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Participatory Climate Action: A Case Study of Meenangadi Panchayat in Wayanad District, Kerala

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Participatory climate action is crucial for creating a sustainable and equitable world because it includes the engagement of individuals, communities, and other stakeholders in addressing the problem of climate change. Only by grassroots individual participation in climate action can climate change be effectively addressed. Participatory climate action at the local level refers to community-based programs and activities. These programmes include sharing resources and networks, as well as educating people about climate change and environmental issues to create a sustainable society. Participatory climate action builds adaptive capacity and resilience by nurturing a sense of shared ownership and responsibility, which helps communities adjust to the effects of climate change and contributes to global mitigation efforts. In this context, this paper tries to analyse the impact of the Meenangadi Model of participatory climate action in the district of Wayanad in Kerala.

Keywords : Climate action, Resilience, Mitigation, Climate change, Collective action

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The greatest threat to humanity in the twenty-first century is climate change. Effective climate action is desperately needed given the seriousness of this issue to both reduce and prepare for its repercussions. Around the world, people are already experiencing the effects of climate change, which include extreme weather events and increasing sea levels that endanger ecosystems, livelihoods, and human health. Governments, communities, individuals, and other stakeholders must act quickly to combat climate change. Even while taking action against climate change, many obstacles remain in the way of efficient mitigation and adaptation strategies. The worst effects of climate change can be lessened by adopting sustainable practices, making investments in renewable energy, and fostering community and individual collaboration. To ensure the participation of people at the grassroots level in climate action, some mechanisms and strategies are required. This paper focuses on the participatory climate action model in Meenangadi panchayat in Wayanad district of the state of Kerala.

Objectives and Methodology

Finding the right theoretical model to correlate with the Meenangadi Model of climate action in Wayanad district of Kerala is one of the research objectives posed here. Additionally, an effort is made to comprehend the advantages and difficulties

that the local people, who are the model's stakeholders, encounter. To conduct the study with fifty respondents for this work, a mixed-method approach, combining qualitative and quantitative components, was chosen.

Theoretical Framework and Literature

Theories of climate action encompass a fair number of perspectives ranging from economic theories to sociological understandings of collective action in climate change. The Tragedy of Commons by Elinor Ostrom is one of the significant theories in environmental economics. This theory postulates that individuals acting in their self-interest will deplete shared resources leading to the degradation of the environment (Ostrom, E,, 1990). This highlights the importance of collective action and the necessity of mechanisms and strategies such as carbon pricing or cap-and-trade systems to address the consequences associated with greenhouse gas emissions.

The conventional method of addressing "tragedy of the commons" problems depends on authority and force exercised by a centralized organization. Scholars who feel that the participants are unable to solve the problem on their own, like Ophuls, support the Leviathan model. Ostrom, however, disputes this, claiming that the strategy ignores the expenses associated with administering the information while assuming the veracity of the data. According to Ostrom's polycentric approach, allowing resource users to create a management structure among themselves is encouraged. She contends that using this strategy lowers the expenses associated with information gathering and enforcement. Local solutions are optimal for resolving "common" challenges, according to Ostrom's polycentric paradigm.

Building upon the Tragedy of Commons, market-based approaches to climate action emphasise market forces to incentivise the reduction in carbon emissions. This encompasses mechanisms like carbon taxes, emissions trading schemes and subsidies for renewable energy. Advocates of the market-based approach argue that by putting a price on carbon, market mechanisms can effectively allocate resources and drive towards low-carbon technologies.

Many nations are implementing economic tools like ecological compensation fees, pricing policies, attractive conditions of investment for environmental technology, market formation, and pollution levies. The People's Republic of China plans to create a pricing system that accounts for environmental costs and integrates environmental and natural resource values into the national economy's accounting system shortly. Mongolia is depending on established resource-use patterns that are strengthened by financial incentives and user-pay concepts as it attempts to transition from a top-down, "command-and-control" system to one with greater public involvement. Thailand has instituted a service charge on community wastewater treatment, subsidized capital investment in the treatment of hazardous waste and toxic chemicals, introduced a price differential between leaded and unleaded gasoline and is contemplating granting community rights to conserve forests (UNEP 2000).

Ecological Modernisation(EM) theory suggests that societies can engage in environmental protection with economic development through the adoption of green technologies and sustainable practices. The proponents argue that societies can achieve ecological sustainability and economic prosperity by integrating environmental considerations into production processes and consumption practices.

