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Women and Environment: Analysis with Survey Data in the Indian Scenario

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Abstract: Gender aspects of the environment are an important issue, as women are more vulnerable as a result of this environment. This issue is very much relevant as UNICEF (United Nations Economic Commission for Europe) is committed to gender equality and aligns its work with the 2030 agenda for Sustainable Development. Instead of a few benefits, there are several disadvantages and serious health issues that women have to face due to their interaction with the environment. Women rely on healthy ecosystems to feed their families, and as such, they are heavily affected by environmental degradation and disasters like flooding, biodiversity loss and climate change. Women in rural and indigenous communities shoulder specific responsibilities to ensure the well-being of their families, such as gathering water and firewood. However, women's representation in environmental decision-making was insufficient, and their access to land and management was too limited. In this background, this study examines the gender issues in the environment in India, that is, the advantages and disadvantages faced by Indian women due to their dependency on the environment compared to their male counterparts. The interaction between women and the environment is mainly studied in three aspects, which are: air, water and forests, and the situations have been analyzed by using secondary data from different sources. Further, this study examines the state-wise performance of maintaining sanitation and using cooking fuel, as these are essential for livelihood and are mostly carried out by women. The result indicates that the economically poor and backward states of India are using traditional fuels and maintain low hygiene compared to the developed states, which may be because of huge population pressure and low income of the people. As it has been empirically observed that women face disproportionate exposure to environmental issues, including climate change, as they are traditionally considered the caregivers of the family, this issue is very much relevant in the contemporary period. Finally, it summarizes and concludes with brief policy suggestions.

Keywords: Women, Environment, Forest, Pollution, India

I. INTRODUCTION

Gender and environmental concerns have been emerging as an important issue in contemporary India, not only from the viewpoint of policymakers but also from the broader environmental aspect. As both gender equality and environmental sustainability have an important role in the 2030 Agenda, the issue of gender and environment is also important in the Sustainable Development Goals (SDGs), as stated by the United Nations. The relationship between gender and environment can be viewed from two aspects. On the one hand, the progress of the environment affects the condition of women and men differently, which actually hurts gender equality, and on the other hand, gender equality and women's empowerment can have a positive impact on the environment. Women's work

forms an important determinant of women's interaction with natural resources and the ecological process. Men and women have different roles to play in the family, community and workforce, and so their interaction with the environment is also different. It is observed that in most of the households, women are responsible for water and waste management. So the gender aspects of the environment are an important issue, as women are more vulnerable as a result of this environment. This issue is very much relevant as UNICEF (United Nations Economic Commission for Europe) is committed to gender equality and aligns its work with the 2030 agenda for Sustainable Development. Women experience differentiated effects from the environment and are severely exposed to environmental degradation due to various socioeconomic and discriminatory factors.

The gendered nature on environment was first brought up in the context of development policies. During 1985, in the Third United Nations Women's Conference, an explicit linkage was presented between sustainable development and women's empowerment as the parity towards gender equity. It was argued that women not only bear the costs of environmental problems, but also are the primary managers of the natural resources.

Globally, women act as the primary caregivers of households. So they have to manage the households as well as manage the environment. But their work was not counted, and often it was overlooked. So, in this background, the study has been motivated by the increasing cost to women due to their interaction with the environment. Therefore, a detailed gender analysis of environmental management is necessary to give recognition to women's work towards the path of gender parity.

II. LITERATURE REVIEW

Maharana et al. (2018) using primary data of 120 slum households in Kolkata region observed that the majority of the households were exposed to indoor air pollution due to kerosene, neighbour smoke and poor ventilation system in the overcrowded area, and thus they suffer from suffocation and dry cough. Hirao (2016) stated that gender is deeply related to the environment in terms of natural resources and ownership, which is not only affected by class and ethnicity but also by gender. Dankelman (2001) examined the differential effects of men and women in the use of resources and their management in relation to environmental degradation and explored the various tasks associated with women in relation to the environment for running the livelihood. In the same line Arya & Shukla (2025) observed that women particularly from marginalized communities often face higher risk due to environmental degradation which includes exposure to harmful waste and inadequate waste management system. Fernandes & Menon (1987) mentioned the dependency of tribal women in the forest economy, while Munshi et al. (2001) examined how the loss of access to forests differentially affects men and women. Leach et al. (2025) stated that women have a special relationship with the environment as it acts as managers or users, and they also argued for the policy emphasis in this context. Mandal (2022) observed that as tribal women are more directly and frequently engaged with the forests, they suffer most from deforestation. In a different way Brindha & Jayaprakash (2025) using the data from NEP scale assessed the impact of gender on environmental perspectives and focused on Ecofeminism theory.

