

**CLIMATE RESILIENT MEASURES
AT RAMANATHAPURAM
CASE STUDIES**



Dr. A. Ramachandran, PhD, D.Sc.
Emeritus Professor,
Centre for Climate Change and Disaster Management
Anna University, Chennai

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INTRODUCTION

Ramanathapuram, the divine district of Tamil Nadu, is one among the thirteen coastal districts of the state with the longest coastal length of 237 km. Located in southern agro climatic zone, the geographical extent of Ramanathapuram district is 4,089.57 sq.km. The district experiences a dry, hot climatic condition throughout the year except during the North East monsoon season. The mean annual maximum temperature is 32.6°C and minimum temperature is 23.8°C during the 1951-2015. The annual average rainfall is 847.3 mm. Projections from global climate models indicate that there would be 1.1°C and 1.9°C increase in maximum temperature in mid-century period (2041-2070) and end-century period (2071-2100) respectively from the baseline scenario under RCP 4.5 climate scenario. The district is naturally prone to hazards of coastal erosion, accretion, which will be aggravated with changing climatic conditions. Ramanathapuram district is also highly drought prone because of the lack of rain and rivers. The quality of water is naturally poor due to semi-marine conditions.

The GIZ – Water Security and Climate Adaptation (WASCA) programme has planned, developed, and implemented the Climate Resilient Measures (CRM), which are specific to the coastal issues pertaining to Ramanathapuram district directly benefitting the cadastral Gram Panchayat (GP) level communities. Bringing success through differentiated actions at GP level is a challenging task, which was brought very successful in our case study in GPs of Ramanathapuram district. These case studies play an exemplary role in supporting Gram Panchayat level, Block level, District level and State Level decision makers in their efforts to cope with the effects of climate change by demonstrating the implementation of coast specific adaptation measures.

The CRM detailed in this booklet are initiated to meet a range of policy objectives, which co-benefits the complete coastal ecosystem covering water augmentation (surface and groundwater), increase in green cover, prevention of erosion, protecting indigenous flora, improve rural access to safe water. The mode of implementing the actions emphasized in the Sustainable Development Goals (SDGs) were carried out through the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) ensures livelihood enhancement of the rural population especially the people living below poverty levels.

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1. Horticulture Park: Towards Harmonious Asset creation



Valantharavai Gram Panchayat of Manadapam block is an exemplary of convergence of activities and implementation works that can be integrated towards achieving the sustainable development goals in real time. The Gram Panchayat is spread across an area of 1619 Ha with no recorded forest area. The village faces the challenge of water scarcity due to the absence of canals, drainage lines and is water deficit by 255 HaM. The soil profiling study indicates that more than 90.49% of the soil is fine coarse loamy and permeable and the percent volumetric soil moisture is in the range of 16-20%. The main scientific intention is to improve soil health through good agriculture practices and integrate with agro-forestry to improve the soil organic matter. Enhancement of soil nutrients including soil organic carbon is a prerequisite for withstanding the climate mediated drought and flood risks.



The major activity is to establish a Horticulture park. However, with zealous effort from the technical team, the village people and the administrative staffs, the livelihood enhancement activity of developing a horticulture park has transcended into a service to nature and people alike. Twenty activities are conceived, planned, executed and followed up with utmost care. The twenty activities taken up within the Valantharavai Horticulture Park under the MGNREGA and technical assistance from the GIZ team are viz. Livestock shelter, Poultry sheds, Mushroom cultivation, Bund strengthening with native species, nursery development, composting, Azolla cultivation, troughs for livestock and farm pond.

The horticulture park has been set up at a total cost of Rs. 45, 65, 000/- with the ratio of material to man of 18,93015 is to 14,20,065/-. The per day rate of Rs. 256/- and man-days is 5547. This horticulture park provides multifaceted benefits and each activity is linked to the other activities improving the efficiency of the system as a whole.



All the activities carried out under the MGNREGA scheme are nature positive and visible evidence of development and tangible benefits to people. The farm pond constructed within the horticulture park is a source of water for the fruit garden and the floral garden of the horticulture park. The fruit garden is a collection of both native species and some species like plums and strawberries are planted to check their compatibility in the soils of Ramnathapuram. This activity has given the MGRNEGA employees a chance to experiment with nature based solution and suggest indigenous ways to sustain it.

The cultivated *Azolla* is mixed with the fodder to cattle, to improve the nutritive value of the milk. The bunds of the farm ponds are strengthened with native species like *agathi* (*Sesbania grandiflora*), which are fed to livestock. The beneficiaries especially women folk find the variety of activities very helpful in causing a livelihood transformation from infrastructure development works to nature positive solutions. They have learnt to raise nursery, tend to plant saplings, water it and maintain it scientifically with support from GIZ's technical assistance. The women ensured financial independence and assure to sustain the activities beyond MGNREGA interventions, by selling fruits, flowers, saplings and seeds, milk and eggs from livestock. The horticulture park is thus a haven for the holistic integrated nature based approach and a forerunner model among the MGNREGA works at Ramanathapuram as a comprehensive