Since EM offers a suitable framework to examine the roles of social actors in the process of reaching best practice environmental outcomes, it is being used more and more in environmental policy analysis (Christoff, 1996; Spaargaren et al., 2009, Howes et al., 2010). According to Cohen (2000), EM is a word used to describe a broad range of developments in the application of science and technology to environmental issues as well as attempts to resolve competing goals between environmental responsibility and ongoing economic growth.

The environmental movement acknowledges the structural nature of environmental problems but maintains that current institutions are capable of internalizing environmental stewardship. According to Howes et al. (2010), there is a scenario in which policymakers, corporations, and members of civil society view ecological principles as essential to their operations.

Prospect theory developed by psychologists Daniel Kaheman and AmosTversky, states that individuals make decisions based on perceived gains and losses relative to a reference point rather than absolute outcomes. In this regard, it can be suggested that framing climate change in terms of potential losses such as economic costs, health impacts and loss of biodiversity can motivate individuals and policymakers to take action. This theory argues that effective communication and framing of climate change narratives are essential for mobilizing public support and political will. Underscoring the benefits of climate action, such as job creation, improved public health and enhanced resilience to extreme weather events can shift the reference point and encourage measures to mitigate emissions and adapt to climate impacts. Mitigation theories focus on strategies and interventions aimed at reducing greenhouse gas emissions to mitigate the drivers of climate change. These theories encompass an array of approaches including technological innovations, policy instruments and changes in consumption patterns. (Kahneman & Tversky, 1979)

Bernard E. Harcourt highlights in his new book 'Cooperation: A Political, Economic, and Social Theory', how liberal democracy is in crisis globally and is unable to handle urgent issues like climate change. However, cooperation democracy is an alternative. People working together may extend the ideas of participatory democracy and sustainability into every aspect of their lives, as demonstrated by the myriad instances of consumer co-ops, credit unions, labour cooperatives, insurance mutuals, NGOs, and mutual aid. Election politics is not a factor in these types of collaboration. Rather, they make use of traditional cooperative principles and practices, which include equity, solidarity, self-determination, democratic participation, and environmental sensitivity. Harcourt thereby proposes the theory of Cooperation to tackle the issues of climate change.

Pinter, T. and Conidi, M.(2023) through Indigenous People's Climate Adaptation analyses how indigenous people's climate adaptation is researched. This encompasses the climate adaptation strategies employed by indigenous communities globally. This highlights that the integration of traditional ecological knowledge with contemporary climate science has been considered in research over the past two decades. Preservation of biodiversity, sustainable water management and agricultural practices through traditional management patterns are there in this integration. The authors stress the need to involve Indigenous communities in climate policy-making to ensure that the strategies are effective and culturally appropriate. This may help in the preservation of cultural heritage and biodiversity.

Bhattarai, M. and Pant,B. (2023) reflect that Participatory Action Research (PAR) is a collaborative approach that involves community members in the research process making it suitable for sustainable development. Through the work of Sustainable Development and Participatory Action Research, they examine how PAR methodology has been applied to engage communities in addressing environmental issues. The authors conclude that PAR can lead to considerable improvements in the local practices for sustainable development and community empowerment. At the same time, PAR is not free from challenges like insufficient funds and trust issues among the stakeholders.

Through Community Action in the Anglophone Caribbean Figucroa, et, al (2023) investigate the responses of community members in the Anglophone Caribbean to health impacts due to climate change. They identify issues such as limited access to resources, lack of adequate support from the government and infrastructural constraints as the key barriers to community action. They identify strong community networks, partnerships with NGOs and academic institutions, local leadership and so on as the facilitators of community action in climate change. The authors emphasise the integration of health and livelihood in climate action.

Linstroth, T., & Bell, R. (2007) Through Local Action: The New Paradigm in Climate Change Polic*y* examine the grassroots approach to emissions reduction as a powerful tool for combating climate change. The authors argue that the massive landfills that service most urban areas are a significant source of greenhouse gases more powerful than carbon dioxide. The book uses real-life case studies to demonstrate various strategies that local governments are adopting to reduce their local greenhouse gas emissions. The authors highlight the necessity of local actions through federal policies to meet the challenges of climate change.

