



Policy Brief **12**

Water Series

Translating Practices into Policy and Practice Changes

Tank Silt Application for Agricultural Production Enhancement - Scope, Issues and Challenges



Rainfall runoff with eroded top soil from surrounding lands filling the tanks



Silt removed from the tank transported to the farms for enhancing crop productivity



Executive Summary

Irrigation tanks formed many centuries ago as water harvesting structures to offset the vagaries of monsoons, serve the purpose of collecting and storing not only the rain water, but also the nutrient-rich top soil eroded from their catchment areas. Thus the tanks facilitate to conserve the prime and scarce natural resources, namely the soil and water while providing multiple services

such as irrigation, flood control, ground water recharge and other social, economic and ecosystem functions. Intermittent occurrences of rainfall with high intensity during the monsoons and the consequent heavy surface run-off, cause erosion of valuable nutrient-rich top soil from the catchment area comprising undulated wastelands and rainfed agricultural lands, which is carried along

with the running water and deposited as silt in the tanks. So there is an imperative need for effective utilization of silt collected in the tanks by transporting it to the agricultural lands, which in turn will help in restoring the tank's storage capacity as well as improving the productivity of farm lands applied with tank silt.

Many research studies have proved that tank silt is useful in release of nutrients such as total nitrogen and beneficial to sandy and alkaline soils. It is a source of manure for crop production. It is also an organic amendment for improving water-use efficiency and productivity. The tank silt contains organic carbon, microbial biomass carbon, residual pesticides, etc., The sediment composition and depth of deposition vary from tank to tank. It is advisable to test the silt samples taken from the tanks located in vulnerable areas and analyse it for toxicity in soil testing laboratories, so as to provide appropriate recommendations for use in the fields.

Application of tank silt to rainfed agricultural lands is an age old traditional practice of South Indian farmers for filling eroded patches and to sustain the productivity of their lands. In Southern districts of Tamil Nadu, till the recent past, it was very common that farmers maintained open compost pits of their own to store the wastes cleared from their cattle yards and covering it intermittently with the silt transported from the nearby tanks during off seasons so that the organic wastes decomposed due to alternate wetting by rains and drying by the sun and wind. The application of such a mixture of tank silt and farm yard manure to agricultural lands before the onset of monsoon not only replenished the soil nutrients, but also improved the soil texture and its moisture retention capacity, conducive for enhanced crop production, without the need for applying chemical fertilizers. Tank silt is applied mostly in dry lands and in garden lands as a substitute or supplement to fertilizers.

Currently the practice of applying tank silt to the agricultural lands has slowly vanished due to the reasons such as:

- 1) Replacement of bullocks and bullock carts by tractors and trailers in the villages, resulting in shortage of farmyard manure. In some

places the small farmers could not afford to hire tractors for transporting silt from the tanks on time.

- 2) Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is implemented during the non-agricultural season which coincides with the season for tank silt application, resulting in labour shortage and cost escalation.
- 3) Farmers perceive the risk of more loss in dry land agriculture because of additional cost involved in tank silt application.
- 4) The important reason, according to farmers is the hurdle created by the local revenue staff for taking silt from the tanks adding to their woes. Consequently, the use of chemical fertilizers has increased further in rainfed agricultural lands.

As the soil health is adversely affected by the continuous application of chemical fertilizers and soil erosion in dry lands, there is an urgent need to have a renewed focus on the traditional wisdom of tank silt application and to explore the ways for scaling up the practice of tank silt application for a better and sustained crop production.

DHAN Foundation has conducted field demonstrations on the technology of “tank silt application along with the soil moisture retainers farm yard manure/coir waste mulch in agricultural lands” in two Kharif seasons during 2008-2010 under “Farmers Participatory Action Research Programme (FPARP)” sanctioned by the Ministry of Water Resources, Government of India. The silt application technology was demonstrated in farmers' fields for two crop seasons. The productivity results were quite encouraging to farmers to come up for loan support for silt application under NABARD supported “Umbrella Programme on Natural Resources Management (UPNRM)”. This experience reiterates the need to revive the traditional practice of tank silt application by creating a facilitating environment to make use of both the water and silt stored in our tank systems.

While implementing the FPARP in Madurai district, farmers had to face difficulties for taking silt from tanks due to the objections raised by the Revenue staff citing the Tamil Nadu Minor

Minerals Concession Rules 1959. As per rule no 6(1) – 1959 of Tamil Nadu Minor Minerals Concession Rules, **“The public may be allowed to quarry free of charge for bonafide domestic or agricultural purposes, sand, earth or Silt from the beds of tanks under the control of the Public Works department or Revenue department which are notified by the Collector under this Rule without obtaining permits for quarrying, provided that the dwelling place or agricultural land of the person concerned and the quarrying place shall be in the same village or in the adjoining revenue village....”** (Rule 12 (2) of Tamil Nadu Minor Mineral Concession Rules 1959) states “Removal of sand etc. from water ways under the control of Municipal Councils and Panchayat Boards” may be allowed free of charge for bonafide public purposes and not for sale or commercial profit. No seigniorage fee shall be charged for the removal of sand for bonafide domestic or agricultural purposes but shall be subject to the previous approval of the Revenue Divisional Officer.....”.)

According to the existing rules mentioned as above, no permit is required for taking silt from the tanks for agricultural purpose. But, operational guidelines of the District Administration insist on obtaining permission from the Deputy Director (Mines) after submitting relevant records to the Tahsildar, RDO, and Collector. Thus, the conditions laid down now for taking silt from the tank for

agriculture purpose are cumbersome to be followed by the poor farmers. The Tamil Nadu Minor Minerals Concession Rules 1959 have to be implemented in a farmer friendly way for using the tank silt for agriculture purpose without any problem. As we have more than 50% of our cultivated area under rainfed condition, it is necessary for the Government to take all possible steps to provide special support for the rainfed farmers. The MGNREGS can be implemented to the advantage of rainfed farmers.

