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**Climate- Resilient Governance:  
Nurturing Eco- Friendly Public Services at the  
Grassroots in Kerala\***

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# **Climate- Resilient Governance: Nurturing Eco- Friendly Public Services at the Grassroots in Kerala**

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## **Abstract**

*Efforts to integrate climate resilience into public services are evident in Kerala's developmental landscape. While climate and disaster risk-informed project planning and implementation are integral components of public service delivery in the region, climate and environmental concerns are often overlooked in the realm of politics in Kerala. Local governments in Kerala play a central role in ensuring the scalability and sustainability of climate-resilient initiatives. By integrating climate considerations into decision-making processes, Kerala's public sector workforce is fostering eco-friendly attitudes, by incorporating digital public goods and e-governance in mainstreaming local service delivery and thereby contributing to broader climate action efforts. This paper critically examines the local climate-resilient activities as forms of 'public services' with emphasis on digital public goods. While the rhetoric is that there is a Kerala model of participatory local climate governance prioritize environmental concerns, the reality is far from different.*

**Keywords:** Climate –Resilient Public Services, Kerala, Local Governance, Odisha Model, Free-Rider Syndrome, Gandhi-Kumarappa Perspective, and Predatory Economy.

## **Introduction**

Kerala, a state in India, with a population exceeding 33 million, has gained global recognition for its remarkable achievements in human development indicators. Kerala is a top performer in the Human Development Index (HDI). In 2021, Kerala had an HDI of 0.752 as against the all India HDI value of 0.633 (UNDP, 2021). In the 2023 National Multidimensional Poverty Index (MPI), Kerala has the lowest poverty rate in India with a score of 0.002 per cent (National Multidimensional Poverty Index, 2023). The state has also ranked first in the last four editions of NITI Aayog's Sustainable Development Goals (SDG) Index. Kerala has also good health parameters and has been the best performer in NITI Aayog's National Health Index. Kerala has the lowest under five mortality rate (8 deaths per 1,000 live births), in the case of neonatal mortality rate, it is 4 deaths per 1000 births (NITI Aayog, 2023, Chathukulam et al., 2023). The state has a Maternal Mortality Rate (MMR) of 19 per 1,00,000 live births. On HIV incidence per 1,000 uninfected population, Kerala (0.01) is close to achieving SDG target 3.3 relating to zero HIV incidences (NITI Aayog, 2023). Kerala also has high literacy rate at 94 per cent compared to the national average of 73 per cent (Census, 2011).

Since the mid-1970s, Kerala's unique development model is characterized by robust healthcare system, decentralized institutions rooted in a participatory mode of governance along with the 'state capacity' to work in synergy with civil society with a high degree of consensus and public trust (Centre for Development Studies, 1975, Dreze and Sen, 1989, Heller, 2000, Törnquist, 2021 and Chathukulam and Tharamangalam, 2021). Kerala model has led to the birth of a

vibrant democracy due to “public action” in the state (Sen, 1999). Dreze and Sen identifies Kerala as a proactive and interventionist state that responds to the popular demands for basic social needs with help of a mobilized and politically conscious society that puts pressure on the state and holds it to account.

While Kerala is renowned for its development model and democratic decentralization, this Southern State in India is highly vulnerable to climate changes. Kerala has witnessed a series of natural calamities in the form of incessant rains, flash floods, landslides and droughts. The Great Floods of 2018 and 2019, and frequent landslides are the biggest examples in this regard. The massive landslides which took place in Wayanad district, Kerala, on July 30, 2024, which claimed the lives of more than 400 people is the latest tragic disaster that took place in the state (The Hindu Bureau, August 16, 2024 and Singh, 2024). Between June 1, 2018 and August 20, 2018, Kerala experienced the worst ever floods in the history since 1924. During this time, the state received cumulative rainfall that was 42 per cent in excess (771mm of rain) of the normal average. The heavy rains caused floods and several landslides. Moreover 37 dams across the state, resulting in a deluge. A total of 341 landslides were reported in Kerala and Idukki district alone had 143 landslides (Government of Kerala, 2019). The devastating floods and landslides affected 5.4 million people, displaced 1.4 million people and 433 people lost lives. Initial estimates by Kerala government found that total economic losses amount to Rs.31,000 crore (USD 3692.89 million) (Samuel and George, 2019). Kerala suffered huge economic losses and close to 2.6 per cent of Kerala’s Gross State Domestic Product got washed away by floods instantly. The damage to agriculture and allied sector was immense with damages around Rs.2,975 crore (USD 354.40 million) and total losses amounting to Rs. 4,180 crores (USD 497.94 million). As per the Post Disaster Needs Assessment (PDNA) methodology of the United Nations, the total damages in 2018 floods comes around Rs.10,557 crore (USD 1257.61 million) and total losses around Rs.16,163 crore. The PDNA estimates total disaster effects around Rs.26,720 crore (USD 3183.03 million), (Govt of Kerala, 2019). In August 2019, floods again ravaged Kerala, the state received rainfall of 951.44 mm as against 426.7 mm, an excess of 123 per cent (Mehrishi et al., 2022). It caused inundation in 1,030 villages and it disrupted thousands of lives and destruction of substantial amount. Again in 2019, landslides in Puthumala in Wayanad district claimed 17 lives. In 2021, heavy rains resulted in 53 deaths and in 2022, further landslides and rains caused 18 deaths and damages.