This kind of horticulture park works are initiated in 11 model GPs of 11 blocks of the Ramanathapuram district in government purampokku lands. More than 18,000 plants are raised in an area of 19.7 Ha area and is about to benefit the rural communities within a span of five years. The GPs where the works are

| Name of the Block | Name of the Panchayat | Area for Plantation (In Ha) |
|-------------------|-----------------------|-----------------------------|
| Bogalur | Bogalur | 1.00 |
| Kadaladi | Mookaiyur | 2.50 |
| Kamuthi | Musitakurichi | 1.04 |
| Mandapam | Valantharavai | 2.00 |
| Mudhukulathur | Therurveli | 2.50 |
| Nainarkovil | Pagaiventry | 0.70 |
| Paramakudi | Thaduthalankottai | 7.00 |
| R S Mangalam | Govindhamangalam | 0.16 |
| Ramanathapuram | Sakkarakottai | 0.50 |
| Thiruppulani | Thathanendhal | 2.00 |
| Tiruvadanai | N.M.Mangalam | 0.30 |

Climate Resilient Measure addressing the Sustainable Development Goals to reduce poverty, hunger, water challenges being inclusive and providing equality to all and also befitting to the supportive ecosystems.

2. Mini-forests and Mega-forests: Tangible nature positive CRM



Forests are the prime source of maintain the ecological balance of any area and their unplanned degradation leads to a massive exploitation of the services provided by the forests. Recreating a forest ecosystem can be a big challenge, especially in the fast pace of industrial and technological development. However, to revert the potential impacts of climate change and to mitigate the cause of climate change, establishment of mini and mega forests is initiated as a Climate Resilient Measure at Ramanathapuram district.

Mini and Mega forests are established in the Government purambokku lands of Ramanathapuram district and this activity is undertaken on a massive scale to realise best benefits. It is observed that the entire vertical cross section of the community has involved full support and efforts to bring about a model “**green cover revolution**” in Ramanathapuram district. A mini-forest is established in an area of 0.05 Ha with plantation of 500 saplings and a mega-forest is established by planting 5,000 saplings in 0.5 Ha. Based on the availability of the land at a stretch, mini-forests are established in 75 GPs of Ramanathapuram district covering an area of 46.8 Ha which includes the plantation of 4,68,000 tree sapling of indigenous varieties. Mega-forests are established in 95 GPs of Ramanathapuram district covering an extent of 92.37 Ha raising 6,16,000 tree saplings. The forests, both mini and mega are raised through the Japanese Miowaki method to facilitate the growth of most competent tree species

among the indigenous varieties so as to be beneficial for the for the rural community in a short span of time.



Trenches are cut along the lines of the tree plantations in the mini-forest area, to retain and conserve water for plant growth and enhance the ground water level. There is a potential control in soil erosion and excess runoff during heavy rainfall.



The total green cover of 139 Ha is very well established and maintained by the villagers even after the 100 days work under MGNREGA. One of the elderly villagers Mr. Kuppaiya of Valantharavai GP says that he is very pleased to see the entire GP being transformed into a beautiful green landscape, which was once a bushy unuseable land. He is thankful to the team of GIZ-WASCA, to provide simple scientific methods of cutting trenches, planting methods and composting. The concerted efforts right from the villagers, the ward counsellors, GP heads and administrators is a real boon to this village, and they all work together to improve the green cover of this village so that their children and grandsons need not face the climate vagaries like droughts and dry days.

There is visible success in the growth of the trees and is a guaranteed stride towards enhancing the green cover of the district to 33% as targeted under the SDG 15. Moreover they will serve as a haven for rich biodiversity of flora and fauna, sequester atmospheric carbon dioxide and enrich the soil carbon.



The smiles of people belonging to the present generation and future generation is the evidence of successful transformation brought by the forests in Ramanathapuram district.

3. Nursery Development: Towards Nurturing Livelihood



Vendhoni is a Gram Panchyat of Paramkudi block, spread across an area of 1049 Ha and houses eight habitations. In this GP more than 28% of the area is under non-agriculture use and only 13 % of the area is irrigated and 3% is covered under rain-fed systems in agriculture. A major portion of this GP that is about 46% of the area is under current fallow. Around 1.52 Ha in the GP is cultivable wasteland. Most of the land in Vendhoni GP was completely covered with invasive *Prosopis juliflora*. The presence of *P. juliflora* rendered the portions of wasteland inhabitable due to misuse of dense shrubs. Under WASCA-MGNREGA about 1.29 Ha area is taken up as a treatment area. The GP also faces water challenges where in around 63.38% water requirement for irrigation is met out through surface water and 36.62% water requirement for irrigation is through ground water. Therefore, it is felt that surface water harvesting has to be given priority. The GP is water deficit by 19 HaM and available runoff for storage is 41.4 HaM. To compensate the water demand, the village has to harvest an additional runoff of 23.8 HaM. This dual demand for reclaiming the wasteland and to address the challenge of water scarcity, 3 farm ponds are proposed in community lands.



The wasteland of the GP has now been converted into two units of district nursery and plantation of mini-forest and proposed mega-forests around the GP. Five lakhs saplings are raised in two units of the district nursery. Each day the women folk of the village prepare around 250 packets of saplings per day at a daily wage of Rs. 273/-. They are actively involved in preparing nursery mother beds for sowing seeds, watering the mother beds, packing the saplings and watering them. Once developed into saplings they are distributed to other panchayats. Plant species useful to nature as well as livelihood enhancing is developed.