Issues, challenges and scope with regard to tank silt application were discussed in detail with leading farmers at their places and also during a policy seminar conducted exclusively for the purpose with many practicing farmers and agricultural scientists. After detailed deliberations the participants made some suggestions to make a few changes in the policy and practice of tank silt application. Accordingly, in this brief it is recommended to revive and rejuvenate the practice of application of tank silt to agricultural lands in a proper manner. In order to implement the suggestion, innovative use of MGNREGA for tank silt application, financial support for transportation of tank silt from the tanks to the farms and provision of NABARD-UPNRM support to farmers for scaling up the tank silt application will be required, as changes in policies and practices by the different stakeholders. A summary of suggested changes in policies and practices is given below:

Summary of suggested changes in policies and practices

Present Status/Existing Policies/Guidelines and Practices	Changes suggested in Policy and Practice
1. Rural Development Department, Government of Tamil Nadu	
<p>“Natural Resource Management (NRM) in convergence with Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) 2011” describes the importance of land development for private lands by undertaking the activities like silt application.</p>	

Schedule item (iv) of Section 1 of the above Act refers to works to be taken up on individual lands belonging to the SC/STs or BPL families or Indira Awaas Yojana (IAY) beneficiaries or small and marginal farmers. It is recommended under category (iv), that works such as provision of irrigation facilities including irrigation wells, horticulture, planting of trees, herbs and grasses, land leveling, boulder removal and **measures to enhance soil fertility such as tank silt application shall be taken up on land belonging to SC, ST, BPL, IAY beneficiaries, small and marginal farmers.** Works on lands of small and marginal farmers will be taken up only after saturating lands of SC, ST, BPL farmers and IAY beneficiaries.

(Rule 12 (2) of Tamil Nadu Minor Mineral Concession Rules 1959) states “Removal of sand etc. from water ways under the control of Municipal Councils and Panchayat Boards” may be allowed free of charge for bonafide public purposes and not for sale or commercial profit. No seigniorage fee shall be charged for the removal of sand for bonafide domestic or agricultural purposes but shall be subject to the previous approval of the Revenue Divisional Officer.....”)

According to the existing rules mentioned above, no permit is required for taking silt from the tanks for agricultural purpose. But, operational guidelines of the District Administration insist on obtaining permission from the Deputy Director (Mines) after

In Integrated Watershed Management Programmes (IWMP), Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is to be inbuilt for taking up the silt application to agricultural lands as a component of land development.

Under MGNREGS, support fund may be allocated for desilting and transportation with some percentage of cost of transport and application to be contributed /shared by the farmers. Guidelines for effective use of tank silt and selection of farmers based on date of application/request or other considerations have to be specifically mentioned.

Tank is the property of panchayat and therefore powers to permit farmers to take tank silt for agricultural land development may be vested with the local panchayat. Therefore the word “Revenue Divisional Officer” occurring after the words “but shall be subject to the previous approval of the” may be modified as the “local panchayat”.

Similarly the operational guidelines may also be modified as “local panchayat”.

Agricultural Technology and Management Agency (ATMA) programme or a separate scheme under the purview of Tankfed Agriculture Mission including Tank silt application may be initiated in each panchayat.

Present Status/Existing Policies/Guidelines and Practices

submitting relevant records to the Tahsildar, RDO, and Collector.

“Quarrying for other than bonafide domestic or agricultural purposes shall be subject to the previous permission being obtained from the Collector concerned and to the payment of seigniorage feeAny removal of mineral from these lands shall be subject to the restrictions mentioned below...”

Changes suggested in Policy and Practice

A set up of “Silt Bank” at panchayat level may be established with appropriate mechanisms and procedures for regulating the process of access to tank silt by the farmers.

The water users association in the local area or the concerned panchayat may be authorized to monitor the removal of silt.

The existing procedure and restrictions may continue as at present, in order to prevent any misuse of the concession given for agricultural use.

2. Agricultural Department, Government of Tamil Nadu

There is no systematic study available on Tank wise silt characteristics, silt sedimentation and its nutrient value or toxic matter in order to recommend the type of silt suitable for agriculture lands and for use by small industries.

Silt (sedimentation) samples need to be taken from the tanks and analysed for its nutrient status and toxicity if any, by the Agriculture Department soil testing laboratories and suitable recommendations on tank wise silt characteristics and its usage may be for disseminated to the farmers.

State level study has to be undertaken to assess the quantum of silt available for use in each tank, with provision of funds required for such a study. .

Factors influencing silting of tanks and their nutrient content, such as addition of livestock manure during grazing season in tank bed and droppings of birds perching on trees planted in tank bed, may be widely published to create awareness among the public.

Agriculture Department in the state may avail the support of NABARD under Rural Infrastructure Development Fund (RIDF) and thereby encourage farmers to take away silt from the tanks which will also restore the water storage capacity of the tanks.

Subsidised transportation support may be provided to farmers for Tank Silt application to lands.

Tank Silt Application may be included as a component of watershed development.

At panchayat/WUA level, a revolving fund may be formed to support the silt application to agricultural lands.

3. Mines and Minerals Department

Power for approving the removal of any sand/rock/any other mineral other than for agricultural purposes is now vested with Revenue/Mining department.

The present status may be continued without any change.

4. Regional Rural Banks/Commercial Banks/ Primary Agricultural Cooperative Societies (PACS)

Presently there is no provision for the above banks to provide any credit support to farmers for tank silt application.

Credit support may be provided to farmers at an affordable rate of interest for tank silt application.

A moderate promotional cost may be allocated to scale up the activity of silt application.