Traditional Theories of Gender & Environment

The relationship between gender and environment has some significant dimensions and implications for ecological relations. There are various theories and approaches to studying the relationship between gender and environment. The theories are briefly discussed below:

Ecofeminism and Environment

The term Ecofeminism was first coined in 1947 when the ecological revolution was to be led by women in order to save the planet Earth. There are different perspectives on ecofeminism approaches. This perspective has two areas: cultural eco-feminism and social eco-feminism. Cultural eco-feminism identifies a powerful link between women and nature through female reproductive functions, whereas social eco-feminism argues that women are in a better position than men to speak about nature. It is argued that the natural propensity of women to protect the environment is an extension of their roles as they already care for their family, groups and communities.

Gender, Environment and Sustainable Development

This is one of the important approaches to understanding the relationship between women and the environment. This approach examines the potential of women's role as daily administrators of natural resources [Dankelman & Davidson (1989)], and the analysis was basically performed at the micro-social level. It is argued that, as women are mostly affected by the energy crisis, so they are in the best position to tackle this crisis. So in this approach, a special role of women is recognized, which is their role as 'custodians of the environment'.

Anthropological Approach of Gender and Environment

In this approach, it is argued that from the inception of society, it was the women who were responsible for gathering basic subsistence, like food, water, etc. Thus, according to this theory, women's relationship to the environment is life-giving rather than life-taking. On the contrary, the theory also stated that some women, especially from upper-class communities, may engage in some activities which exploit nature by wearing animal fur as fashion. But all over, the role of women as producers and reproducers of subsistence goods keeps them in close touch with nature.

Research Gap

The studies mentioned above mostly discuss about the harmful effects on women due to their excessive dependency on the environment, especially the tribal ones. Some literatures [Dankelman (2001), Maharana et al. (2018), Dwivedi et al. (2023), Khatun & Begum (2024)], mention about the various health issues and risks on women which arise mainly from indoor air pollution and poor sanitation facilities. To fill out this gap, this study not only address about the negative impacts on women due to their interaction with environment, but it also states about the positive benefits on women from the environment, though it is very much limited. Moreover, one of the main contribution of this study is to acknowledge the valuable participation of women in the forest management and conservation, especially who reside near the forest areas. So overcoming the research gaps, this study examines negative as well as positive effects on women due to their interaction with the environment, with a special focus on the remarkable

contribution of women in the forest management and protection.

Objective of the study

The basic objective of this paper is to examine the crucial role of women in the environment and their positive as well as negative exposure due to the harmful effects of the environment. The study tries to explore the cost and benefits that women bear due to their interaction with the environment using different survey data and existing theories. Women play a major role in food collection, production and preparation of food, which forms an important determinant of women’s interaction with natural resources and ecological processes. In this background, this study wants to explore an important issue, which is the gender aspects of the environment, as women are more vulnerable as a result of this environment.

III. MATERIALS AND METHODS

This study uses data from different secondary sources and represents it through figures and tables. The interaction between women and environment is studied here in terms of air, water and forest, the main three components of our environment. To analyze, how the women are being affected by the environment, the study mainly uses National Sample Survey (NSS) Data of several rounds and the National Family Health Survey (NFHS) data and represents it by the charts and tables.

