

Meenamgadi to Palli; Panchayat in India towards Carbon Neutral

1. Introduction

Climate change poses grave concern for the entire humanity. In India, where the majority of the population still lives in rural areas and is involved in agriculture and other activities related to primary sector production, climate change risks – whether experienced as greater variability in rainfall, higher temperatures, frequency of extreme weather events and others – directly impinge on the livelihoods and well being of millions of households. Increased exposure to climate risks can push rural households into dire situations of financial stress that result in high levels of personal debt, poor health, immiseration and displacement.

Academics and Policy makers have invested significant energy in outlining plans to confront climate challenges. India's National Action Plan on Climate Change 2008 identifies a range of priorities areas for coordinated intervention at the national and state level. However, these plans have not been given prominent role to the Panchayati raj institutions which are to the people. In the context of de-centralization where devolution has taken place the Panchayats in India can play a crucial, frontline role in coordinating effective responses to climate risks, enabling adaptation, and building climate change resilient communities.

In align with climate change the emerging and widely accepted concept of 'Carbon Neutrality' puts forth the notion of Zero-carbon development, nature conservation, food-energy self-sufficiency and economic development. As human activities are the core cause of current climate crisis, mitigating our Greenhouse gas (GHG) emissions and adapting to the rising extreme weather events is critical. Zero-carbon development which promotes **sustainable living** is the effective solution to reduce anthropogenic emissions as well as to improve our resilience. This paper apart from highlighting the strategy to be adopted by the Panchayats in its way forward in addressing climate issues also presents replicable models for nationwide expansion.

2. A commitment of the nation and the role of Panchayats

While addressing the 2021 United Nations Climate Change Conference also known as COP26 summit in Glasgow, Prime Minister Narendra Modi has made the following commitments for the country:

"In the midst of this global brainstorming on climate change, on behalf of India, I would like to present five nectar elements, 'Panchamrit', to deal with this challenge. First- India will take its non-fossil energy capacity to 500 GW by 2030. Second- India will meet 50 percent of its energy requirements from renewable energy by 2030. Third- India will reduce the total projected carbon emissions by one billion tonnes from now till 2030. Fourth- By 2030, India will reduce the carbon intensity of its economy by less than 45 percent. And fifth- by the year 2070, India will achieve the target of Net

Zero. These 'Panchamrits' will be an unprecedented contribution of India to climate action."

In order to achieve the set goals as enunciated in the statement, it is necessary to strengthen the existing national and state level policies, It is also imperative to encourage the bottom up action and empower the local government to accomplish the global ambition of reaching net zero emission. Here the role of panchayats are much and many sided Primary panchayats can focus on climate risk factor that is specific to local context and developed targeted response to local needs, Panchayat can also intervene in livelihood and income generation activities which is very much essential to face the adverse impact of climate change. Panchayats can be an effective platform for integrating local knowledge and practices in the mitigation process and there is the increasing opportunity for citizen engagement in terms of planning , implementation & monitoring.

3. Carbon Neutral development; An operational framework for the Panchayats.

As there is mounting evidence for human-induced climate change, measures have to be taken to fight this global crisis. Carbon neutral or low- carbon development is a concept that emerged in these circumstances which has its roots in the United Nations Framework Convention on Climate Change (UNFCCC). It refers to development with low GHG emissions to address climate change and integrate climate action in development strategies. It focuses on mitigating the emissions while adapting to climate risks and building resilience among people to increase their capacity to face the adverse impacts of climate change. Adopting policies to mitigate and adapt to climate change and create climate-resilience is critical for the sustainable development of an economy. This change from a carbon- intensive economy to low-carbon development is an arduous task which can only be achieved with the participation of governments, civil society, private sector and individual citizens.

3.1 Preparation of data base:

The first step to achieve carbon neutrality is to estimate the GHG emissions and sequestration of the Panchayats. For this, all sources that emit GHG and all sinks that absorb GHG have to be identified. 'Mapping' is the initial stage for identifying and understanding all processes and activities that result in the emission and

sequestration of GHG and to collect data for baseline emission profile generation of the Panchayats.

To make the mapping and data collection easier, all activities can be grouped in the following categories Energy, Industrial Production, Agriculture and Forestry, Waste and Sequestration. The GHG sources in each sector and data for GHG estimation are to be collected voluntarily. Which is to be consolidated at the panchayat level, this can be based on the 2006 IPCC Guidelines for National Green house Gas Inventories and its refinement in 2019.

