

# **FARMPOND WITH DRIP IRRIGATION AND OTHER CONVERGENCE SCHEMES SUPPORTS RAINFED AGRICULTURE AS VIABLE FARMING - AN EXPERIENCE OF ORIVAYAL WATERSHED IN RAMANATHAPURAM DISTRICT OF TAMILNADU IN INDIA**

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## **ABSTRACT**

Orivayal watershed is located in Drought prone area in Kadaladi block of Ramanathapuram District in .This watershed comes under Gundar river basin .Total area of the watershed is about 1040.63ha. There are 718 families are residing and most of them depends on agriculture as their livelihood options. Soil type in this watershed is predominantly covers with black cotton soil .Average annual rainfall varies from 450mm to 750mm. The farming communities practiced paddy, Chilly and cotton are the crops predominantly.

Orivayal watershed is one of the grant based projects of NABARD under Watershed Development fund taken by DHAN Foundation. The project was initiated by 2004 and completed during July 2011.

The project has taken many activities as integral approach in the watershed development such as creation of farmponds, field bunding with grass seeding to avoid the erosions, continuous contour trenching, percolation ponds, land development by taking measures on leveling and clearing the juliflora jungles, renovation of drinking water pond, provisions of inlet structures to farm ponds for conservation of soil and water. Totally 200 farm ponds created was the highlighted in the watershed which brought positive improvements for increasing cultivable land, productivity and ground water table. 95 farm ponds were constructed through NABARD-WDF assistance and balance of 105 farm ponds have constructed through European Union assistance.

Due to monsoon failure, the farming community in the nearby Orivayal watershed villages (Other villages) faced crop failures except the farmer who was supported by DHAN Foundation to establish a farm pond. Everyone was able to harvest 30 to 35 bags of paddy (65kgs/bag) and 8 to 10 quintals of chillies to cost worth of Rs. 15000 and Rs 30000 as an incremental income in one acre of land. Our experience indicates that, establishment of farm pond is not expenditure rather it is insurance for livelihood sustainability. It reduces risk attached to rain fed agriculture and prevents trauma due to sudden economic loss. In this way we ensure the food security all of the farming families in Orivayal watershed.

Few of the farmers in the watershed have facilitated to use the drip irrigation technology for their irrigation with 100% grant from National Horticulture Mission scheme is being implemented by Horticulture department. The farmers in the watershed have changed their

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irrigation practices slowly from the convention by using the improved techniques like drip through farm pond water source. Mainly drip irrigation is used to chilly and cotton crops. Normally relay cropping system is followed by the Orivayal watershed farmers which mean cotton seed is sowing while flowering happening in chilly crop in the same field. For this cropping pattern drip irrigation is highly preferable by the farmers with farm pond water source. It is highly economically effective irrigation system than others.

The farmers of Orivayal watershed as good example located in Ramanathapuram district of Tamil Nadu in India, to save the crops and ensure the fully harvest of paddy for their consumption and with chilies as their commercial crops to earn the income with farm pond supported irrigation to the crops even they have faced many drought years due to climatic changes.

### **Impacts:**

Crystallizing the different development programme for construction of the farm ponds in Orivayal watershed, the following are the major impact one could infer;

1. Creation of farm pond in Orivayal watershed was successfully implemented and created 200 farm ponds serves irrigation facility to more than 500 hectares. The above intervention caters exclusively for the farmers involved in rain fed agriculture, stabilizing their farming activity, assured cultivation activities, improved productivity and food security in the watershed.
2. The convinced community who mostly belong to the small and marginal farming community with very less land holdings not only came forward to allocate a portion of the available land for constructing the farm pond but also contributed 50% and more during the process of implementation.
3. The intervention not only ensured surface water availability, ensure food security more over started improving the groundwater quality in the area which is saline and hence was not used for irrigation purposes in the past. Now with the qualitative improvement, the groundwater is used for one to two wettings during the cultivation in addition to that farm pond (surface) and bore well water mixed irrigation is giving the more yield to the farming community.(Conjunctive use of irrigation)
4. Farm pond structure is facilitated to catch other government program such as drip irrigation to the farmers in fully grant basis.

Farm pond with drip irrigation is such a unique structure caters many needs of marginal and small farmers, in drought prone areas. The farm ponds established serves as an insurance against crop failures and assures food security to the poor and marginal farming communities. It helps the farming communities to survive and choose a crop that yields better income. The establishment of farm pond directly contributes to poverty reduction. Orivayal watershed is also viewed as one of the model watersheds by NABARD to show case the watershed implementation programme. This farm pond model watershed is positioned in nationally and many of the partners related to water could visits and gained the knowledge about the farm pond with improved irrigation techniques and how could serve the food security to the villagers and keeping the agriculture as long term livelihood activities. This paper would deal the farm pond with improved irrigation techniques, impact and ensure the food security to the farming community.

