



Riding the Coastal Communities Through Responses to Climate Change – A Case Study from Thiruvananthapuram District, Kerala

Bhagyasree L¹; Dr.Sithara Balan V²

¹ Postgraduate Student, Post Graduate Department & Research Centre of Home Science

² Associate Professor, Government College for Women, Thiruvananthapuram, Kerala

ARTICLE INFO

Keyword: Climate change, Gender, Adaptation, Mitigation, Climate literacy

ABSTRACT

Climate change is a pressing global threat that disrupts ecosystems, human livelihoods, and well-being showing differences among extreme weather events. Climate change increases the vulnerability among fishing communities and coastal populations in India, especially in Kerala, whose livelihoods are heavily dependent on marine and coastal resources. In this regard, gender becomes a significant determinant of how people view, adapt to, and reduce climate hazards. This study looked at how climate literacy affects older citizens' and knowledge, attitude, practice (KAP), in a few coastal settlements in Kerala's Thiruvananthapuram District. A purposive sample of 150 respondents who were 60 years of age or older was used to gather data, which was done using a structured interview, climate literacy checklist, KAP scales. The results indicate that although both sexes had high levels of knowledge and favourable views towards climate change, their practices remained modest, with women demonstrating greater awareness and men taking more adaptive actions. While women had comparatively better levels of knowledge, men had much higher levels of climate literacy. In order to improve adaptation and mitigation tactics in vulnerable coastal areas, the insights gained from the study emphasises the necessity of gender-sensitive policies, climate literacy initiatives, and inclusive community-based interventions.

INTRODUCTION

Kerala has a dominant tropical monsoon climate with seasonally excessive rainfall and hot summer. The rising sea levels, unusual floods, severe drought and changing global radiation invoke several damage to community including damage to local infrastructures. Individuals live in coastal areas are more prone to climate changes and it is vital to implement adaptation and mitigation strategies to reduce risks factors (NCESS, 2023 & KSAPCC,2023). Individuals'

perceptions about climate change helps them for better understanding of climate change through their knowledge and beliefs (IPCC, 2021). Coping mechanisms are essential to reduce climatic risks. Understanding their attitudes helps to know how they adapt and influence decision making process and also highlights the importance of viewing vulnerabilities through a gender lens. Programmes and policies taken to reduce risks can be evaluated based on their attitudes to know whether they are effective or not (Vadakepat, 2024). Improved understanding of gender based abilities provide

Corresponding author;

Email: bhagyasreenila@gmail.com / sithara@gcwtvm.ac.in

Copyright @ Journal of Extension Systems (acspublisher.com/journals/index.php/jes)

a solid basis for understanding differentiated impacts of climate change on both genders.

Social and cultural change may have greater enduring advantages than individual behavior modification, despite the fact that it is usually more difficult to do. The way people interact with the natural environment might change as a result of changes in social values, such as changes in the importance placed on particular objectives, roles, and responsibilities. These adjustments could raise knowledge of climate change among the public as a whole and policymakers, improve perceptions of its scope and effects, and raise the possibility of proactive solutions (Weber, 2010).

Predicting the changes caused by climate change and then taking the appropriate steps to prevent or minimize the harm or seize the opportunities are the components of a climate adaptation strategy (Morya & Mehta, 2022). Depending on whether they affect an organism's physical or behavioral characteristics, adaptation strategies to climate change can be either structural or behavioral either mitigation efforts to lower the massive amount of greenhouse gases in the atmosphere or adaptation efforts to have systems and civilizations ready to withstand the effects of climate change are part of the climate change adaptation strategy (Alam & Mushtaq, 2017).

The range of adaptation strategies are influenced by several factors. Communities with stronger economies often have greater access to advanced technologies and infrastructure, which enables them to implement more intricate policies. Education is also crucial because it creates a greater understanding of climate threats and a more proactive approach to adaptation planning are linked to higher levels of education. Environmental challenges, particularly the erratic and worsening effects of climate change, complicate adaptation efforts. Communities must continuously modify their strategies to adjust to these changing conditions (Suhaeb et al., 2024).

