GREEN GOVERNANCE IN GREENERY STATE: EXAMINING THE POLICIES, INSTITUTIONS AND ENVIRONMENTAL INITIATIVES OF KERALA

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ABSTRACT

This paper investigates the extent of green governance by examining the policies, institutions and selected environmental initiatives of the greenery state, Kerala. Green governance refers to policies whereby people share strategies to address environmental concerns during development. One of the states in the country that offers a very distinct social and political character, Kerala is at the forefront of decentralization and community-based growth and development. The study, based mainly on secondary data sources, used simple percentages, tables, charts and trend lines to analyse and present key green governance factors and indicators. The results show that public grassroots engagement and participation are Kerala's main advantages and its main problems are the tendency towards urbanisation and industrial pollution. Suggestions are given on how to improve the green governance structures.

KEYWORDS: Green Governance, Forest Cover, Haritha Kerala Mission, Renewable Energy, Waste processing.

1. INTRODUCTION

As a tool for facilitating sustainable development, green governance, which combines the goals of ecological conservation with efficient policy processes, has recently come to the fore. In Kerala, a state culturally, socially, and naturally highly renowned, this activity has gained new importance. This has established its ground that the state has those features that make it prone to environmental problems, including floods, landslides, and coastal erosion. These misfortunes, coupled with climate alteration and inadaptable urban growth, demand environmental conservation leadership.

In many instances, Kerala's socio-economic development programme that includes and addresses developmental needs such as livelihoods, health, and education is aligned with environmental concerns. Sustaining the three above-stated objectives is, therefore, a challenge that calls for the development of new policy mixes that can help accommodate both ecological conservation and human welfare. For example, programmes in sustainable tourism, waste management, as well as renewable power indicate the state's endeavours to bring together development and environmental conservation. The provisions of traditional knowledge systems and the active involvement of communities and individuals add more strength to this model; hence, Kerala may well be a replicable model for green governance in other countries.

1.1 Green Governance in Kerala
1.1.1 Policy Frameworks
Kerala has incorporated all these national laws, such as the Environment Protection Act (1986), into state policies, mainly concentrating on biodiversity conservation and pollution control. Measures such as the Haritha Kerala Mission reveal the steady passed-down sustainability policies being practised in Kerala [1].

1.1.2 Implementation Mechanisms
Pollution control is supervised by the Kerala State Pollution Control Board, and projects are carried out through the People's Plan Campaign at the state/district levels. The described decentralization contributes to increased accountability and involvement of community members.

1.1.3 Key Environmental Projects

- **Haritha Kerala Mission**: Concerned with waste disposal, reforestation, and biodynamic agriculture.
- **Solar Energy Initiatives**: Rooftop installations are particularly high in the southern state of Kerala, which ranks high in the national hierarchy [2].
- **Disaster Management**: Frameworks of a higher level of stable control over floods and landslides.

In this backdrop, the objectives formulated for the present study are:

- Assess the condition of green governance in Kerala.
- Assess the level of compliance with the ideal policy and its efficiency.
- Suggest practical measures that may be taken to enhance governance.

2. REVIEW OF LITERATURE

Green governance draws from sustainable development, which focuses on sustainable development while seeking ways to spur growth but using environmentally friendly techniques [3]. Kerala's regional administration structure is different from that of a mainstream state and sees itself as a decentralized model that encourages participative decision-making [4]. However, the authors argue that there are weaknesses in respecting national policies at the state level [5].

Green governance is a relatively recent idea, which finds ways to incorporate sustainable development principles into environmental policies and institutions. Accordingly, Meadowcroft [3] has effectively captured the centrality of governance in determining people's ability to rise to ecological challenges by engaging in policy-making processes as well as ensuring that policies are effectively and strongly implemented [6]. It is especially important in the regions that are in the process of economic development because maintaining the balance between economic growth and ecological problems is still an issue.

The system of decentralization has received much attention, especially in Kerala, where people have been involved in participatory planning in physical development. Following Oommen [7], it is worth noting that the state People's Plan Campaign has allowed local self-governments to deliver a major blow to environmental governance. This aligns with global best practices promoting community-based sustainable development.

