



The Palgrave Handbook of Socio-ecological Resilience in the Face of Climate Change

Contexts from a Developing Country

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Making of a Climate Smart Village: A Study on Meenangadi Gram Panchayat in Kerala (India)

Jos Chathukulam and Manasi Joseph

17.1 INTRODUCTION

As per the 2021 Intergovernmental Panel on Climate Change (IPCC), human activities are 100 per cent responsible for the global warming. It was found that earth's global surface temperature warmed by 1.09 degree Celsius compared to the pre-industrial period of 1850–1900 (IPCC 2021). The previous IPCC reports have also pointed out that the alarming increase in anthropogenic (human-made) greenhouse gas emissions has contributed to a rise in global temperature (IPCC 2013) and such changes are causing a negative impact on biological and physical systems across the globe. The 2020 Human Development Report (HDR 2020) titled *Human Development Report, The Next Frontier: Human Development and Anthropocene* states that humanity and planet have entered into a geological epoch known as “Anthropocene or Age of Humans” and warns that countries should redesign their paths to development by keeping in mind the “dangerous pressures humans put on planet and dismantle the gross imbalances of power to prevent

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that change” (HDR 2020). The 2021 HDR report titled *Uncertain Times, Uncertain Lives: Shaping our Future in a Transforming World* cautions that “planetary-level and human-induced changes of the Anthropocene would be sufficient to inject frightening uncertainties for the mankind” (HDR 2021). Though previous climate conferences from Stockholm (1972) to Kyoto (1997) to Cancun agreement (2010) have been demanding to keep the global temperature below 2 °C, it was the 2015 Paris Agreement that turned out to be a historic one in convincing European Union and 192 countries including India regarding the need and urgency to adopt carbon-neutrality. In fact, the term carbon-neutrality got widespread acceptance during the Paris Climate agreement. The term carbon-neutrality in general refers to “*achieving zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset or buying enough carbon credits to make up the difference,*” (Brown 2018). The Paris Agreement aims to “*substantially reduce global greenhouse gas emissions to limit global temperature increase in this century to 2 degree Celsius,*” (Paris Agreement Article 2 (a)).

After the 2015 Paris agreement, the irreversible changes in the climate and its repercussions on the environment triggered discussions to substantially reduce the emission of global greenhouse gases and the need to embrace carbon-neutrality gained momentum. To overcome the challenges posed by the climate change, the Left Democratic Front (LDF) government in Kerala launched a carbon-neutral project on June 5, 2016 in Meenangadi Gram Panchayat. The idea was conceived in 2015 during a discussion with the then Finance Minister T.M. Thomas Issac and the then Gram Panchayat President Ms. Vijayan¹ and other elected functionaries of the Panchayat. They informed the Finance Minister (who also happened to attend the Paris Climate Agreement) regarding the activities already implemented by the Panchayat to preserve and conserve the environment. During the discussion, it was decided to introduce a carbon-neutral project in Meenangadi on a pilot basis. Though Meenangadi has been involved in environment-friendly initiatives, the concept of carbon-neutrality was a challenging one. The Panchayat first conducted a carbon audit in 9000 households to identify the key sectors and sources that lead to maximum amount of carbon emission and carbon sequestration in Meenangadi. The carbon-auditing held in 2016–2017 found that the total carbon emission of Meenangadi was estimated to be at 33,375 tonnes of CO₂ Eq while carbon sequestration was 21,962.53 tonnes of CO₂ Eq (Raghunath 2021). It was also found that there was an excess emission of 11,412.57 tonnes of CO₂ Eq. To bring down the carbon emission and to increase the sequestration, the Panchayat initiated a lot of schemes including Tree Banking

¹ The authors of this paper interviewed Ms. Vijayan on February 21 and 22, 2021 and October 17, 2022. She said that climate change had reduced the yield from agriculture in Meenangadi and Wayanad district. Hence, the Panchayat was mulling to change its approach towards development. So, when the state government wanted local governments to take up projects to tackle climate change, Meenangadi took the first initiative to make the village carbon-neutral.

Scheme in which people were incentivised for planting trees to climate literacy programmes to promoting the use of solar powered street lights and LED lights in homes to decentralized waste management among a few notable initiatives. In terms of fund allocation, for implementing the carbon-neutral project, the Panchayat in 2017 earmarked Rs. 11 crores (US \$1.52 million) and state government allotted Rs. 10 crores (US \$1.38 million). While the initial target was to make Meenangadi carbon-neutral by 2020, the Covid 19 pandemic and the change of panchayat administration owing to 2020 local government elections in Kerala posed hurdles in accomplishing it. At present, the Panchayat is aiming to achieve the carbon-neutral tag by 2025. The ongoing pandemic along with Russia—Ukraine war is like to delay the accomplishment of targets outlined in 2015 Paris Agreement. Though the pandemic had its positives and negatives on environment, it has diverted the attention from the issue of climate change and the ongoing escalations between Russia and Ukraine will certainly undo the progress the world has made in preserving our mother earth.

Another major issue when it comes to achieving the carbon-neutral tag is the concept of carbon trade. Carbon trade operates under the notion that if a country (developed) is promoting an industry that causes high carbon emissions it can compensate for those harmful emissions by planting trees as well as establishing environment-friendly programmes in developing and third world countries or within the rural areas of the country. Experts are of the opinion that capitalism itself needs to be transformed if we were to decarbonize the “global” (Bohm et al. 2012). The problem with rural Meenangadi as well as capitalistic countries in general has sought refuge in carbon trade as they have placed their mission to become carbon-neutral within a growth-centred development paradigm and it does more harm to the environment (Newell 2012). In the recent times, in a capitalistic and growth-centred economy, “embracing carbon markets by financial and political elites constitute a possible first step towards turning capitalist ventures into a new form of greener and sustainable climate capitalism” (Newell 2012; Newell and Patterson 2010). While a growing number of countries are making commitments to achieve carbon-neutrality within the next few decades, the major problem is that they are operating within a capitalistic—materialistic—growth-centred paradigm and going carbon—not only for Meenangadi but for the rest of the world. Here comes the significance of sustainable and simplistic model of Gandhi-Kumarappa Framework in the race towards carbon-neutrality and the philosophy of degrowth.