A key element of flood mitigation is efficient coordination and communication between local communities, government organizations, and researchers. Creating strong channels of communication makes it easier to share information, enhances community involvement, and guarantees that local viewpoints are taken into account when preparing and responding to emergencies. To build flexible and strong governance frameworks that can react to changing flood hazards, hazard-specific policies must be developed and updated often (CSTEP, 2024). Both structural and non-structural flood mitigation techniques should be supported by these measures. Another essential component of contemporary flood management is the investment in affordable technologies for data gathering, analysis, and distribution. Having timely access to reliable data facilitates the development of thorough historical records, aids in decision-making, and increases the efficacy of early warning systems (Singh et al., 2023).

The gendered effects of climate change show that women and girls are disproportionately affected by extreme weather events and other climate-related issues. Disparities in how climate change impacts various genders are mostly caused by social responses to weather shocks. Women are frequently more exposed to the economic implications of these occurrences, as they are more prone to abandon agricultural pursuits and experience substantial challenges in finding alternate forms of income. These reaction patterns not only increase existing vulnerabilities, but also contribute to the deepening of gender disparities, particularly in economic stability and social resilience (Fruttero et al., 2023). The present study on "Riding the coastal communities through responses to climate change – a case study from Thiruvananthapuram, Kerala" is thus designed to explore the existing knowledge, attitude, and practice in climate change and to analyse climate literacy level and its influence on gender, with the help of the following objectives.

Objectives of the study

- 1) To understand the existing knowledge, attitude and practice about climate change perception, adaptation and mitigation strategies of the respondents.
- 2) To identify the climate change perception, adaptation and mitigation strategies of the respondents.
- 3) To analyse the gender differences in the climate literacy level among the respondents.

METHODOLOGY

Thiruvananthapuram being the capital city of Kerala has been selected as the area of the study, which has the highest coastline (78 km) among all the other coastlines of Kerala state. There are five major coastal inlets in the district, covering eighteen major coastal areas (CZMP, 2019). Among this, three coastal areas were selected using lottery method.

Survey Participants

The study comprised of one hundred and fifty respondents selected from the three coastal regions covering 50 samples each from three regions. Older adults from 60 years of age and above were selected for the study using purposive sampling

technique. The study respondents were identified with the help of the voters list made available from Thiruvananthapuram Corporation. Individuals aged from 60 years of age and above from the coastal areas of Thiruvananthapuram District were selected purposively as their life experiences and wisdom can contribute to the knowledge system. They were also included based on the assumption that they can contribute towards the climate change patterns, natural disaster and disaster preparedness furthermore, having experienced with at least one climate induced disaster during their life. Different tools were used for designing the study, which consist of an Interview Schedule, three separate scales for assessing Knowledge – Attitude – Practice, and a Climate literacy checklist. Three separate scales for Knowledge-Attitude and Practice were developed by the researcher to understand the existing knowledge, attitude and practice about climate change perception, adaptation and mitigation strategies related to the respondents. Each scale consists of thirty statements typically in five point scale which measures the agreement, importance and frequency. A climate literacy checklist was prepared to know about the climate literacy level among the respondents. This mainly attempts to explore about the awareness and disaster preparedness. The checklist comprised of 13 statements where each question is answered as Yes or No. The checklist attempts to analyses how both genders were familiar with alerts, disaster management and preparedness. It contains eleven positive statements and two negative statements. Climate literacy scores were ranging from 0 to 4 indicate a low climate literacy, 5 to 8 indicate a medium level and 9 to 13 indicate a high level of climate literacy.

Data Analysis

The collected data were statistically tabulated and analyzed using IBM SPSS Statistics Version 27 and Microsoft Excel. Findings were interpreted using tables and graphs wherever necessary.

FINDINGS AND DISCUSSION

Background Information

Due to the frequent climatic changes like cyclones, tidal floods, heavy rainfalls in the selected study area, people have lost their habitat and were depended on rented house for shelter. The data point outs that a majority of, 81.3 percent lives in their own house but 18.7 percent do not own a house. Most of the respondents (51.3 percent) live in one-storey houses followed by 25.3 percent in sheet houses and 7.3percent in thatched houses. From the observations it was found that housing conditions in the coastal communities were poor.