Positive and Negative effects on women due to their interaction with the environment

The interaction between women and the environment is a largely debated issue as it is largely gender differentiated because women have been considered as the primary caregiver of the household, and so they often hold the primary responsibility for the preparation of food, collecting water and gathering fuel for cooking. The cases are highly sensitive in the rural areas due to a lack of proper fuel, and the source of water is not very hygienic. Even in some areas, they have to walk further distances and cook for longer hours. So the relationship between women and the environment creates both opportunities and also provides severe vulnerabilities to women due to deteriorating environmental qualities.

In terms of positive effects, it can be said that women are the key drivers of eco-friendly practices, such as recycling, reducing waste, purchasing organic waste and adopting renewable energy. Apart from this, women are also involved in reforestation and sustainable agriculture. Moreover, whenever they get an opportunity to access natural resources, they have utilized it in family nutrition, health and education.

Despite the positive impacts, women are severely affected by the environment, mainly due to its degradation. As women have to depend much on the environment for managing the household duties, so they are more exposed than their male counterparts. In the case of air quality, for the poorer households in both the rural and urban areas, women and children were particularly vulnerable to the indoor air pollution

resulting from cooking and heating with traditional fuels. Poor households, especially women-headed households, are often highly dependent on natural resources for survival and livelihoods. The World Health Organization (WHO) estimated that women were exposed to high levels of indoor smoke and thus suffer from chronic obstructive pulmonary disease. It is reported that over 700 million Indians still rely on polluting cooking fuels, where women are primarily responsible for daily cooking tasks and spend 3 to 5 hours daily near the toxic sources. According National Family Health Survey Data 2019-20 (NFHS 5), household air pollution significantly increased the risk of heart disease among women belonging to the age group 15-49.

The impact of lack of access to clean water and sanitation may be disproportionate on women, as women and girls require adequate water and sanitation facilities to manage menstruation hygienically and without access, they face increased risk of infections. So, the women and girls bear the disproportional burden of the deterioration of the water quality and availability in both rural and urban areas. The several NGO’s working in rural areas pointed out that women in many villages have to walk for 2 km or more to get access to their daily drinking water. In urban and semi-urban areas of the developing countries, women or girls do not have to walk long distances, but waiting in line takes time, which reduces their scheduled time for other work. According to the Human Development Report (2006), there is a clear trade-off between time spent in school and time spent collecting water. Therefore, the lack of access to clean water and sanitation was one of the major contributor of gender inequality.

Figure 1 presents scenario of the principal sources of drinking water in the rural and urban sectors of India during the period 2023. It is observed that there exist some differences in the sources of drinking water between rural and urban India. The main source of drinking water in the urban India was piped water, whereas in rural India, the main source was a hand pump or tube well. The provision of bottled water was very low in the rural India compared to the urban India during the study period. So it is quite understandable that rural women were more exposed as they have to give more physical effort to arrange the drinking water for their family.

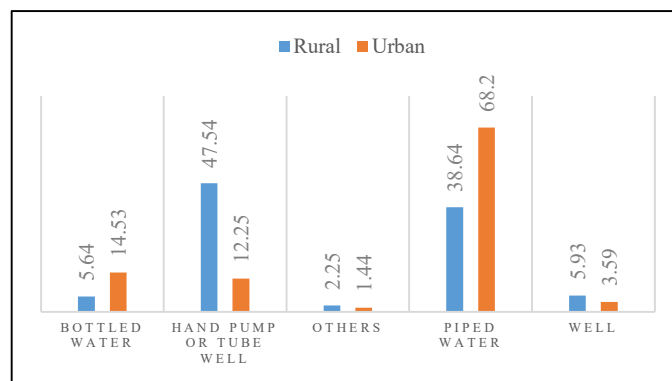


Figure 1: Principal Source of Drinking Water During 2023

Source: Comprehensive Annual Modular Survey, NSS 79th round 2022-23

Figure 2 presents the progress in the source of drinking water separately in rural and urban India between the periods 1983 and 2023. It is observed that the use of wells as the primary source of drinking water had declined in the rural India over the period, whereas the use of hand pumps or tube wells has increased. On the contrary, it is found that the urban India was basically dependent on the piped water from the very early periods, and from 2018 onwards, the bottled water also served as one of the major sources of drinking water in the urban & sub-urban parts of India. So, this analysis also clears the deprived condition of rural women, as they are more deprived than their urban counterparts in terms of accessing drinking water from proper sources.

