuating due to the following

reasons. *Inadequate water availability and depletion of ground water, failure of monsoon rains, uncertainty in release of water in the river Cauvery, rising cost of cultivation, scarcity of agricultural labour and uneconomic returns.*

4. The cropping intensity in the State did not show much change over the years and is hovering between 110 and 120%.

5. Area under permanent pastures and other grazing lands has come down considerably, posing a challenge to livestock security and necessitating use of straw and crop residues as animal feed.

The above areas need close study and administrative action for the planned development of land and water resources to improve crop and fodder productivity.

Irrigation and Water Resources Management

Nature has endowed this country with ample rainfall but with uneven distribution. Water

scarcity is therefore considered to be a primary factor limiting crop production. Therefore water storage becomes an essential component for sustainable crop production. One of the important aspects of water management for irrigation purposes is the conjunctive utilisation of surface and ground water in suitable proportions depending upon the growth phase and water requirements of the crop and availability of water from both the sources. The following table illustrates the reduced utilisation of surface tank water and increased utilisation of ground (open and tube wells) water for the period 2001–2006.

Area irrigated (in ha) in the last six years

Source	Years					
	2005–06	2004–05	2003–04	2002–03	2001–02	2000–01
Government canals	7,99,601	7,53,259	4,48,955	6,13,583	8,00,707	8,32,432
Private canals	560	560	503	560	596	715
Tanks	5,75,352	4,65,355	3,84,960	4,22,313	5,36,706	5,88,633
Wells						
a. Tube wells	3,81,441	3,15,629	3,04,136	2,42,824	2,37,359	2,28,055
b. Open wells	11,55,367	10,84,765	94,491	10,19,936	12,11,264	12,21,409
Other sources	7,224	17,630	14,628	10,674	14,325	16,341
Total net irrigated area	29,19,545	26,37,198	21,47,673	23,09,890	28,00,957	28,87,585

Source: Season and Crop Report 2005–2006, Department of Economics and Statistics

Tamil Nadu located in the southern most part of the Indian peninsula, is a State with large number of tanks. There are around 40,319 tanks in Tamil Nadu. These water-harvesting structures were indigenously designed by native rulers and managed by local communities over the past several centuries. Their water use efficiency has come down due to inadequate maintenance, operational inefficiency and lack of control over the regulation and excessive use of water at field level. It is highly desirable to revive the tanks and ponds to restore their performance efficiency and improve it further with conjunctive utilisation of surface and ground water resources.

Features of Tankfed Agriculture

As an agricultural system, Tankfed Agriculture is distinct in cropping practices, varieties and water management. As an engineering system it is historically one of the oldest in irrigation engineering design. As a management system, it has institutions built around it. As a social system the tank serves and benefits various sections of the village community such as farmers, fisherfolk, artisans, animal rearers and especially women. Tanks have two kinds of perspectives. 1. Conservation perspective 2. Livelihood perspective.

Conservation perspective	Livelihood perspective
Irrigation, Drinking water, Domestic use	Less capital intensive to build and maintain. Provides wage employment for landless and marginal farmers.
Recharging ground water, Pisciculture activities	Stabilises agricultural production in rainfed areas during deficit rainfall period.
Providing silt for agriculture and sand for construction	Ensures higher productivity as that of irrigated areas during normal rainfall period.

Based on the irrigation systems (canals, tanks and rainfall) agriculture is classified as follows:

Canals, Tank, Rainfed and Coastal Agriculture

Canal/Irrigated Agriculture	Tankfed Agriculture	Rainfed Agriculture	Coastal Agriculture
1. Mostly owned by Government.	Traditionally people owned and were involved in tank maintenance works.	Mostly subsistence farming; supplementary source of income needed for family expenditure.	Agriculture land up to 10 km from seashore.
2. Flow of water continuous during the season. So no uncertainty in doing agricultural operations.	Season bound; so uncertainty of adequate water storage.	Monsoon decides the critical activities in agriculture, as rainfall is the only source of water.	Coastal area includes seashore, backwaters, estuaries, and lagoons, which are the sources of water not quite suitable for agriculture.
3. Agriculture can take place throughout the cropping season because of availability of water.	Focuses on conservation of water, agriculture depends on water availability in the tanks.	Scope exists for crop diversification and productivity enhancement as well as off-farm activities.	The major activities are Fishery, Agriculture, Horticulture, Livestock maintenance and small-scale businesses.