The frequent natural calamities in the state leads to serious concerns regarding the effectiveness of environmental policies and programmes adopted by Kerala governments over the years. The answer is that the governments have not paid heed to the repeated warnings by ecologists over the years to stop illegal quarrying and mining and construction of buildings along the ecologically fragile zones and districts in Kerala. In 2012, Western Ghats Ecology Experts Panel led by renowned ecologist and conservationist Madhav Gadgil in its report it identified over 13,000 sq.km, located across 123 villages in 12 of Kerala’s 14 districts as Ecologically Sensitive Areas (ESAs). Majority of the ESAs lies on Western Ghats<sup>1</sup>, which was once a renowned biodiversity hotspot in the world. The Ghats is of geological, cultural, natural and aesthetic significance and is particularly important for their endemism (Nair and Moolakkattu, 2017) The recommendations of the Gadgil Committee included indefinite moratorium on new

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<sup>1</sup> The Western Ghats comprise of a series of largely mountainous areas parallel to India’s Western Coast spread over 1,600 km stretch of land and spanning the states of Kerala, Tamil Nadu, Karnataka, Goa, Maharashtra and Gujarat.

environmental clearances for mining in Ecologically Sensitive Zones (ESZ I and ESZ 2), phasing out of mining from ESZ I within five years, phase-out of all chemical pesticides within five to eight years in ESZ 1 and ESZ 2, ban on cultivation of genetically modified crops, prohibition on creation of new special economic zones, hill stations, coal based power plants, dams, railway lines, major roads in ESZ I and ESZ II, ban on conversion of public lands to private lands, and on diversion of forest land for non-forest purposes in ESZ I and ESZ 2 areas, social audit mechanism of red and orange category industries in ESZ I and ESZ II and regulation on tourism are some among them.

However, the state regime itself was vehemently against the findings and recommendations of the Gadgil Committee and particularly worrying was the fact that the ecclesiastical community, especially Catholic Church leaders did everything in their might to manipulate the laity (majority of them were farmers) in the high range districts (Idukki and Wayanad) by spreading misinformation and lies that the implementation of the recommendations made by Gadgil need to be stopped at any cost. The major political parties in the state, the then ruling United Democratic Front (UDF)<sup>2</sup> and the then opposition led by Left Democratic Front (LDF)<sup>3</sup> also joined in the protest against Gadgil report to protect their own vested interests and in the name of appeasement politics. Religion is part of the vote bank politics not limited to Kerala, but India as a whole. It has been reported that due to “information asymmetries”, endangered by ignorance of contents discussed in the reports, misinformation campaigns spearheaded by and favouring the Church, political parties and other interest and pressure groups to mislead the settler-farmers in the ESAs, and all these resulted in the vehement protest against the recommendations (Nair and Moolakkattu, 2017).

Due to pressure from various quarters, the Kerala government was reluctant to implement the recommendations made by the Gadgil Committee. Along with Kerala, state governments in Karnataka, Tamil Nadu, Goa, Gujarat and Maharashtra also opposed the Gadgil report. The Ministry of Environment, Forests and Climate Change (MoFECC) rejected the recommendations made by the Gadgil Committee and constituted a High-Level Working Group led by eminent scientist Kasturirangan. This report declared 4,156 villages as ESA villages of which 123 were in Kerala. While Gadgil Committee recommended about 75 per cent of Western Ghats to be notified as ESAs, the Kasturirangan Committee reduced the extent of ESAs to 37 per cent (Nair and Moolakkattu, 2017). The other recommendations of the Committee include banning activities like mining, quarrying, sand mining, thermal power plants, highly polluting industries, construction of buildings spread over more than 2,000 square metre and townships spanning more than 50 hectares inside areas identified as ESAs. It also recommended that hydroelectric power projects should be based only at those places where there have been a standard ecological flow of 30 per cent. The recommendations made by the Kasturirangan panel were “far more diluted” when compared with Gadgil panel. Following a draft notification issued by the MoFECC accepting the Kasturirangan Committee recommendations on Western Ghats Conservation, the political parties and the Catholic Church opposed its implementation in the state. The governments have repeatedly underestimated the ecological devastation resulting from, mining, quarrying, and illegal construction of buildings in ecologically fragile areas.

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<sup>2</sup> Indian National Congress and its allies.

<sup>3</sup> Communist Party of India – Marxist and its allies.

The unholy nexus between politicians, quarry owners and mining lobbies is an open secret in Kerala. Bureaucratic machinery in the state also works hand in gloves with them. For instance, Cochin Minerals and Rutile Limited (CMRL), a Kerala based mining firm has been accused of bribing majority of the politicians, police, bureaucrats, and media for facilitating illegal mining of the ilmenite rich mineral that fetch high prices (Raghunath, 2024). Around 50 kilometres of coastal areas stretching between Ambalappuzha in Alappuzha district to Alappad<sup>4</sup> in Kollam have such mineral sand deposits. The local level politicians (elected functionaries of Gram Panchayats) also gives full support to quarries and mining mafias in exchange of money. In the context of crony capitalism, natural resources serve as a critical area of focus in which capitalists secure a portion of the profits by leveraging favours within a mutually established and implicitly agreed upon operational framework (Devika et al., 2022). The phenomenon of crony capitalism is deeply embedded within the local government framework in India. It is perceived as a core component of the governance model. In the past two decades, the rise of cronyism has led to a significant disconnect between local governments and the communities they serve, resulting in numerous local protests against the corrupt nexus of political leadership, bureaucracy, and local capital (Devika et al., 2022). Politicians including elected functionaries seek a share of profit from quarry owners and this rent-seeking behaviour becomes a haven to exploit nature in exchange of money.

Kerala's attempts to protect environment and its commitment to climate change are a paradox in itself. The state is vulnerable to climate change and natural disasters resulting from it. Whenever a disaster strikes there is hue and cry over the urgency to preserve the environment and afterwards everyone will go ahead with activities that upset the equilibrium of the nature. Despite a series of landslides, there is no dearth in the number of illegal mining and quarrying and unscientific constructions in ecologically fragile areas. To compensate for activities that are harmful to the environment, the government come up with eco-friendly public service delivery initiatives, climate -resilient activities and tries to position themselves as champions and saviours of the earth. In reality, the government at all levels, from top to bottom are engaged in extractivism and neo-extractivism to plunder and exploit the natural resources in the name of development and growth. Development within "growth" framework is the acceptable norm for the political regime and sustainable development framework is a mere rhetoric. Meanwhile, Kerala is in a complex situation where it cannot completely ignore the devastating consequences resulting from climate change. The government in Kerala, at state to local level, have made some attempts and initiatives to incorporate eco-friendliness into public service delivery.