Access to potable and safe drinking water for daily needs is

very crucial for improvement in public health and hygiene. The majority of the respondents (86 percent) rely on the KWA pipeline (Kerala Water Authority) as their main source of drinking water and 13.3 percent who depend on bore well water. Significantly all the respondents reported about having access to private toilet facilities and electricity. In terms of access to cooking fuel, 99.3 percent use LPG gas connection while only 0.7 percent use firewood.

Kerala has been actively promoting community composting as part of decentralized solid waste management system. The Haritha Karma Sena plays as a network of collecting non-biodegradable wastes in community level is a wing of Kudumbashree. The data on household waste management practices revealed that 90 percent of respondents manage their household waste through community composting. Additionally, 24 percent of respondents reported as burning plastics wastes, 18.7 percent of the respondents discloses that both biodegradable and non- biodegradable wastes were being discarded into the sea. While 15.3 percent use landfilling as a method of waste disposal. This finding confirms considerable insights about lack of adequate waste management facilities tends to discard wastes into sea it directly contributing to water pollution.

Adaptation, Mitigation and Resilience Strategies adopted by the Coastal communities

The study revealed that air and river pollution and poor solid waste management practices were the only areas of concern identified by the samples as any sort of environmental issues. Frequent weather changes and flood are a matter of concern for the samples and they blame individuals themselves as the cause factor for the same. A whooping majority of samples are not aware of the measures to be taken for tackling the same and they do believe that it may not affect them personally much. It was interesting to note that the samples were not at all bothered about any environmental changes happening around, other than the change in the sea pressure and its impacts and they do believe that it's the role of the government to act upon. About seventy one percent of the samples reported that they have a feeling that the pattern of the weather is changing and the reason they cited for this is the air pollution due to increase in number of vehicles, deforestation and global warming. When asked about what is meant by global warming, it was interesting to note that, many do not have an idea about what exactly is that, but they know that something is happening in the layer of the earth's crust.

KAP levels on climate change

A good majority (89.3 percent) feels that it is the duty of the concerned governments to act on any issues as they also feel that there is a limitation for an individual to work. Regarding the practice, majority believes that buying energy efficient light bulbs, and switching off unnecessary lights when not in use may solve many problems. When asked about the usage of organic foods, it was shocking to know that none of the samples correlates it with an environmental issues. The results obtained interestingly emphasizes that almost all respondents (99.3 percent) have a high level of knowledge regarding climate change perception, adaptation, and mitigation strategies, when given specific statements, with only 0.7 percent falling under the medium category and none with low knowledge. In terms of attitude, a majority of 82 percent display a high level of positive attitude, while 18 percent fall under the medium level, and none have a low attitude. However, when it comes to practice, only a small proportion which was 3.3 percent show high-level of practices, while the majority which is 87.3 percent fall under medium level, and 9.3 percent fall under the low practice category.

One key reason identified for the limited adoption of mitigation practices is that, although individuals possess knowledge often gained through experience but they lack the financial means to implement it. Sustainable solutions such as solar panel installation or the use of electric vehicles were not affordable, as their income levels were insufficient to meet such expenses. Additionally, space constraints hinder the development of kitchen gardens, and agricultural practices are limited in coastal areas due to geographical and environmental challenges. These factors collectively contribute to the low level of engagement in climate change mitigation practices.

