

AMITY JOURNAL OF
**ENERGY &
ENVIRONMENT STUDIES**

January – June 2022, Issue: 1, Volume: 8, ISSN2454-7778



AMITY JOURNAL OF ENERGY & ENVIRONMENT STUDIES

Volume 8; Number 1, January – June 2022; ISSN : 2454–7778

Bi-Annual Refereed Journal of Amity Business School

Amity University, Noida, India

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AMITY JOURNAL OF ENERGY & ENVIRONMENT STUDIES
JOURNAL OF AMITY BUSINESS SCHOOL, AMITY UNIVERSITY, NOIDA, INDIA

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From The Desk of the Editor-in-chief...

Dear Readers,

In recent months, the world has witnessed a profound movement unfolding across the agricultural landscape of India - the Farmer Protests. These protests, born out of genuine grievances and rooted in the livelihoods of millions, present a critical juncture for reflection on the intersectionality of energy, environment, and social justice.

At the heart of the farmer protests lies a struggle for equitable access to resources, fair pricing, and autonomy over agricultural practices. While the immediate focus may seem centered on agricultural policy reforms, the underlying currents of this movement reverberate deeply within the realms of energy and the environment.

Agriculture, as one of the most energy-intensive sectors, relies heavily on fossil fuels for mechanization, irrigation, and transportation. The sustainability of farming practices directly impacts environmental health, from soil degradation to water scarcity and biodiversity loss. In this context, the farmer protests serve as a poignant reminder of the intricate links between agricultural policies, energy consumption, and environmental sustainability.

Moreover, the protests underscore the urgent need for a holistic approach to rural development that prioritizes renewable energy solutions, sustainable farming techniques, and equitable distribution of resources. By empowering farmers with access to renewable energy technologies such as solar-powered irrigation pumps and biogas digesters, we can not only reduce the carbon footprint of agriculture but also enhance resilience against climate change impacts.

Furthermore, the farmer protests bring to light the broader implications of social and economic justice within the energy and environmental discourse. As we advocate for a transition towards clean energy and sustainable practices, it is imperative to ensure that marginalized communities, including small-scale farmers, are not left behind. Inclusive policies that address the needs of all stakeholders are essential for building a more just and sustainable future.

As scholars and practitioners in the fields of energy and environmental studies, it is incumbent upon us to lend our voices in solidarity with the farmer protests in India. By amplifying their concerns and advocating for policies that promote sustainable agriculture, renewable energy, and social equity, we can contribute to a more resilient and equitable world.

In closing, let us reaffirm our commitment to interdisciplinary dialogue, research, and action that transcends boundaries and fosters positive change. Together, let us stand in solidarity with the farmers of India and work towards a future where energy and environmental justice are fundamental pillars of society.

With warm regards,

Dr. Sanjeev Bansal

Editor-In-Chief

Amity Journal of Energy & Environment Studies

Theoretical Approaches to Environmental Democracy

Tanisha Seth*

INTRODUCTION

It is not just the black-and-white pictures of alternative technology futures that make present life feel so perilous. While we are concerned about the global consequences of human devastation-endangered species, encroaching deserts, polluted oceans, climate change, and the ozone hole- we are also forced to consider who we are, where we belong, and what institutions and communities govern our basic social allegiances. These issues necessitated a significant shift toward sustainable development, which included ensuring sustainable resource usage, reducing pollution emissions, and making several other productive adjustments. This link between environmental involvement and democracy has grown to be seen as more or less important for a sustainable future in many parts of the environmental movement over the last forty years or so. Air pollution, which has a negative impact on public health, deforestation, and the emission of chemical pollutants from factories and industry are all big issues that everyone should be concerned about. No single actor can meet these problems alone. For their own health and that of future generations, everyone should contribute to environmental conservation. As a result, every citizen of the country should have the right to make decisions that benefit the ecosystem as a whole, rather than just a single actor. In this paper, I will be discussing the various approaches to environmental democracy, along with case studies, to put forward my point on environmental democracy.

Democracy and Environment

There is no universally accepted definition of democracy. The majority of democratic definitions emphasize qualities, procedures, and institutions. There are many different sorts of democracies, and their various practices have a wide range of outcomes. Democracy does not consist of a single, universally applicable collection of institutions. Democracy's precise form in a country is mostly dictated by the country's political, social, and economic circumstances, as well as historical, traditional, and cultural aspects. The term "democracy" literally translates to "rule of the people." The name is taken from the Greek "demokratia", which was coined in the middle of the 5th century BCE from the words *demos* ("people") and *kratos* ("rule") to describe the political systems that existed in various Greek city-states at the time, most notably Athens.

