

# ROLE OF AGROFORESTRY IN STRENGTHENING ADAPTIVE CAPACITY AND IMPROVING LIVELIHOODS OF MALAYALI TRIBES IN THE EASTERN GHATS

**E.D. Israel Oliver King and N. Kumar**

*M.S. Swaminathan Research Foundation, 42 B2, PVR Street,  
Gandhi Nagar, Mohanur Road, Namakkal. 637001  
Email: [Oliverking@mssrf.res.in](mailto:Oliverking@mssrf.res.in)*

---

## **INTRODUCTION**

Climate change is possibly the greatest global environmental threat the world is facing today. It is likely to much more drastically affect the economy, infrastructure, natural resources and local livelihoods in the developing countries (Francois, 2008). Increasing extreme climatic events will affect human health, food production, water supply, biodiversity and natural ecosystem. In this context, the poorest and most vulnerable tribal populations will be most affected. Sustainable development comprise of economic and social development that protect and enhance the natural environment and social equity. Response to climate change must promote environmental sustainability and ecological security of the resource base on which livelihoods of the resource poor is dependant. Tribes are under privileged section of the society and are often lives in marginal physical environment. Owing to their inherent dearth of livelihood assets, they remain under developed and lag behind in development indices. Integrated Agroforetry based on the principles of diversification maximise biodiversity and stimulate

interactions between different plants and species, as a part of holistic strategies to build long term fertility, healthy agro ecosystem and secure livelihoods (Emile, 2016). M.S. Swaminathan Research Foundation with the support of National Bank for Agriculture and Rural Development (NABARD) implementing a Integrated Agro forestry-Wadi model in Eastern Ghats to support local communities to combat vagaries of climate change. Such good practices in adaptation to climate change constitute an important knowledge base necessary for development of relevant local level adaptation policies and strategies required to guide implementation of the NAPCC (National Action Plan on Climate Change).

Tribal development programme (TDP) is implemented with the aim at promoting sustainable livelihoods of the tribal communities through sustainable agriculture, social empowerment, improvement in quality of life including women development and community health. MS Swaminathan Research Foundation (PIA) has been implementing the NABARD funded TDP in four panchayats namely Thirupuli nadu, Alathur nadu, Gundur nadu and Gundani nadu (TAGG) of Kolli Hills since July 2010 with the project size of 1000 families covering approximately 1000 acre of orchard plantation in 4 clusters for the duration of 7 years.

**Agroforestry Model:** The key objective of this action research programme is to curtail migration of tribal farm families and to provide them with options for on-farm livelihood diversification by creating Wadi (*siruthottam* or orchard). The “Wadi” model of tribal development is holistic in approach addressing production, processing and marketing of the produce and also other needs. The core of the programme is “Wadi” and other development interventions are built around “Wadi”. The “Wadi” in Gujarati means a ‘small orchard’ covering one or two acres. Two or more tree crops are selected in the “Wadi” model to minimize the climatic, biological and marketing risks. Tribal families having less than 5 acre of land is encouraged to promote 1 acre wadi each. Wadi farms are integrated with silviculture, horticulture and animal husbandry. Other development interventions in the areas of soil conservation, water resource development, agriculture development, women development, health are woven around the wadi. TDP – Wadi programme is family centric. The programme cost is met by a grant and a loan and it is ensured that the participants contribute at least 25% of the labour component. Table 1 indicated the Farmers and project coverage since inception.