Even though the tanks are individually small in size as a water storage system, collectively their large number facilitates the absorption of seasonal floods and supply of the stored rainwater to crops during water scarcity periods. In short tanks serve as flood moderators and drought mitigators.

Major issues faced by farmers are:

- Following traditional cropping pattern, e.g., in tankfed areas farmers opt for paddy cultivation even in lean season and face decline in crop production
- Dependency of agriculture on monsoon
- Improper water management techniques
- Income variation due to fluctuations in price of inputs and lack of timely information on price of outputs
- Reliance on moneylenders who charge usurious interest
- Lack of knowledge on crop insurance and advanced technology in agriculture
- Inadequate storage infrastructure like warehouses, grading places etc
- Lack of proper marketing procedures for marketing the agricultural produce.

After highlighting the importance of Tankfed Agriculture and the issues faced by farmers, this policy brief describes DHAN's experience and the recommendations to various departments of Central and State Governments and the farming community.

II. DHAN Foundation's experience in Vayalagam Tankfed Agriculture Development Programme

DHAN foundation has fourteen years of grassroots experience in rehabilitation of minor irrigation tanks and ponds through people-led water security movement called *Vayalagam*. The Vayalagam programme focuses on conservation and development of water resources; it includes rehabilitation of minor irrigation tanks, water management for agricultural production, fish culture and other livelihood interventions. In order to diversify and sustain the activities of the Vayalagam movement, it introduced savings and credit component through Micro Finance Groups (MFGs) among the members of Vayalagam. MFG is the concept of Self-Help Groups, which are farm based, encompassing small farmers, marginal farmers and landless agricultural labourers. It provides a platform for proper maintenance of tanks besides enabling members to pursue other income generating activities for their livelihood. Promotion of MFG encourages these weaker sections of society to get engaged in livelihood activities generated through timely support of credit for agricultural operations.

2.1 Water Management

For improving the agricultural productivity, proper water management is essential. Efficient utilisation of water is being done by construction of farm ponds, community wells, use of regulatory structures such as shutters in sluices and appointing *Neerkattis* or traditional water managers for distribution of water to farmers at the right time and in right quantity.

The quality and availability of water at the required time and quantity is critical for optimum crop growth. Scientific management of water provides the best insurance against weather-induced fluctuations in total crop production. The

quality of water stored in lakes, tanks and ponds is generally good, except in the case of feeder channels, drains or streams flowing over salt affected areas. On the contrary, the quality of well water is highly variable due to climatological and hydro geological conditions. Of all the factors responsible for a high degree of salinity in well water, the characteristics of underground strata and aridity are the most important factors. Therefore irrigation water quality assessment becomes necessary to ensure that the crop growth is not adversely affected.

In the case of surface water the uncertainty of timely supply is high, but ground water is more dependable once it is tapped in adequate quantity. At times the total crop water requirements (quantity wise and time wise) cannot be wholly met from either of these two resources individually, in the tank command areas. With the introduction of high yielding varieties, their more exacting water requirements and their sensitivity to water shortages, the situation becomes all the more critical. Considering the limitations of these two types of water resources, it becomes necessary to utilise both of them optimally to get the maximum yield per unit of water. Conjunctive use of surface and ground



water would help to meet the water requirements of crops both with respect to time and quantity.

The major advantages claimed for the conjunctive use of surface and ground water is as follows:

- It keeps the water table deep enough to avoid the danger of water logging or other hazards of shallow water table.
- It provides security against the irregularity in supply of water required for the crops.

Storage of water below the ground surface is an efficient way of water conservation, but it has to be practiced whenever feasible and to be used in times of need. In Tamil Nadu where groundwater is extracted at an alarmingly high rate, well irrigation by itself cannot provide high crop productivity in a sustained manner. As the water table is falling rapidly due to unchecked water use, ground water supply needs to be augmented through appropriate recharge measures. Irrigation tanks and percolation tanks help to recharge groundwater to a large extent.