The people of the village especially women folk are very happy as the income generated from the MGNREGA works has helped them to be financially independent. The income has helped them during the CoVID pandemic lockdown. The nursery development on wasteland has improved their skills and they are now able to sustain their livelihood. This way, the eradication of invasive species has proved to be a nature positive solution of nursery development. *Prosopis juliflora* is abundantly found in Ramanathapuram district. It is an invasive, drought resistant, evergreen fast growing pheratophyte. It was introduced in Tamil

Nadu in 1959, to address the fuelwood requirements of the rural poor people and to re-vegetate the degraded lands. However, it spread faster and invaded almost all agro-climatic zones of Tamil Nadu. Therefore, from ecological perspective, it is observed that *P. juliflora* is one of the potential invaders having detrimental effects on natural and man-made ecosystems and its local biodiversity in Tamil Nadu.

The drought like events is predicted to recur in water scare districts like Ramanathapuram and the encroachment of *P. juliflora* will be a confounding factor aggravating the consequences of climate change mediated drought risk. Thus, the wastelands invaded by *P. juliflora*, all over Ramanathapuram district can be eradicated and developed into nature positive approaches, through the demand driven MGNREGA works which are technically supported by the GIZ-WASCA, which is also a primary Climate Resilient Measure.

4 Fallow Land Development: Transformation from a Dry land to Horticulture park



Thadhanendhal GP of Thirupullani block is a classic example of transforming a dry fallow land into a horticulture park. This GP faces the challenge of low soil moisture and low soil quality. There is availability of many vacant government land, which are invaded by *Prosopis juliflora*. But there is no recorded forest area. The fallow land is put to a proper usage, by eradicating the *Prosopis* species and developing it into a horticulture park, with plantations that can grow faster than the invasive species. An area of 20.23 Ha is converted to a horticulture park with 10,000 plants. This includes horticulture flowers like marigold are grown, apart from that a portion of land is developed into a chilli park. As an integrated approach, cattle and livestock is also raised. A farm pond is also constructed within the park, to meet the water requirement of the plantation activities.

Nagarajan of Thadhanendhal GP says that it was a very interesting experience in raising the horticulture park. He says that a diverse variety of crops can be raised in this park in a scientific way. This includes crops like chillies, corns; fruits and vegetables like guava and sapodilla are planted here. During the establishment of activities inside the park, they were able to raise decorative plants and sell it in the market at a good price. The horticulture park has also brought a change in the landscape of their village.

With proper maintenance and continued support by the villagers, this model land transformation can be a potential livelihood enhancing activity and providing sustainable adaptation to many such villages of Ramanathapuram, that have large unutilised barren areas.

5. Bamboo Plantation : The futuristic approach



As one of the greening initiatives and as an innovative step towards mitigating and adaptation to climate change challenges, bamboo plantation is taken up in the 4.86 Ha of fallow land in Valanthuravai Gram Panchayat of Mandapam block. The juveniles of bamboo plantations which are still as saplings during our field visit, show fast growth and are a promising climate resilient measure.

The fast growing and renewable stands of bamboo can sequester carbon in their biomass at a superior rates compared to a number of other tree species. Many durable products can be made from bamboo. These products have reduced carbon footprint and low eco-cost. Hence, bamboo can be favourable substitute for hardwoods in the coming years that increases the long-term visible sustainability of the people at Valanthuravai. Bamboo also serves as an alternative renewable source of biomass energy for the villagers. Plantation of bamboo does not need agriculturally areas as it can very well grow on fallow lands and problem soils that are unsuitable for other crops.

Panchavarnam says that they did not know the benefits of planting the bamboo trees here. But they worked for 100 days scheme under MGNREGA. WASCA team has educated them about the potential benefits of bamboo plantation and its use in the near future. They are able to visualise that there is rapid establishment and growth of bamboo since they planted them here. Perumal, an elderly person of the village says that the plantations were able to withstand strong winds and its strong roots have controlled water flow and prevented erosion that usually occurs in this GP. Thus, in future bamboo plantation will support the rural people of this GP against emergent climate change.

It is prospectively planned to extend the present area of bamboo plantation as a eco-tourist spot at Valantharavai GP, with all the structural components made of bamboo. In the eco-tourism area, it is proposed to create a meditation arena, a natural fitness ground. Since bamboo are known as natural air purifier with one bamboo plant able to produce **more than 70 tons of oxygen** and absorb 80 tons of carbon dioxide per acre per year., the eco-tourism area in Vallantaravai can be rightly be called as a climate-smart “Life Park”. Further to provide a year-round source of income, it is proposed to connect the Bamboo park to the active Women Self Help Groups of the Mandapam block who are skilled in creating a wide variety of value-added products for sale.

The future of Valantharavai GP is promising as a climate-smart “Life Park”, offering practical solutions to climate change mitigation and adaptation – and within a span of two years the park will be a typical asset for the rural community and as an effective climate resilient measure also underpinning economic sustainability.

