

# Transitioning Towards Climate Resilient Communities: A Cluster based Ecosystems Approach from Andhra Pradesh by LAYA

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LAYA is a resource centre based in Visakhapatnam, Andhra Pradesh. The main thrust of its activities are around the livelihoods issues of the *adivasi* communities located in six Scheduled Areas of Andhra Pradesh. The area, which is fairly remote, is rich in natural resources – water, forests and minerals. Major issues affecting the *adivasis* in the region relate to displacement and land alienation. The region's high natural resource base is under threat of complete depletion because of multiple demands of agri-business, mining and hydropower sectors. Though there are special protective laws for these Scheduled Areas, they do not prevent violation of the rights of the *adivasis* particularly in the context of access to and control over the natural resources, threat to their livelihood, and identity. The nature of violations becomes increasingly complex in an environment of unabated exposure to the market forces.

It is well known that the impacts of climate change affect the marginalized the most. Ironically, they are the people who contribute the least to the problems of climate change. Micro level planning has its important implications at the grassroots level both in terms of mitigation, because of the need to reduce emissions without compromising the goals of development, and adaptation, for mainstreaming climate change into the development agenda to enhance community resilience to the impacts of climate change. Therefore, there is an urgent need to develop practice models at the micro level which will feed into the climate change and sustainable development discourse at the grassroots level.

The livelihoods of the *adivasis* in the project area are primarily land-based with majority of the population depending on agriculture and collection of Non-Timber Forest Produces (NTFPs). Agriculture however is mostly limited to one season, *khari*, lasting from June to September coinciding with the monsoon season. Limited access to water for irrigation makes raising second crop in a year difficult in the area. There are some farmers who cultivate a second crop on slope lands requiring less water. Many farmers are engaged in cattle rearing, which is on the decline due to lack of fodder availability and veterinary services. Backyard poultry has been taken up and revived under a government scheme. Cash income to the *adivasi* households comes mainly from government promoted schemes like the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). Subsidised food and daily ration are made available on a monthly basis through the Public Distribution System (PDS). Overall, the livelihoods of the *adivasi* communities impacted by climate change is increasingly becoming dependent on government doles and giveaways. This has a negative impact on the development of communities' life skills and capacity to become self-reliant that could build resilience to endure the ill effects of climate change.

The ecological situation is increasingly becoming a matter of concern. The farmers are experiencing erratic and untimely rainfall with long dry periods, short sharp winters and extreme events faced by increasing climate variability. This area has witnessed as many as eight such extreme events since 2010 as gathered from a local study on weather patterns and disasters, 2010-2017. There has been a gradual loss of forest cover and biodiversity. Some perennial streams are also seen to be getting dryer with every passing year.

## 1. Building Community Resilience: Grassroots Actions and Engagements

The key areas of focused intervention have been limited to exploring alternative solutions to address the effects of climate change by building resilience among communities. LAYA, in collaboration with the Indian Network on Ethics and Climate Change (INECC)<sup>1</sup> and *adopting* its diverse processes has seen a transition from its understanding of adaptation to a more robust community resilience building practices. This has translated into developing a clutch of good practices which, when applied together, work as a pragmatic model towards building community resilience to climate change.

The key aspects that these processes and interventions aim to address are:

**Lack of a critical number of successful demonstrable projects at the grassroots level to contribute to a meaningful discourse on climate policy and community resilience.**

In the face of the current techno-centric and growth based development paradigm discourse, at the national and international levels, there is little alternate articulation that addresses the concerns of the vulnerable and the marginalized groups across the country. Therefore, it is also understood that that the current climate change discourse is not seen as an opportunity for addressing sustainable development using the low-carbon pathway. The cluster approach will provide insights for a long term strategic thinking ensuring well-being and also an environmentally sound way forward.