5. Agricultural University and Research Stations

Agricultural University is conducting research on Soils, Agronomy and Plant Geology.

An exclusive research project may be initiated to study the effect of silt application to soil fertility/productivity and its economic. Similarly an intensive study on eradication of aquatic weeds may be undertaken to have an effective preventive measure of evapo-transpiration of valuable water from the tank.

Non-Governmental Organisations could be encouraged to collaborate with the Agricultural University in action research programmes to monitor and assess the benefits of tank silt application.

6. National Bank for Agriculture and Rural Development (NABARD)

Under UPNRM farmers get support for tank silt application.

NABARD can champion the promotion of tank silt application. UPNRM support may be intensified to scale up the activity of silt application.



Tank Silt Application For Agricultural Production Enhancement - Scope, Issues And Challenges

I. Background

Tanks conserve the prime natural resources

Tamil Nadu is endowed with more than 39,000 irrigation tanks, about 80% of which are small tanks irrigating commanding less than 40 ha each with wide geographical distribution and contributing significantly to rural economy. These tanks have been formed many centuries ago as water harvesting structures, to offset the vagaries of monsoons. In spite of the presence of these tanks in large number, more than 60% of the net area sown in Tamil Nadu is cultivated only under rainfed condition due to poor water resources available in the State. These agricultural lands form major part of the catchment areas which contribute to the tanks' rain water storage.

Intermittent occurrences of rainfall with high intensity during the monsoons and the consequent heavy surface run off cause erosion of valuable nutrient rich top soil from the surrounding agricultural lands. The soil is carried along with the running water and is deposited as silt in the tanks.

Interestingly, these tanks serve the most important purpose of conserving the prime natural resources, namely soil and water which facilitate their multiple uses such as irrigation, flood control, ground water recharge and the other social, economic and ecosystem functions.

However the accumulation of silt in the tank bed adversely affects its storage capacity, notwithstanding the fact that retaining the soil transported from the catchment (productive agricultural lands) is also a function of tanks. If tanks were not formed, the fertile soil transported from the productive agricultural lands would have been washed away the streams and rivers and finally to the sea.

There are about 140,000 tanks in the three southern states of Andhra Pradesh, Karnataka and Tamil Nadu and majority of these are silted up. Desilting of these tanks can ameliorate 5.6

million ha of dryland (@ 40 ha/tank) while creating additional storage capacity of 1.4 BCM. (DARE/ICAR Annual Report 2010–11). Hence, for the conservation, development and management of the traditional tank systems, focus is needed not only on the collection, storage and usage of stored water, but also on the effective utilization of the silt collected in the tanks by transporting it back to the agricultural lands.

What is Silt?

Silt is a combination of sand and clay particles collected from tanks or lakes in the villages. Silt can also be referred to as eroded soil deposited in the tanks and lakes of the villages and in delta areas. It is mainly applied to improve soil and moisture conservation, enhancement of water holding capacity as well as increase the aeration, porosity and nutrient status of the soil for a good crop growth.

Application of tank silt to rainfed agricultural lands is an age old traditional practice of South Indian Farmers to sustain the productivity of their lands. In Southern districts of Tamil Nadu, until the recent past, it was very common that farmers maintained an open compost pit of their own. These pits were used to store the wastes cleared from their cattle yards by covering it intermittently with the silt transported from the nearby tanks so that the organic wastes decompose due to alternate wetting by rains and



Rainfall runoff with eroded top soil from surrounding lands filling the tanks



Tank silt applied to field

drying by the sun and wind. Such a mixture of decomposed farm yard waste with tank silt was applied to their dry lands once in two years. Some farmers used to transport tank silt and farm yard manure separately to their fields for spreading before the onset of monsoon. Such practices not only replenished the soil nutrients, but also improved the moisture retention capacity of the soil conducive for enhanced crop production, without the need for applying chemical fertilizers. Incidentally, this practice has resulted in periodical desilting of tanks and restoration of the storage capacity of the tanks.

But this practice of applying tank silt to the agricultural lands has gradually vanished during the past four decades, which may be due to the following reasons:

- As the bullocks and bullock carts have been replaced by tractors and trailers in the villages, it resulted in the reduction of farm yard waste. As the farmers have to hire



Farmers loading silt from Kuruvakulam tank

tractor - trailers for transporting silt from the tanks, they could not avail the facility in time.

- Restrictions imposed by the local revenue staff for taking silt from the tanks.
- Risk of loss in dry land agriculture due to additional cost involved in tank silt application which is taken up before the commencement of monsoon itself.

Due to the above mentioned problems, chemical fertilizers have replaced the application of tank silt and farm yard manure.

As the soil health is adversely affected by the continuous application of chemical fertilizers in dry lands, there is an imperative need to have renewed focus on the traditional wisdom of desilting tanks which, in addition to storing rain water, collect and store the highly valuable silt for putting back on the agricultural lands to replenish the soil nutrients.

When silt is collected and applied to crop land, it modifies the texture of the soil and improves it. In clay soil, silt application enhances its tilth and drainability. In sandy soil, it improves the water holding capacity of the soil and helps to aggregate soil particles. In both the areas, it enriches the land by enhancing the physical, chemical & biological status of soils. Silt application also fills up the local depressions and rills on the land surface and makes the land more productive and easy to cultivate.

This policy brief is more about exploring the ways of scaling up the practice of tank silt application based on DHAN's experience than about how the tank silt application is beneficial to crop productivity which is already an established fact.

II. Tank silt application - DHAN's experience and scope

Consequent to the success of tank silt application to agricultural lands as one of the watershed development components under NWDPR in 45 watersheds, DHAN Foundation has conducted

demonstrations on the technology of “tank silt application along with the soil moisture retainers (farm yard manure/coir waste mulch) in agricultural lands” under Farmers' Participatory Action Research Programme (FPARP) promoted by the Ministry of Water Resources, Government of India. The silt application technology was demonstrated in the fields of 30 farmers for two crop seasons during the years 2008 – 2009 and 2009 – 2010 by transporting the silt from the nearby irrigation tanks. The details of demonstrations conducted under this programme are furnished below.

