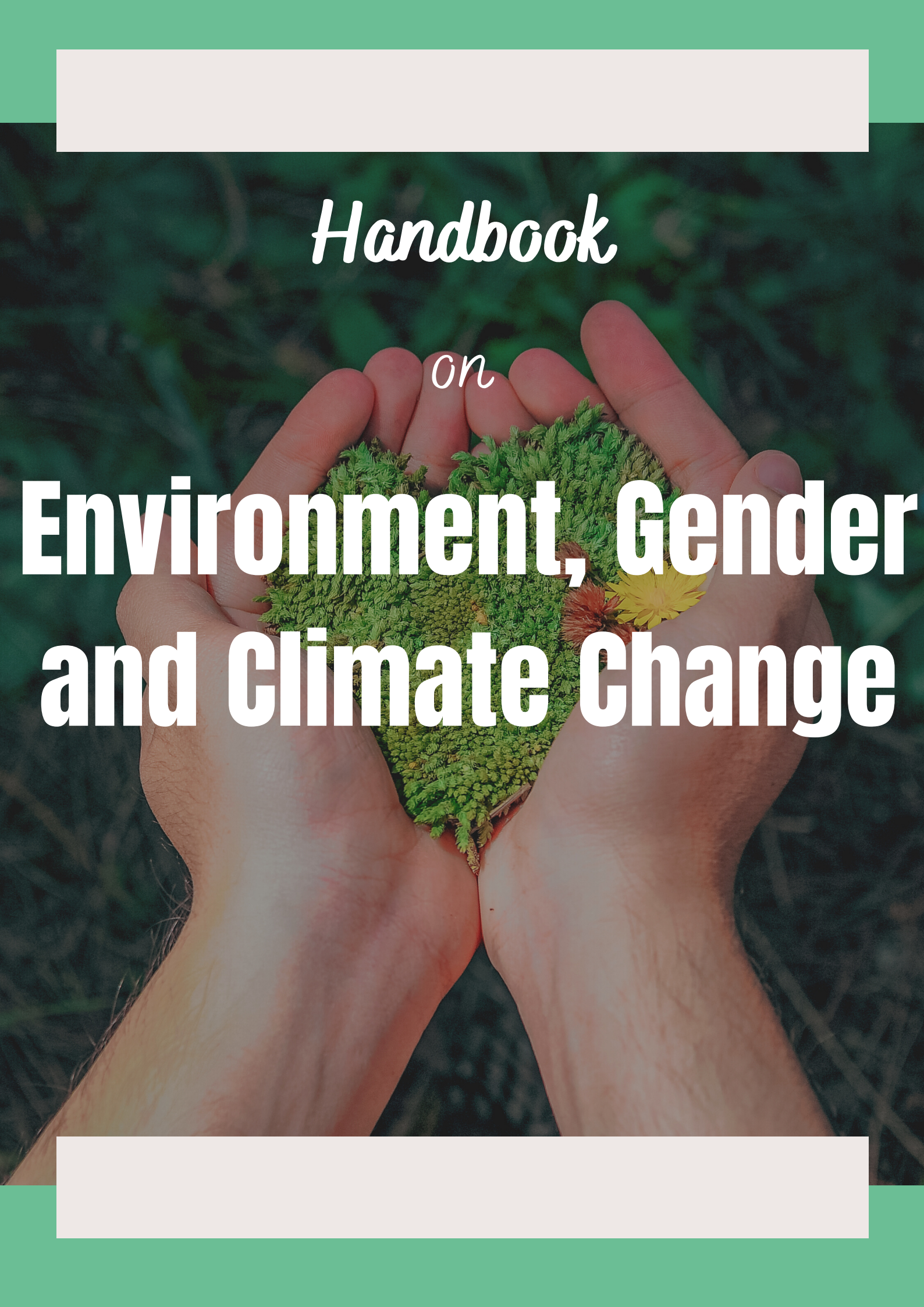


The background of the entire page is a photograph of a pair of hands cupping a small, heart-shaped object made of green moss and a single yellow flower. The hands are positioned in the center, with fingers slightly curled. The moss is a vibrant green, and the flower is a bright yellow. The background behind the hands is a blurred green, suggesting foliage. The overall image conveys a sense of environmental stewardship and care for nature.

Handbook

on

Environment, Gender and Climate Change

Handbook
on
**ENVIRONMENT, GENDER
AND CLIMATE CHANGE**

July 28, 2020

EXECUTIVE EDITORS

Dr. Shiv Kumar Sahdev
Dr. Darshan Malik

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DEPARTMENT OF BOTANY
SHIVAJI COLLEGE
UNIVERSITY OF DELHI
(Under the Aegis of DBT Star College Scheme)

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EDITORIAL

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MESSAGE FROM THE PRINCIPAL



"The mind is not a vessel to be filled, but a fire to be kindled", said Plutarch. I am delighted to know that Dr. Pratima Rani Sardar, Dr. Anuradha Mal and Dr. Chirashree Ghosh are organizing an **International Webinar** on **"Environment, Gender and Climate Change"** and are also releasing a Handbook.