Climate stories from Other Countries

Ghana's government program known as the Ghana Cocoa Forest REDD+Programme (GCFRP) empowers farmers to improve their cocoa plantations. To lower the temperature on the land and boost output, citizens learn how to grow shade trees. They additionally discover how to properly prune and use other sustainable farming methods. Six million hectares of the Guinean Forest in West Africa are covered by the programme. The loss of trees and biodiversity in this area has been attributed to many forces such as illicit logging, agricultural development, and finally, global warming.

Through the promotion of a climate-smart cocoa production and landscape standard, as well as other activities and cross-cutting actions using best social and environmental practises and thorough monitoring, the GCFRP aims to reduce carbon emissions from the expansion of cocoa into forests and from other drivers. Ghana wants to address these factors to drastically cut emissions, protect its forests for future generations, and increase the income and livelihood options for forest users and farmers throughout the programme area. It also wants to make the cocoa industry climate resilient. Over the course of four years, the GCFRP is a novel and useful programme that has inspired and promoted institutional support and cooperation.

Through capital grants and the pooling of slum dwellers' savings through revolving funds for sustainable slum upgrading, the Gungano urban poor fund supports priorities

for the urban poor in Zimbabwe. It is increasingly focusing on climate adaptation, leveraging limited resources to assist urban poor in strengthening their resilience to climate change. Resolving structural disparities is the second locally led adaptation concept, and the fund offers a great illustration of it. It brought together 500 savings clubs and gave them customised funds for improving their local slums and securing land rights, addressing disparities in tenure access that often worsen vulnerability.

In addition to supporting a variety of adaptation initiatives about water, sanitation, and hygiene; livelihoods; health; housing; food security; and energy efficiency measures, notably in the context of climate-induced migration, the Climate Bridge Fund, gives local Bangladeshi NGOs direct access to climate funds. To guarantee that proposals reflect the real need and the best context-specific solutions, the fund involves communities and local government from the project development stage. Target groups include youth, women, and other marginalised groups like climate migrants.

Participatory climate action in Meenangadi Panchayat

As described by Mitchell (1997) and Mitchell (2013), participation is the process through which the community is involved in planning, decision-making, and assessment. According to Reed (2008), pragmatic participation results in better judgments while normative participation is based on the procedure and grants individuals a democratic right to participate in decision-making. Regarding participation, Rowe and Frewer (2000) described it as two-way communication in which information is exchanged through debate or negotiation, whereas Warner (1997, p. 417) proposed participation as "building consensus," in which all parties can live with the outcome. Van de Kerkhof and Huitema (2004) highlight decision-making, accountability, and group learning as the three main objectives of participation, while Lynam et al. (2007) emphasized "co-learning or co-management" as the main focus of participation.

Decentralized climate action often serves better with local communities working to cut down carbon emissions in their respective regions. This can efficiently achieve tremendous improvements with consistency and commitment. That would require a shift from top to bottom approach to the other way around.

According to the United Nations Framework Convention on Climate Change, the aftereffects of climate change-related disasters propelled the United Nations to present ideas for climate change mitigation measures, and in December 2015, world leaders set forth the Paris Climate Convention to combat climate change, reaching a consensus on tactics to reduce the increase in the average world temperature. It has been acknowledged that current socioeconomic and industrial practices need to be changed to limit atmospheric concentrations of greenhouse gases (GHGs), such as carbon dioxide, by reducing emissions from human activity. This will prevent global warming from rising above the 2°C threshold this century. (UNFCCC, 2023d)

Wayanad district in Kerala is known as a green paradise nestled among the mountains of the Western Ghats. The land circumscribes verdant valleys encompassing history and culture. It is located at a distance of 76 Km from the sea shores of Kozhikode contiguous to Mudumalai in Tamil Nadu and Bandipur in Karnataka. This forms a vast land mass for the wildlife to move about in their natural abode. (GOI, n.d.) Understanding the geographical importance of Wayand helps one

to assess it, especially from the point of view of climate change. Wayanad district stands on the southern tip of the Deccan plateau and its chief glory lies in the majestic Western Ghats which has been riddled with ridges, rugged terrain interspersed with dense forests, tangled jungles and deep valleys. According to 2001 Census data, it occupies an area of 2132 Km with a density of population at 369 people/km^2 within a population of 780,619 people. Wayanad consists of three taluks including Mananthavady, Sulthan Bathery and Vythiri with district headquarters being situated in Kalpetta municipality (Kumar, Danesh & Srinath, Pavan. (2011).