### **INTRODUCTION:**

Orivayal watershed is located in Drought prone area in Kadaladi block of Ramanathapuram District. This watershed comes under Gundar river basin. This watershed covers four hamlets namely M.Saveriyar pattinam, Maranthai, Panaikulam and Orivayal. Total area of the watershed is about 1040.63ha. There are 718 families residing and most of them depend on agriculture as their livelihood options. Soil type in this watershed is predominantly covered with black cotton soil. Average annual rainfall varies from 450mm to 750mm. The farming communities practiced paddy. Chilly and cotton are the crops predominantly. This paper would deal the farm pond with improved irrigation techniques includes different programme convergence creates impact as rainfed farming as viable and ensure the food security to the farming community.

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### **INSTITUTION IN WATERSHED**

The watershed program implemented through people institutions called Village Watershed Committee (VWC) comprising User groups (UGs) and Self Help Groups (SHGs) and panchayat ward member. User group as a group is promoted by the farming farmers in watershed villages. The Self Help Group as a group promoted for women members mainly those are in landless and marginal land holdings in watershed villages. The structure of People institutions is being operated in Orivayal watershed. This VWC is a powerful committee to implement the watershed program on taking the minutes of every month by the board meeting.

User Groups+ Self Help Groups

Village watershed committee

### **WATERSHED DEVELOPMENT ACTIVITIES:**

The project has taken many activities as integral approach in the watershed development such as creation of farmponds, field bunding with grass seeding to avoid the erosions, continuous contour trenching, percolation ponds, land development by taking measures on leveling and clearing the juliflora jungles, renovation of drinking water pond, provisions of inlet structures to farm ponds for conservation of soil and water.

**Table-1: The detail of watershed activities taken during the project period.**

<b>Sl.No</b>	<b>Activity</b>	<b>Units</b>
1.	Creation of farm pond	95
2.	Field bunding	19949RM
3.	Grass seeding on the bunding	470
4.	CCT	624
5.	Land clearance	7
6.	Percolation pond	1
7.	Renovation of drinking water pond	1
8.	Retaining wall -CD	1
9.	Farmpond inlets	104
10.	Agro horticulture	6850
11.	Dryland Horticulture	3200

### **CONVERGENCE OF VARIOUS PROGRAMME AND INTERVENTIONS IN THE WATERSHED:**

In addition to the watershed activities, many of the schemes have been intervened in the watershed from the different funding source for the development of family focus and common uses. In this watershed the following areas have been taken as convergence

- Renovation of drinking water pond through Philanthropic assistance
- Creation of farm ponds assisted through various partners
- Enhance the agriculture productivity through credit assistance from NABARD-UPNRM
- National Horticulture Mission for Drip irrigation

**Revival of the drinking water pond through Philanthropic support:**

The watershed has the major problem on shortage of drinking water to the peoples. Drinking water problem creates the stress among the villagers and questioning their employment for survival. Drinking water was a very rare commodity as the pond had less water holding capacity owing to silt deposits and the size was small. The water in that pond could meet the need of drinking only for six months and the remaining 6 months people had to either purchase water from Lorries at a price of Rs.3 per pot or travel long distance to fetch water. Some people even went and stood in queue to Melasirupothu, where there is a desalination plant (salty ground water) to fetch 2-3 pots of water. They also received water from Narippaiur, desalination plant (from seawater). This problem was exist till the entry of watershed programme during 2004. By awareness about the watershed programme M.Saveriyar pattinam villagers approached DHAN Foundation to expect the philanthropic support for revival of drinking water source of two ponds.

In the period of 2006, the village association we called User group has contributed one fourth of the project cost and mobilized the balance three fourth from the philanthropic assistance put together totally 4.00 lakhs of works carried out on the ponds each costing Rs 2.00. With this assistance the revived the two ponds on its original standard and utilized for drinking by the villagers. This was the incredible works done coordinated by VWC to solve the big issues on the same. Now the villagers are felt comfortable with good potable drinking water facility. Through this project 270 plus families are really avoid the drudgery on this issue and concentrated their employment with out worries.