The Handbook on "Environment, Gender and Climate Change" is an attempt in these tough times to not only engage in an academic effort to make people aware of the correlations between environment and gender roles, but also to make the society aware of the ways by which the world is crumbling due to the disastrous human interventions. Though steps are being taken to ameliorate the conditions through various efforts on national and international bodies as well as local efforts; yet much needs to be done to achieve a sustainable ecosystem.

In these efforts of sustainability, women have always played a significant role as their concerns for Mother Earth have always found its manifestation in the hearts of the people. This Handbook not only celebrates those efforts, but also looks forward to think and innovate ways in which these efforts can be coordinated in national and international levels to look for ways in which more sensible and environmentally conscious sensibilities can be evolved amongst humankind and the Sustainable Development Goals (SDGs) can be realized in as little time as possible.

This Handbook indeed reflects the epitome of their sincere efforts in raising awareness for the issue and their utmost interest in bringing up a change in the society.

On this occasion, I congratulate the distinguished speakers of the International Webinar, Professor Greta Gaard, Dr. Vandana Singh and Dr. Vijaya Laxmi. I convey my best wishes to the contributors and also to the Editorial Team of the handbook for this creative and much needed endeavor.

*Dr. Shiv Kumar Sahdev
Principal, Shivaji College
University of Delhi
New Delhi, India*

MESSAGE FROM THE COORDINATOR



It is a pleasure to know that Dr. Pratima Rani Sardar, Dr. Anuradha Mal and Dr. Chirashree Ghosh are engaged in the project of coming up with a Handbook and an **International Webinar** on "**Environment, Gender and Climate Change**". The webinar itself is a great move to deal with the climate challenges that the world is facing for a while now and it is evident that the webinar will make an effort to deal with the challenges in an intensive manner to come up with academic ways of dealing with them. Fresh insights are necessary for dealing with the new challenges and the speakers along with the participants will definitely make the webinar engaging enough to deliberate on innovative means. I am sure that the International Webinar would explore new vistas and serve humanity at large.

The Webinar looks forward to exploring the ways in which women have been playing a significant role in seeking an equitable environment whether they are the role of women in the Chipko Movement or elsewhere. Women's consciousness has been eco-friendly and it needs to be incorporated in the national and international policy making so that their ways find just manifestation in saving the earth.

The Handbook is envisaged and given shape which itself is a commendable job. Issues of climate and gender have been dealt with in the Handbook from a fresher perspective to deal with the environmental crisis before it reaches an irreversible state.

We hope that the efforts - both the webinar and the handbook - will bring fruitful results academically as well as environmentally, to create awareness which will be beneficial to the participants as well as the world in general. I would also like to congratulate the organizers of this Webinar for inviting delegates from very prestigious Institutes of the country and overseas as well and editors of the handbook for such productive academic activities.

*Dr. Darshan Malik
Coordinator
DBT Star College Scheme*

MESSAGE



On behalf of Organizing Committee and be a part of Editorial Team, I express immense pleasure to inform you that the Shivaji College of the University of Delhi is organizing an International Webinar and also publishing a handbook on the emerging issue titled **“Environment, Gender and Climate Change”** on July 28, 2020.

Women play many roles during various stages of their life, as daughter, wife, mother, sister and they have a special and close relationship with nature. Women are particularly altruistic and caring in managing their environment. Role played by women in different environmental movements for their enlistment and livelihood shows their close attachment to nature and the environment. The conceptual phase of webinar began much before this pandemic but this lockdown has made us realize its true potential. Internet and connectivity has brought an incredible opportunities for everybody, the women specifically in less developed countries can work together with developed countries exchange ideas and opportunities in protecting and managing their own environment and health to ensure a safe & livable world which will eventually benefit the future generations. While managing and protecting environment we also need to care for a sustainable development in line with recommendation like the one of **“Bruntland Commission (1987)”** which has defined the sustainable development as *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”*.

I hope university students and other attendees will benefit from this event which will provide a fertile ground to exchange ideas. As an academic and a woman in particular, working on Climate Change issues, I am glad to see this interdisciplinary event is being organised at Shivaji College.

I extend a very warm welcome to all the delegates and look forward to the successful report and recommendations generated by this webinar.