The term 'environment' encompasses a wide range of definitions, meanings, and interpretations. The word 'environment' literally means 'surroundings' (environs); thus, an individual's, object's, element's, or system's environment encompasses all of the other entities with which it is surrounded. Individuals, things, elements, and systems rarely live in isolation in reality; instead, they interact with their surroundings to varied degrees. As a result, it is not especially useful to conceptualize the 'environment' without integrating some sense of relationship in that conceptualization. Individuals, objects, elements, and systems all have an impact on their environment, and are in turn influenced by them. Indeed, the webs of connections that exist between distinct entities can be enormous and complex in some circumstances. As a result, the 'environment' can be thought of as a 'space' or a

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'field' in which entities interact through networks of links, interconnections, and interactions. Because many environmental concerns have arisen because one environmental system has been disturbed or degraded - either accidentally or deliberately - as a result of changes in another, the concept of interconnectedness is a crucial one in environmental science and management.

Environmental Democracy

Environmental democracy is founded on the premise that decisions about land and natural resources should effectively and equally reflect the interests of citizens. Environmental democracy establishes a framework for how decisions should be made rather than setting a criterion for what constitutes a desirable outcome. The general population is far too frequently left out of decisions that affect their health, livelihoods, and culture. Principle 10 of the Rio Declaration on Environment and Development reflects access to knowledge, participation, and justice, collectively known as "access rights." They are the procedural components of the right to a healthy environment, and they are important to environmental democracy.

Environmental democracy is based on the belief that meaningful public engagement is essential for ensuring that land and natural resource choices adequately and fairly meet citizens' interests. Environmental democracy, rather than establishing a criterion for what constitutes a good outcome, establishes a guideline for how decisions should be made. The demand for environmental democracy has always been a feature of the modern environmental movement. Although not all environmentalists embrace a democratic approach to the environment, at least not as a key priority, it has always been central to the progressive part of the environmental movement. "Environmental democracy is anchored in the premise that meaningful public engagement is necessary to ensure that land and natural resource decisions effectively and equitably reflect residents'

interests," according to the authors.

It is safe to say that democracy is the best political structure to safeguard the environment. Freedom of expression, freedom of the press, political engagement, and social awareness are all supported and encouraged by democracy. These components serve as a channel for social needs. Citizens' demands for greater environmental standards and quality rise as the urban population and income rise. New laws and regulations that incentivize individuals and businesses result in less pollution and, as a result, a greater degree of environmental quality. Democratic cultures, on the other hand, are more likely to have a stronger rule of law. As a result, popular demands for a cleaner environment become bills and rules that are efficiently implemented. If expectations are not met, governments can be ousted from office utilizing the country's checks and balances system and public accountability.

The example of the dam project in Chile helps show the necessity of environmental democracy. "Developers" suggested a five-dam project on the Baker and Pascua Rivers in Patagonia, Chile, eight years ago. While the hydroelectric project was expected to generate 2,750 megawatts of power, it would also flood 23 square miles of wilderness, putting the ecology, local culture, and tourism in the area in jeopardy. Citizens opposed the project, claiming that Chile's energy demands might be satisfied through less environmentally damaging programmes like energy efficiency and renewable energy. Chile's Environment Minister, Pablo Badenier, canceled the permission just last month, after an eight-year battle by the Patagonia Defense Council, a combination of more than 70 domestic and international groups and people. International Rivers acknowledged the support of this coalition, which includes Access Initiative member FIMA, as "probably the most crucial factor" for the reversal.

This campaign's success demonstrates the necessity of public participation in land-use choices. Concerns about the proposed dams' effects on

livelihoods and the environment were raised by civil society, resulting in political opposition. The broader public, on the other hand, is far too often excluded from these decisions. This is usually the result of ineffective regulations that restrict public access to information, do not allow for adequate public participation in decision-making, or do not provide for access to justice when environmental harm occurs.

Environmental Participation as Democratic Foundation

Citizen participation is at the heart of democratic politics in all of its manifestations. The majority of democratic regimes have formal political structures in which citizens have the right to participate. The legitimacy obtained from this engagement is crucial to the durability of such regimes. Citizens' participation has always been essential to democratic environmental politics in general. The notion and practise of such participation can be traced back to the late 1960s modern environmental movement, when it was generally recognised as part of a post-material cultural transition in Western cultures. As a result, many people now consider democratic participation as critical to solving environmental problems and, more crucially, creating an ecologically viable society. This emphasis on democratic environmental participation has been extended to a variety of global transboundary issues in recent years, including biodiversity, deforestation, hazardous waste, and climate change, among others. These issues have sparked debates about global environmental democracy since they extend beyond the confines of nation-based representative systems, making their regulation difficult. No issue better exemplifies this than the fight against climate change.

For example, Welzer and Leggwie argue that citizen participation is an essential component of future climate policy; the reconstruction of industrial society is only seen to work when members of society can understand and identify

with it, which necessitates the participation of those who are affected in the "operationalization" of climate policy thinking. Siller believes that the best way to solve the climate crisis is for everyone to participate in democratic processes. Similarly, Hayward claims that citizens "who can think and act responsibly in the benefit of all" are needed to respond to climate change.