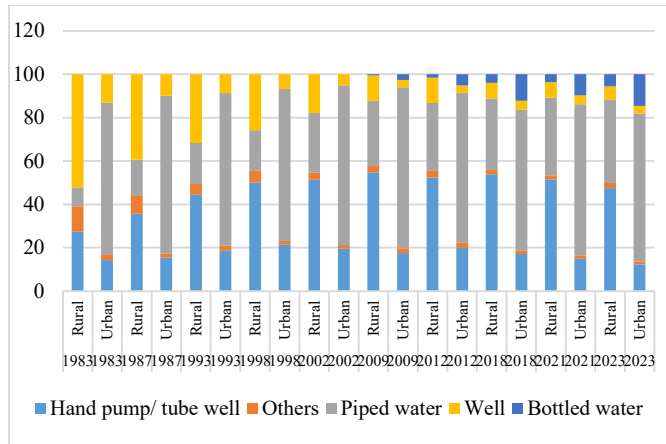


Figure 2: Progress on Drinking Water by Sources between the periods 1983-2023

Source: National Sample Survey Rounds 38, 42, 49, 54, 58, 65, 69, 76, 78 and 79, National Statistical Office

Note: Piped water includes piped water into the dwelling, piped water to the yard/plot, piped water from a neighbour and public tap/standpipe. Well includes protected and unprotected wells. Others include tankers, rivers etc.

Table 1 presents the state-wise distribution of households using improved sanitation facilities and using clean fuel for cooking. It is observed that maximum households from Assam, Bihar, Rajasthan, Odisha, Uttar Pradesh, West Bengal, Lakshadweep, and Jammu and Kashmir do not use clean fuels for cooking, as their share was comparatively lower, as depicted by Table 1. This scenario may be justified by the socio-economic conditions of the state, as due to the huge employment and mass poverty in these states, many households cannot afford to use clean fuels, especially in the rural areas, which directly impacts the women as they bear the primary responsibility of cooking in the family. In case of sanitation facility, the condition of Bihar, Odisha, Jharkhand, Ladakh were relatively poor which may infer the backward condition of these states whereas the performance of Mizoram, Puducherry, Sikkim, Tamil Nadu, Goa, Delhi were relatively better in both of these issues, which may be due to their improved socio-economic condition and low population which benefit them in access to these facilities.

TABLE 1
State-wise Analysis of the households using improved sanitation facilities and using clean fuel for cooking

States/UTs	Improved sanitation facility (2 %)	Using clean fuel for cooking (3 %)
India	70.17	58.62
Andaman & Nicobar Islands	87.97	79.77
Andhra Pradesh	77.26	83.62
Arunachal Pradesh	82.88	53.19
Assam	68.55	42.13
Bihar	49.40	37.79
Chandigarh	84.98	95.81
Chhattisgarh	76.76	33.00
Dadra and Nagar Haveli & Daman and Diu	65.76	79.94
Goa	87.92	96.5
Gujarat	74.02	66.85
Haryana	85.03	59.51
Himachal Pradesh	81.75	51.73
Jammu & Kashmir	75.73	69.19
Jharkhand	56.65	31.89
Karnataka	74.78	79.73
Kerala	98.71	72.07
Ladakh	42.32	76.26
Lakshadweep	99.8	59.43
Madhya Pradesh	65.07	40.05
Maharashtra	72.02	79.72
Manipur	64.85	70.43
Meghalaya	82.88	33.68
Mizoram	95.33	83.77
Nagaland	87.72	43.00
NCT of Delhi	81.12	98.94
Odisha	60.47	34.74
Puducherry	84.93	92.34
Punjab	86.63	76.66
Rajasthan	71.07	41.38
Sikkim	87.26	78.40
Tamil Nadu	72.62	82.87
Telangana	76.24	91.76
Tripura	73.57	45.34
Uttar Pradesh	68.75	49.52
Uttarakhand	78.75	59.17
West Bengal	68.03	40.22