This paper looks into carbon-neutrality in India with special emphasis to Meenangadi in Wayanad, Kerala. The first part begins with a general introduction followed by a brief discussion on Gandhi- Kumarappa framework. The second part gives a brief overview regarding carbon-neutrality in India. The third part offers the profile and the political economy of ecology in Meenangadi in Wayanad district. The fourth part of the paper highlights the relevance of carbon-neutrality in Meenangadi and its significance in preserving

the ecologically fragile Western Ghats. The fifth part of the paper looks into the steps undertaken to assess the carbon emissions in Meenangadi. The sixth part is followed by mitigation strategies adopted by the Meenangadi and the result followed by conclusion.

Gandhi-Kumarappa Framework and Carbon-Neutrality

Mahatma Gandhi in his seminal work *Hind Swaraj* (1909) wrote that earth has enough for “everyone’s need” but not for “everyone’s greed” and it is evident from these words to understand his views on environment and the need to embrace sustainable model of development. Long before, the Stockholm Conference of 1972 (First Earth Summit) there was Gandhi, the visionary, who raised concerns on environment (Tiwari 2019). Gandhi had cautioned the world about the hidden dangers posed by large-scale industrialization and rapid urbanization and how it will eventually lead to destruction of environment (Hind Swaraj 1909). Gandhi gave emphasis to “production by the masses” as it can result in the development of an economic system that minimizes destruction to environment and lead to a more sustainable model of development and he suggested *Swaraj* as a means to accomplish it. It is a widely accepted fact that Gandhi led a zero-carbon footprint lifestyle and Khadi would be the perfect example here. Though Gandhi encouraged the use of Khadi to make India self-reliant and to generate self-employment at the grassroots level, it is also one of the most eco-friendly fabric, a fact many failed to notice even during the time of Gandhi. Not many know that Khadi is a “minimum carbon-footprint fabric” since spinning and weaving of khadi are largely done by hand (with minimal use of water, electricity or fuel). Gandhi used the spinning wheel (chakra) to spin thread and make clothes. Traditionally there are two types of chakras—Bardoli Chakra (Box type) and Yerwada Chakra (round wheel) and these days people use Amber Chakra (Solar Chakra) which make use of solar energy to operate the wheel. There is minimum transportation and packaging involved. The Khadi and Village Industries Commission supports the production, research and sale of Khadi in India. At a time when we are attempting to mend our ways to save the earth, Gandhian way of life can be helpful not in reducing carbon emissions but also in generating self-employment opportunities² J. C. Kumarappa, an economist trained at Columbia University and a close associate of Mahatma Gandhi, has suggested in his book *Economy of Permanence*, that a total non-violence in production and consumption is required for transitioning towards sustainable society to sustainable economy. Kumarappa argues that only through an “economy of permanence” (sustainable social order) in which human beings

² The first author of this paper interacted with Ms. Asha Buch, a retired bilingual teacher and reputed social worker on February 22, 2021. Asha Buch grew up in a family of activists supporting India’s freedom movement under the guidance of Gandhi. She learnt to spin at the age of about seven or eight, a skill that she has honed over the years and enjoys passing it on.

collaborate with nature to meet their needs without disrupting the natural patterns of growth and renewal can lead to a sustainable economy (Lindley 2007; Nair and Moolakkattu 2018). During the field visit to Meenangadi, it was evident that neither the local citizens nor the politicians, panchayat functionaries, civil society organizations were aware of the Gandhi-Kumarappa perspectives on preserving the environment. They are not ready to move away from the growth-centric development and what they prefer is to place carbon-neutrality within growth-centric or development-centric paradigm.

In general terms, being carbon-neutral means balancing out carbon emissions by reducing them elsewhere. For instance, a country can plant as many as trees to suck up the carbon put out by their industrial establishments. This concept of carbon-neutrality is in favour of growth-centred development paradigm. Since Meenangadi is trying to balance between growth-centred development and carbon-neutrality, there are concerns that even if the village earns the tag of carbon-neutrality whether it will remain sustainable in a long run. The concept of solidarity economics also enjoys huge significance in the context of carbon-neutrality. Solidarity economy seeks to *“resist the colonizing power of the individualistic, competitive, and exploitative Economy of Empire”* (Nair 2020). Some of the features of solidarity economy are reciprocity, unity in diversity, shared power, autonomy, horizontal communication, cooperation and mutual aid and local rootedness. Solidarity Economics *“is a process which identifies, connects, strengthens and creates grassroots, life centered alternatives to capitalist globalization, or the Economics of Empire”* (Nair 2020).

India and Carbon-Neutrality

As per India Energy Outlook 2021, India is the world’s third-largest primary energy consumer and not surprisingly it is also the third-largest carbon emitter. India has signed the declaration of 2030 Agenda for Sustainable Development Goals (SDGs) of United Nations. The Goal 13 of the SDGs focuses on urgent action required to combat climate change and to strengthen resilience and adaptive capacity to climate hazards and to integrate climate change measures into policies and strategies. In 2016, India ratified Paris Agreement and under India’s Intended Nationally Determined Contributions (INDCS), the country is committed to creating a cumulative carbon sink of 2.5–3 billion tonnes of carbon dioxide through additional forest and tree cover by 2030. To achieve the targets, India has to adopt a carbon-neutral trajectory. India has already started ways to reduce carbon emissions and Phayeng in Manipur, Majuli in Assam and Union Territory of Ladakh and Meenangadi in Wayanad, Kerala are a few examples in this regard.