S. Block No.	District	No. of demonstrations	Area covered (in ha)
1 Sedapatti	Madurai	15	11.00
2 T.Kallupatti	Madurai	1	1.00
3 Punganur	Chittoor (AP)	5	5.00
4 Chityal	Nalgonda (AP)	9	8.00
Total		30	25.00

For the application of tank silt with soil moisture retainers, an estimated unit cost of Rs.14000/- per ha with 50% farmer's contribution was adopted. 30 demonstrations (20 in dry lands and 10 in lands having supplementary irrigation facility) were conducted covering a total extent of 25.00ha, The results were quite encouraging and healthier growth of crops (when compared to the nearby fields where no silt was applied) was visibly seen by the farmers who visited the demonstration fields. Additional yield of about 15% in dry lands and about 25% in irrigated lands have been noticed by the farmers.

Encouraged by the results of FPARP demonstrations conducted, farmers came forward to avail loan for the application of tank silt in their fields. Accordingly NABARD has sanctioned Rs.40.00 Lakhs as loan for tank silt application under the Umbrella Programme on Natural Resources Management (UPNRM) to be repaid by the farmers within 36 months with 12% interest. The details of loan amounts disbursed and the area covered by tank silt application



Crops grown in tank silt applied field under UPNRM

during the period from April 2010 – Nov 2011 are given in the table below, indicating the increased awareness among the farmers about the benefits of tank silt application in their fields.

S. No	Block	District	Tank Silt Application		
			No of Farmers	Loan Amount disbursed (Rs. in Lakhs)	Extent covered (Acres)
1	T.Kallupatti	Madurai	48	5.34	27
2	Sedapatti	Madurai	11	1.30	17
3	Singampunari	Sivagangai	72	9.66	52.45
4	Mudhukulathur	Ramnad	8	1.40	4
5	Theni	Theni	58	10.19	55.5
6	Thiruvallangadu	Thiruvallur	5	0.90	4
7	Thirkalu kundram	Kancheepuram	16	3.23	14
8	Punganur	Chittoor (AP)	34	5.95	38.78
9	Chityal	Nalgonda (AP)	23	1.55	15
TOTAL			275	39.52	227.73



Land Preparation is completed for transplanting chilli

Experience by the farmer in Tank silt application

V. Muniyandi, Anuppapatti

Thiru. V. Muniyandi S/o. Mr. Velayudam live in Anuppapatti village in Andipatti taluk of Theni district, and he is the secretary of Mottaiyankulam Vayalagam since 2002. He has two acres land with a well for irrigation. During the monsoon period and for almost 8 months he can draw water for 12 hours/day. During the summer months from April to July the water drawal is possible only for 3-5 hours/day.

Before the Tank silt application: He was cultivating Fodder crops, Bajra, Jowar and Maize prior to tank silt application. Through the earnings from cattle he used to repay the loan amount taken from the micro finance groups. During water scarcity months, he takes up these crops. During abundant water availability, he cultivate tomato and onion in one acre each. He also used to apply only Farm Yard Manure. He got 30 bags of onion per acre as yield and around Rs 25000/- as profit from tomato and depending upon the market rates got more income from tomato. He used to apply Di Ammonium Phosphate as basal fertilizer and urea with complex as top dressing and incurred heavy expenditure.

Tank silt withdrawal: Through the UPNRM project by DHAN Foundation, he got a loan of Rs 15000/- for tank silt application from the Theni district Vayalagam federation. In his reflection he was telling that if this loan had not been given, he would not have taken any effort to apply tank silt in my soil.

For tank silt application, the farmers have discussed in series of meetings at the Vayalagam federation and obtained

permission for 7 tractor loads of silt application from the Reddiarkulam tank which is 2 kms away, using his own tractor. He paid labour charges @ Rs 200/load.

Cost workings

Labour cost @ Rs 200/- per 7 loads	1400
Vehicle hire charges	1300
Driver bata	100
Total per day	2800
For 5 days	14000
Soil spreading charges	1000
Total	15000

Note: If the tractor is caught while transporting the soil a fine upto Rs 25000/- by the revenue authorities may be levied. Such problems exist in villages.

Cultivation after tank silt application:

From paddy (Sep/Oct to Jan) he got 30 bags as yield. He also cultivated tomato, onion and lab lab and harvested 22 bags of onion, 3000 to 4000 kgs of lab lab. Harvested good yield of tomato but the prices were low. For paddy that he is cultivating now in 2 acres, He may get 65 bags with significantly lower application of fertilizers. If farmers get the formal permission of concerned authorities for silt application through DHAN Foundation, he intends to do so once in 3 years. Also he expressed that we do not wish to apply silt without permission.

For the past 15 years, DHAN Foundation is facilitating the rehabilitation of tank systems through “Vayalgams”(Tank Farmers Association) formed for the purpose. Whenever the desilting of tank bed was taken up, farmers were encouraged to use the fertile tank silt in their fields; but the response was poor due to financial and other constraints. Realising the importance of recycling the tank silt and the nature of constraints, the “tank desilting” component has been modified as “tank desilting and silt

application to fields” with farmers' contribution while implementing the tank rehabilitation programme with the funding support of SDTT in Karnataka during 2009 – 2011. Under this programme entire quantity of silt removed from the tank beds (leaving the gritty soil material for bund strengthening work) has been used in agricultural lands. The details are as under.