*Dr. Chirashree Ghosh
Associate Professor
Department of Environmental Studies
University of Delhi*

MESSAGE



The Handbook and the Webinar on "**Environment, Gender and Climate Change**" aims to provide an overview of the connections between the environment and gender in development co-operation and on how various policies and programmes can promote a more sustainable utilization of resources, while empowering women at the same time. We as a team have endeavored to bring resourceful speakers and enlightening content for the Webinar and the Handbook, so that the participants of the Webinar are enlightened about the issues dealing with the said theme.

An effort has been made to bring to the fore the environmental concerns which need immediate attention. Governmental and International Policies along with the initiatives of the Non-Governmental Organizations (NGOs) need to take into account the concerns of the women as well as take the women's approaches to the environment into account to make right policy decisions and their implementations.

The Handbook and the Webinar looks forward to making academic and environmental impacts which are gender sensitive and aim at a sustainable world.

Best Wishes!

Dr. Anuradha Mal
Associate Professor
Shivaji College, University of Delhi

FROM THE EDITOR'S DESK



As editor of the Handbook on "Environment, Gender and Climate Change", we would like to state that this small Handbook is an attempt to put on paper some of the key issues that are significant in the present day for environmental sustainability.

We looked forward to a wider participation of the academic community in our efforts and we are humbled by the responses of our colleagues and friends who wholeheartedly responded to our call and sent their contributions in such a short notice which made it possible to take out this eBook within a short period of time. The contributions look forward, along with the Webinar talks and discussions to create a forum which to bring to the fore the issues of climate change, environmental degradation and the role of women from newer and fresher perspectives.

This Handbook would not have been possible without the patronage of Dr. Shiv Kumar Sahdev, the Principal of Shivaji College, University of Delhi, who constantly had inspired us to progress academically as well as to make contributions to the society in a fruitful way. It is this inspiration which made us take up the environmental issue at the present circumstances and do the Webinar and the Handbook.

We would also like to thank the readers of this Handbook for taking out time to read through this handbook as it shows that they are environmentally conscious and want to do their bit to ameliorate the environmental sustainability as well as revolutionize the ideas for environmental safety and ensuring a better world.

Stay safe and Happy reading!!

Dr. Pratima Rani Sardar
Chief Editor

PREFACE

With immense pleasure, we are presenting a Handbook on "**Environment, Gender and Climate Change**" on the occasion of the International Webinar on the same topic which is organized under the aegis of DBT sponsored Star College Scheme, Shivaji College, University of Delhi. We take this opportunity to express our sincere gratitude and appreciation to the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India, for their constant support and to the team members who have worked meticulously and tirelessly for the final production of the Handbook.

We are truly thankful to our Principal, Dr. Shiv Kumar Sahdev, for his valuable support and much needed guidance, who has always been helpful in providing the necessary approval and direction in all our academic efforts.

Thanks to Professor Greta Gaard from University of Wisconsin-River Falls; Dr. Vandana Singh from University of Framingham State University, United States and Dr. Vijaya Laxmi Singh from University of Delhi; for their support and academic contributions.

Last, but not the least, the authors and readers need to be thanked for making the effort to be a part of this academic endeavor.

We wish our efforts will bring favorable response and will lead to greater academic engagement and further research in the field of environment as well as gender.

*Dr. Pratima Rani Sardar
Assistant Professor, Shivaji College
University of Delhi
New Delhi, India*



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..... *Bio-sketch*

***Professor Greta Gaard, University of Wisconsin-River Falls,
United States***



Greta Gaard is Professor of English at University of Wisconsin-River Falls. Her work emerges from the intersections of feminism, environmental justice, and critical animal studies, exploring a wide range of issues, from children's environmental literature and maternal profiling to multispecies justice, material perspectives on fireworks and space exploration, ecogenders and ecosexualities, critical ecofeminism, and the eco-politics of oil pipelines. Gaard's first anthology, *Ecofeminism: Women, Animals, Nature* (1993), positioned multispecies justice as foundational to ecofeminist theory. Her more recent work includes *International Perspectives in Feminist Ecocriticism* (2013) co-edited with Simon Estok and Serpil Oppermann, her monograph *Critical Ecofeminism* (2017), and the *BifrostOnline* special issue on Coronavirus and Climate Change (2020).

..... *Bio-sketch*

Dr. Vandana Singh, Professor of Physics, Framingham State University, United States



Dr. Vandana Singh has a background in particle physics, but since the last ten years has been engaged in exploring new ways to understand climate change and related crises, with a view to communicating it in the classroom and beyond. She is a professor of physics at Framingham State University in the US and a proud alumna of Delhi University. She is a passionate educator, and works hard with students to help them realize their full potential, academically and as planetary citizens. In 2014 she visited the Alaskan Arctic, where she observed the impacts of the vanishing sea ice on the life and culture of the Inupiaq Eskimo people, and realized that justice issues must be central to understanding and teaching climate change. Since then has been developing a transdisciplinary, justice-based approach to conceptualizing social-environmental crises, and has started a new project to work directly with communities at the forefront of climate impacts in India. Vandana Singh is also an acclaimed writer of literary science fiction.