Phayeng, a village surrounded by forested hillocks in Imphal West district in Manipur is considered to be the first village in India to earn a “carbon positive”³

³ The general consensus is that a village is given the tag of carbon positive settlement if it sequesters more carbon than it emits.

eco-model village” tag in the country. The inhabitants in the village belong to the Chakpa (a scheduled caste) community. Phayeng is one among the five villages in Phayeng Gram Panchayat. As per the 2011 Census, there are 890 households with a total population of 3835 out of it 1874 are male and 1961 female. The transition of Phayeng to a carbon-positive village is a remarkable one. In the 1970s and 80s, deforestation was rampant in forest area in this village. In the absence of green cover, Phayeng had an extreme warm climate and scanty rainfall and it led to severe shortage of water. Occasional heavy rains led to flash flooding and it affected the soil moisture which made agriculture and farming activities difficult. In the 1970s, the once dense forest in this village which was spread across 7678.78 hectares was just 579.38 hectares in 2016 (Anand 2017). As the situation worsened villagers decided to do something to save their place and they approached Directorate of Forest and Climate Change, Government of Manipur. They jointly started reforestation of the forest land in the Phayeng village. In addition to that, Ministry of Environment, Forest, and Climate Change, Government of India also provided assistance under National Adaptation Fund for Climate Change (NAFCC) to develop Phayeng as a carbon-positive eco-village (Nandi 2020). National Bank for Agriculture and Rural Development (NABARD) was the implementing agency for this Rs.10 crore (US \$1.38 million) project. The project duration was from 2016 to 2020.⁴ As part of the project, villagers even formed a forest protection committee (*umang kanba*) and also came up with stringent rules including a complete ban on hunting, restriction on entry of outsiders into forest without permission, patrolling in the forest area and monitoring forest fires. The forest developed by villagers in Phayeng have now more than 95 tree species with medicinal value (Nandi 2019). Though the villagers in Phayeng are not explicitly following the Gandhi-Kumarappa framework, the measures they have undertaken to preserve their environment are simplistic and affordable as envisioned by Gandhi-Kumarappa. In short, directly, or indirectly, the foundation of Phayeng community in saving their environment lies in Gandhi and Kumarappa. It is also interesting to note that Phayeng is not involved in any sort of carbon trade within or outside their jurisdiction.

Majuli, the river island district in Assam is also on its way to become a carbon-neutral region. An island in Brahmaputra river, it became a district in 2016. Majuli, which was previously part of Jorhat district in Assam has a population of around 167,304. Flooding and soil erosion are the major issues faced by the people of Majuli as Brahmaputra has devoured half of the island in the last 40 years (Singh 2021). It was in this context, the Department of Environment and Forest, Assam launched a project titled Sustainable Action for Climate Resilient Development (SACReD) in 2016 to combat climate change by reducing greenhouse gas emissions and eventually turning Majuli into a

⁴ The first author of this paper interacted with Phayeng native Shri. Angom Gojendro Singh, a recipient of Panchayat Sashaktikaran Puraskar 2015, on March 3 and 4, 2021. He is the Sarpanch of Phayeng Gram Panchayat.

carbon-neutral district. In addition, the state government is also carrying out forestry activities including bamboo cultivation and biodiversity conservation under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS).⁵ Like Phayeng, Majuli is also by default operating within the Gandhi- Kumarappa framework. There is no deliberate attempt from the part of the residents and officials to follow this perspective.

The Union Territory of Ladakh, one of the least populated UTs in India, is also going the carbon-neutral way. The decision to develop Ladakh, Leh and Kargil into carbon-neutral regions was announced by Prime Minister Narendra Modi on August 16, 2020 (Nandi 2020). The construction of a 7500 MW solar park is underway in Ladakh. Meanwhile Ladakh also functions as a natural carbon sink as the agroforestry sector in Ladakh including the Nubra Valley filled with 575,000 plantations of willow and poplar trees have the potential to sequester 75,000 tonnes of carbon (Kumar et al. 2009) and along with that the locals have been engaged in the cultivation of climate-resilient crops for years.

Meenangadi in Kerala aiming to become carbon-neutral by 2025. Though initially the plan was to achieve the carbon-neutral tag by 2020, the Covid 19 pandemic and local government elections resulted in an inordinate delay. Since 2016, Meenangadi has been in the race to become carbon-neutral. Prior to embarking on the project, a carbon auditing was conducted to assess the total amount of carbon emission and carbon sequestration in Meenangadi. It was found that in 2016–2017, the total carbon emission of Meenangadi was estimated to be at 33,375 tonnes of CO₂ Eq while carbon sequestration was 21,962.53 tonnes of CO₂ Eq (Raghunath 2021). It was found that there was an excess emission of 11,412.57 tonnes of CO₂ Eq. To bring down the carbon emission and to increase the sequestration, the Meenangadi Gram Panchayat initiated a lot of schemes including Tree Banking Scheme in which people were incentivized for planting trees to climate literacy programmes to promoting the use of solar powered street lights and LED lights in homes to decentralized waste management among a few notable initiatives. Meanwhile before delving into the strategies and procedures adopted by Meenangadi to achieve carbon-neutrality, it is equally important to understand more about Meenangadi and its political economy of ecology.

17.2 PROFILE AND THE POLITICAL ECONOMY OF ECOLOGY IN MEENANGADI IN WAYANAD DISTRICT

Meenangadi is one among the 25 Gram Panchayats in Wayanad district in Kerala. Wayanad, a highland region lies in the Western Ghats. Wayanad district which was created on November 1, 1980, is located on the south-western tip of Deccan Plateau, at an altitude of 700 m above sea level, extends over an

⁵ The first author of this paper interviewed Dr. Rakesh Chetry, Assistant Commissioner, Manjuli district, Assam on March 16, 2021.

area of 2125 sq.km. Meenangadi is part of Sulthan Bathery constituency and Wayanad Parliamentary constituency. Around 70 per cent is table land and around 20 per cent is fertile plains. Around 3 per cent of the total area in Meenangadi is covered by forest. Nearly 94 per cent of the land (excluding the forest area) is used for agricultural purpose. Some parts of Meenangadi fall under shadow region. As per the 2011 Census, Meenangadi has a total population of 34,601 across 8199 households. The Panchayat is divided into 19 wards and the Panchayat falls in two revenue villages-Krishnagiri and Purakkadi.