Wayanad is one of Kerala's four climate change hotspot districts, according to the State Action Plan on Climate Change (SAPCC). Its high level of sensitivity to natural disasters like floods and droughts, as well as their effects on biodiversity and human life, make it a dangerous place to live. According to the SAPCC analysis, every degree that the temperature rises in Kerala would result in a 6 per cent decrease in paddy yield. Rainfall and temperature variations would be harmful to crops that are sensitive to heat, such as cardamom, coffee, tea, and black pepper that are grown in high altitudes. Wayanad is one of the four climate regions identified by Kerala's State Action Plan on Climate Change (SAPCC). Crops that are susceptible to temperature fluctuations, such as cardamom, coffee, tea, and black pepper, are grown in the high ranges. It was estimated that fluctuations in humidity and heat stress can contribute to the genesis of novel cattle illnesses. (GOI, n.d.)

Meenangadi is a panchayat situated almost in the middle of Wayanad district, about between latitudes 110 9' and 110 13' North and East longitude is between 760 38' and 760 48' at 1022 metres above sea level. This district in the north is a portion of the Western Ghats, a World Heritage site and biodiversity hotspot that sits on the border of the Deccan plateau.

The 53.52 square kilometre panchayat is made up of plains, valleys, and rocky, mountainous areas. Fertile plains make up 20 per cent of the overall area, whereas tableland makes up more than 70 per cent. Forests occupy around 2.7 per cent (145ha) of the total area. Rainfall in a year is 221 cm. Twenty-three rivulets/streams and four minor rivers drain the entire region. The area's total farming output is around 4919 ha. Pepper, coconut, coffee, arecanut, rubber, cocoa, paddy, banana, ginger, turmeric, cassava, yam, and colocasia are the major crops grown in the panchayat. The total population of Meenangadi comes to around 34,601 with tribal communities forming a quarter of it. Statistics have proven that more than 76% of the population depends on agriculture.

Meenangadi Model launched by the Panchayat became a major initiative to achieve carbon neutrality by 2020. The project was started on June 5, 2016, in honour of World Environment Day. In the past year, the panchayat and all of its residents have made significant progress towards one of the nation's most enduring purposes thanks to a dedicated, creative, and strategic approach. (Contributor, 2017)

Representatives from the Kannur University Zoology Department visited the Panchayat at the beginning of the carbon neutral project to measure the amounts of carbon in the soil, vegetation and so on. To better plan and organise project initiatives and activities, officials of Kerala Agricultural University conducted a 20-day study to identify panchayat wards based on carbon levels.

The principles of "Carbon Neutral Grama Panchayat" include zero carbon

development, preservation of the environment, self-sufficiency in food and energy, economic well-being, and local self-government development. After determining that the primary cause of uncontrolled emissions of greenhouse gases, of which carbon dioxide is the principal gas, is the cause of temperature rise, CO2 is used as an equivalent indication in the assessment of these emission levels. (Thanal, 2016)

Achieving net zero carbon emissions is known as carbon neutrality. This is done by matching the measured quantity of carbon released into the atmosphere as a result of human activity with an equivalent amount sequestered in carbon sinks or pools. Limiting the amounts of greenhouse gases (GHGs) produced into the atmosphere by different socio-economic, developmental, and lifestyle activities through the use of biological or natural processes is essential. This will support regulation. (Thanal, 2016)

The Wayanad district is primarily agrarian with 50 per cent of its geographic area falling under plantation and other agricultural land use. This feature has to be read along with the fact that 97 per cent of the district's population is rural and therefore mostly directly dependent on agriculture for their livelihood. It demonstrates that people prefer working in agriculture on rice fields or coffee plantations where the income is fixed in terms of pay. Starting a farm is still a risky venture because of market and climatic conditions. This socio-cultural dimension of the community was one of the main reasons why it was selected for a community-based climate change adaptation and development initiative named Carbon Neutral Wayanad.

According to research by the Under 2 degree secretariat climate group, Wayanad is highly vulnerable to the adverse effects of climate change, this project became very essential for its people and environment. It is home to crops that are thermo-sensitive and vulnerable to climate change such as coffee, paddy and pepper. According to Meenangadi Grama Panchayat 2012 records, the total population of Meenangadi Panchayat is 34601 with tribal communities forming a quarter of it. Decentralised climate action with better consultation with stakeholders is a necessity for this region which is executed by this project.