3.2 Strategy Setting

After the generation of GHG emission profile of the Panchayat, it would be clear whether it is carbon-positive or negative or neutral. If the Panchayat is carbon-positive, strategy should be taken to reduce the emissions and increase sequestration to achieve carbon neutrality. In the case of carbon-negative and carbon-neutral Panchayat's, measures should be taken to maintain that state and to further prevent any rise in GHG emissions and to become a sustainable economy. The important measures to be adopted to achieve or to remain carbon neutral are explained in the following part.

3.3 Sequestration measures for carbon neutrality:

Carbon sequestration measures are essential for achieving carbon neutrality. They complement the mitigation and adaptation measures by preserving and increasing existing and also the new carbon sinks to transform to a low-carbon economy. Adopting sequestration measures helps increase the carbon sequestration rate which thereby reduces the overall GHG emission of a region.

1. Adoption of renewable energy – Panchayat would initiate activities for self sufficiency in terms of energy instead of being consumer. There is much potential for renewable energy such as solar and wind energy. It is with this view that the state have been directed to launch a campaign for gram urja swaraj by the ministry of Panchayati Raj.
2. Aforestation – planting trees increases carbon sequestration. Some of the afforestation methods are avenue planting (planting trees along roads or streets), rooftop trees, creation of Forest Island, Promoting homestead trees restoring degraded land and forest areas and tree banking.
3. Carbon farming – farming practices to increase carbon sequestration. Eg. Managed bamboo forests – Bamboo has the highest rate of carbon sequestration.

Planting bamboo forest increases carbon sequestration while also improving the livelihood of people by becoming a source of income. Matured bamboo can be cut and sold for various purposes and more bamboo can be planted again at its place.

4. Multi strata agro forestry – these are multi-layered agricultural systems with several types of crops and trees cultivated together to improve degraded soil system, prevent erosion and flooding, recharge ground water table and increase biodiversity.

5. Food forest – these are agricultural systems that resemble forest but filled with food trees. Food forest increases carbon sequestration while also providing food materials for the region

Many of the measures create job opportunities for people, especially for women, to manage food forests, agroforests etc. Carbon sequestration measures have multiple benefits including carbon removal, acts as a source of income, ensures food security and improves ecosystem and biodiversity

3.4 Climate resilient plan: considering all the above mentioned aspects panchayats are to prepare a climate resilient plan which can be integrated with Gram panchayati development plan, this can be a long term & and short term projects in GPDP.

Low carbon development should be given priority. Project relating to carbon should be implemented only after carrying out an emission analysis to estimate the impact and GHG emission of the activity. For example, a plan to renovate a bus shelter should be carried out after analyzing its GHG emission to reduce its emission before and after construction. By looking at projects through a 'low-carbon lens', the Panchayat can integrate low carbon development in all its projects. A 'Carbon Neutral Facilitation Centre' (CNFC) can be created in all the Panchayat to execute carbon neutral works. These bodies can include local government representatives, professionals to provide technical assistance, SHG members, volunteers, students and civic society. Any work regarding carbon neutral development such as campaigns, surveys, classes, tree planting, etc. can be carried out through CNFCs. Capacity building is yet another area which need much attention. Focused training on carbon neutrality is essential for elected representatives, officials and civil member society or organization.

3.5 Resource generation

It is also important to identify the resources which is mainly possible though convergence of schemes and programs. Generating own source of income also can supplement the activity. Part of the fund can be taken from its own fund and other part can be obtained from interested individuals or organizations who want to offset their emission by investing in low-carbon development projects. A system has to be developed within the Panchayats to carry out the monitoring and

evaluation process.

3.6 Setting targets through localizing sustainable development goal (SDG)

Among the 17 SDGs, Ministry of Panchayati raj has identified 9 goals where it could intervene at the grassroots level to achieve the targets. Those 9 goals are – Goal 1 (No Poverty), Goal 2 (Zero Hunger), Goal 3 (Good Health and Wellbeing), Goal 4 (Quality Education), Goal 5 (Gender Equality), Goal 6 (Clean Water and Sanitation), Goal 7 (Clean and Affordable Energy), Goal 8 (Decent Work and Economic Growth), Goal 10 (Reduced Inequalities), Goal 13 (Climate Action), Goal 14 (Life Below Water), Goal 15 (Life on Land) and Goal 16 (Peace, Justice and Strong Institution). All these goals directly or indirectly support the venture against climate change.