Meenangadi and Wayand had been a hub of “new wave of social movements” (Chathukulam and Moolakkattu 2006). Even before carbon-neutrality, green politics and movements to protect environment and land were frequent in Wayanad and Meenangadi, especially several land struggles between tribals also known as *Adivasis*, one of the most marginalized communities in the state constantly fighting for land reforms and for their own land. Muthanga agitation in Wayanad district in 2003 is the biggest example in this regard. The failure of the successive state governments in Kerala to allot one acre of cultivable land to each tribal family, (an assurance that was given to them by the state governments following the displacement of the Adivasis/tribal dwellers in the 1960s and 1980s to make way for eucalyptus plantations in Wayanad) led to one of the landmark agitations by the tribal community in Kerala. As per the Kerala Scheduled Tribes (Restriction of Transfer of Land and Restoration of Alienated Land), Act 1957, the state must transfer cultivable land to all Adivasis in the state but the governments over the years refused to implement this in letter and spirit (Bachan 2019). Considering the betrayal of the governments in the state over the years, around 617 tribal families set up their tenets in Muthanga forest as of protest. The government used police machinery to forcefully evict the protestors from the forest and it turned into a violent clash (Ameerudheen 2016). The socio-economic profile of Adivasis has always been outside of the *Kerala Model of Development* (Chathukulam et al. 2013). According to the 2011 census, adivasis constitute 18.5 per cent of the total population in Wayanad. Paniyas are the largest tribe and they constitute nearly 45.6 per cent of the tribal population, followed by Kurichiyas at 16.6 per cent, Kurumas at 13.8 per cent and Kattunayakas at 11.2 per cent (Census of India 2011; Government of India, Chathukulam et al. 2013). People in Meenangadi, which is home to 23 per cent of tribals⁶ have been very vocal about protecting and preserving their land and environment. In Meenangadi itself, nearly seven years ago, following the mass eviction of people from various tribal settlements, nearly 68 families occupied a 70-acre plot belonging to Kerala Forest Department in Meenangadi (Ameerudheen 2016). The adivasis made makeshift huts inside the vast take plantation and lived there for months withstanding eviction threats from

⁶ Kurumar, Paniyar, Kaattunaykkar, Vettakkurumar and Kurichyar are the tribal communities of Meenangadi are the major tribes found in Meenangadi.

government. The adivasis occupied the land until the state government agreed to distribute one acre of land each to all families. The new settlement in Appad in Meenangadi came to be known as Panchami Colony, named after the first baby, born during the struggle (Ameerudheen 2016). The tribal communities are highly vulnerable to climate change as their livelihood is entirely dependent on climate-sensitive crops and minor forest produces. According to the 2011 Census, the literacy rate of Meenangadi is 81 per cent and it is below the overall literacy rate of Kerala (93.91 per cent). Tribals in Kerala, like any other marginalized communities are a crucial vote bank for political parties. In fact, mainstream and local political parties will be competing to woo these innocent people with poll sops and promises during the election season but none of them are ready to offer their full-fledged support to the cause of indigenous people.

Over the years both LDF led by Communist Party of India (Marxist) and United Democratic Front (UDF) led by Indian National Congress have ignored the demands of the landless adivasis. (Ameerudheen 2016). As per the Biodiversity Register⁷ prepared by the Panchayat, wetlands, forests plantations and homesteads are the major ecosystem. A total of 240 species of plants and trees have been identified out of which 140 species are herbs, 55 tree species, 14 species each of water plants, 12 species each of wild plants and wild ornamental plants. The faunal diversity includes 88 species of birds, 20 species of mammals, 16 species of fishes, 15 species of reptiles, 12 species of aquatic animals, five species of frogs, 40 species of butterflies, five species of dragonflies and damselflies and 38 species of insects are also documented in the Biodiversity register (Jayakumar et al. 2018).

When the carbon-neutrality project was launched in Meenangadi way back in 2016, LDF was ruling the Meenangadi Gram Panchayat. The major phases towards the implementation of carbon-neutral Meenangadi took place when the LDF was ruling the Meenangadi Panchayat. While the target was to make Meenangadi carbon-neutral by 2020, the Covid 19 pandemic and local government elections in 2020 completely disrupted the plan. In the recent local government elections, LDF lost power to UDF. One of the major reasons for the setback was the failure of LDF to internalize the carbon-neutrality project. The in-party fighting's and factions and adversarial politics led to the

⁷ Meenangadi Gram Panchayat prepared the first Biodiversity register on 31-03-2013, it was revised in 2016 and on 8-03-2018 it was further updated. The first author of this paper conducted an interview with Shri.O V Pavithran Master, Convener of Meenangadi Biodiversity Management Committee (BMC) on March 5 and 6, 2021. The above-mentioned details were provided by Shri. Pavithran to the author. The first author conducted an interview with O V Pavithran on October 18, 2022 and Shri Pavithran said that climate literacy programme in coordination with Gram Sabha is being held in Meenangadi. The first author also interviewed the newly elected Gram Panchayat President K E Vinayan on October 18, 2022. Shri Vinayan said that due to the Covid 19 outbreak, the activities under carbon-neutrality took a backseat but added that 90 per cent of the households in Meenangadi now uses LED bulbs. There are also discussions to scale up the carbon-mitigation strategies implemented at the Panchayat level to.