However, the adoption of green governance policies is not without flaws, as has been discussed below. According to Madhavan and Krishnan [5], at present, Kerala has all-round policy measures in place for sustainable waste management, but due to certain barriers like lack of funds, growth in urbanization, and industrial pollution, the actual implementation is very challenging. Such challenges are compounded by low levels of innovation in technologies used in monitoring and enforcement activities.

Implementation of environmental policies of Kerala, which include Arise Kerala and the Mitigation Measures for Natural Calamities, has been applauded due to their novelty. As mentioned by the Kerala State Planning Board [1], these measures have produced a significant positive impact on waste and forest area management in the state. Nevertheless, scholars continue to call for better public-private partnerships and improved institutional arrangements to respond to new and evolving environmental issues.

Compared to other states in India, Kerala stands out as having a high level of people's involvement and recognition of environmental management issues. It has been recommended that this is a major reason why the state can put through measures such as the adoption of renewable energy and afforestation initiatives [2]. Still, deficiencies in industrial pollution control and urban sustainable

development continue to be important issues to address.

2.1 Gap in existing research: Although Kerala has a good record of planning, public involvement, and good practices on green governance through decentralisation planning, environmental-sensitive policies, and environmental awareness programmes, such as Haritha Kerala Mission, the black spots are still visible in its model of sustainable development. The literature review has revealed that while prior research has emphasized the positive aspects of Kerala's participatory governance and policy, further discussion of the problems of industrial pollution, urban sustainability, and the inclusion of innovative technologies within the provisions of environmental monitoring is insufficient and requires exploration. Further, a lack of literature is available on achieving the prospects of PPPs in the expressions of sustainable projects or on ascertaining the status of Kerala's performance in embracing the tenets of green governance on a global platform. This research proposes to meet these gaps by assessing the state of green governance in Kerala comprehensively; reflecting on existing challenges; and suggesting measurable solutions.

3. MATERIALS & METHOD
This research work employs a descriptive-analytical method in order to find out the level of green governance in Kerala. This method includes descriptive research in which policies and environmental movements are described, and analytical research that evaluates the extent of the implementation and success.

3.1 Data Collection
a. Primary Sources: While this study mainly utilizes secondary data, information from government sources is considered secondary; hence first-order references are used to complement the study.

b. Secondary Data Sources: Key data sources include information from the Kerala State Pollution Control Board (KSPCB) that gives an understanding of pollution control and industrial compliance in the state of Kerala.

Policies aimed at state and national Government and called for instance under the Haritha Kerala Mission and Ministry of New and Renewable Energy (MNRE) to assess conformity to green governance principles. The performance of Kerala is benchmarked against other states using environmental indicators that include forest cover and reports by the Forest Survey of India while waste management reports from the CPCB.

3.2 Analytical Framework
Indicator-Based Assessment: Thus, this current study measures the degree of the environmental

impact for Kerala vis-a-vis the national average and other comparable states in the context of India based on specific environmental indicators. The key indicators include 'Renewable Energy Adoption' discusses the share of renewable energy out of Kerala's total energy portfolio vis-à-vis national means. 'Forest Cover' analyse the ratio of forest cover comparing the data from the Forest Survey of India. 'Waste Management' examines the effectiveness of waste segregation and processing, comparing information obtained with state and national reports of waste management.

Comparative Analysis: Descriptive quantitative analysis is used to compare Kerala to other Indian states as a means of showcasing its successes and problems. This means aspiring to locate and compare the types that are on top or bottom of the performance pyramid to understand where Kerala stands regarding green governance.

3.3 Statistical Tools and Techniques
The Statistical approach is one of the essential subjects in the field of data analysis and may be illustrated with the following statistical tools and techniques: Environmental data is presented in terms of averages and percentages, which are types of descriptive statistics. As a result, when it comes to presenting the findings, this work uses bar charts and tables as a way of presenting the information to the policymakers. In a trend analysis, long-term shifts in renewable energy generation rates and deforestation rates are explored over the last 10 years.

3.4. Deficiencies of the Methodology
The main disadvantage of this approach is that it uses secondary data. Six bodies of knowledge are identified to measure green governance in Kerala and serve as a robust framework for further analysis. As pointed out by some prior researchers, the data sources used may affect the availability, accuracy, and timeliness of the data collected. Also, the study does not use survey or interview questionnaires, which would augment the assessment of stakeholder opinion.