## **Methodology**

The author has done extensive desk reach along with intensive field surveys in the vulnerable regions across Kerala especially Wayanad and Idukki districts. The author also had detailed focus group discussions with civil society groups, environmentalists, climate activists, elected functionaries, panchayat officials and local residents. The major limitation of this study is the absence of quantitative data/measures and it can pave the way for a future quantitative work

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<sup>4</sup> The author has done extensive field work in Alappad, a coastal village in Kollam district, Kerala. Alappad is a 22.5 km long mineral sand beach containing heavy mineral contents like ilmenite, rutile, zircon and sillimanite. The author interviewed the locals and climate activists in the region regarding the mining and they opined that Beach Wash, a mining process undertaken by the companies have resulted in high level of erosion of coastline in Alappad.

to test the arguments of the paper. This paper looks into grassroots climate-resilient governance and their role in nurturing eco-friendly public services in Kerala. The first part of the paper looks into the geography, climate and disaster profiles of Kerala. The second part looks into the climate resilient initiatives including digital public goods, citizen-centric climate resilient initiatives and their integration into public service delivery at the grassroots level. It is followed by a detailed discussion and conclusion.

## **Part I**

**This section offers brief profiles of Kerala's geography and climate along with details of disasters that have affected Kerala.**

### **a) Geographic Profile of Kerala**

Kerala is positioned between Arabian Sea in the West and the Western Ghats in the East and occupies a total landmass of 38863km<sup>2</sup>. Located at the Southernmost point of Indian Peninsula, Kerala constitutes 1.18 per cent of India's physiographic characteristics and accounts for 0.75 per cent of the South Asian region. Kerala has a coast line of 592.29 kilometres. The state has three notable physiographic regions including the eastern highlands comprising of mountainous landscapes of the Western Ghats, the central midlands comprising of hills and valleys (agricultural lands) and the western lowlands with coastal regions, backwaters, canals, rivers, canals, and estuaries and sub-sea level wetlands. In other words, Kerala's physiography is categorized into three regions: highlands, midlands and lowlands. Kerala's geography is characterized by diverse cultural and ecological landscapes, ranging from coastal lowlands dominated by paddy and coconut cultivation to the spice-rich eastern highlands. Major crops cultivated in highlands include tea, coffee, rubber and cardamom. In midlands, cashew, coconut, arecanut, cassava, banana, rice, ginger, and vegetables of different varieties are grown. In the lowlands, paddy cultivation is the most suitable one here. Kerala has 44 rivers and 41 among them flows to the Arabian sea. The state comprises of 14 districts and these districts are further organized into 78 taluks, 27 revenue divisions, 1,666 villages, 941 Panchayats, 87 Municipalities and 6 Municipal Corporations for ensuring administrative efficiency.

### **b) Climate Profile**

Kerala has predominantly a tropical monsoon climate characterized by seasonally excessive rainfall and hot summers, as per Koppen's classification. The summer season in Kerala is between March to May, the southwest monsoon from June to October, northeast monsoon from October to December and winter season from January to February. Kerala is one among the 36 meteorological sub-divisions in India for climatological purposes (Directorate of Environment and Climate Change, 2022). Kerala's geographical diversity (high ranges with cool weather and hot and humid in plains) also contributes to varying climate changes in the state. The state has a consistent pattern of westerly winds during the day and easterly winds at night. Kerala experiences high humidity levels with humidity even dropping to 60-63 per cent during hot seasons. The diurnal (day and night) temperature variation ranges from 4 to 16 per cent based on the proximity to the sea and during summer seasons the diurnal temperature range is the highest in the state. Relative humidity during the monsoon period reaches around 85 per cent. Kerala receives a high average annual rainfall compared to other Indian states, with a mean annual rainfall of 2816mm from 1871 to 2016 (Directorate of Environment and Climate Change, 2022).

### **c) Disaster Profile**

Kerala is highly vulnerable to natural disasters. Kerala State Disaster Management Authority (KSDMA) has identified 39 hazards in the state and they are categorized as naturally triggered hazards (floods, landslides, earthquakes, cyclones, lightning and coastal hazards etc) and anthropogenically triggered hazards (human- animal conflicts, human-induced forest fire). Floods are one among the major natural hazards in the state. Close to 15 per cent of the state's land area is prone to floods and in some districts in the state the proportion is as high as 50 per cent. Landslides are also a major hazard in the state. Close to 60 per cent of the landslides reported in India took place in Kerala. In other words, 2239 out of 3582 landslides in India occurred in Kerala (Anandan, 2024). Districts including Wayanad, Kozhikode, Idukki and Kottayam are among the most-landslide prone regions in Kerala. Lightning strikes is another major hazard in Kerala. As per KSDMA, between January 2010 and May 2014, there have been 110 fatalities due to lightning in Kerala. Then between 2015 and 2020, a total of 80 people died from lightning. The state also witnessed six cyclonic storms and five severe cyclonic storms between 1877 – 2005. In 2017, the Cyclone Ockhi, one of the deadliest storms to hit India's coast, also ravaged the state. The devastating Tsunami waves struck Kerala in December 2004 and it claimed 177 lives and caused severe destruction of lives and livelihoods. Droughts are also common in Kerala and it has been reported that Kerala experienced 66 droughts between 1881 and 2000. Kerala lies in the seismic Zone III (Moderate Intensity Zone). In addition, the entire Kerala is placed in Zone III of the hazard map prepared by the Government of India and the state remains highly vulnerable to natural calamities (Kumar, 2019). In 2018 floods, three-fourths of the villages in the Kerala were affected and 341 major landslides were reported in the state at that time (Centre for Migration and Inclusive Development, 2019). In 2019, the gravity and scale of landslides were much higher especially the Kavalappara landslide in the Malappuram district which resulted in the death of 75 people. And the massive landslides which took place in Wayanad district, Kerala, on July 30, 2024 was the latest one.