**Table 1. Farmers and Acreage covered under TDF project in Kolli Hills -2010-2017**

S.No	Panchayat	No of Settlements	Number of Farmers for Batch 1	Acreage covered for Batch 1	Number of Farmers for 2011 for batch 2	Acreage covered for batch 2	Number of Farmers for 2011 for batch 3	Acreage covered for batch 3	Number of farmers for batch 4	Acreage covered for batch 4	Total Number of Farmers	Total Acreage covered for Batch
1	Thiruppuli	11	133	123	188	178.5	0	0	20	20	321.5	321.5
2	Gundur	14	145	127	185	171.5	0	0	0	0	298.5	298.5
3	Alathur	7	0	0	0	0	150	150	40	40	190	190
4	Gundani	8	0	0	0	0	150	150	40	40	190	190
<b>Total</b>		<b>40</b>	<b>278</b>	<b>250</b>	<b>373</b>	<b>350</b>	<b>300</b>	<b>300</b>	<b>100</b>	<b>100</b>	<b>1000</b>	<b>1000</b>

**Table 2. Sources of planting materials**

S.No	Name of Plant/ Materials	Name of Variety	Source	Certified	Govt/Private
1	Jack	PPI1	Horticulture research Station, Pechiparai	Certified	Govt
	Jack	PLR 1	Vegetable research Station	Certified	Govt
2	Jack	PLR 1	Regional Research Station, Virudhachalam	Certified	Govt
3	Mango	Alphonso & Bangalora	Grown Nursery Garden, Salem	Certified	Private
4	Cashew	VR1	Regional Research Station, Virudhachalam	Certified	Govt
5	Silver oak	Saplings	Setturaman Nursery, Yercaud, State Horticulture Farm, Kolli Hills and Karumandurai	Certified	Private
6	Fodder slips	Co4 Grass	Krishi Vigyan Kendra, Namakkal	Certified	Govt

## Horticulture Development

Wadi is the core component and complemented with measures such as soil conservation, water resource development, inter crop, fencing and boundary plantations. While the fruit plants generate income after 4-5 years, the forestry species provide a fence and act as a shelterbelt. The species mix planted meets the families' needs for fuel, fodder and small timbers. It also helps in reducing the pressure on existing forests. Different models of one acre orchard are promoted. Model A consists 188 plants of Jack, Clove, Silver oak, Model B1 with 170 plants of Jack, Mango, Silver Oak, Model B2 with 170 plants of Jack, Cashew and Silver oak. All models include Co4 Grass as fodder plants. Quality saplings (Grafts and Seedlings) of Jack, Mango, Cashew, Clove, Silver oak and Co4 fodder grass procured and supplied from horticulture research stations and authorised nurseries in Tamil Nadu. A consolidated table 4 furnishing details of planting materials supplied in Batch 1, 2, 3 and 4.

**Table 3. Sources of Inputs**

S.No	Name of Materials	Source	Certified	Govt/Private
1	Neem cake	Gandhi Ashram, Thiruchengodu	Certified	Govt
2	Mud Picher Pots	Manamadurai Pottery Workers Cooperative Cottage Industrial Society Limited, Sivagangai	Certified	Private
3	Plastic Agri Picher Pot	Siva Plastics, Melur	Certified	Private

**Table 4. Planting materials supplied for Batch 1, 2, 3 and 4 farm families**

S.No	Planting materials	Model A (600 Acres)	Model B1 (315 acres)	Model B 2 (85 acres)	Total (1000 acres)
1	Jack	12000	6615	1785	20400
2	Clove	24000	0	0	24000
3	Mango	0	6615	0	6615
4	Cashew	0	0	1785	1785
5	Silver Oak	76800	40320	10880	128000
	<b>Total Saplings</b>				<b>1,80,800</b>
6	Co4 grass	226800	119070	32130	378000

**Inter Cropping in the WADI fields:** Wadi farmers are encouraged to develop Inter cropping in Wadi farms. Survey undertaken in 1000 Wadi farms in the year 2015 indicate the following pattern of intercropping. Of the total of 1000 Wadi Farms, inter cropping done in 745 Wadi as; Millets (12%), Banana (25%), Pine Apple (25%), Coffee (50 %), Tapioca (50%), Turmeric (5%), Pulses (2%) were intercropped. Often, Wadi farms have more than two or three additional crops along with Wadi crops.