The goals at GP level taken through Themes, targets and indicators have aspiration in nature, relevant and placing the global goals that are universally applicable, in line with national policies and priorities as well as taking into account local realities in a concise and easy to communicate manner. The iterative process linking the global indicators and national indicators till the grassroots level until Gram Panchayats is ensured in the localization of SDGs. Most SDGs are related to the subjects devolved to the Panchayats. The nine themes identified for the Panchayats are: Poverty Free Village, Healthy Village, Child Friendly Village, Water Sufficient Village, Clean and Green Village, Self-sufficient Infrastructure in Village, Socially Secured Village, Village with Good Governance and Women Friendly Village.

The fifth theme "clean & Green village" refers to a world in which natural resources, including oceans, land, and forests, are sustainably managed and conserved to improve livelihoods and ensure food security, and most importantly protect the environment for future generations. Clean" refers to access to safe & adequate drinking water and sanitation services, low-pollution, low-emission world in which cleaner air, water, and oceans enable people to lead healthy, productive lives.

The SDGs draw attention to the importance of environment for existence of man and all living species. Panchayats, in fact, have a countering role to play, as they counter the damage to environment by the growth of cities and industries. However, the increasing Green House Gases from livestock and air pollution and soil pollution due to certain agricultural practices are a matter of grave concern. Hence, Panchayats have an extremely important role and place, starting with their own village to address the issues and contribute to the whole of environment, in more ways than one. Clean and green environment in Panchayats is the lifeblood towards achieving sustainable development. In terms of the environmental dimension of development, the SDGs cover natural resource management, climate change, water-related issues, marine issues, biodiversity and ecosystems, circular economy, environmentally sound management of chemicals and waste, and much more. Environment means the surrounding habitat of man. In its widest sense, it refers to the entire earth with its green forests, the oceans, the layers of

air and oxygen. This leads to Goals 12, 13, 14 and 15 as being categorized as 'Environmental SDGs. As per the focus attention on SDGs the gram Panchayati development plan (GPDP) is to prepared through an integrated approach

4. Lessons for replicating experience from G.Ps

4.1 Meenangadi Gram Panchayat

'Carbon Neutral Meenangadi' is an innovative and sustainable development model that puts climate change, people and environment at the forefront of development, launched at Meenangadi grama Panchayat in Wayanad district of Kerala in 2016. This is a pilot project for 'Carbon Neutral Wayanad' a project which was envisioned by the Government of Kerala to equip the people of Wayanad to adapt to the rising climate change effects, protect its environment and biodiversity and improve the livelihood and resilience of people as it is one of the highly vulnerable districts in Kerala for climate change and its adverse impacts. The aim of the project was to transform Meenangadi Panchayat and later the whole of Wayanad in a state of Carbon Neutral. Due to the fact that climate change affects all aspects of our lives, it is imperative to address it holistically by targeting all sectors of development. 'Carbon Neutral Meenangadi' comprises projects in the agriculture, energy, waste, water, transportation, land-use and environment sectors. Initially campaigns, classes and studies were conducted in the Panchayat to create awareness among people on carbon-neutral and a GHG emission inventory was prepared for Meenangadi in 2017. Panchayat found to be carbon positive (i.e., GHG emissions were higher than its removal) (Thanal 2018) **(details as in fig-1 & table-1).**