## **Part II**

This section offers detailed discussion on various eco-friendly public service delivery initiatives aimed at fostering the climate -resilience at the grassroots level.

### **a) Haritha Karma Sena: Local Communities Leading Climate Action and Climate Resilience**

Effective waste management is crucial in reducing environmental pollution, a core factor in the fight against climate change. Poor management of waste can create varying levels of pollution, right from land to water to air and all these have direct impact on climate change. Waste management, particularly solid waste management is a challenging problem in Kerala and officially it is treated an essential public service. Resilience of waste management is crucial in the fight against climate change. While Kerala has its own solid waste management policy since 2016, it only proved beneficial after the decentralization of solid waste management through *Haritha Karma Sena* (Green Task Force).

To address the waste management issue, in 2017 the state government launched *Haritha Karma Sena*, functioning under *Kudumbashree* Mission, to collect and segregate dry, non-

biodegradable waste from households and sends it to shredding units for recycling. At present, 35,352 *Haritha Karma Sena* members<sup>5</sup> are actively involved in the collection of solid waste in 19,489 wards across Kerala (Govt of Kerala, 2023). It is functional in all the 1,034 local governments in the state. There are 1,236 Material Collection Facilities (MCFs), 16,096 Mini MCFs and 166 Resource Recovery Facilities (RRFs) in local governments across the state (Govt of Kerala, 2023). The *Haritha Karma Sena* is designed as micro enterprise units registered with *Kudumbashree*. Each unit forms a consortium to manage their daily operations including turnover and payments.

An average of 3500 tonnes of non-biodegradable waste are collected every month and sorted and forwarded for processing through Clean Kerala Company (CKC). Private agencies handle an average of 2500 tonnes every month. The plastic waste stored in MCFs is sub-segregated and sold to partner companies for recycling or processing (shredding and bailing) in RRFs. This is sold to CKCL to be reused, particularly for road tarring. As per CKCL data, from 2016-17 up to 30 September 2023-24, the State utilised 3183.59 tonnes of plastic waste to construct roads of 5669.71 km length (Govt of Kerala, 2023). However, the quantity of garbage and legacy waste heaps in public places have resulted the efficacy deficit in the waste management in Kerala. Though officially waste management is treated as a public service, the reality is far from different, as per the evidence from the field<sup>6</sup>.

#### **b) Eco-Friendly Public Services Approach in Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)**

MGNREGS is India's flagship social protection program. It is also one of the world's largest social security programme (World Bank, 2018). The purpose of the MGNREGS is to enhance the livelihood security of people in rural areas of India by guaranteeing 100 days of wage-employment in a year to members of a rural household. Meanwhile, the works undertaken in the MGNREGS are focused on the creation of durable assets to augment water resources, land development, drought proofing, renovation of traditional water bodies, water harvesting, groundwater recharge, horticulture, irrigation works, flood-control and protection works are some among them. All these activities are closely related to climate resilience, in other words these are eco-friendly public services at the grassroots level. Among the states in India, Kerala has effectively made use of the MGNREGS to a great extent.

Meenangadi Gram Panchayat<sup>7</sup> in Wayanad district in Kerala is a good example in this regard. Meenangadi is one among the first Gram Panchayats in India to achieve the carbon-neutral tag. The eco-friendly activities undertaken through MGNREGS have helped Meenangadi to

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<sup>5</sup> The author interviewed the *Haritha Karma Sena* workers in Vaikom Municipality, Kottayam Municipality, Cochin Corporation, Thrissur Corporation, Thiruvanthapuram Corporation, Kannur Corporation between July 23, 2024 August 10, 2024.

<sup>6</sup> Between August 14,2024 and August 22, 2024, the author visited 22 Gram Panchayats across Kerala and held discussions with local citizens. A paper on *Assessing the Impact of Haritha Karma Sena in Solid Waste Management in Rural Areas in Kerala* was presented in the 5th International Kerala Padana Congress on 25 & 26 August 2024 at Kottayam by C V Balamurali, Centre for Rural Management, Kottayam, Kerala.

<sup>7</sup> The author of this paper interviewed Ms. Beena Vijayan, former President of Meenangadi Gram Panchayat on July 21 & 22, 2024. The carbon neutral -Meenangadi project began during the tenure of Ms. Vijayan. The author also interviewed the present Gram Panchayat President K E Vinayan on July 18, 2024.



achieve the carbon-neutral status. The idea to make Carbon-Neutral Meenangadi was put forward by the delegates who represented Kerala at the Paris Climate Agreement. In addition to this, the 2015 Kerala State Action Plan on Climate Change also identified Wayanad district as one of the “climate change hotspots” in the state. It is in this context, the Gram Panchayat in Wayanad was selected to implement the carbon-neutral project on a pilot basis. As part of this initiative, a Green House Gas (GHG) inventory was constructed in 2016 to estimate the total GHG emissions in Meenangadi. It found a net GHG emission of 11,412.57 tonnes of CO<sub>2</sub> equivalent in 2016-17. As a result, it was decided to reduce these emissions through eco-friendly activities and the MGNREGS was used as an instrument for accomplishing the target of reducing carbon levels in Meenangadi through greening activities. For instance, there was a programme called Tree Banking Scheme (under the MGNREGS), the Panchayat distributed nearly three lakh tree saplings at free of cost to the local residents, especially to farmers. Similarly, under the MGNREGS, bamboo saplings were planted on the river banks and road sides. Between 2017-19, the Panchayat planted about 40,00 trees to increase carbon sequestration and preserve biodiversity and eco system (Raghunath, 2023). Trees have high carbon sequestration. Studies have shown that bamboo serves as a carbon sink (Giri et al., 2015). It has been proven that social protection programmes like the MGNREGS can effectively integrate climate risk management and help households to generate and invest in climate-resilient livelihood strategies (Chathukulam and Joseph, 2023). The activities through MGNREGS has increased the green cover of Meenangadi in the last eight years and it has been estimated that the eco-friendly activities at the grassroots level have led to reduction in the carbon emitted to the atmosphere and have improved air quality in the region, as per environmental activists and residents. Apart from increasing green cover, reviving of traditional water resources in Meenangadi was also implemented under MGNREGS. While 708 water resources were revived and rejuvenated, a total of 862 ponds were dug by MGNREGS workers to provide fresh water to the locals. Thus, the MGNREGS, as an eco-friendly public service at the grassroots level has proven the potential to reduce vulnerability to climate risks and can serve as a panacea to the rampant extractivism and neo-extractivism in the name of development in Kerala and India to some extent. The MGNREGS places greater emphasis to local governments (especially Gram Sabhas/ Village Assemblies) in the decision-making process related to the type of works needs to be implemented in the MGNREGS. Since majority of the works undertaken under MGNREGS are connected with water conservation, drought mitigation and land development and all these play a crucial role in climate-resilience. The implementation of these eco-friendly initiatives requires the collaboration of various stakeholders, right from local level Panchayat functionaries, frontline workers, officers in various line departments are actively involved in this process. This shows the engagement of grassroots stakeholders in facilitating local services aimed at fostering climate resilience in Kerala and across India.