failure of LDF in the recent polls conducted to local governments. Leadership and regime change will have a huge impact on the future of carbon-neutrality in Meenangadi. It is to be noted that the carbon-neutral project was launched in 2016 then the LDF led by Ms. Vijayan was in power. But before the completion, the local government elections came in and the power equations changed. Ms. Vijayan who was a popular face among the residents of the panchayat was fielded as a candidate in the Block/ Intermediate Panchayat this time instead of Gram Panchayat. Though LDF had a dominance over Gram Panchayats, the third tier of the local governance, its representation and presence in the Intermediate/Block Panchayat and District Panchayat had been relatively poor. So, in the latest local government elections, the CPI(M) laid emphasis and attention on fielding candidates that have good prospects to get elected to Block and District Panchayats. Since Ms. Vijayan was a popular president adored by the people, the party realised that the popularity of the candidate at grassroot level can help her to win even if she is fielded at block level. Of course, the strategy worked well and Ms. Vijayan got elected to the Block Panchayat.⁸ Had Ms. Vijayan been fielded in Gram Panchayat, perhaps LDF would have swept the local polls and returned to power and it would have in a way speeded the process to make Meenangadi carbon-neutral to an extent. Though UDF and LDF government have incorporated carbon-neutrality in their election manifestos, one needs to see whether the UDF government will be interested in taking up the carbon-neutral project way forward. Following the interaction with newly elected Panchayat president K E Vinayan,⁹ it was revealed that they are clueless as there is a continuity deficit along with weak institutional memory. Weak institutional memory is a great deficit of the local governments in Kerala as a result there is no culture of continuity. The newly formed UDF government and elected members didn't get much time to study deeply about the carbon-neutral project and hence they are in a situation in which have to continue from the scratch.

17.3 RELEVANCE OF CARBON-NEUTRALITY IN MEENANGADI AND ITS ROLE IN SAVING WESTERN GHATS

In 1957 Kerala had nearly 36 per cent of the land area was covered by forest but by 1990 it was drastically reduced to 12 per cent (Pillai, 2018). As per a study conducted by Indian Institute of Science, Kerala lost 906,400 hectares

⁸ The following inputs were furnished by Dr. Jose George, who is a CPI (M) activist based in Manathavady, Wayanad and a former Professor of Civics and Politics with the University of Bombay. The author of this paper interacted with Dr. George on February 15, 2021.

⁹ The first author interviewed the newly elected Gram Panchayat President K E Vinayan on October 18, 2022. Shri Vinayan said that due to the Covid 19 outbreak, the activities under carbon-neutrality took a backseat but added that 90 per cent of the households in Meenangadi now uses LED bulbs. There are also discussions to scale up the carbon-mitigation strategies implemented at the Panchayat level to block level.

(9064.4 sq.km) of the forest land between 1973 and 2016 (Ramakrishnan and Ramachandra 2016). States along Western Ghats including Kerala conducted large-scale mining, quarrying, construction of buildings and high rises along the hills and unsustainable farming and it made one of India's oldest hill ranges vulnerable to natural disasters. The massive floods of 2018 and 2019 in Kerala and the recurrent landslides in environmentally fragile areas of Wayanad and Meenangadi are due to the vast exploitation of Western Ghats. Large-scale urbanization led to a loss of forest cover and it led to scanty rainfall in places including Wayanad and Meenangadi. Bouts of drought has been plaguing Meenangadi Panchayat for years and it was a huge blow to the farmers and rural households in the Panchayat. Wayanad is in the news for agrarian crisis, farmer suicides (George and Krishnadas 2006; Münster 2012) floods and recurrent landslides. Meenangadi, which is in Wayanad is also going through the same crisis.

Though there have been legislations like Forest Act 2006, Environmental Impact Assessment Regulations 2006 and National Green Tribunal Act to scrutinize the impact of projects on environment before granting clearance and a tribunal to expedite and dispose of cases in connection with environmental issues, they have been effective only to some extent. Then came the Western Ghats Ecology Panel (Gadgil Committee led by Madhav Gadgil) in 2010 and many environmentalists and activists lauded it and hoped it would bring to an end to the exploitation of the fragile Western Ghats. Finally Gadgil report was rejected by the Union Ministry of Environment in 2011.

In its report submitted to the Union government on August 31, 2011, the Committee defined "*Western Ghats as the mountainous region encompassing 1.29 lakh square km, stretching 1490 kms from Tapi Valley in the north to Kanyakumari in south, with a maximum width of 210 km in Tamil Nadu and minimum of 48 km in Maharashtra*" (Gadgil 2011). The Committee proposed designating the entire zone as an ecologically sensitive area (ESA) and within ESA smaller grids were marked as ecologically sensitive zones (ESZ) I II and III. The Committee proposed regulations for these in the light of existing conditions and the threats that are likely to cause if exploitation continues unabated. The Committee also recommended stringent measures to prohibit the degradation of land and proposed ways to reclaim the Western Ghats (Nair and Moolakattu 2017).

However, political lobbying and strong opposition from all six states forced the Union government to reject it. Even more shameful was the resistance from Kerala as the ecclesiastical community¹⁰ and politicians jointly came together to oppose Gadgil report on Western Ghats. The UDF and the LDF were hell bent on overthrowing the report. The unholy nexus between the

¹⁰ The Syro-Malabar Catholic Church, the state's largest church which accounts for the maximum number of farmers living in villages located in Western Ghats strongly opposed the report. The Syro-Malabar church even suggested an international conspiracy behind the Gadgil report.

ecclesiastical community, political leadership as well as poachers and plunderers, mining mafia and quarry operators protested against the declaration that 37 per cent of the Western Ghats as “Ecologically Fragile” as it would put an end to all commercial activities in the said region. The Western Ghats region of Kerala especially Wayanad and Meenangadi has been in the news for recurring landslides and floods and human-animal conflicts (Viswanathan 2019). To save Western Ghats and its rich biodiversity carbon-neutrality is the way and to a climate-resilient approach is the means to achieve it. A radical shift from growth-centred paradigm to a Gandhi-Kumarappa sustainable framework is the perfect solution to this.

17.4 MITIGATION STRATEGIES TO ACHIEVE CARBON-NEUTRALITY IN MEENANGADI

The carbon-neutral Meenangadi project envisions the reduction of human-induced carbon emission through people’s lifestyle and sustainable development in this region. The plan is to achieve it by reducing carbon emissions in Meenangadi. The Biodiversity Management Committee (BMC) in Meenangadi has played a significant role in expanding the green cover in the village.