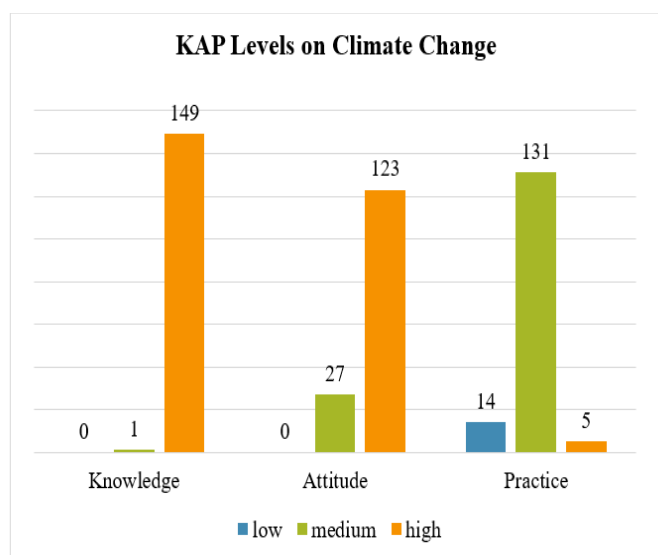


Fig No:1

Multiple bar Diagram Showing Knowledge, Attitude, and Practice Levels on Climate Change among the Respondents

The fisher's exact test shows no statistically significant difference between males and females in knowledge levels (Fisher's exact test, $p = 0.533$), suggesting that gender does not influence knowledge regarding climate change among the respondents.

The analysis of practice levels illustrates that most respondents from both genders fall into the medium category which was 87.1 percent of females and 87.5 percent of males. A small percentage reported low practice among 11.4 percent of females and 7.5 percent of males, while high-level practices were seen in only 1.4 percent of females and 5 percent of males. The Chi-square test revealed that there were no significant gender difference in practice levels ($\chi^2 = 2.046$, $p = 0.359$). The results obtained implies that although practices were moderate in both groups, there is no notable gender-based variation in the implementation of climate change strategies. From the study it was identified that the Sustainable solutions such as solar panel installation or the use of electric vehicles were not affordable, as their income levels were insufficient to meet such expenses. Additionally, space constraints hinder the development of kitchen gardens, and agricultural practices are limited in coastal areas due to geographical and environmental challenges. These factors collectively contribute to the low level of engagement in climate change mitigation practices throughout the coastal lines selected for the study.

Relationship between Knowledge, Attitude and Practice of the respondents

The data illustrates the internal consistency of the scales used in the study and it was assessed using Cronbach's Alpha.

Table No: 1

Relationship between KAP scores and scale reliability statistics

Scale	Mean	SD	Cronbach's Alpha
Knowledge	45.72	3.505	0.628
Attitude	38.65	4.088	0.691
Practice	27.99	4.268	0.588
Climate Literacy	6.92	1.763	0.575

The Knowledge scale showed a moderate reliability score of 0.628, the Attitude scale exhibited slightly higher reliability at 0.691, the Practice scale had a, Cronbach's Alpha 0.588, moderate internal consistency and the Climate Literacy scale

showed the lowest reliability at 0.575, which is still acceptable for exploratory research. The reliability values suggest that the scales used in the study demonstrate acceptable internal consistency for analysis, particularly in the context of this research.

Climate Literacy of the Respondents

The distribution of the respondents based on climate literacy reflects the level of understanding regarding knowledge about climate change effects, causes, long term and short term impacts and possible solutions. The climate literacy checklist points about basic climate knowledge including disaster alerts, changing temperatures, awareness of early warning systems, waste management and sustainable livelihood options. The checklist comprised of 13 statements where each question is answered as Yes or No. The checklist attempts to analyses how both genders were familiar with alerts, disaster management and preparedness. It contains eleven positive statements and two negative statements. Climate literacy scores were ranging from 0 to 4 indicate a low climate literacy, 5 to 8 indicate a medium level and 9 to 13 indicate a high level of climate literacy. The distribution of respondents based on climate literacy is illustrated in the figure below.