**c) Akshaya Centres in Kerala: A Digital Public Good to Deliver Eco-Friendly Public Services**

The United Nations defines digital public goods as “*goods that anyone can benefit from and are described as open-source software, open data, open artificial intelligence models, open standards and open content that adhere to privacy and other applicable laws and best practices,*” (United Nations, 2020). E-governance is a digital public good. While e-governance primarily refers to the use of information communication technologies (ICTs) in public

administration to public services and public service delivery, it also plays a crucial role in the fight against climate change, especially in building inclusive resilient societies. Kerala is one among the first states in India to revolutionize the use of ICT as a digital public good to improve the day to day governance, especially in the delivery of public services in an efficient manner. *Akshaya* centre is one such initiative. It is one of the most popular e-governance initiatives in the state. It was launched in 2002, that is way before the concept of common service centres were introduced. While *Akshaya* was launched as an ambitious economic program to provide computer education/computer literacy to at least one member in each household, today it has transformed into an effective digital public good that help the public to avail a multitude of government and private services under one roof (Anilkumar, 2017). For example, if a local resident wants to submit a ration card application, apply for a certificate from village office, online payments for utility services, Aadhaar Card/UIADI enrolment, make motor vehicle license payments, commercial e-tax filing, apply for Scheduled Caste/Scheduled Tribe scholarship applications, university fee payments, insurance payments and even to book railway tickets, they can go the nearest *Akshaya* centre and avail these services for a meagre fee. Today, *Akshaya* centres have become a one-stop service delivery gateway for all the governance and technology related services or in other words, the centres are one of the most vital public service delivery mechanisms in the state. At present, there are around 2,710 *Akshaya* e- centres in Kerala with at least two centres in each Panchayats (Praveen, 2022). It was able to register 15 lakh families in 45 days in the Comprehensive Health Insurance Agency of Kerala. It is a rare fete considering the fact that even reputed insurance firms take one year to register at least 20 lakh families (Anilkumar, 2017). It also shows the reach and networking capacity of *Akshaya* centres in Kerala. In 2019, the Kerala government began online mustering of its social welfare pension rolls. The online mustering helped the officials to weed out the ineligible beneficiaries<sup>8</sup>. Since 2011, it also offers e-district services in which online applications for 24 different government certificates have been added to its list of services. Right from revenue certificate to caste and domicile certificates for which earlier, the citizens had to go to the nearest village offices have been thus brought down to some extent. It has been reported that close to eight crore certificates have been processed through *Akshaya* centres (Praveen, 2022). Though e-government services or digital public goods could encourage the adoption of environment friendly practices and services, a detailed analysis is required to assess the impact of e-government services and digital public goods on the environment. The carbon footprint or the environmental profile of the services offered by the *Akshaya* have not been estimated or researched.

At present, there is no method that estimates the environmental impact of e-government services in the context of Kerala and such a mechanism is needed to assess an impact on the carbon neutrality goals and climate-resilience altogether. There have also been criticisms that the centres are far from being eco-friendly and accessible to citizens as they have been turned into village offices<sup>9</sup>. The village offices in Kerala have earned bad reputation for long queues, slow service time and arrogant bureaucratic culture. In the case of *Akshaya*, the major reason

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<sup>8</sup> However, recently, it was reported that 1, 458 government employees, including gazetted officers and teachers have been illegally availing themselves of social security pension (The Hindu Bureau, November 27, 2024).

<sup>9</sup> The author has visited selected *Akshaya* centers between June 3, 4, 5, 6, 7 and July 11, 12, 13 and 14 and conducted interviews with the staff working in these centers. They opined that 100 - 200 people come to the centers on a daily basis. The author also interacted with the citizens who have come to avail various services in *Akshaya* and they said long queues have been a problem, especially for senior citizens.

for long queues is the shortage of these centres. Kerala needs 4,600 *Akshaya* centres, it only has 2,761 functioning centres at present (Lal, 2023). Meanwhile, in the realm of e-governance it remains as a positive attempt as it has weeded out rent seeking culture to a large extent while traditional village offices remain the epicentres of corruption.

#### **d) Climate- Resilient Transportation Initiatives as an Eco-Friendly Public Service**

In the recent times, Kerala has shown strong commitment and investment in eco-friendly transport systems. Kerala is one among the first states in India to introduce an electronic vehicle policy way back in 2019. Emphasis and promotion of vehicles powered by Compressed Natural Gas (CNG) and electric two wheelers are indications of this. In 2024, Kerala emerged as the top performing state in terms of adoption of electric two wheelers and electric cars in India (Balachandar, 2024). The electric two-wheeler penetration in Kerala stood at 13.5 per cent in the Financial Year 2024. When it comes to the passenger vehicle segment, electronic vehicle penetration in Kerala increased from 2.3 per cent in 2023 to 5.2 per cent in 2024 (Luthra, 2024). Kerala has 6.4 per cent penetration of electronic cars. A total of 4,068 electric autorickshaws have been registered in Kerala so far (Sewa, 2024). The surge in the adoption of electronic vehicles underscore a positive shift towards cleaner, greener and sustainable modes of transportation. In the case of CNG powered vehicles, the state has a total of 9855 CNG vehicles registered in the year 2023 (Luthra, 2024).