By adopting this holistic approach, the present research seeks to offer an elaborate analysis of the level and efficiency of green governance in the context of Kerala, while paving the way for viable policy prescriptions.

4. RESULTS AND DISCUSSION
This section covers the observed strengths and challenges of Kerala regarding the green governance endeavour, a comparative analysis of green governance attributes between Kerala's and national averages and between Kerala's performance and popular eco-friendly states in India.

4.1 Strengths and Challenges of Kerala

Table 1 Strengths and Challenges of Kerala regarding green governance

Strength	Challenges
Public participation	Rapid industrialisation,
Leveraging local bodies	Rapid urbanisation
Community initiatives like "Haritha Keralam"	Migrant influx pressures water, energy, and waste systems
Improved disaster preparedness post-2018 floods	Unplanned sprawl harms wetlands and increases flood risks

(Source: Secondary Data)

Table 1 reveals that Kerala's tradition and style of public participation have strengthened the state's environmental governance and its local bodies like gram Panchayat which also monitor and conserve the natural resources through state initiatives like "Haritha Keralam". The purposeful involvement of stakeholders, in this model helps to ensure that those involved are accountable and can ensure sustainability. The heading shows the latest development in response to disasters after floods occurred in 2018 the response contains strategies, preparation, early warning systems and community involvement, infrastructure development and partnership and climate change resilience. However, prospects of economic development challenges such as industrial pollution, which stems from industrialisation in Kerala whereby pollutants adversely affect the quality of air, water and soil. Evaluations from the side of the Kerala State Pollution Board have only led to regulation to which enforcement remains a problem given limited capacity and lack of compliance. This confirms the need to step up scrutiny of such programmes and adopt technologies to manage them. Kerala has undergone a rapid process of urbanisation and this has brought with it a heavy burden on the environment as well as the governance. Rural individuals moving to the cities and the expansion of cities place considerable pressure on essential resources such as water and energy as well as expand into wetlands, forests, and floodplains, which worsen floods and declines in bio-diversity. Municipal waste production has increased and the disposal of this waste has resulted in both landfilling and open dumping, polluting water and soil. The above complications are made worse by poor urban planning and growth, poor enforcement of building codes and standards, and slow implementation of sustainable solutions. To mitigate these problems, Kerala needs to adopt smart city solutions, better urban development procedures, and better infrastructures for making sustainable development of the urban structure for a sustainable future.

4.2 Comparison of Green Governance indicators Between Kerala and the Nation's average

Table 2: Comparative Environmental Indicators (2023)

Indicator	Kerala	National Average
Forest Cover (%)	52.3	21.3
Renewable Energy (%)	27.8	18.6
Waste Processing (%)	63.5	41.8

(Source: Secondary Data)

Table 2 compares Kerala's performance with the national average on three key indicators of green governance: Leading areas of specialisation are: Forest Cover, Renewable Energy, and Waste Processing.

Forest Cover (%): Kerala does substantially better than the national average, with over twice the proportion of the state covered by forests. This shows that Kerala places a lot of value on the practices of afforestation and natural ecosystem protection.

Renewable Energy (%): Kerala's findings indicate that the state has a higher percentage of renewable energy than the overall percentage for India. This could be due to the fact that the state has and supports several renewable power sources projects and investments as a way of adopting clean energy, particularly, hydropower and solar power.