Talk Description on *"The End of the Future: The Climate Crisis and Justice for All"*

*-- Dr. Vandana Singh, Professor of Physics,
Framingham State University, United States*

How do we imagine the future? Until recently the future for many of us has been 'normalized' as a fairly predictable sequence of life transitions, with education resulting in a job, starting a family, and so on. However, the Covid 19 crisis has shown us that the current global economic system is very vulnerable, and that what we consider to be normal can vanish within weeks or months. The future as we once knew it is gone. But climate scientists, ecologists, historians and marginalized communities have always known that the world is full of unexpected and often unpleasant surprises. We can learn from them to understand how social-ecological crises happen, and how we might prepare for an uncertain future. How can we re- conceptualize the multiple crises of today so that we can imagine and work towards radical visions of diverse socially just and ecologically viable futures?

..... *Bio-sketch*

***Dr. Vijaya Laxmi Singh, Associate Professor,
Department of History, University of Delhi, India***



Dr. Vijaya Laxmi Singh, Ph.D. is currently Associate Professor, at the Department of History, University of Delhi. She did her M.Phil from University of Delhi and her Ph.D. from Jawaharlal Nehru University. In her bright academic career, she taught in various colleges of Delhi University like Lakshmi Bai College and Aurobindo College. She has also served as Dy. Director in charge at Centre for Professional Development in Higher Education (CPDHE), University of Delhi. Dr. Vijaya Laxmi Singh has been the author and co-author of a number of articles and books. She is best known for her detailed and rigorous work on Ancient Indian History, Archaeology, Urbanization, culture, and Gender issues.

Gender Environment and Sustainable Development: A Historical Perspective

*Dr. Vijaya Laxmi Singh, Associate Professor
Department of History, University of Delhi*

A study of the relationship between human society and environment encompasses and includes all interaction between humans (men and women) and the environment. It tries to understand how the human community has adapted to or changed its surroundings to suit its needs and how much the environment affects people motivating them for new innovations and techniques. Historically man has always been dependent on the environment and with his restricted opportunities he has tried to adapt or modify techniques to exploit the environment. History has shown that environments have helped in the growth of early civilizations, be it Indus, Mesopotamia, Egypt, Greece and Rome. Herodotus who is also called ‘Father of History’ said that “*Egypt was the gift of the Nile*”. So is the case of all civilizations which were grown around the water, energy and forested areas with flora and fauna and living beings on earth.

Ancient Indian people tried to have a strong bond with nature. First let us look at the ancient Indian perspective on the environment where nature (environment) is expressed as feminine gender. Environment is called as *Prakriti* in *Rig Veda*’s ‘*Aranyani Sukta*’, the forest Goddess *Aranyani* is described as the protector of forest, flora and fauna. The concept of representation of forest by a female deity is in vogue in most of India’s forest and tribal regions even today. It is believed that the environment has certain attributes that are similar to women. This connection between environment and femininity may have been now called ‘**Eco- feminism**’. Eco-feminism connects feminism with ecology and relates the exploitation of women with that of the environment. The connection of nature and women in ancient India is often described as ‘**spiritual eco-feminism**’ where the environment is presented in the feminine gender and termed as sacred and divine. Ancient Indian literature was the reflection of the bond between humans and nature, especially between women and nature. The *vedic* gods *Indra*, *Aditya*, *Mitra*, and *Varun* are invoked to maintain the balance of nature. There are hymns seeking blessings of nature (*Panchtattva*): *Vayu*, *Agni*, *Jal*, *Akash* and *Prithvi*. The two great epics *Ramayana* and *Mahabharata* also state the significance of *aranya* (forest) and the stories and events move around the forests and rivers.

Classical literature also depicts this bond, in *Abhijyanshakuntalm*, the great poet Kalidasa showed how Shakuntala nurtured an intense relationship with the environment—trees, animals, and forest. Shakuntala also expresses her concern for the pregnant deer. His other works *Ritusamhara* depicts harmonious relation between man and forces of nature and the importance of each season. Kalidasa's *Meghaduta* describes the growth of the city on the Sipra river. He talks about the Himalaya, Narmada river and forests on its bank. Though his poems and plays were about love for man and nature, it also throws light on man-nature relation and *Arthasastra* and *Manu Smriti* which were legal texts mention that officials were appointed for protection of forest, formalizing the importance of environment for mankind's existence. *Matsya purana* considers one tree as equal to ten sons. Destruction of forest was considered to be a violation of *dharma*.