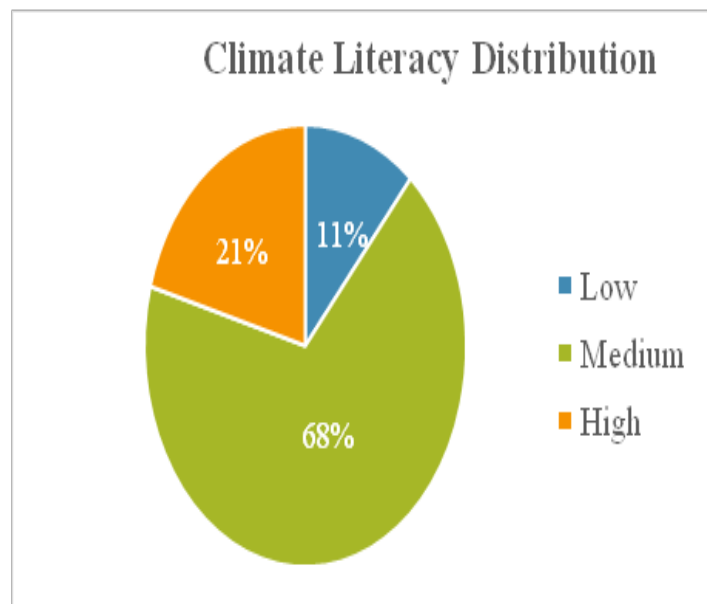


Fig. No: 2

Climate Literacy Levels Among the Respondents

The climate literacy among respondents shows that a majority of 68.0 percent possess a medium level of climate

literacy. Around 20.7 percent of respondents have a high level, while 11.3 percent fall into the low literacy category. This suggests that while most of the individuals have a moderate understanding of climate-related concepts, disaster management and preparedness.

To enhance public understanding and engagement in climate action, climate literacy campaigns and awareness programs must be conducted on a sustainable and periodic basis. These interventions should focus on educating communities about climate change, sustainable practices, and adaptive strategies. Active collaboration with Local Self-Governments (LSGs) and Non-Governmental Organizations (NGOs) is essential to ensure that these efforts are context-specific, inclusive, and effectively reach grassroots levels.

The data reveals that a higher proportion of females (17.1 percent) fall into the low literacy category compared to males which is 6.3 percent, while a greater proportion of males that is 25.0 percent fall into the high literacy category than females 15.7 percent. The Chi-square test was used to determine the gender wise distribution in which value of $\chi^2 = 5.480$ with a p-value of 0.065, which is slightly above the 0.05 threshold, indicating that the association between gender and climate literacy levels is not statistically significant, but it approaches significance and may suggest a trend worth further investigation. However, female respondents have comparatively lower levels of climate literacy than male.

Correlation analysis on KAP scales

Correlation measures the strength and directions of a relationship between two variables. It helps to understand how variables change together, potentially revealing patterns, making predictions, and informed decision making. It was used in the present study to examine the relationship between knowledge, attitude and practice regarding climate change.

Table. No: 2

	Knowledge	Attitude	Practice
Knowledge	--		
p-value			
Attitude	0.175*	--	
p-value	0.032		
Practice	0.223**	0.070	--
p-value	0.006	0.396	

*Significant at 5% level

**Significant at 1 % level

The above table shows the correlation between Knowledge, Attitude, and practice scales using Spearman's rank correlation. The data revealed a significant positive relationship between knowledge and attitude scores, with a Spearman's rho (ρ) of 0.175 and a p-value of 0.032, indicating that as climate change knowledge increases, attitude scores also tend to improve slightly. A moderate positive and statistically significant correlation was also found between knowledge and practice scores ($\rho = 0.223$, $p = 0.006$), suggesting that individuals with higher knowledge were more likely to engage in climate-related practices.

However, the correlation between attitude and practice scores was weak and not statistically significant ($\rho = 0.070$, $p = 0.396$), indicating that attitude alone may not strongly influence the adoption of climate-related practices among the respondents. The findings can be concluded as, knowledge is related to practice, as knowledge increases attitude as well as practice also tend to increase hence initiatives related to mitigating practices are being important. Practice is not increasing with an increase of attitude and doesn't relate among respondents.

A statistically significant difference was also observed in relation to fishing involvement of family members with those without such involvement shows slightly higher attitude scores. The comparison of practice scores were significantly influenced among the respondents who were employed, habit of savings, and access to smart phones exhibited notably higher levels of practices related to climate change. Furthermore, respondents without involvement in fishing related occupations scored significantly higher practices. Overall, the findings indicate that demographic and socio-economic factors such as age, marital status, occupation, family structure, education, and employment play a crucial role in shaping individual practices toward climate change adaptation and mitigation.