Models of Environmental Democracy

1. Representative Democracy
2. Participative Democracy
3. Deliberative Democracy

Representative Democracy

Representative democracy is a modern kind of democracy that first appeared in the founding papers of the American and French republics in the late 18th century, when it "developed as the moral underpinning for the State's proper rule over vast populations." Democracy, in the contemporary definition, refers to a form of representative government in which legislators are elected through free elections. As Birch has underlined, "the opportunity to vote is the minimum condition that a governmental system must satisfy to qualify as democratic, but further

opportunities and forms of political participation are highly desirable" People in a representational democracy vote for other people – representatives – rather than directly on legislative initiatives. These representatives then draft, propose, discuss, and vote on our country's laws and policies. They're expected to do it in a way that they think we'll like. That is, they are our representatives. This relieves us of the responsibility of brushing up on the finer points of law and policy, and instead places these obligations in the hands of someone whose job it is to be an expert on these topics. After a time in which the notion of participation lost much of its currency in public and academic debates, a new concept, participatory and

deliberative democracy, has emerged as a hot topic in a number of publications.

I will be taking the case of France and its elected leader, President Emmanuel Macron, to explain how elected representatives can play a major role in environmental conservation. Before the French elections where he emerged victorious, Macron designated the environment a "red line," and his suggested initiatives were consistent with previous commitments. In the past, France has been extremely environmentally forward-thinking. François Hollande outlined the way for France to become "the nation of environmental excellence" through an energy transformation centered on efficiency and the growth of renewable energy in his first major speech as President. The President indicated that he supports a "new paradigm for growth" that is equitable, sustainable, and environmentally friendly. He announced a large-scale, well-targeted investment plan to assist him reach his environmental goals, including €15 billion in public funding for the green energy transition and more money for public building repairs and agricultural system transformation. Mr. Macron also pledged increased investments in renewable technologies, energy-efficient home renovations, and organic food production, as well as crackdowns on air pollution and single-use plastics. According to polls, the environment is one of the top priorities for French voters, but it has been eclipsed as an election topic by the crisis in Ukraine and the rising cost of living. This shows that representative democracy ensures that elected leaders act as per the will of those who bring them to power.

Participative Democracy

Because men should not be represented by others, Jean-Jacques Rousseau did not believe in representational government. The idea of direct self-government in small communities was central to his philosophy, as was the belief that "individuals should set their personal interests aside when participating in politics, and commit

themselves instead to the development of communal welfare." Participatory democracy views participation to be a basic aspect of political practise, as the phrase suggests. Some authors described participatory democracy in basic literary terms as "all acts of citizens designed to influence the behavior of those empowered to make decisions," as "all acts of citizens intended to influence the behavior of those authorized to make decisions." Any democratic political system, it appears, should be built on a commitment to broad public engagement. At the very least, democratic institutions should be structured in such a way that no individual citizen is structurally unable to participate: democratic participation should be viewed as something that all people can do. A lot of recent research has focused on this seemingly basic premise, and it's becoming increasingly crucial in democratic transition. Indeed, after a period in the theoretical wilderness, participatory democracy is resurfacing, with a growing interest in how the theoretical principles articulated in some of the "classic" treatises of participation are still applicable today. As a result, participatory democracy may include the aforementioned participation declinations, and its implementation and use can be justified on three grounds. Importantly, citizenship is recreated and improved as a result of the expansion of political practice beyond the representative system.

The case of Ralegan Siddhi is an example of how the participation of citizens helped solve environmental issues pertaining to a particular district. In an ordinarily steep, arid, and dusty terrain, Ralegan Siddhi, in the Ahmednagar district, looks fresh and green today. Due to a scarcity of irrigation water and sparse agriculture, everyone has been suffering. There were only a few wells capable of irrigating a few hectares of land. The community, however, took a new course of watershed development under Anna Hazare's leadership. Along the 30 to 45 meter high hills around the settlement, villagers built a succession of storage ponds/reservoirs and 'nala bunds.' Nala

Bunds came in diverse shapes and sizes, both open and underground. Between these, there was a lot of planting. The situation soon improved. Bunds, trenches, nals, and plants blanketed the hills and surrounding areas. Positive outcomes were shown almost immediately. The agricultural area and yield grew, while the groundwater level rose from 100 feet to 40-50 feet. The village's wells and ponds were also filled, so it now has water even if it doesn't rain for a year. Anna Hazare's tactic of mobilizing the peasants was critical. He urged individuals to take an active role in the planning and decision-making processes of various programmes, so that "the village is constructed through the creative, productive, and innovative hard work of the people themselves." In the village, there were 14 'vividh karyakari' societies that dealt with forestry, water, cooperatives, and education, among other things. The village panchayat was dominated by women, with nine of the nine members being female. The sarpanch of the panchayat, Santa Bai Maghari, explained how they were chosen unopposed due to Anna's wishes for women to have a larger role in the village's development.