Water Metro is another example of sustainable water transport system in Kerala. The Water Metro project is introduced in Ernakulam district in Kerala. The Water Metro project uses electronic propulsion for the boats and it has the potential to reduce GHG emissions by at least 16,500 tonnes per year (Prabhakaran, 2024). This project closely aligns with India's target of becoming carbon neutral. The Water Metro connects island communities in Kochi with the mainland through a fleet of 78 battery operated electric hybrid boats plying along 38 modern terminals and 15 routes spanning 76 kilometres. Of the 78 boats, 23 of them have the capacity to carry 100 passengers while the rest have a capacity of 50 passengers. The boats are made of lightweight and recyclable materials. It is engineered in such a way to reduce the noise pollution as well as boat induced waves that can cause erosion in river banks. The Water Metro, as a mode of eco-friendly public service has the potential to reduce road traffic, congestion and pollution in Kochi.

Kerala can learn a few lessons from Ethiopia's Climate Resilient Economy (CRGE) strategy, particularly its adoption of fuel-efficient standard vehicles. For decades, Ethiopia has experienced a succession of droughts and famines which led to severe food shortages, further aggravated by civil unrests, political instability and extreme climatic events (Gray, 2018). Today also Ethiopia, particularly Northern Ethiopia is reeling under these problems which has now turned into a humanitarian crisis (Goddard, 2024). Meanwhile, in the midst of all these adversities and challenges, Ethiopia is one of the fastest growing economies in the world and what is unique about their development trajectory is that they have adopted a 'climate – resilient economy framework'. In 2011, the Government of the Federal Democratic Republic of Ethiopia launched CRGE initiative to safeguard the nation against the detrimental impacts of climate change and to establish a green economy that supports its goal of achieving middle-income status by 2025 (United Nations, 2011). The green economy plan of Ethiopia is based on four pillars (1) improving crop and livestock production practices for higher food security

and farmer income while reducing emissions (2) protecting and re-establishing forests for their economic and ecosystem services like carbon stocks (3) expanding electricity generation from renewable sources of energy for domestic and regional markets (4) leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings (United Nations, 2011). A few notable initiatives taken by Ethiopia in this regard includes (1) adoption of fuel-efficiency standards for all vehicle types and (2) construction of an electric rail network for freight transport. Ethiopia is on its way to become the first country in the world to ban the import of petrol and diesel vehicles, representing a shift towards adoption of fuel-efficient vehicles – electric vehicles (Getachew, 2024). In 2020, Ethiopia introduced a new vehicle tax that linked the excise tax rate to engine size and age of vehicles and higher rates on fuel efficient vehicles and higher rates on fuel inefficient ones and it has led to a decrease in the share of high polluting vehicles whose CO<sub>2</sub> emission levels are above 130g/km (Tessema, 2023). While the decision is intended to stimulate the economic growth, it faces a significant challenges too as only 50 per cent of the population in Ethiopia have access to electricity.

Meanwhile, Kerala with its institutional capacity and resources can make use of the vehicles with fuel-efficient standards on a large scale when compared with Ethiopia. Lack of widespread and easily accessible charging network for electric vehicles/fuel-efficient standard vehicles is a major problem in Kerala. A robust charging infrastructure is required to provide mobility to electric vehicles in Kerala. While the question regarding scale and efficacy of Ethiopia's success in achieving climate - resilient economy needs to be reviewed, Kerala can learn an important lesson from climate-resilient economy strategy of Ethiopia especially regarding its commitment and courage to bypass conventional approach to economic development and create a green economy where economic development goals are met in a sustainable manner.

It has been argued that fuel economy standards would lead to decrease in air and noise pollution, enhance the balance of payments by lowering fossil fuel imports and reduce the overall cost of leadership. While fuel-efficient vehicles have higher initial price, the savings on fuel costs would compensate for this expense. It also improves public health along with energy conservation and environmental protection. Many developing and developed countries across the globe including China, Japan, Singapore, Indonesia, Malaysia, Philippines, Thailand and Vietnam have adopted fuel economy standards and labels to reduce fuel consumption and lower CO<sub>2</sub> emissions (Silitanga et al., 2012 and Mahila et al., 2013). The Indonesian experience proves that leadership from local governments will play an important role in accelerating the uptake of electronic vehicles (Mahalana and Yang, 2021) and this can be emulated by local governments in Kerala. Although there are strategic documents and guidelines addressing climate change mitigation, enhancing energy efficiency, promoting sustainable low -carbon development, need to adopt fuel economy standards and labels, the transportation sector in Kerala lacks a definitive framework for GHG reduction policies. The existing documents and literatures outline aspirational goals and measures. Thus, there is an urgent requirement for binding GHG reduction targets and policy frameworks to facilitate decarbonization of the transportation sector in Kerala.

#### **e) Citizen- Centric Climate Resilient Initiatives**

Since Kerala is highly vulnerable to climate change, government sponsored climate-resilient initiatives alone cannot bring drastic changes. The efforts to protect environment has to come

from within, that is each citizen in Kerala has to develop their own climate-resilient initiatives in their own areas. There are some notable examples in terms of community/citizen centric climate resilient initiatives. For instance, students of a local school in Poonjar are part of Meenachil River Protection Council (MRPC)<sup>10</sup> project. The students provide hi-tech flood alert system for the local community in the Meenachil area. The student volunteers who are part of the MRPC document the size, intensity, duration and patterns of precipitation with the help of cylindrical rain gauges installed near the school premises (Fountain, 2022). The students who have joined as volunteers are given training in reading from these cylindrical rain gauges interprets the data and sends it to the MRPC WhatsApp group. It is then combined with the data collected from cylindrical rain gauges installed over 150 locations across the Meenachil River Basin. These rain gauges have helped in the alerting the authorities to evacuate people in regions vulnerable to floods during rainy seasons. Similar citizen centric initiatives are there in Wayanad and Malappuram districts. Rain Trackers<sup>11</sup> in Malappuram is a similar initiative which focuses on community centric weather forecasting with the help of rain gauges. The amount of rainfall in each area is collected through the rain gauges and recorded through a special mobile app using GIS techniques. Due to the daily rainfall mapping, accurate information is available at each point in time regarding vulnerable regions. Based on the inputs, alerts and warnings are issued to public and the authorities.