Tree Banking Scheme

Trees play a pivotal role in controlling carbon emissions and helps to sequester excess carbon. As expanding the green cover is one of the targets to be accomplished to become carbon-neutral, Meenangadi launched a Tree Banking Scheme. Under Tree Banking Scheme, anyone who owns a piece of land in Meenangadi are eligible beneficiaries for a loan of Rs. 50 (US \$0.69) per year annually on the basis of its future market value. The loan is provided by Meenangadi Service Cooperative Bank on the guarantee of the Panchayat. As part of the carbon-neutral Meenangadi project, the state government has deposited a corpus fund of Rs. 10 crore (US \$1.38 million) for the Tree Banking Scheme at the Meenangadi Service Cooperative Bank and this amount is used to disburse the loans. Under this scheme, each tree sapling can be pledged for Rs. 50 (US \$0.69) per year for a period of 10 years. So, if a person pledges 100 trees in his or her land, the bank will pay them Rs. 5000 (US \$68.90) per year for 10 years in the form of a loan.

The sapling between 3 and 5 years of age is distributed to beneficiaries under this scheme. The Panchayat has listed 34 species of trees that people can plant on their land and it includes mango (*Mangifera indica* L), jack-fruit (*Artocarpus heterophyllus*), neem (*Azadirachta Indica*) lemon (*Citrus limon*) cinnamon tree (*Cinnamomum Verum*) arecanut (*Areca Catechu*) cashew (*Anacardium occidentale*) and banyan tree (*Ficus Benghalensis*) are some among them. As part of the MGNREGS, the Panchayat has distributed nearly three lakh saplings at free of cost through its MGNREGS nursery. The

geo-tagging feature helps the Panchayat officials to monitor the growth of the sapling at six-month and one-year intervals. The saplings grown by the beneficiaries on their own are also taken into account under the scheme. The primary aim behind this scheme is to financially incentivize people, including farmers to grow and preserve trees. This way, farmers or even residents will be discouraged from axing trees, a practice that has been widespread in recent years and considered fatal to the biodiversity of Wayanad. The beneficiary has to start an account in the cooperative bank. Each beneficiary is given a unique registration number and each tree is geotagged and details digitally recorded.

Trees in Homesteads

Plants and trees serve as a natural source of removing carbon from atmosphere. The Panchayat carried a tree survey to estimate total carbon sequestration in Meenangadi. As part of the tree survey, the total number of trees, including their size, age, and species in each household in the Panchayat. Following the completion of the survey, a database of trees in each ward were constructed. As part of this exercise, average girth, and height of each species of trees and wood density of each tree species were collected and recorded. So far, 7526 trees in homesteads have been geotagged in 157 households in Choothuppara and Appad wards with the help of trained *Kudumbashree* workers and volunteers. As part of the survey, carbon sequestration levels were estimated for each tree species based on their age. Average carbon sequestration potential per homestead was calculated based on data collected from 3746 tree samples. It was extrapolated to the total number of households to find total carbon sequestered in homestead trees in the Meenangadi. It was found that it accounts for 34 per cent of the total carbon stock of Meenangadi. Though the Panchayat has planted more than 3000 tree saplings in and around Meenangadi so far, it would take three to four years for the tree to start the carbon sequestration process. Therefore, the conservation of existing trees in homesteads is very important to attain carbon-neutrality. The trees that existed even before the carbon-neutral was launched are covered under the Tree Mortgage Scheme/Project. Under the Tree Mortgage Scheme, the trees that existed in homestead even before the launch of carbon-neutral project would be provided with interest-free loans considering trees as a security.

Organic Farming

Vegetable farming has also received a big push with around 70 acres of land now being used for cultivation. Meenangadi has today become self-sufficient in vegetable cultivation. One of the “Attakolli” Jaiva Park (organic farming land). Around Rs. 47 lakh (US \$64,765) was spent on organic farming initiatives attempting to reverse the existing trends of using harmful pesticides and imports of vegetables and fruits. Organic farming was promoted not only to cultivate clean food but to also make the region self-sufficient in food produce.

Apart from planting trees, managing waste, preserving water resources, the carbon-neutral project has adopted various innovative methods to bring down the carbon levels. Around Rs. 80 lakh (US \$110,238) was spent to set up an electric crematorium in the area. This has drastically brought down the use of wood for cremations. Plastic bags in the Panchayat markets have been replaced with handloom bags. Free distribution of bicycles to school students and encouraging people to use non-polluting vehicles are part of the project.

17.5 MGNREGS A CLIMATE RESILIENT APPROACH HELPING THE CAUSE OF CARBON-NEUTRALITY IN MEENANGADI

The MGNREGS launched in 2006 in India is one of the world's largest social security programme. MGNREGS aims at enhancing the livelihood security of people in rural areas of India by guaranteeing a 100 days of wage-employment in a financial year to a rural household whose adult members, both men and women volunteer to do unskilled work. MGNREGS works are focused on the creation of durable assets to augment land and water resources, improve rural connectivity, and strengthen livelihood resources of the poor. It largely focuses on land and land development, drought proofing, renovation of traditional water bodies including water harvesting, groundwater recharge, and conservation, soil conservation and protection and so on. Thus, MGNREGS works have the potential to generate environmental benefits. Therefore, it is important to assess the "carbon-sequestration" potential, as a co-benefit, from MGNREGS (Ravindranath and Murthy 2018). In the case of Meenangadi, large-scale afforestation works are being carried out under drought proofing and afforestation under MGNREGS.