Deliberative Democracy

Environmental politics, according to Baber and Bartlett, entails "some type of deliberation, some form of communal agreement about how to regulate our social interactions..." However, what constitutes deliberation is still a hotly debated topic in academia. It should, in their opinion, and many others', take the shape of deliberative democracy. "Participants offer recommendations, attempt to persuade others, and choose the best results and policies based on the arguments and reasons filled out in public debate," according to the definition of deliberative democracy. An open conversation, in which participants are treated equally, respected, and given equal opportunity, is a distinguishing feature of deliberation. Simply said, deliberative democracy puts reasoned debate at the center of the

democratic process. It "is built on an ideal in which people come together on equal footing and mutual respect to discuss the political challenges they face and, based on those talks, make decisions that will influence their lives." Deliberation, according to proponents of deliberative environmental democracy, focuses on discussion and debate aimed at developing reasoned opinions in which citizens are willing to change their environmental preferences in light of new information and arguments presented by their peers. Citizens participating in environmental discourse have their own interests, but they are expected to provide reasons why they believe their environmental views are in the best interests of all participants, including those who have not yet been born. Deliberative democrats say that rather than forsaking democratic values and methods in the face of climate change, democracies can and must establish more effective democratic institutions and practices to address the problem and other long-term structural concerns.

The case study of New Mexico explains the intersection of deliberative democracy and environment better. Two deliberative processes were held in Taos, New Mexico, in October 2006. The workshops were part of a wider Forest Ecological Restoration Analysis (ForestERA) project and consisted of two three-day sessions. A total of 20–30 stakeholders attended the initial workshop (the numbers fluctuated over the three-day process). Representatives from state and local land management agencies, nongovernmental organisations, academia, and local government attended. The second workshop began right after, with 11 lay participants (five females and six males) from the study area who had responded to recruitment calls in the local media and were chosen to attend in order to achieve a reasonably representative occupational and geographic spread of participants from across the region. For a variety of reasons, the ForestERA team assessed such deliberative workshops as a viable approach for addressing forest restoration in northern New

Mexico. This is a way of working that recognises the importance of public participation in continuous science-policy discussions, as policies are more likely to fail without the inclusion of various bodies of knowledge and greater public ownership of outcomes. Given the problematic history of forestry management and use in northern New Mexico, these concerns were especially apparent in this area.

CONCLUSION

From the beginning, the desire for environmental democracy has been an element of the modern environmental movement. In order to ensure the protection of humanity, environmental democracy is critical on this planet. The environment is a must-care-for issue since we all exist in it, and granting environmental rights to citizens who earn them promotes both the state's development and people's motivation to protect the environment. Environmental democracy does not establish a criterion for what constitutes a successful conclusion, but it does establish a criterion for how effective decisions should be made. "Earth offers enough to meet every man's need, but not every man's greed," remarked Mahatma Gandhi. The Earth has abundant resources to meet human requirements. The only reason we have a resource deficit is because we haven't reined in our greed. We have allowed our population to expand at a rate that is unsustainable in nature. At the same time, we've allowed per capita resource consumption to skyrocket. To make matters worse, we treat natural resources as if they were free. Our efforts have been solely focused on obtaining it quickly and at a low cost to us, regardless of the damage it may have on others or future generations.

Despite the fact that current political practices are far from environmental democracy's ideals and norms, it is very likely that it will continue to be an essential normative term in future fights. As the environmental crisis intensifies, particularly the climate crisis, there are demands for eco-authoritarianism, which sees democracy as a

problem rather than a solution when it comes to long-term sustainability, if not survival. Indeed, great scientific, economic, and political leaders are frequently associated with such viewpoints. Given that citizens will continue to strive for participation in environmental decision-making processes while fighting authoritarian inclinations, environmental democracy—in some form or another—will undoubtedly remain an important political commitment for environmentalists in the coming battles.

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Recent Advances in Microfluidics (Paper Bases Sensors)

Shivangi*

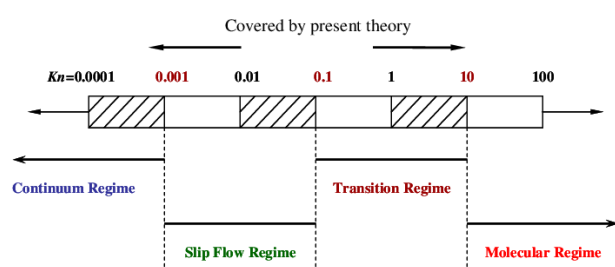
This paper is focused on recent advances in the field of microfluidics. Here we get information about how we can use microfluidics as a boon in our life like lab-on-a-chip technology. Microfluidics is manipulation of fluids on nano or micro level. Paper-based sensors provide affordable platforms for simple, accurate, and rapid detection of diseases, in addition to monitoring food quality, environmental and sun exposure, and detection of pathogens. Paper-based devices provide an inexpensive technology for fabrication of simple and portable diagnostic systems that can be immensely useful in resource-limited settings, such as in developing countries or austere environments, where fully-equipped facilities and highly trained medical staff are absent. The knowledge about microfluidics, its use in different fields and some very useful applications are shown here.