Indian forests are a treasure house of food and medicine. Rural people knew how to use the abundantly available nutrients of the forest plants, and the knowledge was handed down to them from generation to generation. So the involvement of local people is an integral part of forest management. The main threat to forest conservation is our materialistic approach towards the environment. In ancient times women were compared to *prakriti* and *prakriti* was deified by people. The forests started degrading when society began treating it as mere objects with some utility. The divinity of forest is now confined to mere romanticism. Policies for forest conservation do not reflect this divinity. Colonial writings have shown complete ignorance about women as a subject and have shown gender blindness while writing about the role of women. Post-colonial historians however tried to fill the gap by relocating the lost women, but we do not find any serious work on environment history relating to gender dimension. Until the 1980s there was complete blindness towards gender questions. There is also complete denial of the women's agency. Some environmental activists and scholars have given two theoretical approaches, one Women Environment and Development popularly known as WED; two Eco-feminism. **Chipko Movement** in 1970s and 80s is an example of eco-feminist movement much argued by **Vandana Siva**. This was a forest conservation movement around the Himalayas which became a turning point for the ecological movements across the globe. The impact was so deep that it forced the government to bring **Indian Forest Act** in **1927** (Colonial Period) and later **Forest Conservation Act, 1980**. The other prominent movements were **Greenbelt Movement** led by **Wangari Mathia** of Kenya and **Greenham Movement** in **1981** by women which protested against the deployment of US nuclear missiles in Europe.

Though these approaches have been critiqued by the scholars as androcentric views. The **1990's RIO Movement** was a historic milestone for informal political action for a safe environment and sustainable development with women in centre as integral part of policies. Eco-feminists call for women's participation in all environmental programmes and policies as opposed to the androcentric model.

(This essay is based on my general understanding and readings on Ancient Indian texts and secondary texts and various published papers).

Risk of Indoor Air: Assessment of Respiratory Health Status of Housewives

*Dr. Chirashree Ghosh, Associate Professor
Department of Environmental Studies, University of Delhi*

Indoor air pollution has been associated with a wide range of health outcomes. Most of the air pollutants directly affect the respiratory and cardiovascular systems. Increased mortality, morbidity, and impaired pulmonary function have been associated with elevated levels of sulphur dioxide (SO₂), Suspended Particulate Matter (SPM) or Respirable Suspended Particulate Matter (RSPM). While the precise mechanism of how exposure causes disease is still unclear, it is known that small particles and several other pollutants contained in indoor smoke cause inflammation of the airways and lungs and impair the immune response. Acute and sub-acute health effects of the inhalation of biomass smoke cause conjunctivitis, respiratory inflammation/irritation, and respiratory infection. Whereas chronic effects of the inhalation of indoor pollutants are majorly responsible for COPD (Chronic Obstructive Pulmonary Disease), chronic bronchitis, adverse reproductive outcomes and pregnancy related problems of women, such as stillbirths, low birth weight, and also lung cancer. Nowadays many studies focus mainly on the pulmonary health of the women as they spend most of their time inside the house and it was also reported that the impact of air pollution on women health is a big threat as household cooking is the largest profession of the world and is an occupation dominated by women.

Interestingly in developing countries, concentrations of health-damaging air pollutants tend to be highest indoors but the challenges are different both in Urban and Rural environments. In the case of rural households biomass fuels such as wood, animal dung, and crop residues are burned for cooking and heating. Combustion of biomass fuels in poorly vented kitchens using poorly functioning stoves leads to the release of high concentrations of respirable particulates and gases including CO, SO₂, NO_x, toxic compounds like benzene, formaldehyde, and polycyclic aromatic compounds such as m-benzo[a]pyrene (Smith, 1987; Saksena et al., 1992). In a review on residential wood stoves, over 100 different organic compounds were detected in the smoke coming from these wood stoves. Of these 14 are known as carcinogenic, 5 are cancer promoting and 6 are toxic or irritants for eyes and respiratory organs. Research in the highlands of Papua New Guinea, upland Kenya

and in India reported high prevalence of respiratory problems due to indoor pollution (WHO, 2002). Smith et al (2000) confirmed that women cooking on simple stoves in several Indian villages are exposed to high TSP (Total Suspended Particles) and BAP (Benzyl Amino Purine) levels i.e, 7 ng/m³ and 6000 ng/m³ respectively, which could be link to smoking over 20 packs of filtered cigarettes per day. Along with ventilation characteristics unique to each dwelling, also add temporal and spatial variation to pollutants, and as such, the level of exposure to occupants in the dwellings is varied and often unpredictable. In India, between 4,10,000 and 5,70,000 premature deaths among adult women and children (aged under 5 years) arising from exposure to indoor air pollution, on the basis of data on risk and exposure derived principally from the studies carried out in this country (Smith., 1999).