Irrigation from tanks is demand based unlike canal irrigation which is supply driven. The command area fields close to the tank (head reach) do not require as much irrigation as the middle and tail end reaches do, as the seepage effect from tank storage itself contributes to soil moisture to a significant extent. Tank irrigation is more efficient, if the stored water is conserved by preventing wastage through leaky sluices and night irrigation. Thus judicious water management will facilitate high productivity. Alternating surface and ground water for irrigation also helps to correct the salt accumulation in tank irrigated lands.

2.2 Micro Finance Groups

Micro finance groups are formed as part of Vayalagam to facilitate operation and maintenance of tanks systems, provide credit to farmers for agriculture related expenses, to create assets, provide alternative livelihood opportunities through livestock, on-farm enterprises and to meet family expenditure, social obligations etc. These MFGs have been linked with Micro Finance Institutions such as

Kalanjiam Development Financial Services (KDFS) and Nationalised and Regional Rural Banks.

2.3 Agriculture Interventions by DHAN

2.3.1 Distribution of quality inputs

Professionals or associates in agriculture manage **Vayalagam Agriculture Development Centres (VADCs)** promoted at cascade level by DHAN. These centres help in knowledge dissemination and extension activities. The main activities include soil testing and creating awareness to farmers through farm field schools for crops like groundnut, paddy and cotton.

Seeds: Seeds play a pivotal role in increasing the productivity of crops. Selected farmers in each Vayalagam are helped to produce certified seeds of those varieties, which are high yielding and are of greater market value. Seed farms promoted by DHAN are in operation in the districts of Theni and Thiruvallur. In Theni district farmers produce seeds of ADT 36, (short duration variety) and ADT 39 and CO 43 (medium duration variety). In Tiruvallur district, seeds of millets like Ragi and minor millets like *Thenai* and *Kudiraivali* are produced in seed farms and supplied to National Seed Corporation. Hence the farmers become self-sufficient in seed production and they get quality seeds without any adulteration or admixture.

Fertilizers: Application of fertilizers based on soil fertility status plays a crucial role to minimise input expense and to face the future challenges on food security. Because of intensive cultivation resorted over the years, the soil has lost its health and soil nutrients got depleted.

Bio-fertilizer is one of the important components in Integrated Nutrient Management (INM) and is an eco-friendly and cost-effective input. VADC promotes the use of bio-fertilizers like *Azolla*, *Azospirillum*, *Rhizobium* and *Phosphobacterium*, which provide nitrogen and phosphorous to the crop. Emphasis on organic farming is given by growing green manure crops like Sun hemp,

Daincha, Sesbania, Kolinchi etc. Ploughing them in situ just before flowering will considerably increase the organic content of the soil. In Puliangudi of Tirunelveli district organic farming is being practiced. Advantages of application of *Vandal* soil (silt from tank) and vermicompost technology are being explained to farmers through field schools organised by DHAN.

2.3.2 Plant protection

Integrated pest management (IPM) by organic method of farming is encouraged, which includes the use of plant extracts and neem cakes for control of pests and diseases. Stress is given on summer ploughing. Use of *Panchakavyam* has gained momentum since the use of inorganic pesticides has caused the degradation of land and health of people. The reduced use of chemical pesticides not only brings down the cost of cultivation but also obviates the ill effects like environmental pollution, residual toxicity and resurgence of pests.

2.3.3 Changes in cropping pattern

Encroachments in the feeder channels of the tank have retrained the flow of water into the tank. Apart from silting of the tanks, weakening of tank bunds reduces the storage capacity of the tanks. In Tamil Nadu mostly paddy is grown in tankfed areas. This is a high water consuming crop. When there is a failure of monsoon, the tank does not get filled and hence the agricultural activities are affected. Taking into account all these factors, DHAN Foundation lays stress on alternate cropping and introduction of varieties, which are of short duration, drought resistant and less water consuming.

In Ramnad district, *Kuzhipidichan* or *Varappu Kudanjan* varieties of rice and ADT 36, ADT 39 and CO 43 are being planted because of high salinity in soil and water. In Theni district, farmers grow vegetables, chillies and *Avuri* (medicinal plant) after paddy crop utilising the residual moisture. Medicinal plants like *Coleus* and cultivation of *Jatropha* for bio fuel are also being introduced by DHAN to farmers to increase their income from agriculture.