6. Mangrove Plantation : Enhancing Ecosystem resilience

Globally mangroves have demonstrated substantial resilience to natural disasters especially with respect to shoreline changes. Evidence of this service provided by the mangrove ecosystem is visible through the soil accretion rates in mangrove forests, which is on par with mean sea-level rise. The patterns of mangroves to recover from natural disasters makes it a very resilient ecosystem in coastal regions. Mangroves are popular natural filters for water pollutants. They act as coastal land protectors mediated through trapping sediment and ability to withstand damages from storm. The special aerial roots, support roots, and buttresses render mangroves to thrive even in muddy, shifting, and saline conditions. They can establish themselves even with changes in sea level by growing upward or by expanding landward or seaward. Mangroves are climate resilient as they create a large reservoir of below-ground nutrients, facilitate nutrient flux and microbial decomposition, act as complex and highly efficient biotic control to various types of disturbance.

Works to establish mangrove plantation is at a nascent stage at Kaliyanagari GP of Thiruvadana block covering an area of 2.03 Ha with proposed 10,000 mangrove trees. This is a natural resource management activity, which primarily focusses on conservation, and it will take few years realise the potential of mangroves in the GP as a climate resilient measure and for the rural communities to reap benefits.

7. Coastal Shelter Belt plantation : Protecting the coast



Kallimangundu is a Gram Panchayat in Thirupullani block with an extent of 514 Ha. Around 65% population belong to the Scheduled Caste community as per the census data (2011). The information on land use is that there is no forest area within the GP.

The Thirupullani block, is vulnerable to climate vagaries mediated through coastal cyclones and storms as it is in close proximity to the coast, which includes some habitations at a distance of 0-100 m from the seashore. Kallimangundu is located 800 meter from the seashore and likely to face stormier winds by the habitants in future.

Kallimangundu is thus identified as a potential location for coastal shelterbelt plantation for a two-kilometre stretch of the forestland and a mini-forest is developed in the 0.2Ha Government Purampokku land. The mini-forest with 2000 tree saplings is proposed and one unit is successfully established at an estimated cost of Rs. 1,62,500 per unit of 0.05 Ha of 500 saplings employing 643 man days. The plant saplings are raised in the village nursery of Kallimangundu and the block level nursery at Vannangundu Gram Panchayat of Thirupullani block. These nurseries are developed at a cost of Rs.14,25,000/-covering 3991 man-days at a daily wage of Rs.273/-. Thirty thousand Native plants are grown in the nursery. These plants are chosen based on their ability to withstand strong winds and commercial value to sustain the livelihood of the village locals.



From the Rapid Rural appraisal of the villagers in Kallimangundu, it was found that the plant saplings had to be raised with utmost care as, they were frequently affected by the sea breeze and the salinity. The Palmyra saplings would be destroyed whenever unpredicted rains visited their coast after planting the seedlings. The women folk who worked under the MGNREGA scheme to develop the mini-forest as a part of the coastal shelter belt plantation are very happy to see the place transformed from a thorny unusable patch of Prosopis outgrowth to a green serene mini-forest. These bushy areas were never safe for people to cross. But now due to the intervention of GIZ-WASCA MGNREGA, the place has become safe to commute. Their livelihood has improved through the job generated in mini-forest activity and has supported them during hard times whence, the fishermen of the family couldn't venture in to the seas due to climate vagaries. The women folk are very happy to raise the nursery and claim to have learnt to raise plants in a scientific way. They are eager to show sustainability with their skills learnt from this job opportunity even after the 100 days of guaranteed job.

The coastal shelterbelt plantation will act as a bio-shield if it is extended in blocks like Thirupullani along the vulnerable coastline to protect the hamlets and their livelihood from future coastal storms and cyclones, which are predicted to increase and be more uncertain in future.

8. Avenue Plantation : Creating a green corridor



The GPs of Ramanathapuram district are improving their infrastructure facilities and their connectivity to other places through concrete and well-developed road networks. Though on one hand this has led to the rural improvement of the GPs, the concretisation is gradually depleting the natural resources of the region. Therefore, present day development may in future cause a natural resource crisis. Plantation along the roads and streets is a sustainable development initiative, which also proves to be a climate resilient measure.

About 240 km stretch of avenue plantation has been initiated covering 86 villages in 8 blocks of Ramanathapuram district. About 76800 trees suitable to the local agro-climate are planted with a combination of 100 big and 200 small trees per km along roadsides.

The indigenous avenue trees planted in the GPs of Ramanathapuram help to reduce air and water pollution. Presence of concrete roads leads to excessive runoff without an opportunity for rainwater percolation. It is projected across Ramanathapuram that dry days will become frequent and the possibility of intense rainfall events will also be more. Therefore capturing the water that falls on land is the best solution to tide over the projected climate vagaries and build community resilience.

Avenue plantation help control the "heat island" effect by providing shade, reducing albedo and cooling evapotranspiration. These trees increase the infiltration rate. If well-maintained, avenue plantation help buffer high winds, control erosion, and reduce drought. Further, like any plantation activity it avenue trees help mitigate climate change by capturing and storing atmospheric carbon dioxide during photosynthesis.