North Delhi as a Case Study:

To understand Urban Scenario in a highly polluted city like Delhi, we had initiated our study to monitor the indoor criteria pollutants (SO_x, NO_x and Particulate Matter) and to investigate the influence of exposure on respiratory health of middle aged housewives residing at three different economic zones (Low, Mid and High) in the North District of Delhi, NCT. Pulmonary health of the women is a big concern because till now in India a large population of women are house wife and they spend most of their time inside the house. Their respiratory health was monitored using spirometer and COPD as a marker disease (Fig.1).

Analysis and the interpretation of results obtained from the study was done through the standard protocol given by *Global Initiative for Chronic Obstructive Lung Disease* (GOLD) to define the different stages of COPD based on the lung capacity (Table 1).

Stage	Characteristics
0: At Risk	Normal spirometry Chronic symptoms (cough, sputum production)
I: Mild COPD	FEV ₁ /FVC < 70% FEV ₁ ≥ 80% predicted With or without chronic symptoms (cough, sputum production)
II: Moderate COPD	FEV ₁ /FVC < 70% 30% ≤ FEV ₁ < 80% predicted (IIA: 50% ≤ FEV ₁ < 80% predicted) (IIB: 30% ≤ FEV ₁ < 50% predicted) With or without chronic symptoms (cough, sputum production, dyspnea)
III: Severe COPD	FEV ₁ /FVC < 70% FEV ₁ < 30% predicted, or the presence of respiratory failure,* or clinical signs of right heart failure

* Respiratory failure: PaO₂ < 8.0 kPa (60 mm Hg) with or without PaCO₂ > 6.7 kPa (50 mm Hg) while breathing air at sea level.

(SOURCE: GOLD; Pauwels et al. 2001)

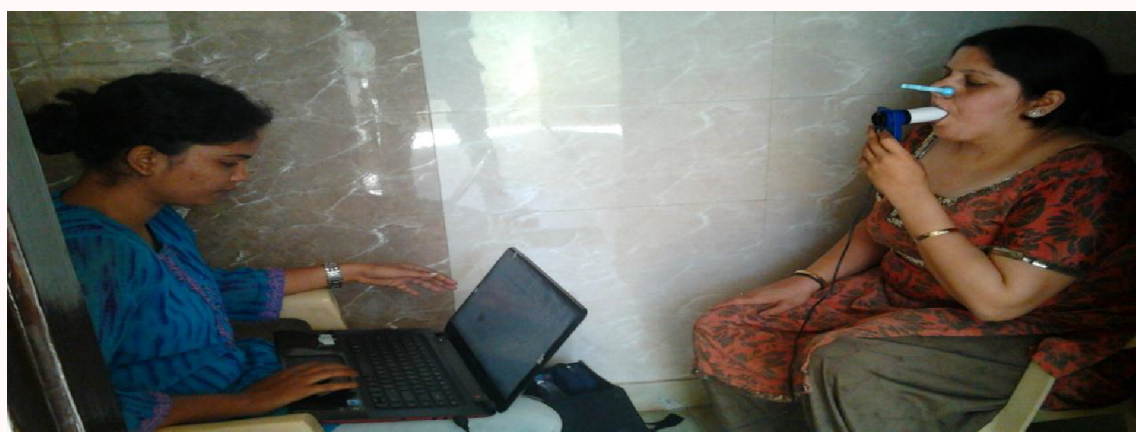
TABLE 1. GOLD Spirometric criteria for COPD severity.



(a) Low Economy Zone



(b) Mid Economy Zone



(c) High Economy Zone

FIGURE 1. a, b and c: Performing Spirometry at three economy zones.

Interestingly the result confirmed that overall **90%** of women in the **Low economy zone** were found to have various stages of COPD (including mild and moderate forms) and only **10%** were found **normal** or at risk of having the pulmonary disorders. Most of the households in this region have lack of basic services living in substandard housing with overcrowding and with poor ventilation. Unhealthy living conditions and hazardous locations with high levels of air pollution may be another reason for the declining health conditions in this area. At the **Mid economy zone**, **86%** of housewives were suffering from various stages of **COPD** and **14%** were found to be **normal** or at a risk of having pulmonary dysfunctions. This site was found to be least polluted during our study and the concentrations of all the pollutants measured (SO_x , NO_x and Particulate Matter) were found to be lowest. This site can be characterized by low pollution and lots of green areas around the neighborhood with low vehicular pollution and the housing conditions are also better with proper ventilation.