There are very few or hardly any demonstrations of coping with climatic changes to improve resilience of local communities or to promote decentralized renewable technologies managed by the vulnerable and marginalized communities to enhance quality of life at the community level. There is a need to demonstrate the perspective at the grassroots level as well as highlight the various kinds of initiatives that are being undertaken with the objective of feeding into the climate discourse at various levels in the country.

### **Inadequate attention to the value of climate change education**

Inadequate understanding of the ill effects of climate change among various groups of people is an important concern. Because of lack of information and exposure, people do

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<sup>1</sup> LAYA is currently the secretariat for INECC.

not seem to have a sense of how urgent the climate change problems really are, and what they mean for all of us. A widespread support for climate change awareness and education is largely missing as a national response to address the crisis. Given the far-reaching implications of the climate change crisis, the youth will have to play leadership roles in responding to the crisis in a meaningful way. Hence, it is important to invest in climate change education at various levels.

## 2. The Primary Stakeholders

The primary stakeholders of LAYA constitute farmers from 3 districts of Andhra Pradesh- Visakhapatnam, East Godavari and Srikakulam. Since 2016, LAYA has reached out to around 900 *adivasi* households mainly of the Konda Reddy Particularly Vulnerable Tribal Groups (PVTGs). They are drawn from 40 villages from 4 Panchayats of Y. Ramavaram Mandal of East Godavari district. The four Panchayats have 48 ward members of which 19 are women and two of the Sarpanches are also women.

To select activities for interventions, a discussion is held with the target communities and their suggestions are sought. To make the process more participatory and robust, the community members are part of the monitoring process through field observations, monthly reporting and preparation of annual report cards on composite interventions in each of the 4 Panchayats and Focused Group Discussions with the beneficiaries for annual feed-back. The 740 farmers are also tracked along with the number of sustainable farming practices and local technology initiatives they adopted.

## 3. The Intervention

### 3.1 Climate Friendly Sustainable Farming

This is a pathway to develop long-term resilience through ensuring climate responsive local food security systems. Farming (as opposed to agriculture) gains prominence in a context when the pressure of commercialization and cash demands is pushing communities into unsustainable farming practices. Climate variability and extreme events are forcing communities to depend on unsustainable use of chemical inputs to sustain and raise crop productivity. Over time, LAYA has identified these challenges of the livelihood security needs of the community. The challenges have two major dimensions as given below.

- Facilitating processes for optimum use and regeneration of natural resources in order to maintain crop productivity on a sustained basis; and
- Introduction of a set of coherent Package of Practices (POPs) that that enables sustaining or even increasing crop production following ecologically sustainable PoPs.

The resilient farming system, in this context therefore integrates the following bundle of practices:

### 3.2 Promotion of System of Rice Intensification (SRI) in 'Pallam' Lands (Wet Lands)

SRI is a combination of several practices including changes in nursery management, time of transplanting, water and weed management etc. SRI is a system of production with four main components, *viz.*, soil fertility management, planting method, weed control and irrigation management. The practice has had a proven yield in the area with an average increase of 30 to 40 per cent in productivity as compared to conventional rice cultivation (field studies have shown that the average yield per acre, of conventional rice cultivation is 750 kg whereas in SRI it is 1,050 kg, i.e. an increase of 300 kg).

### 3.3 Promotion of Mixed Traditional Crops

Mixed cropping is the traditional practice of growing two or more crops together on the same piece of land in a crop season. It is a traditional practice of the tribal communities. The induced technologies/practices promoted by the government have changed their cropping patterns. The technologies for cash crops such as cotton, tobacco and tapioca are often not relevant to the local conditions and there are a lot of fluctuations in crop productivity, particularly in the East Godavari tribal area. Hence, the need to facilitate *adivasi* farmers to restore their traditional practices of mixed cropping.

### 3.4 Agro-Forestry and Forest Regeneration in Forest Areas with Economically Viable Species

This is especially relevant in degraded 'podu' (hill-slope) lands, where there is sparse vegetation on the hills and surrounding areas. It is important thus to promote fast growing NTFPs species as well as fuel-wood species to meet local livelihood needs in the villages and in the reserved forest areas.