WHAT IS MICROFLUIDICS?

It is the science and technology of systems that process or manipulate small (10⁻⁶ to 10⁻¹² litres), amounts of fluids, using channels with dimensions of tens to hundreds of micrometers. It refers to the behaviour, precise control, and manipulation of fluids that are geometrically constrained to a small scale at which surface forces dominate volumetric forces. It is a multidisciplinary field that involves engineering, physics, chemistry, biochemistry, nanotechnology and biotechnology.

PHYSICS OF MICROFLUIDICS

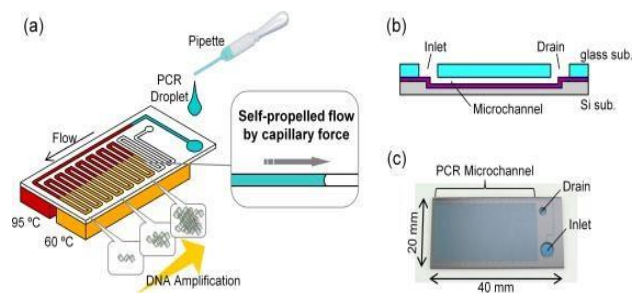
Knudsen number = λ/L or ratio of molecular mean free path length to a representative physical length scale. For microfluidics, Knudsen number is of the order 10⁻⁷. In microfluidics viscous forces tend to dominate inertial forces.



APPLICATIONS OF MICROFLUIDICS

- ⊙ Polymerase chain reactions
- ⊙ Immunoassays
- ⊙ Drug screening
- ⊙ Analysis of unpurified blood samples
- ⊙ DNA sequencing
- ⊙ Lab-on-a-chip
- ⊙ Polymerase chain reaction-

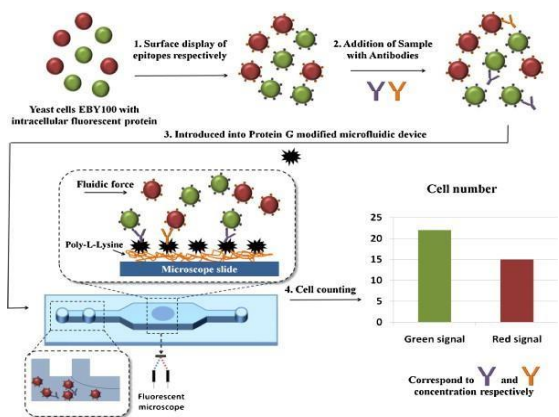
Polymerase chain reaction (PCR) is a laboratory technique used to amplify DNA sequences. It is used to make millions to billions of copies of specific DNA sample and makes it easier for scientists to study the sample. Below shown is the example of polymerase chain reaction for DNA amplification.



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© **Immunoassays-**

A biochemical test that measures the presence or concentration of a macromolecule or small molecule in a solution. Below shown is the example of a figure on immuoassays for detection of yeast cells.



© **Lab-on-a-chip**

It is a miniaturised device that integrates onto a single chip one or several analysis, which are usually done in a laboratory. Lab-on-a-chip is going to be a promising and effective technology in upcoming future. About 70% of the deaths occur due to late diagnosis of the problem. In many areas there is not availability of proper staff and medical Instruments to diagnose the problem. Lab-on-a-chip as the name says is a chip shaped device which can perform the tests on s chip for which we need a whole laboratory.

Low cost and high impact microfluidics

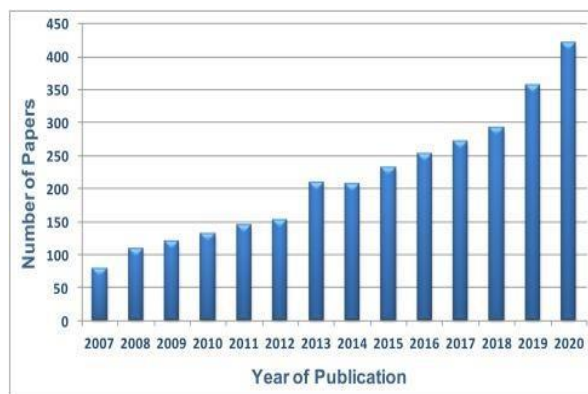
	Paper	Textile	Plastic
common material	Nylon and polyvinylidene fluoride	Cotton,silk	polyacrylamid
Transport	Capillary action	Capillary action	Laminar bulk flow
Purpose	Immunoassay, pH detection	Immunoassay, pH detection	Cell separation, cell culture

Plastic based microfluidics:

- © Use of material such as polydimethisiloxane (PDMS), Acrylic (PMMA), polystyrene, polysulphone (PSU),etc.
- © It is used for variety of applications that cannot be achieved with paper.