**CREATION OF FARMPONDS THROUGH DIFFERENT PROJECTS:**

Now a day’s farm pond plays the critic role to the agriculture productivity. Particularly Ramnad district is severely drought prone and 80% of the cultivable area doing rainfed agriculture. Agriculture is gambling and also depending on the nature of Rainfall of the particular year. The farmers of this watershed faced really the adequate crop failure due to shortage of one or two irrigation in crop life cycle. Totally 200 farm ponds created was the highlighted in the watershed which brought positive improvements for increasing cultivable land, productivity and ground water table. 95 farm ponds were constructed through NABARD-WDF assistance and balance of 105 farm ponds have constructed through European Union and others assistance

To realize the benefit from the watershed program different with support of DHAN Foundation, the European Union donors and others came forward to assist the fund for farm pond construction to the farmers in orivayal watershed. Our nation motto is every house will have one tree in their home premises like that every farming families is must have for farm pond as their motto for enhancement the productivity.

**Table-2: The details of funding utilized for creation of farm pond.**

Sl.No	Source of funding	No.of units	Volume created in cum
1.	European union economic fund	93	146475.00
2.	NOVIB-Nether land	12	18000.00
<b>Total</b>		<b>105</b>	<b>164475.00</b>

## **Technicality behind farm pond construction:**

### ***Farm pond and its features:***

Farm Pond is a small scale water harvesting structure established in a farm land to collect and store water during the monsoon. The runoff water above the surface and below the surface in the catchment area is collected in the farm pond. The water stored in the ponds is used to irrigate crops and survive the crops at the time of water shortage. It is a pro-poor product, suitable for the farming families involved in small scale farming. One notable fact is that about 68% of the area is susceptible to drought in India. Farm ponds are the efficient products to reduce the impact of drought on the poor families. Generally two types of farm ponds are established

***Dug out ponds:*** Generally dug out ponds are rectangular or square shaped and it stores water below ground level

***Surface ponds:*** They are the miniature of irrigation tank, established by building an earthen embankment across small streams flowing in and around the farm lands. Generally the site which has already a depression will be selected for digging a farm pond. It collects the surface run-off from its catchment area.

The agriculture fields are irrigated manually or using traditional devices or through gravity outlet for or by using diesel engine operated pumps.

## **Purpose of Farm Pond**

The farm ponds are established to

- i. Harvest rain water (runoff from the catchment)
- ii. Provide supplemental irrigation to the standing crops at critical growth stages
- iii. Incidental benefit of ground water recharge
- iv. Provide drinking water to cattle
- v. Take up fish rearing activity for generating income
- vi. Promotion of horticulture plantations or tree crops
- vii. Generate wage employment to landless
- viii. Promotion of vegetables to meet the demand of family consumption

## **Factors influences the effectiveness of the farm pond**

1. Rainfall: rainfall is the main factor for surface run-off and infiltration of water into soil. Higher the rainfall intensity, greater will be the surface run-off. Shorter spell with long duration leads to higher infiltration of water into soil.
2. Soil: The texture and structure of soil decides the storage capacity of the farm ponds. Farm ponds need not be established in sandy or laterite soil areas due to high infiltration. Clay loam or loamy soil is highly suitable for establishing farm pond. The establishment of dug out ponds in this area will help the small and marginal farming community to increase the area under agriculture.
3. Site of farm pond: The basic objective of the farm pond is to harvest/conserves water and use it for crop production and other purposes. Therefore, the site of the pond should be decided in such way that major amount of run-off water can be harvested and used easily. Natural depression or low lying area located in the farm land could be ideal area for the establishment of pond.

4. Percolation and evaporation losses: percolation or seepage takes place at the bottom as well as sides of the farm pond. Seepage losses are noticed in the first two years; after two years the seepage reduces gradually. To reduce water loss due to percolation clay soil can be deposited in the farm pond bed at 1 foot height and height of the clay packing can be increased based on the soil strata.
5. Pond size: The size of the pond varies depending upon the topography and land holding size. In orivayal watershed farm ponds are established to hold 500 cubic meters to 2000 cubic meter of water. The shape of the farm pond will vary depending upon the field conditions. Normally in square type and rectangular type is practiced
6. Catchment area: catchment area decides the number of filling per year; the ponds should have a catchment of at least 3-5 acres.
7. Cropping pattern: the sole purpose of farm pond is to harvest rain water to irrigate crops. Here farmers choosing paddy as well as chilli are the major crops benefiting through farm pond structure and it is better to avoid crops that require huge volume of water.
8. Farmer contribution: Contribution in any form (Kind / cash / labour) can be mobilized to build the ownership of the stake holder. This ensures regular maintenance and management.

#### **Cost of Establishing a Farm Pond**

The cost incurred to dig out one cubic meter of soil is around Rs. 30-45. The establishment works are executed by employing machineries like earth movers (JCB) and tractors. The cost of establishing a farm pond with a water holding capacity of 1000 cubic meters is 40000-45000. The establishment of such farm ponds assures farm productivity and reduces the probability of crop failures.