S.No	Block	No of Tanks	Volume of silt used in fields (Cu.m)	Area applied with tank silt (ha)	No of farmers benefited
1	Yadgir	7	19388	1081	587
2	Gurmitkal	4	13324	882	342
Total		11	32712	1963	929

The clear inference is that a strong demand from farmers with their willingness to share the cost of silt application, their group action and an enabling environment were instrumental for achieving such a massive application of tank silt to agricultural lands. The farmers are very much happy to enjoy the twin benefit of enhanced storage capacity of their tanks and improved soil fertility of their lands.

Thus our experience highlights the scope for reviving the traditional practice of tank silt application by creating a facilitating environment to make use of both the water and silt stored in our tank systems.

Identifying and addressing the issues and challenges in tank silt application

Though the farmers have inherited knowledge and awareness about the usefulness of tank silt application in their fields, there are some intrinsic issues hindering the revival of this practice.

Mostly dry lands are subjected to soil erosion and hence they essentially need soil replenishment through silt application. But these dry lands are cultivated with low level of crop productivity and uncertainty due to vagaries of monsoon. In many parts of the state, farmers consider the rainfed agriculture as an economically un viable

occupation, as their produce could not fetch a reasonable price commensurate with the increasing prices of agricultural inputs and other commodities they use. Hence many youths of the farm families opt for working as skilled/unskilled labourers elsewhere leaving their dry lands fallow.

The earlier experience of implementing the MGNREGS made the farmers to believe that it has paved way for the unrealistic increase of wages of farm labour and hence the MGNREGS is perceived as a potential threat to agriculture. Further, the MGNREGS is implemented during the non-agricultural season coinciding with the season for tank silt application and thereby labour shortage and cost escalation of tank silt application. This perceived threat of MGNREGS can be changed as an opportunity for desilting of tanks and silt application in dry lands if it is implemented with innovative approach. One such suggestion is indicated below.

The labourers under MGNREGS can be well utilized for excavating, collecting and stacking the tank silt in the tank foreshore, so that the needy farmers can use them in their fields. The MGNREGS labourers are to be used also for loading the silt in the trucks/trailers.. If a suitable policy to this effect with implementation guidelines is evolved by the Government, it will lead to multiple benefits such as:

- Effective engagement of labourers under MGNREGS in a highly useful job.
- Poor dry land farmers will be benefited much by enhancing the productivity of their lands and in turn their net income.
- Improved performance of tanks due to their increased storage capacity.

Another issue is the lack of support for motivating the farmers towards tank silt application. Banks can sanction loans for tank silt application by considering it as an important component of agricultural development. Wherever support through MGNREGS could not be provided for tank silt application, Government may give subsidy to the farmers as they deserve for such support.

The third issue is about the unwanted interference of the Revenue staff at lower level for taking silt from the tanks for agriculture purpose.

Difficulties encountered by the farmers in obtaining tank silt are:

- a) Authorities in charge of the tanks are not aware of the entitlements of the bonafide farmers.
- b) Farmers are also not aware of the procedure to obtain tank silt.
- c) In many cases multiple authorities such as P.W.D, Revenue, Mines department claim that they alone are competent to permit the removal of silt from tank bed.
- d) Farmers applying for permit have to go from pillar to post before their request is processed.
- e) Though the removal of silt is beneficial to the tank as it improves the capacity of tank-the authorities do not take this into consideration.

Tank silt is considered as “Minor Mineral” though strictly speaking it is not a “minor mineral” as per the definition in Mines and Minerals (Development and Regulation) Act 1957.

So there is a strong need to simplify the rule implementation procedure to make it farmer friendly. It is necessary to allow the farmers to take silt from the tanks just by informing the details of the Revenue Survey number of the field and the land owner name and address to the VAO/Panchayat President concerned.

Hurdles experienced by farmers: A case

The hurdles experienced by the farmers for taking tank silt for conducting field demonstrations on tank silt application under FPARP sanctioned by MoWR, Gol in Sedapatty block of Madurai district, brings out the ground reality. The Village Administrative Officer (VAO) directed the farmers to get the permission of Tahsildar for taking silt from the tanks. When Tahsildar was approached for getting necessary permission, he directed them to contact the RDO, who in turn asked them to approach the District Collector, who finally put the request of the farmers on hold. Blocked at that level, the

Vayalgam Federation (Tank farmers Federation) sought the rules for taking silt from the tanks using RTI Act. Finally, the Deputy Director, Geology and Mines, Madurai, communicated the Rule No. 6(1) - 1959 of Tamil Nadu Minor Minerals Concession Rules, which indicates that no permission is needed for taking tank silt for agricultural purpose.

But the Deputy Director also stated that a farmer should submit the details of location of the quarry and the place where it is to be used to the concerned Tahsildar, RDO, DD(mines) and the Collector so that the DD(mines) will give necessary permission.

Though no permit is required for taking silt for agricultural purpose as per the relevant rule 6(1), the DD's communication insists on getting permission from him by a cumbersome process.

III. Sectoral Review on Application of Tank Silt to farm fields

Uses of silt application the ain land helps in retention of

Role of tank silt in release of nutrients

Sen and Asija (1954) evaluated the efficiency of tank silt in its nitrification potential by mixing tank silt with two soils, one with high clay content from Guntur and the other an acid soil from Jorhat. They observed an increase in organic carbon content in the soil-silt mixtures after eight weeks period. In the case of acid soil, when the pH values were 6.2 to 6.4, traces of nitrate were formed and increased with increase in PH. There were appreciable quantities of nitrate found in the Guntur soil at the end of eight weeks. Increase in total N content was observed in both the soils. In both the soils there was decrease in pH. On the whole tank silt application was found to be more beneficial in sandy and alkaline soils.