Climatic Conditions:

Meenangadi is a 53.52 square kilometre region made up of plains, valleys, and rocky, mountainous areas. Because Wayanad district is located on the eastern slope of the Western Ghats, some parts of Meenangadi are under its rain shadow. Despite receiving over 2200 mm of rain annually, there are summertime water shortages in some areas of Meenangadi. Coffee is an important plantation crop in Wayanad and Meenangadi. The yield of highly thermosensitive crops like coffee is being affected by recent unanticipated changes in rainfall patterns and untimely precipitation. The maximum temperature in the region varies greatly throughout the year, from approximately 35°C in the summer (March to May) to 29.8°C in the winter (December) whereas the minimum temperature ranges from 15 to 25 degree Celsius during respective seasons.

Discussion

The demographic details suggested that most of the respondents were either unemployed, self-employed, daily wage workers or homemakers. The occupation of the community living in Meenangadi also helps to throw some light on the monthly

earnings they make which mostly remained in the bracket of twenty-five thousand and below. The educational background of people living in this region is confined to high school which is about 36 per cent of the community. There are very few people who have passed higher secondary grades representing 20 per cent of the population. While only 18 per cent of the population are graduates and even fewer are post-graduates out of a sample size of 50 respondents. This creates a general picture of the region suggesting its position in the low-income earning group. Carbon-neutral Meenangadi also focuses on providing monetary benefits to the village communities which will uplift them from their current levels of low income. Along with monetary allowances, the region has also become vegetable self-sufficient, underlining the safety net carved through food security (Survey, 2023).

One of the greatest advantages of this project has been the level of participation it has created among common villagers of this region concerning climate-friendly practices including recycling, reducing the usage of plastics and being sustainable in daily life activities. The majority of the people among whom the survey was conducted have responded positively for living a sustainable and climate-friendly life almost always. The level of penetration which this project has been able to achieve among people from different backgrounds united in this arena of thought suggests the efficiency of the project.

However, while dealing with the subject of monetary benefits and allowances, a mixed response was received. One of the many schemes involved in this project which guarantees monetary allowances is the tree banking scheme. Tree planting is similar to long-term investments. People plant trees as investments for their future generations or out of a sense of devotion. Given that they would have to wait a long time or might not be able to benefit financially from planting trees, this is not appealing to many individuals. Tree banking is a plan to receive payment in advance for a tree planted today that will give a harvest later on. The Tree Banking Scheme guarantees both liquidity for financing and monetary benefits in the form of annuities.

The two models of the tree banking scheme are banking on existing trees and annuity on newly planted saplings. Haritha Karma Sena, a team of environmentally conscious specialists with training in tree identification and cooperative bank appraisal, has been functioning well in panchayats. The Bank approves short-term loans with a minimum interest rate of two to three years based on the appraisal report. The trees ought to be 5-8 metres tall, at least 50 centimetres in circumference, and at least 10 years old. An approved list of tree species for banking would be approved by the Panchayat.

The second model has a goal of planting trees and giving them protection for at least 20 years. The Haritha Karma Sena is given authority by the Panchayat to oversee and evaluate the planting and upkeep of trees. The Panchayat will recommend an annuity and turn over the records to the Cooperative Bank after three years. The following will be the annuity:

Year 1–3: 100 Rupees per Sapling

Years 4-6: Rs. 200 per sapling

Year 7–10: 500 rupees per sapling

Year 11 and above, Rs. 1000 per tree

Even though the scheme has been implemented, it was understood from the survey

that the results were not consistent and uniform. Responses from the population elicited a mixture of inconsistencies including payment denials and negligence. Some had planted fifteen saplings while others had over fifty to seventy. Monetary allowances were supposed to be paid in instalments but most of them received just one instalment with which the scheme was later denied attention. Individual achievements resulting in almost ten thousand rupees is one of the few exceptions.

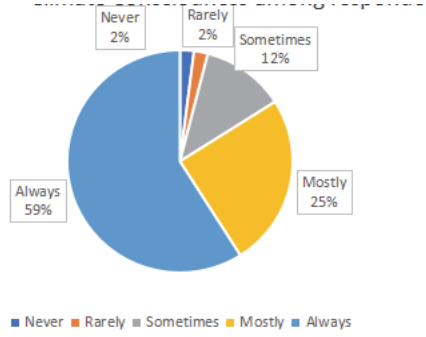
Some villagers, who had dedicated more than one hectare to the project, ended up receiving only five thousand rupees in certain cases. Despite allocating hectares of land for the scheme, some people have not even received the stipulated financial benefits. Some were denied benefits after planting the saplings stating lack of ownership details of their land. Though the scheme was launched in the year 2016 by the then Finance Minister, the scheme seems to be lacking the bureaucratic support it requires.