Source: NFHS 5 Data

Forest and Women

There is a deep interlinkage between women and the forest. According to the estimate of the World Bank, around 90 percent of the poorest households depend substantially on forests for their livelihoods. Women in forest-dependent communities not only collect subsistence and market goods from forests but also derive paid employment. [Padhi & Patel (2021)]. Women gather unpaid fuel wood and manage non-timber products critical for family income. According to a report by the United Nations (2011), 275 million villagers depend heavily on forests for their livelihoods. In addition to the firewood, the poor women also collect non-timber forest products such as fodder, grasses and different raw materials like bamboo, canes, leaves, gums, waxes, etc., and also many forms of food line nuts, honey, wild fruits, etc. So, it is clear that poverty itself forces a woman to become dependent on the forest for many issues. Nguyen & Tran (2018) stated that the poorer households depend on the forest not only for their livelihoods, but also for their income. This great dependency on the forest among the poor tribal people also has a negative effect. The excessive use of forests by the poor women actually leads to deforestation, which not only affect environment but also affected themselves. Zeb (2019) mentioned that local livelihoods put a lot of pressure on forests, which actually leads to deforestation and forest degradation. And due to this degradation of forests, poor and tribal households are unable to collect forest products from nearby forests, and so they have to walk far miles to collect wood and other items for their livelihoods. According to the report 'Women's Right to Forest Space and Resources' (2011) by the United Nations, the first victims of any environmental degradation are the women among the poor, as the fuel wood crisis, as a result of deforestation, forces the village women to travel for miles in search of wood. In this context, we can mention the Indian National Forest Policy (1988), which rightly emphasizes the role of women in conservation and sustainable management of forests.

The figure 3 shows the involvement of men and women in non-timber forest products in West Bengal. It is observed that the share of women was higher in each of the activities, like-gathering, processing, marketing and consumption. Notably, the processing of non-timber forest products was entirely dominated by the female, which signifies a huge burden on them. So, while men do more laborious work, women were concentrated more on collection, fodder and fuel wood. [Saxena (2011)].

It is noted that women make up roughly 50 percent of forest users globally, which brings unique knowledge and a vital role in forest management. A worldwide scenario shows that women serve as the bridge between ecology and community, which ensures that forests continue to generate life for the next generations. According to Biland et al. (2021) women and children are the main labourers of forest income, and women can also empower themselves by local handicrafts or other small home based business.

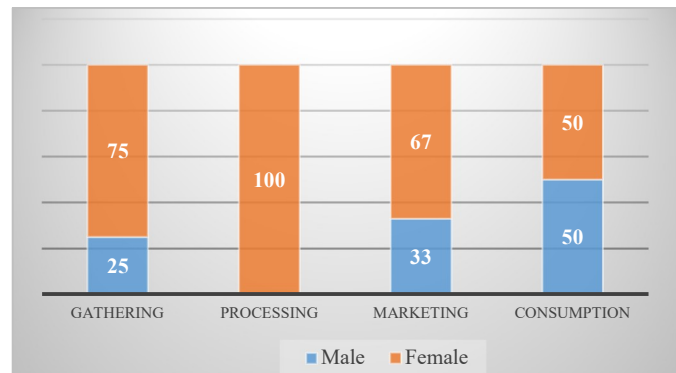


Figure 3: Activities related to non-timber forest products

Source: Sarkar & Das (2002)

Role of Women in Forest Management

Women play a crucial role in forest management as primary users, managers of non-timber products and conservationists. They are also responsible for protecting the local forest and conserving the trees from fire and illegal logging. Especially, the role of tribal women is notable as they are blessed with diverse natural resources, and they also have the traditional knowledge of practising the forest-based livelihoods. A report by KumudDubey (2024) stated that tribal women from Panna, Chitrakoot and Sonbhadra were the primary managers for the conservation of Mahua tress many of which have been destroyed due to forest fires. The report 'Women Involvement in Forest Management' (2021) clearly states that, as women usually spend more time in forests, they have a huge knowledge which helps them to identify a wide range of plant species and usable plant parts.) The traditional knowledge of women regarding forestry has provided food security and sustainable farming [Rawat& Chandra (2015)]. But, despite these positive arguments, women have a very limited role regarding the decision making in forest management, and they often face numerous barriers and challenges due to the patriarchal thought of society, due to their heavy burden in the household work, combined with the limited mobility to move outside and restricted public speaking. So, the participation of women needs to be improved for the greater success of Joint Forest Management by the line of increasing awareness among women through constant and sustained dialogue.