For instance, under Tree Banking Scheme, as part of MGNREGS, the Panchayat has distributed nearly three lakh saplings at free of cost to residents especially farmers through its MGNREGS nursery. As trees and plants have high carbon sequestration, this programme is proving beneficial to the environment and ecology of Meenangadi. Similarly, under MGNREGS, bamboo saplings are planted on the river sides, road sides and in schools as bamboos can capture and sequester significant amount of atmospheric carbon and thus help in mitigating climate change. Researches have shown that bamboo serves as a carbon sink (Giri et al. 2015). So sustainable utilization, conservation, and proper management of bamboo trees under MGNREGS in Meenangadi can make it an effective carbon sink besides fulfilling the diverse needs of rural households.

Social protection programmes like MGNREGS can effectively integrate climate risk management and thus help rural households to generate and invest in climate-resilient livelihood strategies. In the case of Meenangadi, as part of afforestation works, bamboo cultivation has got a boost. On the one hand bamboos have the potential to improve socio-economic status. The people

in Meenangadi and Wayanad in general use bamboos to make handicrafts, furniture and other utility products and it has become a major livelihood for women in Wayanad. It has given the villagers financial and economical empowerment as in the case of MGNREGS. Apart from socio-economic potential offered, bamboo has a lot of potential when it comes to going carbon-neutral as bamboo has high carbon sequestration capacity. This potential of bamboo is being utilized by MGNREGS in Meenangadi by promoting bamboo cultivation. So, programmes like MGNREGS not only help poor households with poverty and marginalization but also helps to adopt absorptive, adaptive and transformative resilience to absorb the effects of climate risks, adapt to climate change impacts and transform their capacities and strategies to address growing climate changes (Kaur et al. 2019).

In addition, soil conservation, fodder development, afforestation, and drought proofing works have sequestered carbon, thus mitigating climate change (Esteves et al. 2013). Similarly, activities under MGNREGS in Meenangadi have been able to achieve this potential. The much-lauded tree banking scheme to increase green cover in Meenangadi, recreating forest and preserving groves, organic farming, bamboo park in schools and bamboo planting on the banks of rivers and all these activities are implemented under MGNREGS. In Meenangadi under MGNREGS, a total of 862 ponds were dug by MGNREGS workers and out of it 462 ponds are used for pisciculture. In drought proofing alone, 824 works have been carried out, 335 water bodies in the Meenangadi has been revived in the last six years and 708 water bodies have been preserved and conserved so far and all these activities were carried out MGNREGS. So, Meenangadi has too proven that MGNREGS has the huge potential to reduce vulnerability to climate risks. In the case of Meenangadi a huge investment is made for rural projects under MGNREGS. Wayanad where Meenangadi is located has showcased good performance when it comes to the implementation of MGNREGS since the beginning. The scheme was launched in Kerala on a pilot basis in two districts, Palakkad and Wayanad, in 2006 and at that time Wayanad score six points more than Palakkad (Chathukulam and Gireesan 2008). The average expenditure incurred per year for the last six years under MGNREGS in Meenangadi amounts to Rs 808.38 lakhs (US \$1.11 million). The average person-days generated per year is 2,23,839. Details of activities undertaken under MGNREGS in Meenangadi (2015–2021) given in Table 17.1.

Under MGNREGS, drought proofing works such as afforestation and reforestation, and horticulture development are the activities carried out for improving the vegetation cover and biomass availability in the villages. Meenangadi has been actively involved afforestation and other drought proofing works. Programmes like bamboo park in schools and “*punyavanam programme*” to protect sacred groves in Meenangadi are a few among them. Meenangadi has won the 2018 Mahatma Award instituted by the Kerala government for the efficiency in implementing MGNREGS.

Table 17.1 Details of activities undertaken under MGNREGS in Meenangadi (2015–2021)

<i>Sl. No</i>	<i>Name of the Activity/Work</i>	<i>2015–16</i>	<i>2016–17</i>	<i>2017–18</i>	<i>2018–19</i>	<i>2019–20</i>	<i>2020–21</i>	<i>Total</i>
1	Rural Infrastructure	0	0	0	4	4	5	13
2	Drought Proofing	99	81	93	152	181	218	824
3	Flood Control	20	0	0	0	0	0	20
4	Land Development	29	47	8	12	25	57	178
5	Playground	2	2	1	1	1	0	7
6	Renovating Water Bodies	50	68	42	30	68	77	335
7	Rural Connectivity	12	36	57	137	207	211	660
8	Rural Sanitation	0	2	37	66	46	45	196
9	Water Conservation	0	85	77	155	180	211	708
10	Works on Individual Land	547	447	337	485	427	295	2538
	Total	759	768	652	1042	1139	1119	5479

Source Compiled and Computed from the MIS, MGNREGS, Ministry of Rural Development (MoRD), Government of India

17.6 ACTIVITIES UNDERTAKEN IN MEENANGADI TO EXPAND GREEN COVER

Bamboo Garden and Park

Schools in Meenangadi have also embraced carbon-neutral project. A notable one among them is a school named Navodaya Adivasi Aided Upper Primary School in Meenangadi which houses 50 rare species of bamboos, eight of them endemic and six of them under the endangered category. The school has a four-acre bamboo garden at present. This school has bagged the prestigious *Vanamitra Award* instituted by Forest Department 2019–2020. Meanwhile, it is interesting to note that the bamboo garden was started way back in 2002 by planting nearly 29 species. In 2016, when Meenangadi decided to go carbon-neutral, the Panchayat started to provide all support to the project through programmes such as Green India Mission under MGNREGS. The Panchayat has spent Rs. 15 lakh (US \$20,669) for this bamboo garden. The school also possesses a medicinal plant garden with 30 species of plants, an arboretum with 84 tree species, and a collection of 26 wild edible fruit conservatory.

Preserving Sacred Groves in Meenangadi

Meenangadi has a total of 54 sacred groves¹¹ and the locals have realized the potential of these groves and have started preserving them. The transformation of nearly 34 acres out of the total 38 acres of the Manikavu Temple including a sacred grove attached to the temple into a green paradise. Manikavu temple is situated in Meenangadi, Sulthan Bathery Taluk of Wayanad district.