The average number of trees planted by each household with a minimum required area of land seems to be between thirty to fifty with a maximum being hundred. After planting saplings, these are tagged by government officials. Inconsistencies have been reported in this area also. There have been residents who lost access to benefits due to non-tagging. One point to laud the scheme would be its scope of raising employment opportunities within the Panchayat through employment programmes involved in tree planting.

In contrast to the monetary benefits, almost all participants in the survey responded positively to the social benefits they were enjoying due to the scheme. Access to clean air and water, a salubrious lifestyle, community protection, a rise in green spaces and fewer health issues are the many benefits provided by the residents due to the carbon-neutral project. Many have given names of trees which were planted through the project including Mahogany, Thanni, Maruth, Indian Gooseberry and also about the free vegetable seeds that were along with it.

The level of awareness creation that has been initiated in the society is tremendous. People are very much aware of climate change and its related effects. There is a clear understanding of the concept and all equally emphasise the need for united action and effort. Around 59 per cent of the population has responded that sustainable living is a part and parcel of their daily lives. Altogether 25 per cent of the people have responded positively towards being climate conscious in their life.

FIGURE 1: **Climate Consciousness among respondents**

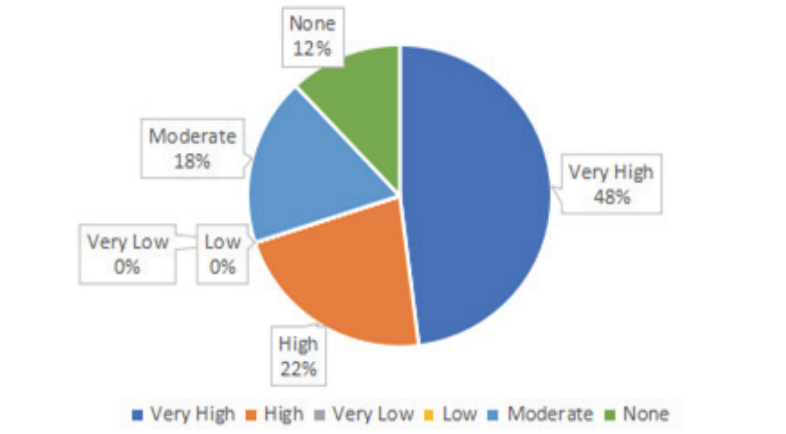


Source: Primary Data,2023

Fortunately, the majority of the respondents have underlined the fact that this region has been safe from natural disasters. There haven't been any incidents of landslides, floods or earthquakes to mention a few of the recurring natural disasters. The issue of rising temperatures was mentioned by a few of the respondents but they believe that it is a universal issue and not something specific to Wayanad. The only major issue that they have mentioned is the destruction of crops by monkeys and Indian boars. The local government has been taking many steps to prevent this destruction of cash crops which can be detrimental to farmers.

It was interesting to receive suggestions from the people of the community which could be implemented locally so as to contribute to efforts to mitigate climate change and related impacts.

FIGURE 2:**Suggestions on Mitigating Climate Change**



Source: Primary Data,2023

Most of the responses underscored the importance of installing waste management practices within their region to tackle the issue of plastics and other non-biodegradable wastes along with inculcating sustainable agricultural practices including saving resources like water. This represents 32 per cent of the community who suggested implementing both waste management practices along sustainable agricultural models. Usage of solar energy has been a repeated suggestion by 24 per cent of the participants but there hasn't been any consolidated project launched yet in this region on these lines. There are ongoing plans by the concerned government department to invest funds in solar energy but that awaits discussions and deliberations. The 50 respondents have given multiple suggestions pointing out the increased climate awareness among the population.

Other suggestions included creating more green spaces by 10% of the community and emphasis on green infrastructure but that requires efficient allocation of funds from the government with greater involvement of the private sector for better efficiency. There are suggestions for transforming energy usage from non-renewable

to renewable sources of energy with the introduction of electric vehicles and solar energy. These currently remain achievable goals which require bureaucratic support and political will.