**Soil conservation** is vital for sustainability. Compartmental bunds/ V bunds are the key soil conservation measures taken to curtail soil erosion and completed in 835 acres of WADI fields. **Trenches:** Another soil conservation initiative is establishing trenches in around the WADI fields. Trenching in series is considered to be highly effective in catching surface runoff and to recharge deeper soil strata which become accessible to the roots during summer, when there is no rain at all. Trenching work extended in 796 acres of WADI fields.

**Water resources development:** Though the Wadi sites receives an annual rainfall of average 900 mm, because of steep slopes and rocky terrain, water retention is poor resulting in severe soil erosion and nutrient loss. As existing water resources are not sufficient to irrigate Wadi farms, run off/seepage water is harvested through mini percolation ponds and Water catch pits. Of the identified 400 farmers based on suitable locations for water availability and conduits, PIA is promoting Individual Percolation Pond, Collective Percolation Pond, Percolation pond with Water storage tank, constructing community open well with the involvement of Wadi families. Since inception, there are 215 mini percolation ponds with the size of 10X10X10 foot (68 in Thiruppuli Nadu, 67 in Gundur Nadu, 52 in Alathur and 28 in Gundani Nadu) and 10 common well with the size of 10X10X50 foot (each 3 in Thiruppuli Nadu and Gundur Nadu and each 2 in Alathur Nadu and Gundani Nadu panchayats) completed. **Pitcher Pots:** pitcher irrigation was done with purpose of providing water during summer period for all major horticulture plants by using mud pitcher pots and plastic pitcher pods. Mud pitcher pods are sourced from Manamadurai Pottery Workers Cooperative Cottage Industrial Society Limited, Manamaduarai, Sivagangai district and plastic pitcher pots from Siva plastics in Melur of Madurai district. About 18510 mud pitcher pots and 90270 plastic pitcher pots were transported and distributed to 1000 Wadi farmers of batch 1, 2, 3 & 4 in the project area.

**Table 5. Distribution of pitcher pots**

Sl.No	Materials	Model A (600 Acres)	Model B1 (215 acres)	Model B 2 (85 acres)	Total (900 acres)
1	Mud pitcher pot	18510	0	0	<b>18510</b>
2	Plastic pitcher pot	52470	27090	10710	<b>90270</b>

**Health and Nutrition Programme:** Some of the basic problems faced by the tribal families are related to malnutrition, illness and inaccessibility to health care. Community health programme focuses on primary and preventive health care. The participants are educated on sanitation and hygiene. During Kharif Season 2013, 2014 and 2015, as a part of creating nutritional awareness among the participating farm families, several village level awareness camps on water and sanitation were organised. In addition, to ensure the nutrition security of WADI farmers, PIA has sourced varieties of vegetables seeds from vegetable research station, Palur a “Kitchen Garden Kit” containing Tomato, Brinjal, Chilly, Green leaves, Ladies finger, Ribbed Guard, Bitter Guard, Cucumber, Bottle guard, Pumpkin to all 1000 farmers in Thiruppuli and Gundur Nadu panchayat.

**Women Development:** There has been a special attention on women’s participation in the programme. The major activities taken up are promotion of SHGs for inculcating thrift and credit habits, income generation activities for land-less, drudgery reduction along with awareness generation about reproductive health and development aspects. In order to reduce drudgery of women in fuel wood collection, smokeless stoves were introduced to the families. A study indicates that an average of 250 kg of fuel wood per month is consumed by a family of 4 members. Fetching fuel is key role of women in a tribal setting. A woman has to fetch fuel wood from nearest fuel source with the two way travel of 4 - 6 km with the head loads of 20-25 kg fuel wood. It was noticed 30-45 working days of women in a given year is spared for collection of fuel wood. Women spent average of 3-5 hrs in a day in the kitchen. All these burdens contribute to the heavy drudgery and health hazards to tribal women. With the aim to minimise these burden, with the help of Envirofit Company, energy efficient biomass cook stoves were distributed to 1000 families. The feedback survey on the usage of these stoves reveals that stoves reduces smoke, reduce the fuel consumption and reduces cooking time. The portability and stability of these stoves is advantage to the farmers.