Textile microfluidics:

Useful for producing wearable devices and an alternative to paper.



Out of the three types mentioned in previous slide, paper based microfluidics had shown a rapid growth in research field (can be seen in graph above). Paper based sensors in paper microfluidics has recent advances in the field of paper microfluidics.

Paper based microfluidics

It is the branch of microfluidics involving devices made out of paper, or other porous membranes that wick fluids by capillary action.They can manipulate small volume of fluids(10⁻⁶ to 10⁻⁹)by capillary action.They are disposable and biodegradable .

Paper based sensors

Paper-based sensors are a new alternative technology for fabricating simple, low-cost, portable and disposable analytical devices.These analytical devices can be integrated in a manner that is flexible, portable, disposable and easy to operate.Paper has become a promising platform for lab-on-a-chip devices.

APPLICATION AREAS

• *Medical Diagnostics-*

Paper sensing devices are attractive as potential lab-on-a-chip (LOC) devices. The ideas of LOC are mainly to minimise the scale of laboratory tests and allow portable POC diagnostics and on-site detection

• *Food Quality Control*

In the food industry, food quality control from the production process until the packaging stage is very important before a product can enter the market for which we use paper based sensors.

• *Environmental Monitoring*

In environmental monitoring, real time detection of heavy metals and other pollutants is important as sample conditions can fluctuate over the day and also over the time course of collection and transportation back to the lab for which we need sensors for onsite detection and accurate monitoring.

LAB-ON-A-CHIP

Lab-on-Chip technology implies those techniques that perform various laboratory operations on a miniaturized scale such as chemical synthesis and analysis on a single chip leading to a handheld and portable device. In other words, LoC is a device which is capable of scaling the single or multiple laboratory functions down to chip-format. The size of this chip ranges from millimeters to a few square centimeters. LOCs prove to be useful for finding the methods for early stage diagnosis of deadly and chronic diseases. The LoC processing initiates by collecting the physiological sample and then from this sample, the extraction of particular analyte/biomarker is done. Depending upon the biomedical application, the transducer will act on the analyte electrically, electromechanically optically or mechanically. The next step involves counting, sorting and amplification of the transducer output is performed according to the

application. Finally, the amplified sample is processed using microelectronics techniques. Current trend shows the growth of research in this area.

A LoC is a device which is capable of scaling the single or multiple laboratory functions down to chip-format. The size of this chip ranges from millimetres to few square centimetres. Extremely small fluid volumes of less than pico litres can be handled by LoC. LoC technology is closely related to the microfluidics which is primarily the combination of physics, the study and manipulation of small quantities of fluids. The applications of LoC in the medical field such as to diagnose HIV infections and in the field of plant sciences have been explored. The scaling of one or several of the lab processes onto a single chip-format is known as LoC which has the capability of handling micro and nano particles by combining several laboratory functions on one chip.

CONCLUSION

Paper microfluidics are not the most efficient or useful systems to transport liquids when taken as independent systems; neither are bioactive papers particularly sensitive or accurate for medical diagnostics. However, combining microfluidics with bioactive paper enables the creation of invaluable diagnostics for health care applications. This is the result of the very low price, great design and flexibility, and simplicity of use given by paper-based diagnostics. Paper-based microfluidic devices have the potential to become a disruptive technology in the diagnostics and healthcare industries. The current COVID-19 pandemic has highlighted the need for reliable POC diagnostic tests that can be developed quickly.

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The Contribution of Renewable Energy to the Realization of Sustainable Development Goals

Atul Mishra*

The need for energy and environmental protection has significantly increased throughout the world in recent years. As a result, these two topics have drawn more attention from researchers. This paper gives an overview of the state of energy and environmental research at the moment, highlighting emerging trends and pressing problems. The article also offers thorough examination of a variety of subjects, including energy storage, climate change, renewable energy, clean energy technology, and energy efficiency. The report finishes by detailing some viable remedies for the upcoming energy and environmental problems.

INTRODUCTION

The environment and energy are two of the most crucial issues facing the globe today. There is a need to create sustainable solutions that are both commercially feasible and environmentally friendly due to the rising worldwide need for energy. As climate change and other environmental challenges have gotten more urgent, protecting the environment has also become a top priority. As a result, environmental and energy research is now more crucial than ever.

A summary of the state of energy and environmental research is given in this publication. It opens with a basic summary of the trends and difficulties that researchers are now confronting. The study then offers a thorough analysis of a variety of subjects, including energy storage, climate change, renewable energy, clean energy technology, and energy efficiency. Consideration of potential answers to the energy and environmental problems of the future concludes the article.