The local government have placed great importance on conducting green literacy campaigns and awareness creation workshops to create a sense of clarity concerning the importance of carbon neutrality. This is a success as most people have a sense of better awareness and direction about climate change and global warming.

Most of the participants have been a part of the tree banking scheme which has increased their participation in other green activities. Yet lack of concerted and consistent efforts on the part of local government is disappointing. There was not much support for the people during the growth period of saplings except for two visits from the department and some got damaged due to lack of attention. Fertilizers were used by some participants along with those they were using for their major crops. Respondents were also appreciating the Panchayat's efforts in creating awareness camps regularly along with inter-departmental support including the camp launched by the Panchayat with the Excise Department of the region. The Panchayat had also created tie-ups with local plant nurseries to collect myriad fruit trees as well as cash crops to be planted.

Questions related to suggestions that can be inculcated in the public policy of the government elicited varied responses. Some focused on increasing conscious efforts to create awareness campaigns among school children while others focused on stricter rules and regulations like the Plastic Waste Ban introduced by India in the year 2021. Other points mentioned earlier including solar energy and sustainable green infrastructure were repeated with a greater focus on creating changes in public policy measures.

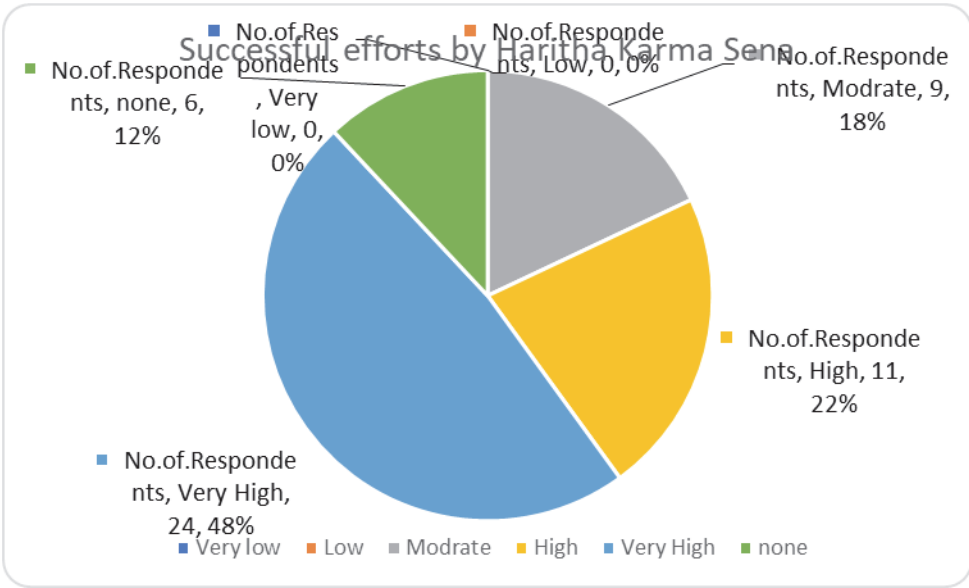
Another most important question was regarding the involvement and influence of children in creating awareness and consciousness among communities to instil greater changes to tackle the issue of climate change. It was disappointing to note that there was not much emphasis placed on schools or children as an important part of creating change in the field of climate action. There are exceptions where people have mentioned school surveys which have been conducted in Meenangadi to understand communities' preference for trees and crops which have done great benefits to the tree banking scheme. An important suggestion which was provided was that families do have a greater role in influencing children to practise climate-friendly practices. Waste management practices along with rainwater harvesting must be implemented at homes to teach children the importance of sustainable development. Anganwadis which are primary care centres for children locally have also been making efforts to distribute saplings and contribute to forestation along with planting these in public spaces and major highways.

Environment Day is celebrated in Kerala with great vigour to impart to children the art of green skills and green literacy. Most people have said that it must not be a one-day effort that happens every year on June 5, but rather a collective, daily action that can truly protect our dying environment. Organisations like the National Cadet Corps, Student Police Cadet programmes and National Service Schemes are contributing to creating a consciousness among children on environmental issues.