Parthiban of Thathanenthal GP says that planting trees along the roads was a new work for him. They had thought that bringing in concrete roads was the major need for the village. But, WASCA team educated them that though development must be in tune with nature and must take measures to prevent future climate change. Parthiban adds, when they saw the trees grow and provide such pleasant environment, they felt very happy and this plantation stretch has given a new possibility for community interactions as villagers gather to get some relief from the scorching heat, which has increased after road construction.

Thus, avenue plantation provide critical social and cultural benefits also that may strengthen community resilience to climate change.

9. River-bank Stabilisation : Towards sustainable and resilient livelihood



Urapulli Gram Panchayat of Paramakudi block is spread across an area of 719 Ha. According to the Census of 2011, there are no recorded forest area in the Gram Panchayat. Urapulli village completely depends upon surface water for irrigation, therefore surface water harvesting has to be given high priority. Moreover, the Vaigai river that passes through this village, is a vital source of water. The bank of this river is prone to erosion during intense rainfall. To avert further erosion in event of predicted vagaries in rainfall and to address both extremities of very heavy rainfall and drought conditions, stabilisation of river bank and establishment of mini-forests is proposed as a climate resilient measure. The efforts to address the key water security challenge has been converted into an opportunity to improve and protect the endangered tree species of Tamil Nadu.

The river bank which was completely encroached by the invasive species *Prosopis juliflora*. This encroachment was completely eradicated and the river-bund is strengthened. The river bank is developed as a complete mini-forest region. 5000 tree saplings have been planted on each side of the bank at a cost of Rs. 29,72,000/- involving 11463 man-days at a daily wage of Rs.256/-.



Inspired by the verses of Thirukural, the mini-forest has now turned into a sanctuary of 133 endangered tree species, with a concerted effort from the team GIZ-WASCA and MGNREGS. Seeds are collected from other districts from voluntary organisations who support the preservation of endangered plant species in Ramanathapuram district.

A centralised district nursery is established along the river bank of Urapulli GP to support the expansion of the mini-forest to the adjoining area. This nursery is developed at a cost of Rs. 50,00,000/-involving 11096 man-days under the MGNREGA. The persons involved in the works are very happy to improve their livelihood through income generation from the 100 days employment scheme. Specifically, the women folk are more confident that their children can now go to study better with the extra income thus generated. They are now confident of being financially independent and can save some money for the future as well. They have become skilled in nursery development and plantation activities. They can use this skill to develop their own agriculture lands or create horticulture parks in other lands. The villagers are confident to sustain their livelihood beyond the MGNREGA by selling fruits and other horticulture products from the mini-forests and are ready to take up the responsibility of maintaining the asset that is generated from the nature and beneficial to nature as well as people even during extreme climate conditions. This Gram Panchayat is indeed a concrete example of a nature-positive solution mediated through river bank stabilisation.



As a climate resilient measure, fruit-bearing trees are also raised along with the miscellaneous species. This orchid once established will prove to be a potential income generator helping the people of the Gram Panchayat. In a condition when agricultural produce get hampered due to climate variation, this activity will yield benefits and serve as a buffer occupation for the rural poor. An intertwining coverage of activities including River Bank Stabilisation, Nursery Development, Mini-forest with endangered species and fruit bearing trees at Urappulli is one of the potential climate resilient measures that can be taken as a model and replicated in Ramanathapuram district, which are in lands with closer vicinity to rivers.

10. TANKA : A new approach for the dry lands



Saltwater intrusion is a significant issue in coastal stretches of Tamil Nadu, which hinders access to safe drinking water. Groundwater flows from higher water-table elevations of inland areas toward a lower sea height during recharge. Subsequently, seawater saturates the ground along the coast, and this creates a periphery beneath the surface along which saltwater meets freshwater. Saltwater is denser than freshwater, because of which saline groundwater may “intrude” beneath fresh groundwater, creating a saltwater “wedge” at the coastline. During severe drought conditions caused due to low rainfall coupled with erratic monsoons, excessive groundwater extraction can aggravate saltwater intrusion in the coastal aquifers rendering the groundwater unpotable.

One such village affected by saline water intrusion is the Chithoorvadi Gram Panchayat of the R.S. Mangalam block. This gram panchayat has an area of 1458 Ha and is a cluster of seven hamlets with a total population of 1952. The extent of saline water at Chithoorvadi GP is 4.03 per cent ¹. We learned more information from the local people during our Rapid Rural Appraisal. The senior women folk of Chithoorvadi gram panchayat recollected the difficult times during severe summer seasons when the water was always turbid and unpotable.



The womenfolk of Chithoorvadi collected water from Ooranis, and to clean and disinfect the water; they added Thethankottai (*Strychnos potatorum* Linn. Loganiaceae). Women scrub the earthen pots filled with water using clearing nuts. The seeds are natural coagulants that help the sediments to settle down. Although very natural, the conventional system of purifying water is a time-consuming process, well addressed by GIZ by adopting a new methodology of the Tanka system.

The “Tanka” is a system of effective water storage and conservation adopted from the drylands of Rajasthan. A Tanka is underground rainwater conservation and storage structure for securing drinking water. This structure covers an area of 32.2 square kilometres and is implemented under the MGNREGS by GIZ WASCA intervention in 2020-2021. The Tanka has a storage capacity of sixty thousand litres, serving safe drinking water to around 200 families for three months during dry summer seasons experienced by the local people of Chithoorvadi.