OVERVIEW OF PRESENT ISSUES AND TRENDS

The importance of energy and environmental preservation has grown over the past few years. As a result, research in both fields has sharpened and advanced. Researchers are now investigating the potential of renewable energy sources including solar and wind power as well as ways to make conventional energy sources more efficient and cost-effective. In order to use energy more effectively, experts are also looking at ways to store it.

Environment-related research is concentrating on methods to lessen greenhouse gas emissions and lessen the effects of climate change. The creation of clean energy technology and the application of renewable energy sources fall under this category. Also, research is being done on alternative ways to reduce emissions as well as the possibilities of carbon capture and storage.

Researchers are also looking into ways to lessen how energy production and usage affect the environment. This entails investigating the potential for energy efficiency and conservation as well as investigating the possibility for renewable energy sources.

ENERGY SAVINGS

Any endeavour to lower energy use and its negative effects on the environment must include energy efficiency. To achieve this, less energy must be consumed in order to

generate an equivalent quantity of energy.

There are several strategies to increase energy efficiency, such as using more energy-efficient equipment, greater insulation, and better lighting.

ALTERNATIVE ENERGY

The importance of renewable energy sources like solar, wind, and geothermal power is rising as the globe seeks to lessen its reliance on fossil fuels. The fact that renewable energy sources are clean, abundant, and emission-free is just one of their many benefits. They can, however, have significant disadvantages, such as being more expensive than conventional energy sources.

TECHNOLOGY FOR CLEAN ENERGY

Technologies that use clean energy are intended to lower emissions and increase energy efficiency. This covers the utilisation of solar energy systems, wind turbines, and other energy-generating equipment that doesn't rely on fossil fuels.

ENERGY RESERVES

Any endeavors to increase the effectiveness and cost-effectiveness of renewable energy sources must include energy storage. In order to store energy for later use, this includes the use of technologies like batteries, fuel cells, and flywheels.

CHANGING CLIMATE

One of the most important environmental issues of our day is climate change. As a result, it is now more crucial than ever to do research on how to cut greenhouse gas emissions and lessen the effects of climate change. The creation of clean energy technology, the utilization of renewable energy sources, and the possibility for carbon capture and storage are all included in this.

CONCLUSION

Two of the most crucial challenges affecting the globe today are energy and the environment. As a result, study in these two fields has grown in significance. This paper gave an assessment of the state of energy and environmental research at the moment, stressing emerging trends and pressing problems. In-depth analyses of a variety of subjects, such as energy storage, climate change, renewable energy, clean energy technology, and energy efficiency, were also included in the study. The report concluded by outlining some potential answers to the energy and environmental problems of the future.

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Theoretical Approaches to Environmental Democracy

Keshav Gupta* Jatin Kashyap**

Demolition waste refers to the debris produced during the dismantling of a structure. In India, the construction sector produces approximately 10-12 million tons of waste each year. Although recoverable materials such as bricks, wood, and metal undergo recycling processes in the country, the recycling of concrete and masonry waste, which constitutes over 50% of the total waste generated, is currently not implemented. The paper presents the experimental studies on the properties of recycled aggregate concrete and compared results with the natural aggregate concrete at the same proportions of mixes. Recycled aggregate concrete was prepared by replacing the natural coarse aggregate with recycled coarse aggregate at 0%, 25%, 50% and 100% replacement. The experimental investigation was performed in 2 phases. In 1st phase, physical properties of coarse aggregate such as specific gravity, crushing value, Los Angeles, Abrasion resistance were determined for recycled aggregate and compared with requirements of coarse aggregates to use in the road pavement. Results after environmental investigation have shown that coarse aggregate is not fit for the surface coarse because of high abrasion value, but it can be used as sub base coarse in rural roads. In 2nd phase, different properties of concrete were determined such as slump, compressive strength with different percentage of replacement Natural Coarse Aggregates with Recycled Aggregate.

Keywords: Recycled Aggregate; Sustainability; Construction Material; Waste; Concrete

LIST OF NOTATIONS

C&D	Construction and Demolition
R.A.	Recycled Aggregate
R.A.C.	Recycled Aggregate Concrete
R.C.A.	Recycled Coarse Aggregate
F.R.A.	Fine Recycled Aggregate
C.R.A.	Coarse Recycled Aggregate
M.K.	Metakaolin
N.C.A.	Natural Coarse aggregate
N.A.C.	Natural Aggregate Concrete
W/C	Water and Cement Ratio

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INTRODUCTION

Sustainability of construction materials has become an important area of research to reduce the depletion of natural resources and to overcome the problem of demolition waste disposal. One of the ways to produce sustainable concrete is to use the Recycled Aggregate (RA) obtained from the demolished concrete as an aggregate source for new concrete.

The unlawful disposal of waste in urban regions, adjacent creeks, roads, and unprepared locations carries significant environmental and economic repercussions, leading to financial challenges for both the community and public administration. Over recent years, governments have enacted new policies addressing responsibilities, disposal practices, and the overall recycling of waste.