Waste Processing (%): The author also pointed out that waste collected from households in Kerala is higher than that processed in the rest of the country, suggesting better management. This is in line with the structural characteristics of well-developed municipal solid waste processing systems, recycling and possibly decentralisation of waste management approaches.
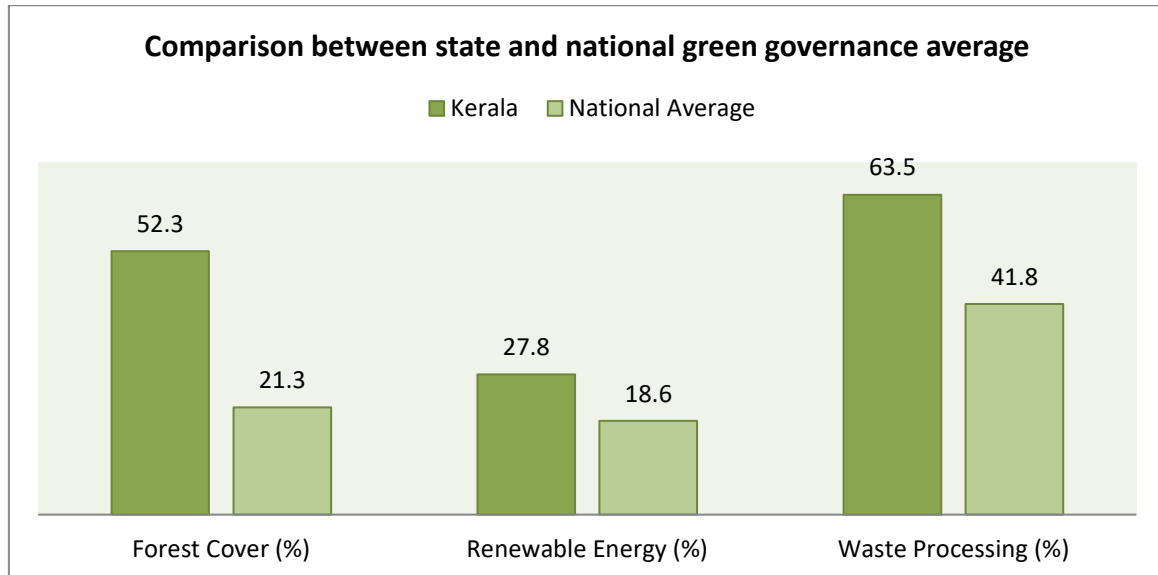
Figure 1 Comparison of Green governance parameters average score between Kerala and India

These corroborate the fact that as the state with the highest per capita income, and the best environmental management and waste management systems, Kerala is, indeed, ahead of the national average in all three areas. This success could be attributed to progressive state policies, community participation and a high level of implementation of green governance.

Table 3 Green Governance Comparison of key environmental performance indicators for Kerala and other top eco-friendly states in India

Major Indicators	Kerala	Himachal Pradesh	Rajasthan	Sikkim
Forest Cover (in %)	52.30	66.53	9.62	81.00
Renewable Energy share (in %)	27.81	21.30	30.20	17.52
Waste Processing Efficiency (in %)	63.50	55.10	45.20	70.21
Air Quality Index (average)	42.01	38.00	62.20	35.04
Green Awareness programme (P.A)	250.02	180.00	120.04	150.12

(Source: Secondary Data)

Table 3 presents a comparison of five environmental metrics—forest cover, renewable energy percentage, waste management efficiency, air quality index (AQI), and environmental education initiatives—across four Indian states: Kerala, Himachal Pradesh, Rajasthan and Sikkim. Sikkim has the maximum tree canopy density of 81.0 %, which is relatively far low in comparison to Rajasthan,