There is a broad grin on the sun-tanned face of typical rural women when they excitedly explain that the Tanka has helped their family tackle the challenges of daily drinking water

needs. Their livelihood has improved with the daily wage of Rs. 259/- under MGNREGA in constructing the Tanka and maintaining it with the adjacent park.



In addition to livelihood benefits, the Tanka has inspired administration across the other stakeholders viz. the Head of the Gram Panchayat, the overseers are pleased and the Assistant Engineers involved in the success of a simple solution for a vital water security challenge.

Through GIZ intervention under the MGNREGA, the Tanka scheme has brought a livelihood transformation. It is a classic example of a climate-resilient measure to address the risk of saltwater intrusion projected to be intensified by drought hazards. GIZ proposes to upscale the construction of 355 Tankas across the gram panchayats of Ramanathapuram district that face saltwater intrusion. Such water harvesting programme is very successful and goes long way to create awareness among the people and to have capacity of their own indigenous knowledge to develop it further.

11. Farm Ponds : Enhancing Water Augmentation



Augmenting water for irrigation purposes is a dire necessity for many GPs of the Ramanathapuram district especially during prolonged dry spells. Surface water storage helps to provide continued water supply for irrigation purpose and help farmers tide over water scarcity. While economically stronger farmers respond to climate change challenges shifting professions or using more mechanised farming practices. But most , low and middle-income farmers of more than 10 blocks of Ramanathapuram district are vulnerable are left highly vulnerable from the perspective of socio-economic condition, water requirement and agriculture production. Under such circumstances, individual and community farm ponds augment coping and resilience capacity of the vulnerable farmers by supporting agricultural activities. In total 1088 farm ponds are completed in the water vulnerable blocks which includes 712 community farm ponds and 376 individual farm ponds.

| Block | Community Farm Ponds | Individual Farm Ponds |
|----------------|----------------------|-----------------------|
| Bogalur | 11 | 8 |
| Kadaladi | 10 | 83 |
| Kamuthi | 6 | 26 |
| Mandapam | 77 | 3 |
| Mudhukulathur | 81 | 73 |
| Nainarkoil | 90 | 6 |
| Paramakkudi | 57 | 55 |
| R S Mangalam | 49 | 33 |
| Ramanathapuram | 99 | 54 |
| Thiruppulani | 127 | 13 |
| Tiruvadanai | 105 | 22 |

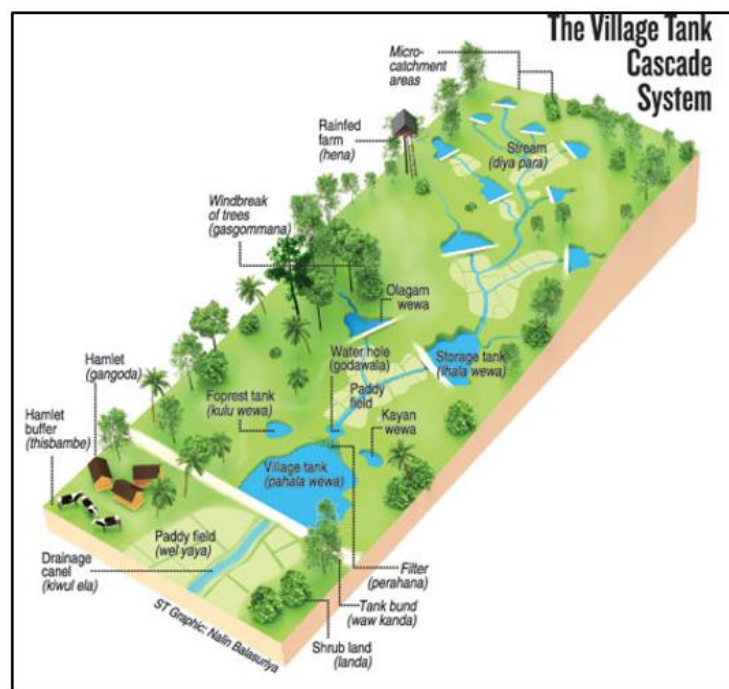
Based on the GP the size of the farm ponds vary from 2-6 ha and is designed to support supplementary irrigation for agriculture by the individual farmers.

Ramasamy of Chithoorvadi GP, RS Mangalam block says that they dug the farm pond with an aim to earn 100 days daily wages to support their family due to Corona crisis. After rains, they are able to use the water from the farm pond to support their farming activities without the need to depend on mechanised irrigation. They still have sufficient water and have plans to raise fish culture with technical guidance from GIZ- WASCA.



From our the RRA exercise it is evident that Surface water augmentation is successful as a climate resilient measure especially in the coastal tract of Ramanathapuram district and should be extended to more individual farms to ascertain sustainability of the marginal farmers and small land holders.