### 3.5 Growing Fruit Trees or Horticulture

As part of a future income security measure, LAYA facilitates planting of fruit trees in the *adivasi* areas. The species promoted are mango, sapota, custard apple, pineapple, guava, citrus and cashew varieties. They meet the nutritional needs of the households to an extent. Cashew plantation is most sought after because of higher returns.

### 3.6 Promotion of Vegetable Cultivation

LAYA encourages the *adivasis* to grow a variety of vegetables in their backyards as well as *garuvulu* (less-gradient) lands by providing dry fencing on a plot size of about 50 cents. The communities are provided vegetable seedlings to grow in their kitchen gardens, which helps meet their household nutritional requirements and sometimes also leave them with a small surplus to sell in the market to get some cash.

## 5.7 Organic Agriculture

Under this initiative, nurseries were raised and seedlings of papaya, drumstick, gum karaya, orange, custard apple, mango; vegetables like tomato, chilli and brinjal etc. were distributed in the targeted villages. Youth from the tribal communities were selected and trained on organic farming practices, preparation of local manures, promoting crop diversity, and local agricultural practices. Exposure visits were organized to successful sites. Nearly 30 tons of vermicompost was produced in the selected villages. Besides vermicomposting, preparation of organic manures from tank silt, pig manure, decomposed litters, humus from the surrounding forests, powder of tobacco stumps, crop residues, goat and sheep manure were demonstrated.

## 5.8 Promotion of Crop Diversity

Under promotion of crop diversity, seed centers were established. Attempt was made to conserve 30 rare and disappearing crop varieties of millets, pulses and vegetables. Seeds were collected and distributed to the farmers for cultivation and multiplication of these rare varieties of seeds. Moreover, local varieties of paddy, pea and beans were collected from the community and they were encouraged to promote crop diversity in the area.

## 5.9 Zero Budget Natural Farming (ZBNF)

LAYA was selected as a facilitating agency by the State Government to introduce ZBNF in 86 hamlets in 4 Panchayats covering 2,157 households.

## 5.10 Backyard Poultry Farming

Backyard poultry was promoted in 2,900 households with 29 breeder farms. Besides targeted egg and chicken production, it served as a potent tool to empowering women in the households. It also helped meet the households nutritional requirements.

# 4. Non-Timber Forest Products (NTFP) Related Initiatives

## 4.1 Training Material and Skills Based Training for NTFP Collectors

Training programmes were setup to encourage sustainable harvesting of NTFPS like gums, amla, wild fruits, adda leaves, barks and brooms.

## 4.2 Broom Grass Plantation

This plantation was facilitated through vegetable inter-cropping. The financial return in the first year was INR 2,500 per acre and in the second year, it was INR 3,500 per acre and continues to be a source of extra income for the farmers. Later, it was promoted in 400 acres in degraded lands with average income of INR 15,000 per acre in the first year and INR 40,000 in the second year onwards with a life cycle of 6 to 7 years.

### 4.3 Monitored Agro Forestry Model of Seed Dibbling

Under this intervention, seeds of tamarind, pongamia, wild mango, jackfruit and hill broom were planted. Protection by the community has resulted in the plants growing well and also ensures a good survival rate.

In addition, different types of NTFP species were strategically promoted by linking up with the nursery at Addateegala. The varieties were *jeeluga*, *ippa*, *kunkudu*, *goddukura*, *sadanapuvveduru*, and *kovela*. A total of 3,500 plants were raised in the nursery. The NTFP species included tamarind, bamboo, broom grass and kanuga raised in common lands in 14 villages in the watershed.

### 4.4 Documentation of Wild Tubers

Documentation/enumeration of wild tubers and their harvesting methods were initiated through a participatory approach.