Role of tank silt as a manurial source in crop production

The findings of Joshi and Deshpande (1953) that the organic matter content of the tank sediments of Madhya Pradesh ranged from 0.58 to 0.92 per

cent paved way to recommend the use of tank silt as a bulky manure. To strengthen this, Sen and Asija (1954) gave a definite evidence of N₂ fixation by tank silt in soils. Moreover, they also proved that tank silt application was highly beneficial in sandy and alkaline soils.

The increase in crop yields on the addition of tank sediment reflects its beneficial effect on the improvement of the soil properties. Ramesh (2001) revealed that the practice of addition of silty loam tank sediment to clay soils resulted in increased sand and silt content. Chemical properties indicated a decrease in soil pH and EC and increase in soil organic carbon, total and available N, P, available K and micronutrients. Higher average bengalgram yields were recorded in fields receiving tank sediments.

The recommendation that tank silt can be supplemented for 100 per cent RDF to grow crops like groundnut, greengram, black gram and maize in rabi season and to sorghum, pigeonpea, cotton, castor etc. in kharif season was stated from a study conducted in Medak district of Andhra Pradesh (Anonymous, 2003). Annadurai et al. (2005) noticed that tank silt amendment enhanced the productivity of crops like sunflower, groundnut, cotton, sugarcane, soybean, gingili, tomato, onion, brinjal, turnip, cucumber, chilli etc. The physical conditions of red sandy soils improved reducing the bulk density and pH and increasing the organic carbon and water holding capacity of the soil.

Review of the paper on Tank silt application for improving soil and water productivity in rainfed crops by Mohammed Osman, Principal Scientist (Agronomy), CRIDA reveals that tank plays an important role for rural livelihoods. There is an implication to tank due to poor management of agricultural lands forming catchment area of tanks, need for desilting of tanks, importance of application of silt to agricultural lands and trend in slow down practice of application of silt to agricultural lands. It is also shared the pilot experiences.

Poor management practices of catchment have resulted in silting of most of these water bodies and significant reduction of storage capacity. Silt deposit has not only reduced the storage capacity but also groundwater recharge, eutrophication of tanks and most importantly higher release of carbon to atmosphere through silt mediated anaerobic decomposition of organic carbon. Good practices such as desilting and application of silt to agricultural fields have been abandoned. Continued mining by crops and reduced application of organic manures has resulted in deficiency of several nutrients particularly that of micronutrients. Recycling of tank silt provides a win-win situation to both, improvement in soil health and renovation of the tank.

The pilot experiment results show that the nutrients retrieved from silt were considered to be the profit (benefit) as against the expenditure (cost) incurred on removing the silt from the tanks. Additionally the process of silt application to farm lands that is rich in organic C will result in C mineralisation and higher nutrient availability thereby helping plant growth and greater fixation of C through photosynthesis.

A pilot study on Quantification of Nutrients Recycled by Tank Silt and its Impact on Soil and Crop in Warangal District of Andhra Pradesh has provided the following policy recommendations;

Tank silt to be considered as a substitute for the fertilizer and a part of subsidy given to fertilizers need to be diverted for tank de-silting and recycling of nutrients to farm lands. Fertilizers provide one or two nutrients, while silt provides all the nutrients in adequate quantities and also improves soil health and water-holding capacity essential for drought-proofing in rain-fed areas.

- De-silting operations of the existing tanks could be included in the National Food for Work Programme, which creates employment as well as restores the asset for harvesting rainwater.
- Provide soft credit line to farmer to apply tank silt to the fields and credit support to various government programs/panchayats for undertaking de-silting operation. (Global Theme on Agro ecosystems Report No. 52)

The studies conducted by the Central Research Institute of Dryland Agriculture (CRIDA, Hyderabad) in Nallabelli and Regonda Mandals of Andhra Pradesh on the recycling of tank silt for improving the productivity in rainfed areas have revealed the following results.

- Soil moisture retention has gone up by 4 -7 days.
- Higher plant population and higher plant height.
- Savings on chemical fertilizers ranging from Rs.2500/- to Rs.3750/- per ha.
- In case of maize, the increase in yield was 700 kg/ha.
- In case of cotton, the increase in yield was 1000 kg/ha.

Studies made of silt taken from several irrigation tanks in Karnataka by the University of Agriculture Sciences show that they have plant nutrients which can enrich the land where it is applied and could result in increased land productivity.

The addition of tank silt to the fields improved the water-use efficiency and water productivity of different crops at a number of locations in Anantapur, Warangal, Solapur and Bhilwara districts. It has been recommended that Tank silt as an organic amendment for improving water-use efficiency and productivity (DARE/ICAR Annual Report 2010–11).

Water- use efficiency (WUE) and Water productivity (WP) in different crops as influenced by tank silt application

District	Crop	WUE (kg/ha/mm)			WP (t/ha/mm)		
		With silt	Without silt	Improvement (%)	With Silt	Without Silt	Improvement (%)
Anantapur (n=20)	Ground nut	2.60	1.41	84	65.25	30.90	111
Warangal (n=22)	Cotton	2.96	2.09	42	86.55	60.65	43
Solapur (n=10)	Rabi Sorghum	7.19	5.13	40	78.45	56.20	40
Bhilwara (n=10)	Maize	6.09	4.75	28	54.90	42.65	29

Note: Mean of two years; n=number of farmers

Review of paper on Comprehensive land development of assigned lands -

J.Venkateswarlu states, that the tank silt application has taken a new dimension. With use of tractors for hauling, the small holders are almost deprived of its use. Must ensure that the shallow poor soils (16% in the state) receive the valuable material.

A Synthesis on Economic Analysis of Tank silt after conducting studies in 21 tanks in Medak District by Dr R. Sakthivadivel reveals the following:

1. Importance of Tank Sediment

Sediment Deposition in Village water Tanks is a significant problem. Tank desilting is primarily resorted to increase tank storage and availability of more irrigation water. Desilting is resorted to ground water recharge also and has environmental benefits. Desilting and returning the desilted sediment to agricultural fields provides multiple benefits.