Hume Centre for Ecology and Wildlife Biology<sup>12</sup>, a non-profit organization based in landslide prone Wayanad district have installed 150 rain gauges to measure daily rainfall in the district and around 70 thermometers to gauge temperatures in various areas in the district. This monitoring system provides local people and farmers with early warnings about extreme weather conditions like heavy rains. The Centre also provide critical predictions on the possibilities of landslides but only to government authorities, as they are the ones authorised to issue alerts to the public (Vishnuprasad, 2024). The Centre collected rainfall data from over 200 locations in Wayanad and it had even alerted the Wayanad district administration regarding the possibility of landslide in Mundakkai and surrounding areas on July 30, 2024 at 9 am. Had the authorities been vigilant, many lives could have been saved.

### **Odisha Model of Disaster Resilience**

Odisha was the first state in India to establish a disaster management authority known as Odisha State Disaster Management Authority (OSDMA). It was in the aftermath of the 1999 Super Cyclone that impacted close to 18 million individuals and resulted in 10,000 deaths and significant economic and infrastructural damages, the coastal state introduced the OSDMA (Jena and Kauome, 2023). Since 1999, Odisha has adopted an innovative approach to disaster management by placing local citizens at centre of its development initiatives as well as disaster mitigation projects. Each year, in June and November extensive community-led mock drills throughout the state, engaging various line departments, district collectors, gram panchayats, NGOs, women self-help groups and 100, 000 trained volunteers to effectively mitigate

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<sup>10</sup> The author interviewed Eby Emmanuel, General Secretary of the MRPC on July 15 and July 16, 2024. The author also interviewed the student volunteers of St Joseph's Upper Primary School in Poonjar, Kottayam District (Kerala). These students are aware of *School Strike for Climate* and *Fridays for Future* as international movement of school students. It is reflected in the documents produced by the MRPC.

<sup>11</sup> The author interviewed A Surjith, team leader of the Rain Trackers on August 6, 2024.

<sup>12</sup> The author interviewed Dr. C K Vishnudas, Director, Hume Centre for Ecology and Wildlife Biology on August 7, 2024.

disasters and oversee rescue and relief efforts (Banerjee and Mohapatra, 2023, Jena and Kaoume, 2023). Odisha also has robust disaster-resilient infrastructure and the OSDMA has built over 800 multi-purpose cyclone shelters and evacuation roads along the state's entire coastline. To protect villages in the coastal areas from the ingress of the sea, the government has built embankments and multi-hazard disaster – resilient houses (Sweta and William, 2023). Odisha is also the first state in India to have created an early warning system for disseminating critical disaster – related information to the very last mile (Jena and Kaoume, 2023). Around 1, 200 villages in Odisha's coastal district now receive cyclone and tsunami warnings through sirens and messages. The disaster - resilient infrastructure forms the bedrock of Odisha's disaster preparedness, service delivery and response (Parida et al., 2021). Kerala can learn a number of lessons in disaster resilience from the Odisha model.

### **Climate Change as a Global Public Good and the Free Rider Syndrome**

A free rider is defined as a person that reaps the benefits of a collective resource or good without contributing fair share to its provision. Here the free rider enjoys the outcomes of a group or society's efforts and resources while neglecting to bear any cost or responsibilities associated with it. The concept of free rider can be applied in the context of climate change. For instance, each nation depends on other nations' initiative to reduce emissions. Countries motivated by self-interest fail to limit their own mitigation and instead benefit from the efforts of nations who are addressing climate change. Thus free-rider problem is a major challenge in fighting climate change (Nordhaus, 2018, Leo and Singh, 2022).

In modern economic theory public goods are characterized as “non-excludable” and “non-rival” (Nordhaus, 2015, Nordhaus, 2018, Leo and Singh, 2022, Lipi et al., 2024). The public goods are accessible to everyone and the consumption of one individual does not diminish the availability for others. In this context, climate change mitigation is also an example of global public good. For instance, when Country A engages in a lot of efforts to lower its greenhouse gas emissions, it cannot prevent its neighbouring Country B from benefitting from the climate-resilient initiatives of Country A, regardless of whether Country B adopts similar measures in their own territory. The cost associated with implementing such eco-friendly policies are solely incurred by the nation which has invested in climate-resilience, such as Country A. This has led to the emergence of free-riders syndrome among and the voluntary aspects of international climate agreements has also contributed towards it (Nordhaus, 2015, Leo and Singh, 2022).

J C Kumarappa's views<sup>13</sup> on predatory economy closely aligns with the free-rider syndrome. According to Kumarappa, *“when a unit in nature benefits itself without conferring a corresponding advantage to another unit it is said to be predatory. A monkey comes into a mango grove, to the existence of which it has not contributed anything by either digging, planting or watering, but enjoys the fruits on the trees. It acts in self-interest but without a contribution. This form of economy may be less violent than the previous one, but nevertheless, it is destructive,”* (Kumarappa, 1936, pg.12).

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<sup>13</sup> The author interviewed Rev Dr. Solomon Victus, who has authored several books on Kumarappa, on January 1, 2025. Victus also agreed that free-rider problem is similar to predator economy concept of Kumarappa.