Fig-1

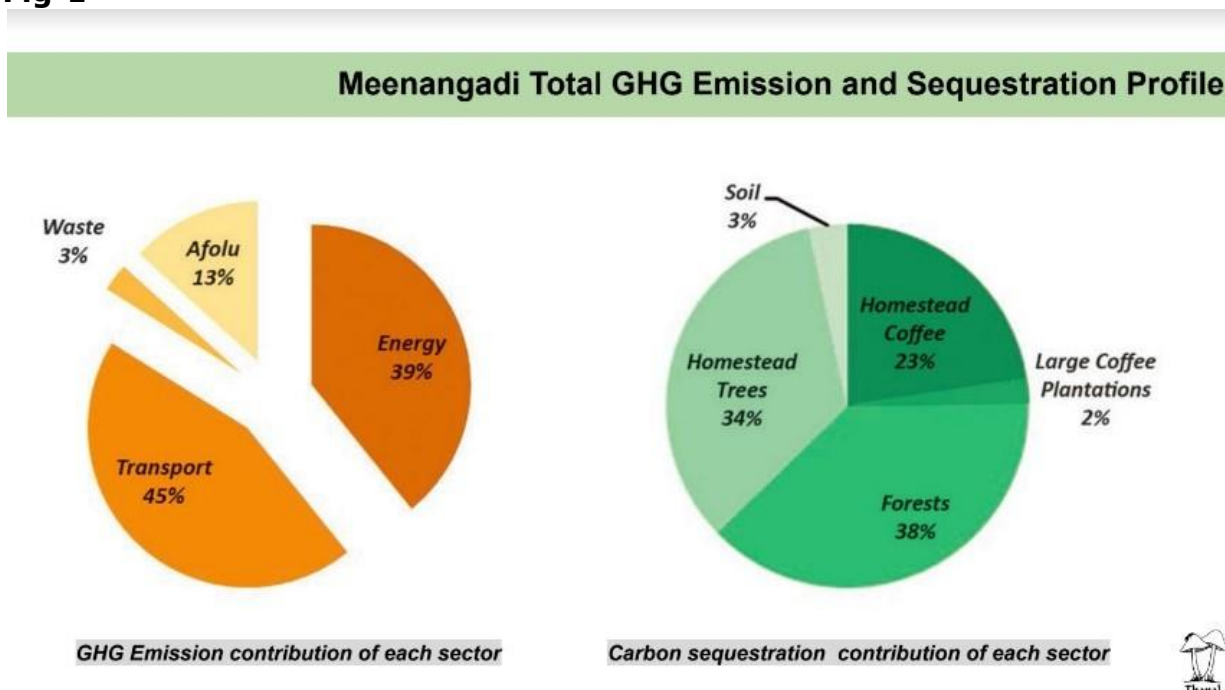


Table- 1

Meenangadi Carbon Balance

Sector	Tonnes of CO2 eq. emissions	Sector	Tonnes of CO2 eq.
Energy	13,082.56	Homestead Coffee	4,975.57
Transportation	14,910.70	Large Coffee Plantations	445.28
AFOLU	4433.74	Forests	8,370.08
Waste	948.10	Homestead Trees	7,425.22
Total	33,375.10	Soil	746.38
		Total	21,962.53

Excess of emissions = 11,412.57 tonnes of CO2 equivalent



Source: report prepared by Thanal

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Several ingenious multi-sector schemes were implemented in Meenangadi to reduce its emissions, increase its carbon sequestration, preserve its ecology and biodiversity and create resilience among the people. 'Tree Banking' is one of such landmark schemes introduced at Meenangadi to aid the carbon neutral works in the Panchayat. The scheme encourages people of Meenangadi to plant and protect trees by providing them interest-free loans. This will help to increase carbon sequestration, improve biodiversity while also acting as a source of income for the people of Meenangadi. Around 1,58,816 trees were planted in the Panchayat as part of the scheme with the help of Kudumbasree and MGNREGA in three years, starting from 2017. Another project implemented in the Panchayat was the planting of bamboo trees on river banks to conserve soil and water resources. Bamboos are plants with a high carbon sequestration rate due to its faster growth rate. Planting bamboo not only increases carbon sequestration but they also protect the soil from eroding. Geo- textiles were also laid on the banks of water resources to prevent soil erosion and protect river banks. To ensure water availability, the Panchayat rejuvenated existing water bodies and constructed new ponds in private lands. Waste and energy audits were conducted at 400 houses in two wards of Meenangadi to improve waste management and energy efficiency. A compost park was established to manage biodegradable waste, five Thumboormuzhi compost bins were built and composting equipment were distributed throughout the Panchayat for decentralized waste management. A plastic shredding unit was established and plastic and other non-biodegradable waste were collected through Haritha Karma Sena. A production unit for alternate products was established and training was given to

Kudumbasree members. They were also given training on making LED bulbs to replace filament lamps with CFL. Active involvement of the Panchayat and the citizens has enabled this project to stay on the right track to shift to a sustainable Panchayat. 'Carbon Neutral Meenangadi' is a nature-based and people centered project which provides an opportunity for people to improve their livelihood, achieve climate resilience while also protecting the environment. It is a leading example of low carbon development in India through local self-governments to combat this ever changing climate. With the rapidly increasing unpredictable extreme weather events due to human-induced climate change, cross-cutting projects like this can play a crucial role in tackling this global crisis

Five years have passed since its introduction in the 2017 now the Panchayats has entered to its second phase changes are visible in the panchayati area. One can see greenery everywhere, People are very much aware about the importance of carbon neutrality and linkage to be established through GPDP.