2. Sediment Composition

Clay & Silt Particles(30 % clay & 70 % silt)

Fertilizer: Nitrogen and Phosphorous varied from tank to tank and also with depth of deposition indicating management practices from tank to tank and also with respect to time in a tank.

Organic carbon, microbial count & microbial biomass carbon Pesticides

3. Sediment Quantification

- Nitrogen 720mg/kg
- Phosphorous 320mg/kg
- Potassium 310mg/kg
- Organic carbon 9.1 g/kg
- Microbial biomass carbon 308mg/kg
- Microbial biomass carbon/Organic Carbon=3.8%

4. Impact of Silt on Agriculture

	Without silt	With silt
Net Income (Rs.) (cotton)	10210	24620
Net Income (Rs.) (Chillies)	40320	50676
Net Income (Rs.) Turmeric)	31075	31213

Source: A Synthesis on Economic Analysis of Tank Silt by Dr. R. Sakthivadivel, Emeritus Professor, Anna University, Chennai.

5. Economic Evaluation

The economic valuation of nitrogen in the silt is based on the cost of urea while phosphorous on the basis of single super phosphate (SSP). Potassium based on Muriate of Potash (MOP), Zinc (Zinc Sulphate) and boron (Borax) at the existing rates. Value of tank silt is based on the content of N, P, K, Zinc and Boron and equated with cost of fertilizers. Benefit was calculated by totaling the value of silt for different nutrients. Sulphur was not accounted as SSP and Zinc sulphate supply sulphur. Value of other nutrients was not estimated.

The benefit-cost ratio calculated is the apparent value and indicates only the cost of desilting operation borne by the project and the total value of the nutrients.

Economic Value of Plant Nutrients

- Based on the economic value of N&P, plant nutrients returned to the fields, the average benefit cost ratio works out to be 1.17.
- This in addition to increased rain water Storage
- Groundwater recharge
- Water availability for multi-purposes

Benefits

- Restoration of biological activity
- Return of High Value organic carbon to Fields
- Microbial activity increasing soil fertility
- Increasing moisture holding capacity of soils.

A paper on synthesis review of field experiences, literature, and policies by B Adolph and JA Butterworth) states the status of silt application practices in Karnataka and Andhra Pradesh.

In Karnataka, the sand and silt deposits are often collected and applied to coconut gardens. Sediments are also used for other productive activities including brick-making. Sometimes the sediment is 'sold' by village watershed committees with the revenue being used to fund development activities and provide loans to villagers. There are numerous programmes (Neeru Meeru in AP) underway to desilt tanks –

although focused on trying to improve water storage capacity and to provide employment, rather than to improve soil fertility. Transport is a major constraint in using available silt. (Soil fertility management in semi-arid India: it's role in agricultural systems and the livelihoods of poor people).

Under the Indira Prabha (Comprehensive Land Development Project), the guideline on Unit Cost of various works stated (according of Administrative Sanctions, Government of Andhra Pradesh, Office of the Commissioner Rural Development, Circular No.9/CLDP/2004 Date: 03-03-2005) that Tank silt application (Most important) is one of the sequence of activities may be adopted for execution of the works and it is one of the activities eligible under RIDF-IX and RIDF-X. The unit cost suggested for Tank Silt application was Rs.1500-2000/acre.

The Working Group's recommendations on Natural Resource Management (NRM) in convergence with Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in 2011 states the importance of land development for private lands by undertaking the activities like silt application.

Schedule item (iv) of the Section 1 refers to works to be taken up on individual lands belonging to the SC/STs or BPL families or IAY beneficiaries or small and marginal farmers. It is recommended that under category of (iv), works such as provision of irrigation facilities including irrigation wells, horticulture, planting of trees, herbs, grasses, land leveling, boulder removal and measures to enhance soil fertility such as tank silt application shall be taken on land belonging to SC, ST, BPL, IAY beneficiaries, small and marginal farmers. Works on lands of small and marginal farmers will be taken up only after saturating lands of SC, ST, BPL farmers and IAY beneficiaries.

Report of the Committee for Revision of MGNREGA Operational Guidelines by Dr. Mihir Shah Committee to Ministry of Rural Development, Government of India.

In the guideline it is recommended the following under works and their execution. In the para under 7.3 Negative List 7.3.1 Rule 2 of Schedule I

mandates that creation of durable assets is an important objective of the Scheme. This implies that assets created should be tangible and measurable in nature. Works like boulder, pebble or shrub removal, silt application and similar activities which are non-tangible in nature are not permissible as stand-alone activities except when they are part of tasks in projects for strengthening the livelihood resource base of rural poor. Hence it is important to work out the combination of activities in shelves to improve the land development. Also it is needed to work out the cost benefit details in listing of the tank silt in the project list.

As per rule no 6(1) – 1959 of Tamil Nadu Minor Minerals Concession Rules,

“The public may be allowed to quarry free of charge for bonafide domestic or agricultural purposes sand, earth or Silt from the beds of tanks under the control of the Public Works department or Revenue department which are notified by the Collector under this Rule without obtaining permits for quarrying provided that the dwelling place or agricultural land of the person concerned and the quarrying place shall be in the same village or in the adjoining revenue village.....”

(Rule 12 sub rule (2) of the Tamil Nadu Minor Mineral Concession Rules 1959). The only condition is the District Collector should notify that silt can be removed from the particular tank.

Note: All the tanks which were once under the control of the Revenue Department have since been transferred to the Panchayat

“Quarrying for other than bonafide domestic or agricultural purposes shall be subject to the previous permission being obtained from the Collector concerned and to the payment of seigniorage feeAny removal of mineral from these lands shall be subject to the restrictions mentioned below...”