#### **NABARD-UPNRM FOR VARIOUS ACTIVITIES:**

National Bank for Agriculture and Rural Development is implementing Umbrella Programme for Natural Resource Management (UPNRM) as one among the schemes in their development perspective for development of village economy. The project mainly focusing is to restore the natural resource through loan assistance. In orivayal watershed UGs and SHGs have availed the project and members benefited out of it. The activities are taken up through this project is as given in the table.

<b>Sl. No</b>	<b>Loan purpose</b>	<b>Loan amount in Lakhs</b>	<b>Areas benefited in ha</b>	<b>Members benefited</b>
1.	Land development activity by clearing prosopis juliflora in the farmland	1.20	6	14
2.	To grow pesticide free chilly crop through seed and land development activity	8.00	35	85
<b>Total</b>		<b>9.20</b>	<b>43</b>	<b>99</b>

#### **Impact of UPNRM loan in the watershed:**

The Chilli producing farmers of User group in orivayal watershed of Ramanathapuram district have been taking loan to shift from present practice to produce Pest free Chilli. This could fetch

them good return due to marketability. The expenditure could include cost of cultivation, application of fungicide/ farm yard manure and seed cost etc. The orientation by experts to members to produce with organic fungicide and Farm Yard Manure could make the quality of chili highly competitive in the market.

#### **NATIONAL HORTICULTURE MISSION PROGRAMME FOR MICRO IRRIGATION:**

Through the watershed programme awareness the members are well aware about the Micro irrigation techniques for vegetables and other crops such as chili and cotton. Few of the farmers in the watershed have facilitated to use the drip irrigation technology for their irrigation with 100% grant from National Horticulture Mission scheme is being implemented by Horticulture department. This drip project was established during the period of 2008 in Orivayal watershed. Total cost was Rs 85000/ha in which the project contributed by Rs 49000/ha and balance met by the respective farmers for single unit. The farmers in the watershed have changed their irrigation practices slowly from the convention by using the improved techniques like drip through farm pond water source. Mainly drip irrigation is used to chilly and cotton crops. Normally relay cropping system is followed by the Orivayal watershed farmers which mean cotton seed is sowing while flowering happening in chilly crop in the same field. For this cropping pattern drip irrigation is highly preferable by the farmers with farm pond water source. It is highly economically effective irrigation system than others.

They have stated that drip irrigation is good technology would facilitate 20% of the incremental yield and also increasing the area of extent in terms of cultivation if properly maintained the systems with farm pond water source.

#### **OUT COMES AND IMPACTS:**

Crystallizing the different development programme in Orivayal watershed, the following are the major impact one could infer;

Due to monsoon failure, the farming community in the nearby Orivayal watershed villages (Other villages) faced crop failures except the farmer who was supported by DHAN Foundation to establish a farm pond. Everyone was able to harvest 30 to 35 bags of paddy (65kgs/bag) and 8 to 10 quintals of chillies to cost value of Rs. 15000 to Rs 30000 as an incremental income in one acre of land. Our experience indicates that, establishment of farm pond is not expenditure rather it is insurance for livelihood sustainability. It reduces risk attached to rain fed agriculture and prevents trauma due to sudden economic loss.

Creation of farm pond in Orivayal watershed was successfully implemented and created 200 farm ponds serves irrigation facility to more than 500 hectares. The above intervention caters exclusively for the farmers involved in rain fed agriculture, stabilizing their farming activity, assured cultivation activities, improved productivity and food security in the watershed.

The convinced community who mostly belong to the small and marginal farming community with very less land holdings not only came forward to allocate a portion of the available land for constructing the farm pond but also contributed 50% and more during the process of implementation.

The intervention not only ensured surface water availability, ensure food security more over started improving the groundwater quality in the area which is saline and hence was not used for irrigation purposes in the past. Now with the qualitative improvement, the groundwater is used for one to two wettings during the cultivation in addition to that farm pond (surface) and bore well water mixed irrigation is giving the more yield to the farming community.(Conjunctive use of irrigation)

Farm pond structure is facilitated to catch other government program such as drip irrigation to the farmers in fully grant basis.

Farm pond with drip irrigation is such a unique structure caters many needs of marginal and small farmers, in drought prone areas. The farm ponds established serves as an insurance against crop failures and assures food security to the poor and marginal farming communities. It helps the farming communities to survive and choose a crop that yields better income. The establishment of farm pond directly contributes to poverty reduction. Orivayal watershed is also viewed as one of the model watersheds by NABARD to show case the watershed implementation programme. This farm pond model watershed is positioned in nationally and many of the partners related to water could visits and gained the knowledge about the farm pond with improved irrigation techniques and how could serve the food security to the villagers and keeping the agriculture as long term livelihood activities.