2.3.4 Post harvest technology

- DHAN has installed thrashing floors in 5 villages under CAPART scheme.
- An action research to minimise post harvest losses is being carried out by DHAN in collaboration with TNAU, Coimbatore and MCGILL University of Canada.
- Solar driers for reducing the moisture content in chillies have been installed. Similarly installation of solar driers for other crops is also under active consideration.

III. Sectoral Review Analysis

Current Agricultural Scenario

Agriculture in India is a predominant sector in Indian economy. Agriculture and allied sectors like forestry and fishing accounted for 18.6% of the GDP in 2005 and employed 60% of the country's workforce. About 43% of India's geographical area is used for agricultural activity. Agriculture plays a significant role in the over all socio-economic sector and development of India. The relatively low productivity in agriculture in India is due to the following reasons:

- High rate of illiteracy, general socio-economic backwardness, slow progress in implementing land reforms and inadequate or inefficient finance and marketing services for farm produce.
- The average size of land holdings is very small and is subject to fragmentation due to land ceiling acts and in some cases family disputes. Such small holdings are often over-manned resulting in disguised unemployment and low productivity of labour.
- Adoption of modern agricultural practices and use of technology is limited due to ignorance, high cost and impracticality in the case of small land holding.
- Irrigation facilities are inadequate, only 53.6% of the land was irrigated in 2000–2001. This resulted in farmers still being highly dependent on rainfall, specifically during the monsoon season.
- Farm credit is regulated by NABARD, which is the statutory apex body for rural

development in the subcontinent. Small and marginal farmers are more prone to debt because of repeated crop failures.

The National Policy on Agriculture 2005–2006 seeks to utilise the vast untapped growth potential of Indian agriculture, strengthen rural infrastructure to support faster agricultural development and promote value addition, which in turn would accelerate the growth of agro business and create employment in rural areas. This would secure a fair standard of living for the farmers, agricultural workers and their families and would discourage their migration to urban areas and enable them to face the challenges arising out of economic liberalisation or globalisation. The policy seeks to promote technically sound, economically viable, environmentally non-degrading and socially acceptable use of country's natural resources like land, water and genetic endowment for sustainable development of agriculture. The National Agricultural Policy places emphasis on contingency agricultural planning for development of drought and flood resistant crop varieties, watershed development programmes and drought prone area programmes on an area basis. Similarly, specific focus should be given to Irrigated Tankfed Agriculture.

The role of KVKs (Krishi Vigyan Kendras), Extension Department, NGOs, farmers' organisations and para-technicians, as stated in the National Agricultural policy, is not quite intensive in implementing development programmes and needs greater effort.

There is a **need for a separate Mission for Tankfed Agriculture by Agriculture Department**. Contingency planning for Tankfed agriculture at the time of risk is needed. Universities should give separate package of practices for tank-based agriculture to farmers of each region. There is a need for coordination between Universities, KVKs, Extension departments, farmer's associations' in Tankfed areas and NGOs to ensure the implementation of the projects and the recommended water management and improved cultivation practices without deviation.

Traditional knowledge regarding agriculture, livestock and water management can be documented with the help of rural people, since it would pave way for developing many new technologies that are of low cost and would lead to sustainable agriculture.

The major aim of National Policy for farmers is to improve the economic viability of farming by ensuring that farmers earn a “**minimum net income**” and to ensure that the advances made in improving the income result from agricultural progress. It also lays emphasis on the distribution of wastelands equitably and adoption of proper water management practices to reduce the ground water dependency. Water Users' Associations have to be encouraged to gain expertise in maximising the benefits from the available water by adopting micro irrigation when practicing well irrigation.

Community managed seed villages and seed technology training centres are needed in larger numbers with women playing the major role because of their traditional knowledge of seeds and seed management. Organic farming requires far greater scientific inputs than chemical farming. Tank silt application while improving soil fertility, also modifies the soil texture, enhances its water holding capacity and economises water use. There is also a great need for eradicating the aquatic weed *Ipomoea carnea* growing wild in the tank bed and *Parthenium* and *Prosopis* growing around the tanks in a cost effective manner. These areas need intensive research by high-level multidisciplinary scientists and proven technology to be transferred to a farming community. Taking into account the new opportunities opened up by ICT, new pedagogic methodologies should be introduced for promoting a learning revolution among students in Agriculture as well as the farming community.