(Rule 12 (2) provision of Tamil Nadu Minor Mineral Concession Rules 1959) “Removal of sand etc. from water ways under the control of Municipal Councils and Panchayat Boards

”..... may be allowed free of charge for bonafide public purposes and not for sale or commercial profit. No seigniorage fee shall be charged for the removal of sand for bonafide domestic or agricultural purposes but shall be subject to the previous approval of the Revenue Divisional Officer.....”

Policy change to be suggested in view of the fact that all tanks which were under the control of Revenue Department have been transferred to Panchayat.

IV. Policy Seminar

Policy seminar at state level was organised at Chennai on 20.11.2011 by inviting Farmers, Experts, Representatives of State Government Departments and Academia, for the deliberations followed by the lead paper presentation by DHAN Foundation and the papers presented by other institutions like CRIDA, TNAU forum has proposed the recommendations.

V. Recommendations and Way forward

The scope, issues and challenges related to the tank silt application in agricultural lands were discussed in detail in the forum of all stakeholders so as to arrive at the specific needs of policy changes on this subject. The forum has highlighted the need for community regulation to access tank silt to agricultural lands, with priority to be given to small and marginal farmers.

For the conservation and development of traditional tanks, focus is needed not only on the collection, storage and usage of stored water, but also on the effective utilisation of silt collected in the tanks by retrieving it and applying back on the agricultural lands. twin benefit of silt application in augmenting moisture retention on one side and improving the soil texture and water holding capacity of dry lands on the other.

It is recommended that the following suggestions may be considered while formulating the policies for taking silt from the tanks for agricultural purpose.

- As per Minor Minerals Concession Rules, no permit is needed for taking silt from tanks, if the tank and the fields are in the same village. Tank is the property of panchayats and hence the powers and rights to use the tank silt have to be given to panchayats like fishing rights as given in Karnataka State. The farmers are to be allowed by panchayats to take silt from the tanks just by informing the details to the the Panchayat President concerned.
- The Tank Water Users Association or any other village institution functioning in the area may be authorized to monitor the removal of silt and send periodical reports to the Panchayat President.
- Engaging labourers for collecting and stacking silt in the foreshore, loading the trucks sent by farmers and spreading the silt in their fields may be included under MGRGEGS.
- Grant fund may be provided to farmers for application of Tank Silt to their land. 100% grant fund to be allocated for small and marginal farmers.
- Interest free loan and loan products to be designed to farmers to support this activity on a scale.
- Subsidised transportation support may be provided to farmers for Tank Silt application to lands.
- Tank desiltation and Tank Silt Application may be included as a component of watershed development under watershed development fund (WDF)/NWDPR scheme.
- Studies may be conducted on the level of silt accumulation and factors influencing silting of tanks for suggesting preventive and remedial measures.
- Need to analyse the economic benefits of tank silt application and compare it with application of inorganic fertilizers in terms of quantity and the cost is imperative
- Farmers have to be sensitised through different methods and through a special campaign on the use of tank silt application.
- Tank desilting programs should have a separate component for tank silt application also.

The desilting of tank may include the other uses of the silt for construction (road laying) and brick making works, which will need special permission of Revenue authorities and close monitoring by the VAO/Panchayat President and the Local Tank/Village Institution. This procedure should continue henceforth also.



Policy seminar on tank silt application- Inauguration and discussions



Policy seminar on tank silt application- Sub group discussions

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Abbreviations

AP	- Andhra Pradesh
ATMA	- Agricultural Technology Management Agency
BCM	- Billion Cubic Meters
BPL	- Below Poverty Level
CRIDA	- Central Research Institute for Dryland Agriculture
DARE	- Department of Agricultural Research and Education
DD	- Deputy Director
FPARP	- Farmers Participatory Action Research Programme
IAY	- Indira Awaas Yojana
ICAR	- Indian Council of Agriculture Research
IWMP	- Integrated Watershed Management Programme
MGNREGS	- Mahatma Gandhi National Rural Employment Guarantee Scheme
MOP	- Muriate of Potash
NABARD	- National Bank for Agriculture and Rural Development
NREGA	- National Rural Employment Guarantee Act
NWDPPRA	- National Watershed Development Project for Rainfed Areas
PACS	- Primary Agricultural Cooperative Societies
PWD	- Public Works Department
RIDF	- Rural Infrastructure Development Fund
RRB	- Regional Rural Bank
RTI	- Right To Information
SC	- Scheduled Caste
SDTT	- Sir Dorobji Tata Trust
SSP	- Single Super Phosphate
ST	- Scheduled Tribe
TFA	- Tank Farmers Association
TNAU	- Tamil Nadu Agricultural University
UPNRM	- Umbrella Programme on Natural Resources Management
VAO	- Village Administrative Officer
WUAs	- Water Users Association

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 been decided to come out with Policy Briefs to disseminate the changes needed in specific sectoral issues. This will facilitate Administrators and Field level Organisations in their attempts of better management of scarce water resources.

Policy Brief 12 focuses more about exploring the ways of scaling up the practice of tank silt application based on DHAN's experience. It highlights the importance of silt application in soil health, need for the analysis of silt sedimentation in order to recommend it for its usage to agriculture, small industries. It is proposed to convergence of Government schemes such as MNREGA to renovate the practice of desilting and application of silt to agriculture fields on large scale.

It is mainly focusing the attention of Tamil Nadu state government departments of Agriculture, Rural Development, Revenue Administration, Ministry of Rural Development and Agriculture and co-operation, NABARD and Banking Institutions.

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 organisation 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 long run. Presently DHAN Foundation is working on the themes namely Community Banking, Conservation of Tanks, Information and Communication Technology for 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 the 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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