Climate Change and its effect on women

The climate crisis affects everyone, but its impact is deeply unequal as women and girls face disproportionate health risks, safety threats and livelihood opportunities. The lack of assets coupled with women's higher likelihood to engage in informal employment, greatly reduces women's capacity to cope with the effects of climate change and other crises. The Gender indicates that by 2050, climate change may push up to 158 million more women and girls into poverty (16 million more than the total number of men and boys. A2025 UN Spotlight brief finds that climate change is intensifying the social and economic stresses that are fueling increased levels of violence against women and girls. According to the report 'Women, Gender Equality and Climate Change' by the United Nations,

women are more vulnerable to the effects of climate change as they constitute the majority of the world's poor and depend mainly on forests and natural resources for their livelihoods. Women are more susceptible to extreme heat with higher mortality rates compared to men during heat waves. Climate change also impacts pregnancy with increased risk of pregnancy and neo natal issue. [Persson et al. (2025)]. A report by Centre for Strategic & International Studies (2024) states that rural women in India have a disproportionate crisis on climate change as they are often responsible for household task and so they face heightened vulnerability to these environmental conditions. Climate change also effect India's agricultural sector of India where women constitute a major part due to the gender assigned norms like- collection of water and natural resources and burden of household activities which actually reduced their resilience to climate change disasters. [Sukumar (2025)]. An Observe Research Foundation Report (2022) states that women are severely affected by the climate change in India, especially in the rural sector as they are mainly responsible for securing food, water and fuel for their households and suffer from vision loss, skin infections, loss of appetite and breathing problems.

IV. CONCLUSION

This paper examines the gender effect on the environment through different issues. It explores the extensive dependency of tribal and poor rural women on forests and the environment, and its positive and negative effects. The analysis reveals that the interaction between women and the environment benefits the women by reforestation and sustainable agriculture, whereas they are severely exposed to indoor air pollution due to the excessive use of traditional fuels, which they collect from the environment and a lack of access to proper sanitation, hygiene and water quality. The state-wise analysis states that the relatively backward states like Bihar, Jharkhand, Odisha, Rajasthan, and West Bengal do not maintain proper hygiene, and they also lack sanitation facilities in the households, which may be due to the huge population, which increases the poverty in these states. It is observed that the condition of Bihar was the worst among all other states in terms of fuel use and sanitation facilities according to the survey data of 2019-20. There is also a deep interdependency between the forest and women, especially among the tribal women who not only collect the essential items from the forests for their livelihoods but also derive paid employment from them. But, this excessive dependency of tribal and poor women on forests actually leads to the destruction of the forests, which itself creates a problem for them as they have to walk far for the collection of wood and other things for their families. So, this situation actually creates a paradox where the excessive poverty forces the women to get dependent on forests, and this much dependency is actually responsible for the destruction of the forests. The women also play a significant role in forest management by using their traditional forest-based knowledge to conserve and protect different plant species. Finally, this study addresses the adverse effects on women due to the change in the climate, as stated by different survey reports.

The policy suggestions can be stated as increasing the awareness and sharing the household responsibilities with the other members of the households which may reduce the excessive dependency of women in the environment and thus reduce their health exposure. Moreover, women can devote this time on forest management and conservation and can actively participate in the Joint Forest Management and contribute their valuable knowledge to the growth of different plants and conservation of the forests. Moreover, supply of piped water should be increased in the rural areas so it can reduce the burden of women for collecting water from far areas along with improved sanitation and cleaner fuels. So, the policy suggestions are mainly to increase the household benefit for women along with the proper implementation of piped water, maintaining proper hygiene and sanitation inside the households and using cleaner fuels, which actually reduce the health risk of women.

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