CONCLUSION

The study reveals that elder coastal community's awareness, attitudes, and practices regarding climate change were not significantly influenced by gender. This could be basically due to the higher levels of literacy of the state and also due to the gender sensitisation campaigns initiated by the Government of Kerala, across all spheres of the population. Despite the high level of knowledge demonstrated by both genders, there were differences in practice, with men acting more adaptively and women exhibiting greater awareness. Knowledge strongly influenced both attitude and practice, though attitude alone didn't predict practice. The findings highlight the pressing need for inclusive, climate change plans that take into account the particular difficulties encountered by coastal communities. Prolonged focused training interventions of disaster management

can be potentially lead to desirable change in attitude and practice. Adaptive ability and resilience can be increased by bolstering education, encouraging sustainable livelihoods, and providing men and women with information and resources. Policymakers and community stakeholders can promote more successful climate change adaptation and mitigation plans by addressing socioeconomic gaps and incorporating local knowledge. Thus, the study emphasises that in addition to scientific and technical solutions, social equality, community involvement, and gender-responsive strategies are necessary for sustainable climate action communities capacity to adapt and reduce climate risks will be improved by empowering them through education, awareness-raising initiatives, workshops, campaigns and participatory planning. In vulnerable coastal areas, inclusive approaches that integrate social justice, local expertise, and technical solutions are crucial for long-term climate action. A strategic behaviour change communication framework is essential for an aging population in a changing climate, or else the marginalised older adults will further be pushed to the edge of safety and survival.

REFERENCES

- Alam, G., & Mushtaq, S. (2017). Climate change perceptions and local adaptation strategies of hazard-prone rural households in Bangladesh. *Environmental Development*, 17, 52–63. <https://doi.org/10.1016/j.envdev.2015.09.008>
- CSTEP. (2024). *Sea level rise scenarios and inundation maps for selected Indian coastal cities (CSTEP-RR-2024-04)*. Center for Study of Science, Technology and Policy.
- Fruttero, A., Halim, D., Broccolini, C., Coelho, B., Gninafon, H., & Muller, N. (2023). *Gendered impacts of climate change: Evidence from weather shocks (Policy Research Working Paper No. 10442)*. World Bank Group. <https://documents.worldbank.org/en/publication/documents-reports>
- Intergovernmental Panel on Climate Change (IPCC). (2021). *Climate change 2021: The physical science basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. <https://doi.org/10.1017/9781009157896>
- Kerala State Action Plan on Climate Change 2.0 (2023–2030). (2023). *Directorate of Environment and Climate Change, Department of Environment, Government of Kerala*.
- Morya, G. P., & Mehta, J. (2022). Climate change scenario in Indian context. *Emerging Trends in Climate Change*, 1(2), 17–22.
- National Centre for Earth Science Studies (NCESS). (2023, March). *Draft report on coastal zone management plan (CZMP) for Thiruvananthapuram District – Kerala*. Department of Environment, Government of Kerala.
- Singh, C., Solomon, D., & Rao, N. (2021). How does climate change

- adaptation policy in India consider gender? An analysis of 28 state action plans. *School of Environment and Sustainability, Indian Institute for Human Settlements*.
- Suhaeb, F. W., Tamrin, S., Jumadi, & Irwan. (2024). Community adaptation strategies to climate change: Towards sustainable social development. *Migration Letters*, 21(S2), 943–953. <https://doi.org/10.33182/ml.v21iS2.3456>
- Vadakepat Menon, D. (2024). Coastal erosion and challenges to traditional fishermen in Kerala. In S. L. Saloul & B. Bailie (Eds.), *The Palgrave encyclopedia of cultural heritage and conflict*. Springer. https://doi.org/10.1007/978-3-030-77892-2_3242
- Weber, E. U. (2010). What shapes perceptions of climate change? *Wiley Interdisciplinary Reviews: Climate Change*, 1(3), 332–342. <https://doi.org/10.1002/wcc.41>