### **Part III - Discussion and Conclusion**

It was in the 1990s, the efforts to mitigate climate change got mainstreamed as an international agenda with introduction of United Nations Climate Change Conference which later came to be known as Conference of the Parties (COPs). The notable COPs include the 1997 Kyoto Protocol, 2009 Copenhagen Summit, and 2015 Paris Conference. While the 1997 Kyoto protocol initially appeared promising in addressing global warming by cutting GHG emissions in 38 industrialized countries by 5.2 per cent through a trading scheme modelled on market-based approaches, it later failed in materializing the targets. Then came the 2009 Copenhagen Accord which described climate change as one of the greatest challenges of our times and emphasized on the importance of a “strong political will” to combat climate change. However, this too failed. Meanwhile, the 2015 Paris Agreement, the UN 2030 Agenda for SDGs and Sendai Framework for Disaster Risk Reduction gave a strong boost to climate action and climate resilience particularly on a sustainable, low-carbon and resilient development. India is also a signatory in 2015 Paris Agreement, UN 2030 Agenda for SDGs and Sendai Framework for Disaster Risk Reduction. Following the Paris Agreement, the Government of Kerala introduced a carbon neutral project in Meenangadi Panchayat in Wayanad district. While Meenangadi, is on its way to become carbon-neutral, the same is not the case with the rest of Kerala. Issues concerning climate change are often overlooked in the realm of politics in Kerala. Environmental concerns hardly becomes a political issue in the state and it only has limited effect on shaping public opinion in favour of climate action, as it is far from being a sensational topic. Matters concerning environment are often relegated to the end in election manifestos of major political parties<sup>14</sup> in the state.

When a disaster strike, as in the case of the 2024 landslides in Wayanad, then the politicians will become spokespersons of climate-resilience. However, after one or two months, this rhetoric will end and it again emerges in the aftermath of another disaster. Environment protection is placed within development-centric/growth-centric paradigm. Kerala has a history of ecological devastation driven by human intervention in the name of development and business interests. To compensate for these activities, the government and concerned stakeholders indulge in various environment friendly schemes like planting tree saplings on road sides and so on. This shows the paradox on climate change much like Kerala’s development paradox.

Kerala, which is highly vulnerable to natural disasters, cannot solely rely on government sponsored climate-resilient initiatives. Each citizen in Kerala has to develop their own climate-resilient initiatives. The climate- resilient initiatives that exist in Kerala are only in a nascent stage and that too they are standalone entities which will have a limited effect on the larger climate cataclysm looming across Kerala. While Kerala have climate resilient initiatives like MGNREGS, eco-friendly governance and transport and it may help Kerala’s journey in achieving a sustainable climate in the coming years but each individual has to prioritize ways to protect their own surroundings and environment around them to secure their right to live in a sustainable eco-friendly spaces. Societal resilience is the key factor in the fight against the

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<sup>14</sup> Ahead of the 2021 State Assembly Elections, the climate change was listed as an issue in the manifestos of both the LDF and UDF. Carbon-neutral Meenangadi found a place in the LDF manifesto while UDF used the general term environment.

climate change. Kerala being a region vulnerable to adverse climate change needs to institutionalise climate resilience at the grassroots level by embedding environmental justice in its policies and programmes, through collaboration with public and private partners to unlock collective actions, and enhancing their data analytics capabilities to create a climate-inclusive society. While research on disaster risk reduction predominantly focus on the aspects of vulnerability and hazards, the importance of resilience, more particularly community resilience in restoring/rehabilitating affected societies to their pre-disaster conditions have gained significance in the recent times (Ali and George, 2021a, 2021 b, 2021 c, World Bank 2023 a). In community resilience, the emphasis is given on developing capacities/capacity development to meet social needs, foster social learning and promote participatory discussions and deliberations to generate new perspectives, values and ideas (Ali and George, 2022). Here comes the importance of community resilience index for disaster prone areas in Kerala. A 2022 study titled *Modelling a Community Resilience Index for Urban Flood Prone Areas of Kerala, India*, was conducted in 74 wards coming under the Kochi municipal corporation limits (Bhoola et al., 2024). Kochi experienced significant devastation during the Kerala floods of 2018 and the remarkable resilience of the local community in the time of crises garnered praise from all quarters. The 2022 study found that the central regions of Kochi Municipal Corporation achieved high score in community resilience index and eco-friendly public service delivery played a significant role in strengthening the community resilience. These areas are high in terms of social, infrastructural and educational factors. The least-resilient regions in Kochi have weak social and governance systems along with high population density, inadequate access to basic infrastructure, poor drainage systems and all these indicates weak service delivery standards and absence of eco-friendly service delivery. Although there are strategic documents including a Citizen Charter by Directorate of Environment and Climate Change<sup>15</sup>, Government of Kerala and guidelines addressing climate change mitigation, enhancing energy efficiency, promoting sustainable low -carbon development, need to adopt fuel economy standards and labels, Kerala lacks a definitive framework for GHG reduction policies and climate-resilience in general. The existing documents and literatures outline aspirational goals and measures. Thus, there is an urgent requirement for binding GHG reduction targets and policy frameworks to facilitate eco-friendly public service delivery in Kerala. While the advancement of e-government services could encourage the adoption of environment friendly practices and a more eco-conscious public sector workforce, a more detailed analysis is needed to determine the exact impact of e-government services on the environment. Kerala has to embrace degrowth framework rooted in the Gandhi- Kumarappa perspective. However, local citizens, policy makers, political leaders, local government functionaries, civil society groups as well as social and environmental activists are not adequately aware of the Gandhi-Kumarappa perspective for achieving climate -resilience. Efforts are equally needed to integrate climate resilience public services into a Gandhi Kumarappa perspective in Kerala's developmental landscape. Everyone favours a growth centric development and instead prefer to place climate-resilience within development-centric paradigm. A consensus based democratic approach along with an economy of permanence as advocated by Gandhi-Kumarappa is what Kerala needs to integrate climate resilience public service in all realms in its true sense.

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<sup>15</sup> See <https://envt.kerala.gov.in/1512-2/>



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