In intensively cultivated monocrop areas, crop diversification will be beneficial from the view point of ecology, economics and employment generation. However, steps to ensure effective market support for the alternative crops must accompany any advice on crop diversification. In planning for crop diversification, particularly

from food to non-food crops, such as for the production of bio fuels, the food security of the nation should have the highest priority.

The current scheme of the Tamil Nadu State Government on “Land for Landless Scheme” needs modification in its approach. Poor families should be identified/endorsed through people/farmers' federations or Water Users' Associations to ensure that only deserving cases are benefited. This scheme if implemented properly in tankfed or rainfed areas has a great potential to increase productivity.

RBI's credit policy on priority sector lending predominantly supports government's macro economic strategies. Even though the present guidelines are elaborate and appreciable, Reserve Bank of India should proactively give the required focus to ensure effective utilisation of priority sector lending. RBI should provide eligibility status to the small and marginal farmers and to landless labourers having prudential track record in Micro Finance activity similar to SHG women members.

Further, commercial banks should come forward to provide loans to bankable components in water resources development like farm ponds, deepening of drinking water ponds, community wells, desilting of supply channels, fishponds, construction of thrashing floors and rural godowns and purchase of farm implements as a group activity. The term of repayment of loan should be flexible, particularly during drought and flood affected years.

Tankfed agriculture depends on monsoon rains for water and hence there is some uncertainty in agriculture. The sectoral analysis reveals that there is no specific policy or package of practices related to Tankfed Agriculture at National and State level.

There is a need for contingency planning for the Tank farmers to mitigate the risks in farming as farming in Tankfed area depends mostly on water availability.

Tank being a unique feature in water management practices, there should be a focus on the crop

varieties adaptable for tankfed cultivation, and the traditional knowledge that is involved in the water distribution practice. There is a need for a separate Mission on Tankfed Agriculture.

IV. The Seminar

A Seminar was organised on “**Cultivation Practices for Improved Tankfed Agriculture**” focusing mainly on issues related to water management and changes needed in agricultural practices related to Tankfed Agriculture areas. The main participants were Farmers, Central and State Government Officials, Bank Officials, Academicians, Scientists from Research Institutions and DHAN Foundation executives. The seminar mainly dealt with various agricultural practices in Integrated Farm Management, which included Integrated Nutrient Management, Integrated Pest Management and Integrated Water Management, the need for alternate cropping, the importance of farm ponds, community wells and the use of silt from tank as manure to land. For increasing agricultural productivity in tank-based system it was emphasised that Agricultural Department, Agricultural University, Government and Banks should join hands and work with greater coordination. As a followup of the seminar and further deliberations, this policy brief has been formulated with the following recommendations:

V. Recommendations

1. Agriculture Department and NGOs

- The department should bring out a set of appropriate practices especially for Tankfed Agriculture and the NGOs should help to disseminate them to tank farmers.
- Contingency plan to farmers during drought period in Tankfed Agriculture should be clearly spelt out.
- Giving training to farmers in the production of quality seeds.
- Distribution of quality inputs like seeds, fertilizers etc., through Tank Farmers' Associations/Water Users' Associations.

- Awareness programmes on the rights and responsibilities of the Water User's Association, Gram Panchayats, Panchayat Unions and Government Departments should be initiated.
- To ensure that the producer gets the right price and that quality product reaches the consumer, there is a need for proper storage structures and post harvest processing equipment and appropriate marketing facilities.

2. Water Resources Organisation (WRO)/Local bodies like Panchayat, Panchayat Union etc.

- Proper guidelines should be prepared by the above organisations after detailed consultations with the local community for the following work:
 - i. Removing encroachments from tanks and feeder channels
 - ii. Rehabilitation of tanks and tank components

3. Agricultural Universities and Research Stations

- Agricultural Universities should concentrate on developing crop varieties suited to tankfed areas which are less water consuming and drought and pest resistant.
- Alternate cropping and suitable cropping patterns should be made available for tankfed areas.
- Emphasis on growing medicinal plants and other market remunerative crops in tankfed agriculture should also be made by Agricultural Universities.
- Awareness building among farmers about the organic farming, by KVKs and field schools should be made mandatory.