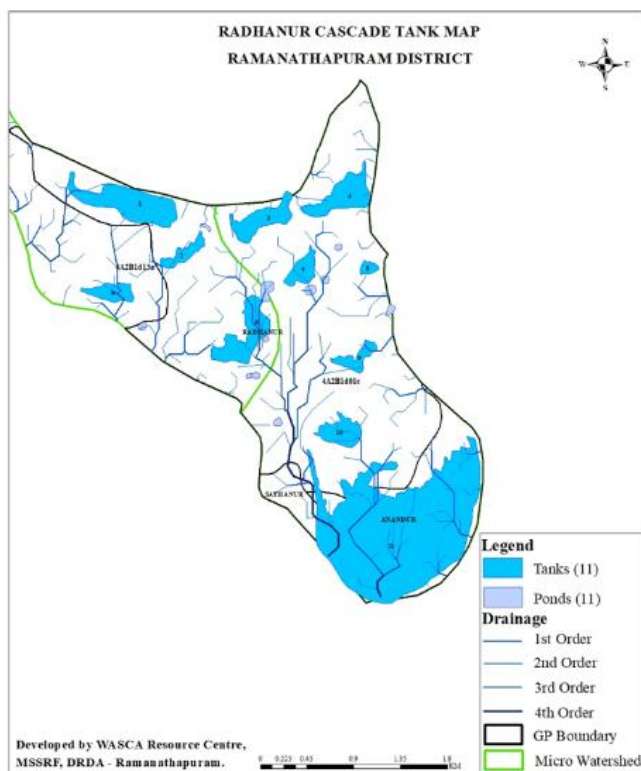
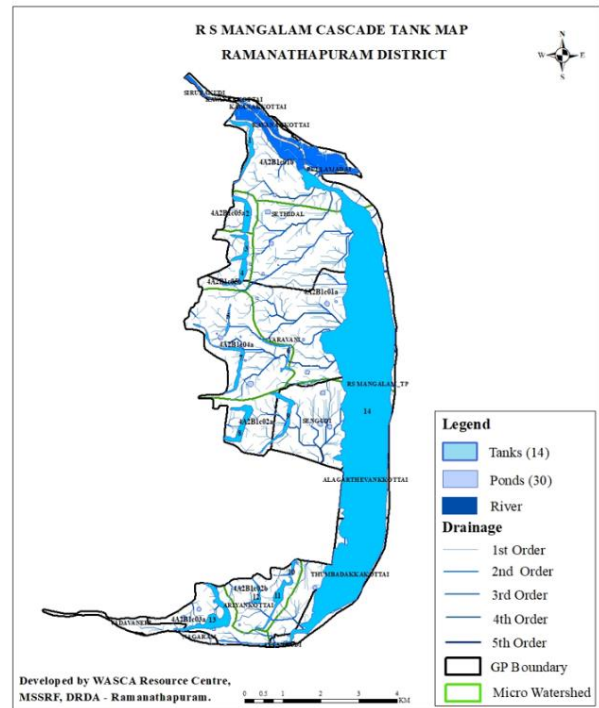
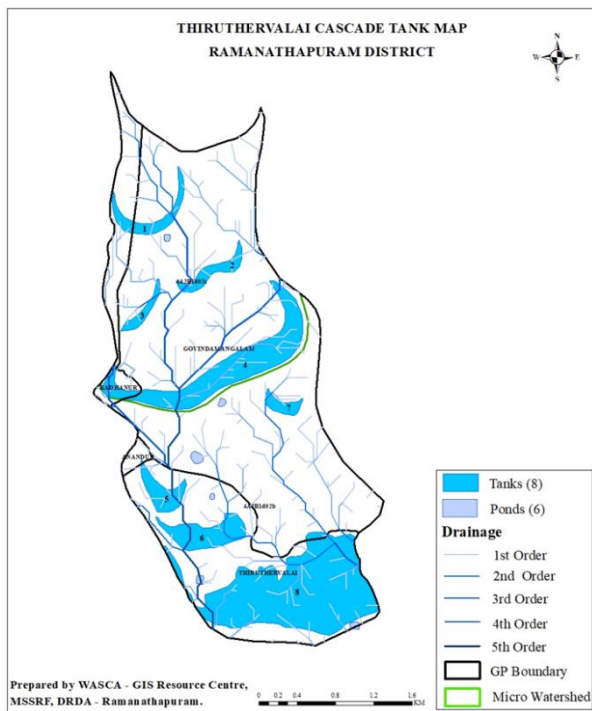
12. Tank Cascades and future challenges: A theoretical Approach



South India, is bestowed with a rich tradition in maintaining its water resources that sustained civilisations and agriculture based communities for a long time. However, due to increased population and negligence on shared natural resources, the bountiful natural resources have been deteriorating due to mismanagement. The cascading system of tanks is one of the ancient engineering marvels in water management of Tamil Nadu. A tank cascade is primarily a network of surface water holding structures. These were built more than 2000 years ago by local rulers and were maintained by the local communities for centuries.

This Tank cascade is not implemented in this district but covers under the agenda of GIZ for Ramanathapuram district. It is pertinent to mention here these cascading system of water bodies are well carried out by the ancestral inhabitation and currently it requires a careful intervention to rehabilitate the canals, connected to tanks (*Tam. vaaikal and varathhu*). The cascading system of Tanks is based on the principle of gradient along which the water flows. A tank in the upper reach of the slope is interconnected to series of tanks located down the slope. The feeder channels provide the interlinkage between the tanks at different gradients forming a network of cascading tank system. During monsoon season, the surplus water received in tanks located at upper reach tank is effectively drained through the interlinked feeder channels to tanks located in downward slope link. After these tanks get overflowed, the water will be channelized to the subsequent chains of tanks down the link. Rainwater is

effectively contained within the watershed itself instead of draining into the ocean. This increases better irrigation access to the dependant agricultural community. It was also a very essential system to overcome drought risks in the past.