The farmers of Orivayal watershed as good example located in Ramanathapuram district of Tamil Nadu in India, to save the crops and ensure the fully harvest of paddy for their consumption and with chilies as their commercial crops to earn the income with farm pond supported irrigation to the crops even they have faced many drought years due to climatic changes.

#### **LEARNING AND RECOMMENDATIONS:**

A typical example is paddy cultivation is not taken place in every year in the same field .In addition to that an alternative year is preferred or other field is recommended for paddy cultivation because of salinity of the land. Adopting field bund techniques in this watershed is an alternative mechanism to reduce the salinity of the land and it is being more preferable for paddy cultivation in same field for many years.

The farmers of orivayal watershed is used the land with double cropping system earlier mono cropping pattern is followed.

The plenty of juliflora jungle removes and area brought back into the agriculture.

Ground water level is drastically improved by making adequate water harvesting structure in the watershed and practicing the water saving techniques like drip irrigation with farm pond.

All watershed programs should be replicated through this model and would ensure the vibrancy in watershed program.

Adjoining watershed program will be taken through cluster or sub basin level by collaborative approach of panchayat federation, GO and Government.

Facilitating the post harvest techniques like solar drier and cold storage to chilli crops because chilli is predominant crop in Ramanathapuram district for

Value chain would be developed in chilli marketing because Ramanathapuram district Mundu type chilli is highly pungency/Capsicum compare to other district.

Corporate Social Responsibility (CSR) would come forward to avail the drip like advanced irrigation techniques to the farmers in larger scale.

#### **Case study**



### **Farm pond source drip irrigation saves the life.....**

Alagarsamy is a small farmer, who lives in Maranthai village of Ramanathapuram District in Tamil Nadu. He owns 3.00 acres of land and they were left uncultivated for two years due to water shortage and labour costs. In spite of the hard work, he was unable to earn out of agriculture. Until the establishment of farm pond under the EU funded project and drip irrigation techniques he did not had a hope to restart agriculture. Now he has earns ` 1.5 lakhs per annum from agriculture. Alagarsamy, he himself narrates what changes he has come across in his life.

My name is Alagarsamy and I am living with my wife and two children. We live in Maranthai village of Ramanathapuram district. Agriculture is my primary livelihood and I engage in milch animal activity during the off-season. Farmers in our village entirely depend on monsoon and if monsoon fails and our agriculture too fail. Our area received less than 700 mm of rainfall..

The income from agriculture was insignificant and returns out of efforts were very less. Due to shortage of water for irrigation, increased cost of labour, and decreased availability of labourers I left the land as fallow for the past two years. Income from Milch animal was the only source. Agriculture was the source of income since my early days and I often worried seeing the barren land. After waiting for two years, I decided to do something to start agriculture. Farm pond was one of the best option but the government programmes were unreachable.

Finally, I came to know about the European Union funded project implemented by DHAN Foundation. I shared my needs with the Tank Farmer Association (User group), and the field staffs. I submitted my request to the staff of DHAN Foundation; after the field visits, they considered my request. In July 2010, I established a farm pond with a water storage capacity of 1176 cubic meters was established. About 50% of the contribution was received from the project and I contributed 50%. Immediately after farm pond formation I could assist with NHM for drip irrigation establishment for my crop cultivation.

The farm pond established was filled with water after monsoon. I cultivated chilly crop in the entire land. Finally, I harvested 5 quintals (500 Kilograms) of chilies per acre and totally, I have harvested 15 quintal of chilies. The market rate of chilies was ` 9,500 per quintal. The total income earned by me was ` 1, 43 lakhs (gross income). My worries due to inability to cultivate in my own land vanished and with the support farm pond source drip irrigation, I was able to optimize the production. After seeing the benefits realized by me, many of the local farmers have come forward to establish farming in their own lands.

The farm ponds have multiple benefits and all the farmers must come forward to establish such infrastructures on their own. If farmers in our area start to dig farm pond on their own land they can drive-out the desertification. The farms, which are left as fallow due to shortage of water, can be brought under cultivation and food production can be increased by tapping rainwater. I suggest all the farmers to establish their own farm pond and have drip irrigation and this is my message.



**Figure-1: An expert team visits drip irrigation with farm pond water source**



**Figure-2: Field irrigating through drip system**



**Figure-3: Labourers engaged in Harvesting Chilies**

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1. Hand book in watershed management-Published by TAWDEVA (Tamilnadu Watershed Development Authority) -Tamilnadu
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