## 5. Watershed Development based Initiatives

### 5.1 Soil and Moisture Conservation

This is done through construction of percolation tanks, rock-fill dams, terracing, new farm bunds, stone bunds and vegetative barriers including removal of stumps and leveling. These interventions on the land facilitate in retaining soil moisture during extended dry spells.

### 5.2 Promotions of Organic Manures at the Household Level

The current practice of agriculture with emphasis on cash crops in some of the *adivasi* areas has caused incidences of soil erosion and therefore reduced soil fertility. Compost pits and restoration of traditional manuring helped in revitalizing the soil fertility.

Natural resources form major source of livelihood for the *adivasis*. The ecological management of natural resources therefore has to address the underlying issues that threaten a dignified and ecologically sustainable livelihoods among the *adivasi* communities. Under favorable conditions, natural resources along with some assets can provide livelihood security at the household, community and village levels.

LAYA's main objective is to improve the productivity of natural resources in a sustainable manner. In doing so, it ensures that the *adivasi* communities in high altitude tribal zones (HATZ) value and equip themselves with sustainable technologies in natural resource management in order to be 'food secure' to have basic livelihood security. This approach integrates seamlessly with the Low Carbon Farming (LCF) framework, where each of the activities can be quantified in terms of improvement in nutritional value, water conservation, and energy savings.

Locally relevant, climate-friendly and low-carbon emitting agricultural technologies can offer a good model to more equitable and sustainable future. These technologies refer to a package of decentralized technologies (adapted or developed locally) that address the local development needs while providing an efficient farming ecosystem.

LAYA is constantly exploring and introducing climate-friendly, low-carbon and low-emission technologies; which harness the natural and renewable resources to facilitate the wellbeing of the communities. At a time when increasing access to modern energy services is seen as a key development priority that forms part of the Sustainable Development Goals (SDGs), LAYA believes in adopting locally relevant approaches for livelihoods security of its people.

The implications of adopting different technologies on the local *adivasi* communities as well as an understanding of their interactions with social and environmental systems is necessary before designing technologies to the advantage of the most vulnerable. Such initiatives can be part of more inclusive policy-making that acknowledges multiple viable pathways of development based on local knowledge, skills and capabilities.

### 5.3 Encouraging Gravity Water Flow

After a feasibility study and tests to measure water pressure and other details, LAYA came up with the unique solution to solve the issue of water availability. Gravity Flow facilitated by holding water at an elevated level with outlet at the bottom can help the farmers in drip irrigation. This was first initiated in 2010 at Munagalapudi village with the aim to bring fallow land back into cultivation. Over time, this has not only helped in critical irrigation but allowed households access to water. In the process, it reduced the drudgery and saved energy consumed in fetching water from far away sources. Today, approximately 45 acres of fallow land and 30 farmer families are reaping the benefits of 3 Gravity Flow units.

### 5.4 Hydram

The hydram or hydraulic ram pump is an alternate pumping system that uses renewable energy from falling water to pump it to an elevation much higher than where it originates. This is an energy efficient way to provide adequate water supply and can be set up anywhere. The key benefit of this system so far has been in providing access to water to the households in close proximity, allowing them more time to devote on farming activities. With 6 water outlets from the stream for irrigation and 10 taps for drinking water supply to the villages, LAYA has so far set up hydrams in 4 locations bringing about 5 acres of land under irrigation.

Both these pilots have resulted in multiple benefits to the communities as they do not require electricity to operate, have minimum emissions and require minimum maintenance, while also enhancing income from agriculture and employing local youth to maintain the projects.

## 6. Special Programmes for Single Women

Special initiatives were undertaken for single women in different villages. The initiatives included selection of crops linked to nutritional needs by promoting traditional mixed cropping incorporating millets like ragi, sama, ganti, with pulses like red gram and green gram etc. Livelihood groups were formed including single women in 3 clusters of the East Godavari district. These group started saving activities to meet as a part of microfinance initiative under the programme.