Surprisingly **88%** of the women living in the **High economy zone** were also found to have various stages of **COPD** and **12%** are **normal** or at risk of getting COPD. During the study period, indoor particulate matter concentration was found quite high in this site, may be due to the practices of closing the doors or windows for a long time in a day to avoid infiltration of outdoor pollution as buildings are situated near by roadside. This lifestyle practices ultimately trapping the pollution indoors. The low health status of the women can also be attributed to the modern lifestyle like smoking habits of the occupants, according to Epstein et al, (1996) worldwide tobacco smoke, especially **second hand smoke** is by far the most important risk factor for COPD.

Women are probably more susceptible for COPD and respiratory symptoms caused by environmental factors than men, therefore our study is focused on women only. Education of the citizens living in a society plays an important role in creating awareness about the environmental problems such as ***Indoor Air Pollution***. Unfortunately when we talk about air pollution people mainly think of outdoor pollution and emphasize vehicular pollution and they generally think that their ***homes are safer places to live***. During our survey, we have also observed that the occupants of all the three economic zones (Low, Mid & High) lacked proper awareness about indoor air pollution, this can be attributed to less media campaigns on this issue. Currently, millions of people are diagnosed with COPD, many more people may have the disease and are not even aware about it which will develop slowly. Symptoms often worsen over time and can limit your ability to do routine activities. Recently the risk of contacting COVID-19 in Patients with COPD is found to be 4 fold higher than patients without COPD (Zhao et al, 2020). Most of the time, COPD is diagnosed in middle-aged or older adults and has no cure yet, and doctors don't know how to reverse the damage to the airways and lungs. However, treatments and lifestyle changes can help us to feel better, stay more active, and slow the progress of the disease. So, the first and the most important step in the prevention of illnesses resulting from indoor air pollution is to educate the public, administrators and politicians to ensure their commitment for the improvement of public health. There is utmost requirement to collect better and systematic information about actual exposure levels experienced by households in different districts and in different climatic zones. Along with it there is a need to develop a model for predicting the exposure levels based on diverse fuel use and use of chemical based household products to protect human health and **specially for women**.

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Gender shaping the Environmental Law Principles

Rohit Kumar, Advocate

In the COVID-19 phase, the outlook of the world towards our environment is likely to be affected in order to attain higher growth or to maintain the status quo prior to the pandemic. Whether it would be due to necessity or due to competition, in this changing scenario it is imperative to look at the environmental law principles governing the environmental laws across India and inspiration they acquire from the international law principles. The jurisprudence of environmental law in India developed rapidly after the Bhopal Gas Tragedy compelling the Government of India to bring about the changes to further restrict the mishappenings in the future. With the passage of National Green Tribunal Act 2010, Environmental Law had received momentum by adding the precedents and providing the platform that is capable of taking suo-moto cases of environmental significance. Now it is required further to comprehend the jurisprudence and include the gender perspective in order to achieve sustainability and intergenerational equity.

Various principles such as the precautionary principle, polluters pays principle, public trust doctrine, sustainable development, public trust doctrine resembles or derives their inspiration from the international environmental law. Thus, consideration of gender sensitivity and recognition would make them more reliable and complete providing the scope of further improvement in future, when the countries would try to outpace each other in order to overcome the loss suffered by pandemic.

The environment related cases have set the various precedents acting as an established jurisprudence for the upcoming issues, such as in *A.P. Pollution Control Board V. Prof. M.V. Nayudu* (1999), the Indian Supreme Court applied the precautionary principle in considering a petition against the development of certain hazardous industries. The Court held that *“It is necessary that the party attempting to preserve the status quo by maintaining a less-polluted state should not carry the burden of proof and the party, who wants to alter it, must bear this burden.”*

The Supreme Court of India has devised an innovative method to calculate damages to be borne by them. This allows the court to keep a watch on the deterrent nature of

its award. In a policy statement issued by the Government of India, it has been accepted that the Polluters Pays Principle has to be an essential aim of the government policy to prevent and control pollution.

This landmark case saw the Indian Apex Court use the Polluters Pays Principle inspired by **Principle 16 of the Rio Declaration** on Environment and Development and **Precautionary Principle** inspired by the **Principle 15** which states that where there are warnings of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. The Apex Court held that if an enterprise is engaged in an inherently dangerous activity, which might cause harm to another in course of the actions, will have to bear the financial burden of preventing or remedying the damages that might be caused by the pollution being created by the manufacturing process. The enterprise would also be strictly and absolutely liable for the damages caused by his actions.

On considering the effect on humans, pollution and environmental changes have different consequences on different genders. Women are more vulnerable to the effects due their historical disadvantage over the resources, SDG goals reflect these vulnerabilities. More women than men live in poverty, especially during their peak childbearing years. Women and girls around the world are 4% more likely than men and boys to live in extreme poverty, and the risk rises to 25% for women aged 25 to 34. On considering the earth as an affected area and applying the Polluter Pays Principle along with Precautionary Principle, it is certainly that the women are more vulnerable and do not have the privilege to pay in equal remuneration as men. Thus, over the period of time enjoying the control over the resources men have developed the deeper pockets in order to pay for his doings, as per Polluters Pays Principle then it is required that the dominant gender across centuries should pay for the damage it has caused and the other gender should be on the receiving ends of the benefits.