The annual average rainfall in Ramanathapuram district is 827 mm with the maximum amount near the coast and it decreases towards the inland region. Major proportion of

Ramanathapuram district falls in the Gundar-Vaigai river basin. Besides, Virusuli, Kottakariyar, and Upper are the seasonal rivers carrying flow from west to east towards the Bay of Bengal. The drainage pattern is dendritic and streams branch in several directions. The district has three catchments, seven watersheds, 736 micro watersheds, and 253 coastal watersheds. The topography is in general flat and the coastal regions have a slope between 1-2%.

The district has 1694 tanks, of which, 477 tanks have more than 40 Ha and 1217 tanks have less than 40 Ha area. It is estimated that there are about 200 such connected tank cascades systems in the district. It shows that the density of the tanks in each of the cascades is higher. Apart from these, each tank is connected with a minimum of four ponds in the village. Such ponds primarily receive water from the tanks through the sluices, in addition to receiving runoff from the catchment area in the upstream region.

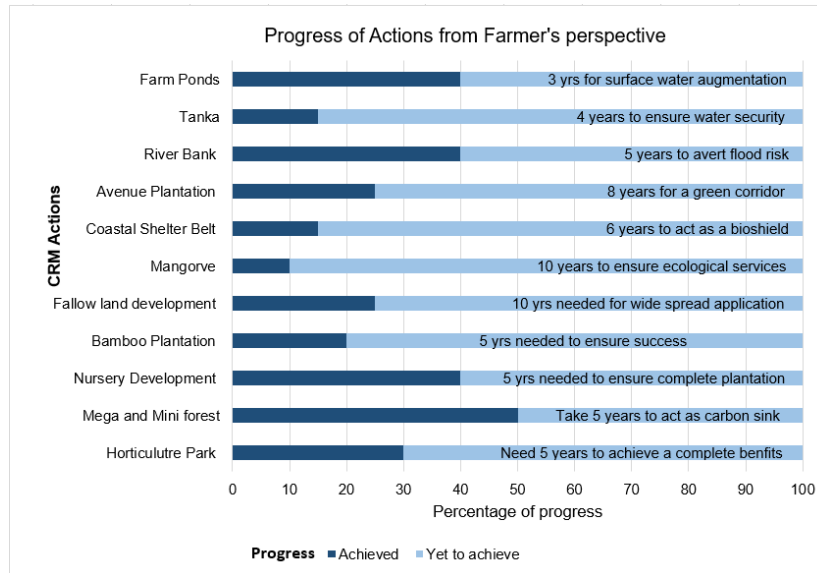
There has been incidences of intense rainfall of around 248.5 mm recorded in one week in January as against the normal average of 48 mm. This caused severe damage to the standing crops across 87,596 Ha. This kind of climate extremities may increase in the future especially on the coastal areas of Ramanathapuram district. Careful selection of agricultural crops are highly warranted to cope up the vulnerabilities due to variety of disasters like extreme rainfall and drought.

As an important climate-resilient measure, restoration of TCS is proposed with the objectives of drought and flood proofing method in reducing the climate risks for on-farm livelihoods, management of land degradation especially public and common lands, improving the ecosystem services namely groundwater recharge and water quality.

As a pilot project, a theoretical Geo-spatial framework for cascading system of tanks for three tanks is proposed for the Kotakaraiyar basin by the GIZ team under the MGNREGA activities at Ramanathapuram district. The three cascading tanks covers 13 micro watersheds. The system aims to benefit 18 Gram Panchayats, 34 tanks and 58 ponds along the course of the cascading tank systems. The challenge is that the connecting drainage lines are blocked due to abandonment and encroachment by the local communities. It is proposed to restore the originality of this canal irrigation system through the GIZ-WASCA-MGNERGA intervention.

13. GIZ and Way forward:

The overall scenario of the implementation of different programmes by GIZ-WASCA are indeed very successful and require to take forward for some more period to treat the area to reverse the lost ecosystem of the GPs.



As the solar energy potentials are high in this area, the GIZ can include Solar energy harvesting coupled with biogas plants to meet the partial requirement of village energy needs and it can play a substantial role in emission reduction addressing climate change. This way these villages not only head in attaining SDG, it also leads to smarter villages. This will ensure total sustainability of these villages towards nature based habitation. It is first time that GIZ used the scientific tools to reach the village and to take up the programmes based on sustainable development goals in combination with MGNREGA. The ground truth verification carried out by my team has seen visible spectrum of success in these adopted villages by GIZ compared to other non-treated villages adjacent to the treated villages.

By and large the larger section of the people of the GPs express their view that they have seen visible and verifiable success in water augmentation programmes such Tanka, Farm ponds etc. and need to be expanded in the available wastelands at a larger scale along with bund planting. They expressed integrating water resources as well as green cover will meet the basic requirements of water and fodder for animals.

The Anna University wish the GIZ team to come forward to provide such kind of success in each and every villages of Tamil Nadu.