## 7. Accompaniment of Community based Organizations and People's Institutions

To build capacity of the community, LAYA facilitated 8 community-based organizations (CBOs) to promote Natural Resource Management (NRM) activities in their areas of operation. LAYA has organized workshops with 8 CBOs on sustainable agriculture, forest and water management. 5 of these CBOs are from the East Godavari district and 3 from Visakhapatnam district.

Exposure visits and trainings were key tools of learning when it comes to sustainable agriculture. A number of exposure visits and on-site trainings were organized for the farmers' groups on themes such as mixed cropping, cashew orchard management, vegetable cultivation, tree-based crops like coconut, mango, banana and backyard poultry, watershed approach to farming, organic farming etc.

## 8. Convergence with Schemes for Tribal Farmers from Government Departments

LAYA has played a key role in raising awareness and facilitating access to schemes for tribal farmers from various government departments. It has developed working relationship with the officers of the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), the State Horticulture Department, the Integrated Tribal Development Agency (ITDA), the Central Research Institute for Dry-Land Agriculture (CRIDA), the National Institute of Rural Development (NIRD), the Regional Agriculture Research Station HAT Zone, Chintapalli and the Andhra Pradesh Micro Irrigation Development Corporation (APMIDC). Some of the schemes that LAYA has leveraged include:

- Horticulture plantations such as mango and cashew in the East Godavari and Visakhapatnam districts through the State Horticulture Mission (SHM)
- Availing SRI paddy tools, weeders and markers and paddy drum seeders for select families in Visakhapatnam district through the ITDA
- Promoting vermicomposting units and farmyard manure composting units in East Godavari district through ITDA and the State Horticultural Mission (SHM)

- Introducing small-scale lift irrigation schemes and micro and drip irrigation units among the farmers in the East Godavari district through the Andhra Pradesh Micro Irrigation Corporation (APMIC)
- Obtaining vegetable seed kits from the National Horticulture Mission (NHM)

## 9. Climate Change Education

Climate change education runs across all components of Laya's resilience model and is a powerful tool to address the issues relating to the adverse impacts of climate change. As part of Laya's engagement with the communities and the stakeholders at various levels, contextualizing the interventions with the local ecosystem is given priority. Engagement with diverse groups facilitates them to see a role for themselves in mitigating, adapting, and learning to cope with the challenges of climate change.

Climate change presents an additional challenge as it impacts most *adivasi* communities. It is increasing the risks in managing natural resources and sustaining agricultural productivity, on which many *adivasi* communities depend. The *adivasi* peoples' legal control and sustainable use of natural resources in their ancestral domain provide two significant benefits on the adaptation and mitigation fronts. First, legal control and sustainable use of natural resources improve the livelihoods of the *adivasi* communities, thus increasing their economic resilience and capacity to adapt to the adverse impacts of climate change. Second, sustainable agriculture and forest use have strong potential to provide a Greenhouse Gases (GHG) sink to reduce deforestation and promote rehabilitation of degraded lands, water conservation and biomass production.

The success of sustainable practices by the *adivasi* people, however, rests in large part on the inclusive relations between community members and the strength of the entire community, when faced with external pressures of privatization and globalization. Gender is also a very critical component to the success of such interventions.

At the community level, LAYA has made efforts to promote education, training and public awareness on climate change impacts on agriculture, forests, livestock, water, health, technologies, women, gender inequality and lifestyles. The key is to learn from the local adaptation practices introduced and make them work to the benefit of the vulnerable women and men.

LAYA's engagement on climate change education and exposure visits with young sarpanches over the past three years has created spaces for exploration and replication of activities in other districts as well.