which has only 9.6% possibly thanks to the large desert region the state possesses. A state like Rajasthan which boasts of having large disparities in its electricity generation mix still leads in renewable energy at 30.2%, only slightly ahead of Kerala at 27.8% in terms of solar energy mix. Coming to waste management, Sikkim tops the chart with 70% efficiency in comparison to the overall efficiency of Rajasthan 45.2%. When it comes to the air quality, AQI is quite impressive – 35 for Sikkim and 38 for Himachal Pradesh and, therefore, higher and not that positive, namely 62, for Rajasthan differing in terms of pollution. Kerala also telecasts the maximum number of environmental awareness programs per annum which is 250 while Himachal Pradesh has 180 programs, Sikkim has 150 programs and Rajasthan has one hundred and twenty programs. Altogether, although Sikkim has some advantages in several aspects, such a state is not sufficient in establishing renewable energy programmes. Kerala exhibits both dimensions equally well while Himachal Pradesh requires significant improvement in energy and waste management even though forest cover is very good, Rajasthan has problematic due to very low vegetation cover.
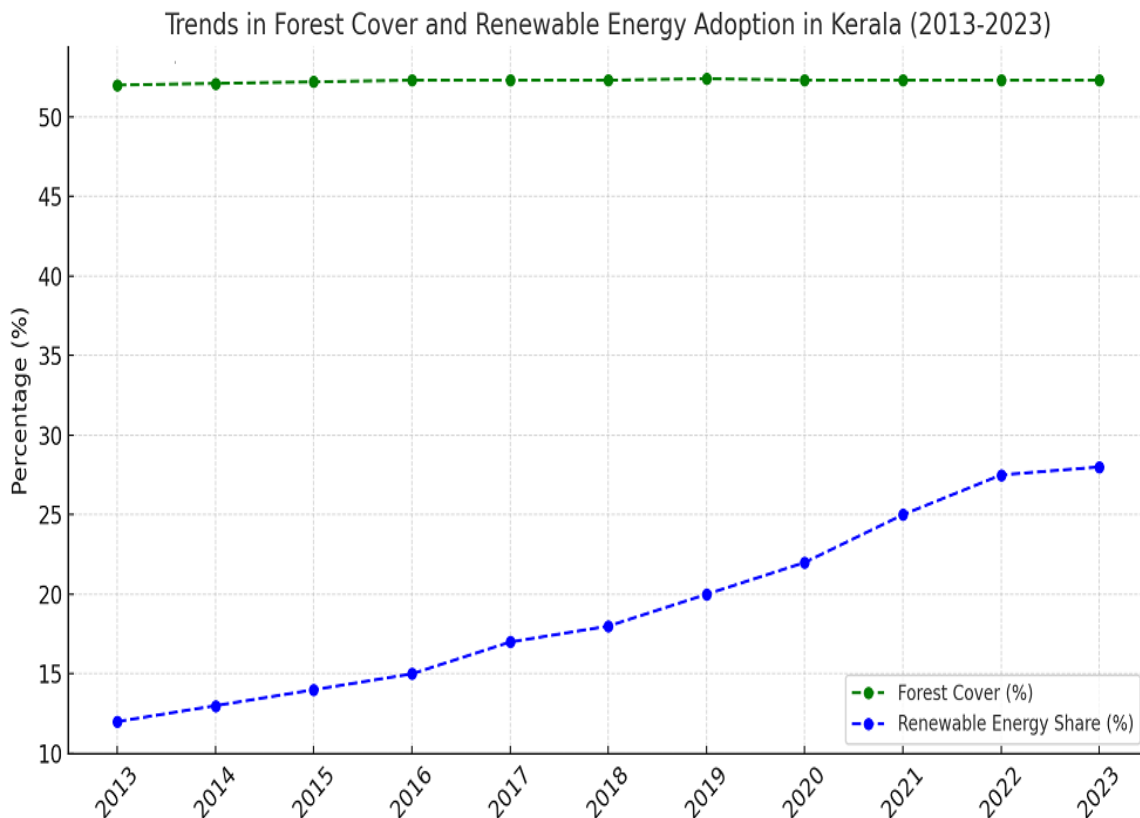

Figure 2 Trends in Forest Cover and Renewable Energy Adoption in Kerala (2013-2023)

The trend line above illustrates the changes in forest cover and renewable energy adoption in Kerala from 2013 to 2023: Forest Cover (%): These indicate that Kerala has been very much conscious about

the forest cover which has stayed somewhat around 52% of the total geographical area. Renewable Energy Share (%): Ahimsa has seen a year-on-year capitalization for renewables where they have total renewables as a percentage of their energy mix stood at about 12% in 2013 rising to about 28% in 2023. This growth is however attributed to the funds invested in solar and small hydropower projects. Such trends mark the State's continuing concern for environmental consciousness and emerging interest in the exploitation of renewable resources.

5. RECOMMENDATIONS
- Strengthen Local Bodies: These councils will act as funding agencies and receive more funding from the state in order to manage the environmental projects.
- Adopt Technology: Employ GIS along with IoT for capturing the environment data in real-time scenarios.
- Public-Private Partnerships: Promote partnerships with the private sector especially in the production of renewable energy and the management of waste.

6. CONCLUSION
The main strategies of green governance in Kerala are the provision of decentralised governance with active participation from the community and disaster management. Some of the government-developed initiatives like Haritha Kerala Mission demonstrate Kerala's concern with social and green growth and raising public consciousness. Still, some hurdles through urbanisation and industrialisation process results in environmental issues like pollution or dumping. This underlines the need to improve the present and future means of regulating our society and the physical layout of an urban built environment. To enhance the monitoring work and improve the policy, integrating with such technological platforms as GIS, IoT and big data analytics are important. To sustain the growth in the long run, the state of Kerala needs to address the question of industrialisation and urbanisation through policy innovations, best uses of technology and sustained public participation.

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