4. Agricultural Marketing and Cooperation Department/Ministry of Cooperation, Food, Civil Supplies and Consumer protection

- Minimum support price to farmers for commodities to be fixed by involving the producers and analysing their input costs.

5. Commercial Banks

- Commercial Banks should provide soft loans to the groups, which are performing well in the areas of seed farms, kudimaramathu activities, reclamation of soil, formation of farm ponds, ooranis etc.

6. Farming Community

Adopt economic use of tank water by avoiding night irrigation and irrigation within four days after rain, prevention of wastage occurring through leaky sluice outlets and surplus weirs. Applying water in accordance with the growth phase of crops, practicing integrated/conjunctive use of surface and groundwater and land levelling and shaping will facilitate saving in water use and uniform crop growth and increased production.

VI. Way forward

DHAN Foundation and Conservation Council for Small Scale Water Resources will take this policy brief into consideration for suggesting suitable steps to realise the Policies, Practices and Research for the benefit of small and marginal farmers in tankfed areas. This can be done in consultation with the following departments/organisations:

- State Agriculture Department
- State Water Resources Organisation and Rural Development Department
- State Agricultural University
- Planning Department of Tamil Nadu
- Commercial banks
- Experienced farmers' federations.

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Abbreviations

IFM	—	Integrated Farm Management
INM	—	Integrated Nutrient Management
IPM	—	Integrated Pest Management
KVK	—	Krishi Vigyan Kendra
MFG	—	Micro Finance Group
NABARD	—	National Bank for Agriculture and Rural Development
NGOs	—	Non-Governmental Organizations
NSDP	—	Net State Domestic Product
PWD	—	Public Works Department
RDD	—	Rural Development Department
SHG	—	Self-Help Group
SRI	—	System of Rice Intensification
SRR	—	Seed Replacement Rate
TFA	—	Tank Farmers' Association
VTADP	—	Vayalagam Tankfed Agriculture Development Programme
WRO	—	Water Resources Organisation
WUAs	—	Water Users' Associations

Why this Policy Brief?

DHAN Foundation is involved in Natural Resources Management, focusing mainly on Community based Development and Management of Water Resources in South India. The initiatives taken so far have reached several villages through rejuvenating water bodies benefiting thousands of families. By working closely with the community, DHAN Foundation has gained valuable experience over the past two decades. DHAN believes that for better management of water resources, certain changes in the present policies and practices are needed. Hence, it has now been decided to come out with Policy Briefs to disseminate the changes suggested in specific sectoral issues. This will facilitate Administrators and Field Level Organisations in their efforts for better management of scarce water resources.

Policy Brief 6 focuses on the issues related to improvement of Tankfed Agriculture and Water Management practices and the policy and practice changes that are needed to enable the farmers in tankfed system. The Brief is planned for focusing the attention of Secretaries to Government of Agriculture Department, Public Works Department (Water Resources), Rural Development Department, Education Department, Voluntary Organisations and Panchayat level Administrators. Agriculture Universities and Research Stations are also our target groups.

About DHAN Foundation

DHAN Foundation is a grassroots development organisation and was initiated with the objective of bringing highly motivated and qualified young professionals to the development sector for new innovations in development programmes and for upscaling development interventions to eradicate poverty. The Foundation works towards bringing significant changes in the livelihood of the poor through innovation in themes and institutions.

The approach of the Foundation is to promote people's organisations and their networks aiming at improving the livelihoods of poor communities by organising development works around themes. These people's organisations would sustain themselves and excel in the long run. Presently DHAN Foundation is working on the themes such as Community Banking, Conservation of Tanks, Information and Communication Technology for the Poor, Rainfed Farming and Panchayats.

About the Centre for Policy and Planning

The Centre for Policy and Planning of DHAN Foundation provides support to the programmes and institutions of DHAN Collective so that they evolve, develop and modify their policies and fulfil their aims. It shapes the sectoral policies to practice at the grassroots. DHAN Foundation as a member of many policy-making bodies on Micro Finance and Water Conservation strongly advocates pro-poor policies. The Centre takes up policy study and initiating research on Micro Finance, Water Conservation, Rainfed Farming, Panchayat Raj Institutions and Disaster Mitigation. As a resource centre, it organises many capacity building events and training programmes for Bankers, Government Officials and Representatives of NGOs within and outside the country.



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