4.2 Experiences from Palli Gram Panchayat

Palli Gram Panchayat is located in Bari Brahmamana Tahsil of Samba District in the Union Territory of Jammu and Kashmir in India. It is located at 32°37'01.1"N 74°53'29.6"E longitude and latitude. The nearest town is Bari Brahmamana, which is about 3 kilometres away from Palli. The Gram Panchayat has 2 revenue villages known as Bassi and Khurd. There are 724 households having a population of 3700, out of which male population is 1,918 and female population is 1,782. Out of which SC Population is 1206 and ST Population is 50.

The Gram Panchayat covers an area of 330 hectares with 1017 cultivated land, 850 irrigated land and 150 un-irrigated land. For further enhancing the irrigation facilities, about 10 hectares of land shall be covered with micro irrigation system like sprinkler and drip irrigation facilities by Agriculture Department during current financial year. Not only this, the farmers have been motivated to use agriculture system with alternate practices, crops etc to cope with the changes in the climate.

At the outset Panchayats has prepared climate resilient plan focusing on climate change adaptation efforts with objective to reduce the effects of climate change. The main effort has been the implementation of climate-resilient infrastructure and agriculture activities. In the Gram Sabha, villagers have been sensitised about the climate change mitigation factors like reducing energy consumption, usage of fossil fuels, abandoning of plastics, use of non-renewable system in the building and also to promote measures like plantation, adoption of good agricultural practices like drip irrigation, water conservation measures and conservation of wet lands to maintain balance of ecosystem. In this connection, GP has passed a resolution to use LED lights electric appliances, sustainable fuel for cooking in all households, schools, Anganwadi Centres. BioGas and Solar System has been installed in schools and Anganwadi Centres. 27 Solar lights have already been installed in prominent and busy areas of the Panchayat. Recently, electric bus service by the State Road Transport Corporation (SRTC) has been commenced from the Gram Panchayat to Jammu City.

In Palli Gram Panchayat a solar plant of capacity 500 KW has being installed on a total area of 6,408 square meters to provide clean electricity to 340 houses under the Gram Urja Swaraj Programme. Electricity generated will be distributed to the village, having a daily requirement of 2,000 units, through the local power grid station.

Preservation of environment is the one of the main objectives of the Panchayat. The Panchayat has been declared ODF free and there is well maintained community sanitation centers with the regular water supply connections. Out of the five of water bodies in the Panchayat, one of the water body has been stands renovated with people participation and others are planned to be renovated during current financial year itself.

In the GPDP for the FY 2022-23, Gram Panchayat has mainly focused on attending water conservation, measures & projects on drinking water and improving sanitation sectors importance was given to convergence of scheme of rural development Departments, Health & Family Welfare, Women & Child Development, Education, Agriculture in the plan with the sole aim of attending carbon neutrality.

5. Gram Urja swaraj: A campaign for wide use of renewal energy

The campaign initiated by Ministry of Panchayati Raj and launched by the state focuses the effective adoption of the renewable energy that would enable the panchayats to achieve the local energy requirements. Solar energy offers an opportunity to replace the archaic source of energy such as kerosene, diesel, wood-fired chulas etc. which can cause health and environmental hazards. It gives a lot of opportunities for employment and income generation. Some of the panchayats have developed their own implementation models with the support of Renewable energy development Agencies of the states which are cost effective and encompassing various environment friendly bio energy technologies. Panchayats owned, promoted and funded system are Tamil Nadu, Maharashtra, Madhya Pradesh, Kerala and many more states. For example Odanthurai Panchayat in Tamil Nadu has its own wind mill, Thikekarwadi GP in Maharashtra has established biogas plant in PPP mode and Meenvallam, Project of Palakkad district panchayati in Kerala in the first initiative of a panchayati in micro hydel. There are solar roof top models, solar kitchens, solar street lighting and solar high mast light owned by the panchayats. These are isolated efforts but need to reach far and wide through the campaign mode of Gram Urja Swaraj. The Ministry of New and Renewable Energy (MNRE) and other related departments have joined hands with the ministry of Panchayati Raj in this venture.