## 10. Impact

The core strategy behind the intervention is that climate change can be addressed and resilience can be built through relevant smart agricultural practices that are sustainable

and could enhance livelihoods. This would reduce vulnerability while conserving the ecosystem in the face of the climate change crisis. The achievements related to sustainable farming indicate that 900 farmers, including 22% women farmers have adopted the recommended PoPs. With these 900 farm households, LAYA has been able to demonstrate ecosystem based good PoPs that contribute to food security, nutritional uptake and income enhancement of community members, thereby strengthening their livelihood resilience. The lessons drawn from such experiences indicate that the selection of appropriate PoPs like soil enrichment from agri-waste, mixed cropping, soil and water management practices, bio-fencing, promotion of homesteads etc. is very effective. Since these practices have the potential to be upscaled/ adopted/ adapted in different contexts, LAYA will be engaging with 400 more farmers, 85% of who belong to PVTGs) from a different district in Andhra Pradesh to replicate the PoPs adopted by 900 farmers.

The climate friendly people centric technologies seem to have great value among the communities in locations where they have been demonstrated. The technologies related to the hydram and gravity water flow together with slow-sand water filters in particular are serving as low emission technologies, which not only enable better access and availability of drinking water but also reduces drudgery especially among the women. Further demonstrating the value of simple agriculture tools has also reduced drudgery and time consumed in agriculture related work. Greater focus is needed on gender from a climate technology perspective. The lesson learnt is that there is a need to demonstrate as many pilots as possible in various locations across different eco-regions as there are few pilots to learn from and adopt. There is a great value in having a diverse sets of technologies to suit different end users. This has go together with investments in research and development of context specific technologies. At the same time we need to explore ways to subsidise the costs and encourage community contribution for the technologies.

On the policy front, impact can be understood in relation to developing and strengthening working relationships with government officials and individuals who work as influencers. With respect to work at the grassroots, the local administrative officials especially the Integrated Tribal Development Agency (ITDA) officials responsible for water supply, horticulture, agriculture and allied programmes in particular have been reached out to for integrating them with the on-going development programmes. This has led to LAYA being identified as one of the knowledge partners and implementing agency for the Andhra Pradesh State government programme related to zero budget natural farming.

## 11. Conclusion

There is an increasing recognition that climate change disproportionately impacts the economically vulnerable, especially in areas of high-risk natural disasters. The adivasi communities are among the most vulnerable as they are among the most dependent on natural environment. Participation of women and youth is essential to enable the adivasi communities to adequately adapt to the effects of climate change. Addressing climate

change is not only an existential imperative; it is also an opportunity to move towards a cleaner, more productive and just path of development where appropriate practices could lead us to sustainable low carbon resilient communities.

Accordingly, the following policy perspectives are recommended.

### **11.1 Deepen Future Research**

More context specific research is needed regarding effective adaptation and mitigation strategies at local and national level for *adivasi* communities, especially in the face of the current global food and energy crises. What are good practices or failures? What aspects of their indigenous knowledge have been overlooked and could contribute to effective mitigation and adaptation? How may access to new technologies, higher-level technical education, marketing management, freedom of occupational choice and mobility specifically increase the capacity to cope with natural disasters and environmental stress? What do the *adivasi* communities identify as priorities and strategic needs? Knowledge in these areas can spur innovation and increase effectiveness of future policies and programmes.

### **11.2 Strengthen Participation of Adivasi Women and Youth in Climate Change Planning and Decision Making Processes**

The *adivasi* women alongside youth and men should be adequately involved in consultation and decision-making processes in areas that affect their health, nutrition and livelihoods. This includes areas in forest and agricultural policies and programmes, renewable energy projects, biodiversity protection measures and climate change adaptation and mitigation negotiations at the national and international levels. Participation could be facilitated through:

- Enhanced training on ecosystem-contextual climate change to build knowledge
- Consultations to share knowledge between the *adivasi* women and youth leaders, academics, scientists and traditional knowledge holders
- Workshops to facilitate sharing of the best practices from similar communities;
- Fora for dialogue at local, national and international levels.

### **11.3 Capacity-Building for Alternative Livelihoods**

Access to alternative livelihoods is essential for the *adivasi* communities to build resilience to climate change. Laya believes that any alternative livelihood is dependent on the individual, the community and the circumstances in which they live.