Back in 2012, much before the launch of Meenangadi carbon-neutral project, nearly 34 acres of land were lying abandoned for a long period of time and as years went by nearly it was filled with invasive plants. The thoughtful intervention of Meenangadi Panchayat and MSSRF helped to transform nearly 44 acres of abandoned area in the temple premises into a beautiful garden with endemic and medicinal plants. It was carried out under the “Punyavanam Programme” (and in the first phase the programme even got the funding support from Sir Dorabji Tata Trust, SDTT, Mumbai). The governing body of the temple, the Panchayat and MSSRF actively participated in the programme. With the involvement of the Panchayat, MGNREGS workers since 2016 have played a significant role in turning the Manikavu temple and the adjacent sacred grove with medicinal plants and 115 trees. Today it has turned into an ecosystem with deep flora and fauna and the members of the BMC have informed us that two elephants occasionally reside in this recreated forest.¹²

Setting up of Biodiversity Management Committee

As per Kerala Biological Diversity Rules 2008, Section 22 Sub Section (4) the Chairperson of the BMC shall be the chairperson of the local self-government and the secretary of the local self-government shall be the member secretary of the BMC, who shall maintain the records. Besides these six people are nominated as members of the local self-government to the committee of which two should be women (33 per cent) and one member (18 per cent) should belong to SC/ST categories (Kerala Biological Diversity Rules, 2008). All the six members nominated should be permanent residents of the panchayat jurisdiction and their names should be in the voters list.

As per the requirements, a BMC has been formed in the Panchayat since 2008. They have been actively involved in the making of Biodiversity Register for the Panchayat. As per the Biodiversity Register prepared by the Panchayat,

¹¹ Sacred groves, also called Kavu in Malayalam language, are rich abodes of biodiversity. Establishment of sacred groves was also seen as traditional efforts by the villages to conserve biodiversity and water resources. These groves had perennial water supply and thus supported human habitation. They also served as places for worshipping nature.

¹² The first author of this paper conducted an interview with Shri.O V Pavithran Master, Convener of Meenangadi Biodiversity Management Committee and Shri. V Suresh, Former Chairman, Welfare Standing Committee, Meenangadi Gram Panchayat on March 5 and March 6, 2021 and October 16, 2021. The above mentioned details were provided by Pavithran and Suresh to the author.

the major ecosystem habitats prevalent in the area are wetlands, forests, plantations and homesteads. A total of 240 species of plants and trees have been identified from the forests and plantations of the Panchayat out of which 140 species were herbs, 55 species were trees. A total of 12 species of wild plants, 14 species of water plants, five species of wild relatives of crops and 14 species of wild ornamental plants were also identified (Jayakumar et al. 2018). The faunal diversity includes 88 species of birds, 20 species of mammals, 16 species of fishes, 15 species of reptiles, 12 species of aquatic animals and five species of frogs. Around 40 species of butterflies, five species of dragonflies and damselflies and 38 other species of insects were also documented in the biodiversity register (Jayakumar et al. 2018). In 2017–2018, the BMC, Meenangadi won the state biodiversity award for tree banking, conservation of ponds, promotion of organic farming implemented as part of carbon-neutral Meenangadi. The BMC also won the special jury mention in 2018 India Biodiversity Awards.

17.7 CONCLUSION

The concept of carbon-neutrality is not new to India. Attempts are underway in various places in India including, the Union Territory of Ladakh (Districts of Leh & Kargil) and Manjuli district in Assam to convert them into carbon-neutral regions. While it is interesting to notice that India is taking baby steps towards achieving carbon-neutrality, it is to be noted that the carbon-neutrality tag is being earned by placing it under a growth-centred trajectory. The approach is less like doing a carbon-trade within the four walls of the country. While India has not yet established a carbon market or carbon pricing policy, it is directly and indirectly engaged in carbon trade within their territories as in the case of Meenangadi. For instance, transport amount to more than 50 per cent of carbon emissions in Meenangadi. Instead of replacing it with eco-friendly transport systems, Meenangadi is planting trees on roadsides. In such cases, carbon-neutrality is achieved by balancing it within the growth-centred development. The Gandhi-Kumarappa framework which lays stress on *economy of permanence*, the foundation of which is total non-violence in production and consumption is missing not only in Meenangadi but also in many parts of the world. During the field visit to Meenangadi, it was evident that the neither the local community nor the politicians, panchayat functionaries, civil society organizations were aware of the Gandhi-Kumarappa perspectives on preserving the environment. They are not ready to move away from the growth-centric development and what they prefer is to place carbon-neutrality within growth-centric or development-centric paradigm.

The concept of carbon-neutrality is not in favour of growth-centred development paradigm. Since Meenangadi is trying to balance between growth-centred development and carbon-neutrality, it is highly doubtful that even if they earn the tag of carbon-neutrality by 2025 whether it will remain

sustainable in a long run. Though neither the local community nor the politicians, Panchayat functionaries, civil society organizations were aware of the Gandhi-Kumarappa perspectives on preserving the environment and solidarity economy, they are familiar with environment and climate-related terminologies like carbon sequestration, carbon-positive, carbon-negative and greenhouse gas emissions and these words became the local political phraseology. Carbon-neutrality has become a topic of political agenda in Meenangadi and Kerala. The election manifestos of LDF and UDF mention about carbon-neutral Meenangadi. This itself denotes that carbon-neutrality is no longer a subject limited to environmentalists but also to the political machinery and thereby to the rest of the society (LDF and UDF Manifesto 2020). Meanwhile, attempts are being made to scale up and customize carbon-neutrality to Wayanad and rest of Kerala. The Kerala Institute of Local Administration (KILA) has developed a training module to introduce and familiarize people and functionaries of local governments on climate change resilient and carbon-neutral regime. The adversarial politics is also hampering the efforts of Meenangadi Gram Panchayat to earn the carbon-neutral tag. A consensus-based democratic approach along with an economy of permanence as advocated by Gandhi-Kumarappa is what Meenangadi and the rest of the world need if they want to go carbon-neutral in its true spirit.

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