**Human Resource Development:** PIA has organised about 8401 trainee days with the involvement of 4119 male and 3062 female on various themes such as orchard development and maintenance, Soil conservation, Water resource development, Women development, Health and Sanitation. Several promotional efforts including training, capacity building, exposure visits, sensitization programmes organised for the benefit of communities. At the national level, BAIF is providing the resource support services. Exposure visits and capacity building programs are held at Dhruva, Gujarat for farmers and provided inputs on technical aspects and operational issues.

**Table 6. Details of training and Capacity building activities**

Sl. No	Trainings/Camps/Exposure visit	Male	Female	Total members	Trainee days
I	Awareness Creation	343	296	639	1278
II	Groups Formation training	1048	381	1429	1429
III	Wadi based training	1253	602	1855	1855
IV	Water Resources Development Training	182	15	197	596
V	Soil Conservation Training	478	223	701	701
VI	Women Development Training	222	1076	1298	1338
VII	Community health Training	270	362	632	632
VIII	Enterprises development Discussion	173	53	226	284
IX	Farmers exposure visit	150	54	204	288
	<b>Total</b>	<b>4119</b>	<b>3062</b>	<b>7181</b>	<b>8401</b>

**Social Capital Building:** PIA has formed 53 groups (18 Wadi groups in Thirupuli and 18 Wadi group Gundur and 17 groups in Alathur and Gundani Nadu). Of that 46 groups were registered with Indian Bank, Semmedu and 7 groups with LAMP Society. PIA has initiated formation of VPC in four panchayats. The concern panchayat president; animator and representative of SHGs and farmers club, staff of MSSRF, local school teacher, Anganvadi workers, local social workers and panchayat ward members are the members of VPC.

**Credit programme:** To inculcate good credit habits among the participants, a small loan component (around 10% of the project cost) is provided as loan to Project Implementing Agency (PIA) for on lending. PIA has identified suitable off-farms and non-farm enterprises opportunities based on the field appraisal, Farmers willingness. PIA is intended to promote Backyard poultry, Vermi compost production unit, goatary and grocery shops by providing financial assistance as a loan worth of Rs. 30 lakhs

**Processing and Marketing:** The programme has been designed to ensure assured market and remunerative prices for the wadi related produce. Decentralised processing facilities for majors Wadi crops like cashew, mango, Jack will be established under the cooperative fold with two levels viz., village and Federation. This will facilitate creation of employment opportunities for jobless tribal families in the project area and also ensured suitable price for the farm produce, by providing captive market for the raw material and better returns through value addition and development of market chain for produce emanated from the Wadi villages in future.

## SUMMARY AND CONCLUSION

“Integrated agro forestry model” comprise of silviculture, horticulture, and intercropping of annual crops enhances green cover in the region and helps in combating local weather risks. Enhanced green cover raised through this programme might help farmers to access benefits from carbon credit systems. Interventions related to soil conservation, water resource development methods adopted in the programme improves soil health and enhances *insitu* water resources. Adoption of such integrated model strengthens adaptive capacities of the farm family and reduces environmental vulnerability. It is evident that such model not only enhances Natural and physical assets in the region and also empowering social, financial and human development aspects through training, networks and credits systems. Eastern Ghats are highly populated and exceedingly exploited landscapes in the country compared to other hilly regions. In this context, this case is evident that implementation of such Integrated Agro forestry Model with suitable customisation has lot of potential and relevance to similar social and ecological conditions.

## REFERENCES

- Climate resilient development – Towards adaptation to climate change – Synthesis report IC in India, Country Series 4, 2008. Inter Cooperation Delegation, Hyderabad, India.
- IPES-Food. 2016 From Uniformity to Diversity: A paradigm shift from industrial agriculture to diversified agro ecological systems. [www.ipes-food.org](http://www.ipes-food.org).