Similarly, Sustainable Development has received a global definition thanks to the **Brundtland Commission (1987)**, in which it was suggested that the phrase covered “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*” Yet in Indian context sustainable development primarily meant material or economic progress. In **Narmada Bachao Andolan v. Union of India (2000)** wherein it was observed that “*Sustainable development means what type or extent of development can take place, which can be sustained by nature/ecology with or without mitigation.*”

Situations like Hydro-power Projects raise a number of other problems of migration, inequality etc. due to destruction of ancestral areas of livelihood for the sake of privileged people receiving the benefits of the modern technologies and policies of government.

In this process of migration and rehabilitation women are more vulnerable to the changes further deterring the targets set by the SDG as according to an assessment of migration policies related to family reunification from 45 countries shows that 71% impose some restrictions on spouses and partners joining migrants in the host country. In other cases, women's migration status is tied to a resident or citizen spouse, preventing them from living autonomous lives and heightening already unequal power relations and possible exposure to violence. And the migration led to the development of slums in which women again are on the darker side of vulnerability. According to the UN, women are over-represented in slums in 70% of countries where data are available.

It is the need of an hour to further introspect the definition of sustainable development, where emphasis on the role of women is required not only in order to attain sustainability but also to achieve the goals set for our future. Environmental Law is emerging to be an essentiality not for humans but for the planet as a whole.

The Gender Impact of *Amphan*

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The fiercest super cyclone in hundred years hit large areas of coastal West Bengal and Bangladesh on 20 May 2020. In the midst of the prevailing pandemic Covid-19, super cyclone *Amphan* added more misery to the lives of millions of people. Although loss of lives could be minimized by timely evacuation, the damage to settlements is unprecedented. The affected regions are already savaged by salinity, past disasters, poverty and the inability to cope with shocks. These coastal areas generally have low per capita incomes, poor access to resources, inadequate mitigation strategies and an overall poor quality of life.

While estimating the ferocity of *Amphan* and the extent of the devastation, several social aspects have also come to the fore. The impacts of disasters are generally not equal across the affected population. It depends on several social parameters, such as, socio-economic condition, caste, gender, religion and so on. In addition to the pre-existing inequalities, women bear a disproportionately larger burden during this kind of disruption. It includes a multitude of effects including mortality, health, nutrition, access to relief, violence against women during and after the disaster.

A rapid gender check of *Amphan* reveals several features. The first and foremost is the need for food. The shortage of food was already induced by the lock-down during the pandemic. Millions of poor households were already facing livelihood hardships and were pushed below the poverty line. The immediate response to disaster is reduced meals. Given the patriarchal social system, women and girl children will be the first ones to be compromised. This will dampen the long-term nutritional status of the female members of the families who already suffer from malnourishment. Providing food, water and care is the responsibility of women. Therefore, getting raw materials, cooking fuel and safe drinking water in a situation of inundation is an added burden on them.

Reproductive health of women during disasters is a major concern. Studies have revealed the appalling conditions of pregnant and menstruating women. More than 50% of women have been found to be of the reproductive age and 25% of them were actually pregnant when the cyclone hit. Mental health issues of women under trauma need special attention too.

Medium and long-term impacts include negative coping mechanisms, such as, selling of productive assets, shrinking of loans etc. The impacts on women have been severe in self-help groups and microfinance organisations. Women seldom have control over family resources and participate in decision-making. However, situations like *Amphan*, put several additional financial burdens on women. It has been observed that many of them are looking for jobs outside home now. This is the gendered narrative of rural-urban migration.

Relief camps and shelters involve further issues related to women's safety and security. The shelters are not always friendly to gender, age and diversity. Protection from domestic and intimate partner violence and exploitation of girl children are issues that compound the problems. Although closure of schools for a reasonable length of time will disrupt education for all children, the girls will be deprioritised for longer periods in decisions about sending children back to school. Somewhere lower down in the social ladder, live other affected women, namely, domestic workers, street vendors, daily wage laborers, sex workers and transgender persons. Women with disabilities will also be severely hit.

The role of the state is paramount in addressing these issues. The governments of West Bengal and Bangladesh have a tough challenge to design policies for short, medium and long terms to rehabilitate life in the affected areas. Protection and empowerment of women must be one of the priorities of a meaningful development strategy.



*"Never doubt that a small group of thoughtful,
committed citizens can change the world;
indeed, it is the only thing that ever has."
- Margaret Mead*

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