Some best practices in renewable energy:

Odanthurai Panchayat, Tamil Nadu: Odanthurai Panchayat is situated in Karamadai block of Coimbatore District. Due to installation of drinking water plant, new borewells Overhead tanks and Street lights, the electricity consumption charges of the Panchayat started to increase as such 60% of the Panchayat funds were utilised only for paying Electricity bills. Hence the Panchayat Council decided to pursue Wind-Mill as their alternate source of energy. The

Panchayat council decided to invest the savings amount of Rs.40 lakhs and decided to borrow remaining amount of Rs.1.15 crore from Central Bank of India. The Odanthurai panchayat decided to purchase one acre land in a wind farm, to utilize it for installation of 1 windmill (350 KW) for Power generation. Accordingly, the Windmill was installed, and Odanthurai Panchayat became first local body to own a windmill in Tamil Nadu. The initiative taken by the GP head, proactive approach of the bank manager of Central Bank Page 20 of 45 of India and the District Collector who made a committee under his chairmanship, and this committee recommended the project to the bank for sanction of loan, were all instrumental in the success of the project. It is a good initiative to tap a source of renewable energy for the benefit of the Panchayat. However, the present policy does not allow a wheeling arrangement wherein the units generated at one site are adjusted by the Electricity Board against the consumption at another site. The units generated by the Odanthurai windmill are in high tension while the consumption of the GP is in low tension and the present policy does not allow conversion from low tension to high tension for the wheeling arrangement to work. These issues need to be addressed for promoting similar efforts by Gram Panchayats in other States for harnessing the potential of Wind Energy in rural areas, especially in the coastal areas of the country.

Thikekarwadi Gram Panchayat, Junnar, Pune (MH): Thikekarwadi Gram Panchayat is in the Junnar Block in Pune District of Maharashtra State. The GP has a total count of 120 households Page 22 of 45 with a cattle capital of 400 and fruit/vegetable cultivation takes place in 300 acres. The Gram Panchayat has established a community Biogas plant in a PPP mode through which 35 households are connected with a provision for additional 40 households. 12 kW Power from the biogas plant is supplied for utilisation by school, street light, temple and GP Office. The bio-digested slurry produces Phosphate Rich Manure (PROM) as a solid fertilizer and bio slurry as a liquid fertilizer. Bio slurry produced in the biogas plant is provided to each farmer from the village free of cost, every fortnight for agricultural applications. This initiative has not only increased the income of Gram Panchayat increased, but it has also generated employment in for women and youth of village, and provided biogas for 50 families for cooking. There are few tangible benefits like Compressed Biogas for cooking to the villagers which helps in reducing the need of LPG and burning of coal/wood for daily energy needs, Phosphate Rich Organic Manure (PROM) as solid fertilizer and slurry as liquid fertilizer. Thus, it helps in reducing the use of chemical fertilizers and ensuring the good health of the soil, which has also increased the agricultural yield as per the villagers. In addition, the generation of electricity reduces the cost of running the plant, as well. Also, there are huge intangible benefits e.g., it is providing environment friendly fuel, reduction in carbon emission, effective rural waste management, reduction in dependency on LPG and a major step towards the self-sufficient village. However, there have been challenges such as high capital cost, fall in cattle count and inadequate capacity utilisation are there which would need to be addressed while going forward

Opportunities for employment and income generation:

In the upcoming years, factors such as India's demographic dividend, renewable energy potential, and recent push to bring enabling policy ecosystem in renewable energy sector, are expected to make significant contribution towards augmenting income and employment generation in the power sector Major areas for employment generation include: Solar energy assessment of potential sites, Operations and Maintenance , Construction and installation, Sales and services, Training and apprenticeship

6. Conclusion:

Adopting low-carbon or low-emission development strategies is critical for any economy in this current world ridden with floods, storms, droughts and pandemics. Nations around the world has realized that sustainability is the only way forward to combat this fatal threat. Human actions today affect the future of not only humanity but of all other living things on this planet. Reducing our GHG emissions, improving carbon sequestration, preserving biodiversity, protecting the environment, etc. are critical for the survival of all. As countries across the globe are starting to address this menace, The states and UTs in India have to move with more focused attention, There is no other institution other than local self government institutions that can contribute for the fulfillment of the commitment given by the Prime Minister of India at the Glasgow summit.