Kudumbashree, a poverty eradication and women empowerment programme implemented by the Government of Kerala, plays a major in the local governance of

Kerala. Still, this project has not effectively used this mechanism to promote climate-friendly actions among communities and carbon-neutral initiatives. A good suggestion given by many was to effectively and efficiently use this agency to popularise carbon-neutral projects in Wayanad, especially in those regions which have not been covered in the first phase.

FIGURE 3**:Successful Efforts by Hariths Karma Sena**



Source: Primary Data,2023

Around 48% of the total respondents, which amounts to 24 people out of the 50 respondents, appreciated the efforts of Haritha karma sena, a programme which employs women from the local regions to collect plastic wastes from residences and convert them into useful materials through proper scientific waste conversion. This programme has been consistently and methodically organized where plastic wastes segregated and separated are collected from houses every two months. A nominal fee is also charged on this which is being criticised by few especially as people living in poverty may not be able to provide the fee towards this process. However, one has to appreciate this teamwork for consistently putting out efforts to eliminate plastic waste from society.

Measures to gauge the outcome of participatory climate action

The overall amount of greenhouse gas emissions measured in tonnes of CO_2 equivalent (CO_2 Equiv), as well as the amount of carbon sequestered at different levels in Meenangadi panchayat, are estimated using scientific approaches. Activity data for this study was produced by conducting a thorough primary data collection at the household level across several sectors. The mass of greenhouse gas emissions

in an activity unit is measured by an emission factor. Using emission factors from globally recognised toolkits applicable to India, carbon emissions for waste, energy, and transportation were computed. According to estimates, the transport sector accounts for almost 45% of Meenangadi's total GHG emissions. Additionally, diesel-powered auto rickshaws account for the majority of emissions, with passenger buses and automobiles coming in second and third. The majority of Meenangadi families mostly rely on firewood for their home's culinary needs. Despite having LPG connections, the majority of homes utilise firewood as a backup source for cooking and other related needs. The burning of firewood results in direct emissions, but the use of electricity causes indirect emissions. An estimate of Meenangadi's total GHG emissions for the 2016–17 year was 33,375 tonnes CO2 equivalent.

According to the estimate, Meenangadi's transport and energy industries are the main producers of greenhouse gas emissions. Their respective contributions are nearly equal, and Meenangadi Grama Panchayat's ability to intervene in both areas is also constrained. Participatory climate action can also be measured through the success of various projects that have been instituted along with the project including solar mobile phone chargers, renewable energy projects, solar lighting, biogas plants and energy parks.

Major Findings

One of the main challenges in implementing decentralised climate action is the prevailing top-down approach of climate action plans instituted by central and state governments. Climate resilient adaptation plans at the panchayat, block and watershed levels with multiple consultations with natives, experts and elected representatives can yield better success than generic action plans. Climate impacts can be effectively addressed by engaging local groups and institutions.

Concerning specific challenges from the Carbon Neutral Meenangadi project, there are a few. One of the most important challenges is the formation of methodology. Due to the absence of a Green House Gas inventory at a sub-national level, adherence to methodology became very challenging.

There is also the issue of lack of flow of climate knowledge between governments and communities which puts regional communities at a disadvantage. While communities may be aware of the changes brought about by climate change in their immediate surroundings, their understanding of the causes and anticipated long-term consequences of these changes may be restricted. Community-based adaptation efforts can benefit from the integration of expert-generated estimates through education (Ayers & Forsyth, 2009).

One of the greatest changes witnessed through the Meenangadi Project was the success of decentralised climate action especially in a sustainable low-carbon economy. This project has effectively created environmental, social and economic benefits, both qualitative and quantitative including some training provided, megawatts of solar energy installed, greater acceptance of smart meters among residents and so on.

Conclusion

As Prospect Theory states individuals make decisions based on perceived gains and losses relative to a reference point rather than absolute outcomes. In the

particular context of Meenangadi, it can be assessed that economic incentives could motivate the unemployed to be part of climate action in a significant manner. In addition, the individuals were able to understand the environmental benefits of their actions in the later stage. This study delineating the nuances involved in the Carbon Neutral Meenangadi Project has given a deeper understanding concerning the public perception of climate change and the need to be part of climate action. Collective consciousness is seen with efforts from governmental agencies to promote ideas of climate-friendly practices. The major suggestion from the respondents was to ensure consistency and efficiency in the projects, especially in providing monetary allowances. This model if implemented with support from other actors like the private sector by mobilising the Corporate Social Responsibility (CSR) fund can help achieve climate goals and promote sustainable development.

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