Workability and Compressive strength of concrete were studied with respect to variables percentage of Recycled aggregate. The investigation involved the assessment of these characteristics at curing durations of 7, 14, and 28 days. This analysis considered water-to-cement ratios of 0.5 and four varying proportions (0%, 25%, 50%, and 100%) of recycled coarse aggregates replacing the conventional natural aggregate.

One important materials is aggregate which provides the strength to concrete. Concrete is the most common material used for construction around the world. In August 2020, the Building Material Promotion Council (BMPTC) disclosed that India produces approximately 150 million tons of construction and demolition (C&D) waste annually. These discarded materials are frequently deposited on the ground without being repurposed, adversely impacting the environment and soil fertility.

METHODOLOGY

2.1. Experimental Program

Recycled concrete was formed in the study which contained recycled aggregate as coarse

aggregate, sand (as fine aggregate), Ordinary Portland Cement (OPC) between the proportion of concrete mix. The maximum size of coarse aggregate for both natural and recycled aggregate was used down to 20 mm size.

Experiments had been conducted on both recycled and natural coarse aggregate to determine their impact value, crushing value, specific gravity, abrasion resistance and water absorption.

Mix proportions were made up into 4 types by replacing the natural aggregate with recycled concrete aggregate with various percentages of 0%, 25%, 50% and 100% of RCA and then the compressive strength was determined at 7th, 14th and 28th day by keeping them into curing pond for the same duration. According to **IS 456:2000**, the size of concrete cubes were taken 150mm x 150mm x 150mm.

Experiments Performed in Laboratory

2.2.1. Flakiness Index

Flakiness particles are the particles whose, least lateral dimension is smaller than 0.6 times of its mean diameter. It is defined as % of flaky particles in the sample.

The test was not applicable for the particle size smaller than 6.3 mm. To conduct this test effectively, it is necessary to evaluate a substantial number of aggregates, ensuring that 200 pieces from each fraction can be gauged. Flaky aggregate must not be more than 15% in general to be used for preparation of concrete.

Particles of each fraction were passed turn by turn, through the respective opening over the thickness gauge (also known as Flakiness Index Scale) as shown in Figure 1 and weight of aggregates passing through the opening was recorded.

Flakiness test was performed for both recycled aggregate and natural aggregates and the readings were taken accordingly.

- The readings obtained from the test were 14.2% for NCA and 19.5% for RCA.



Figure 1: Flakiness Index Scale

2.2.2. Elongation Index

Elongated aggregates are aggregates whose greatest size is greater than 1.8 times of its mean size. Elongation of the aggregate is measured in terms of parameter elongation index, which represents the % of elongated particles in the sample. This test is not applicable for aggregate having size smaller than 6.3 mm.

In order to perform this test, sufficient number of aggregates were taken such that 200 pieces from each fraction can be gauged. Particles were passed through, respective opening over the length gauge (also known as Elongation Index Scale) as shown in Figure 2 and aggregates retained over those opening were weighed.

The elongation test was performed for both recycled and natural aggregates.

- Elongation Index for Natural aggregate was found out to be 15.8%
- Elongation Index for Recycled aggregate was found out to be 26.2%



Figure 2: Elongation Index Scale

2.2.3. Impact Value

The aggregate impact value is used for determining toughness of aggregates which is resistance to abrupt impact or shock which is a metric that can vary from the resistance to a slowly applied compressive load..

For performing this test, aggregates were sieved to 10-12.5 mm and then filled in three layers by tamping it in every layer in cylinder cup. After that, the cylinder cup was kept in Impact Testing machine on Circular Base so that the authors could drop hammer 15 times on the cylinder cup. After hammering, the sample was sieved through 2.36 mm sieve and then weighted so that the authors could calculate Aggregate Impact Value for checking whether the aggregate was suitable for construction.

- Aggregate impact value of NCA was found out to be 17.2%
- Aggregate impact value of RCA was found out to be 18.8%

2.2.4. Aggregate Crushing Value

Aggregate crushing test is used for checking the strength of aggregates which is a numerical index of the resistance of aggregates to crushing under a gradually applied compressive load under standardized conditions.

For performing test, aggregates from 10 to 12.5 mm were sieved and then these aggregates were filled into the cylindrical mould in three layers by tamping 25 times in all three layers, as in Figure 3. Then, this cylinder was kept in compression testing machine under the plunger at given specified place, after that the load was

applied at the rate of 4 Tonne/minute for 10 minutes. Then the cylindrical aggregate was taken and sieved it through 2.36 mm after weighing it. Aggregate crushing value was calculated afterwards.

- Aggregate crushing value for NCA was found out to be 20.32%
- Aggregate crushing value for RCA was found out to be 21.38%



Figure 3: Cylinder, Mould, Plunger and Base Plate

2.2.5. Specific Gravity

Specific gravity refers to the ratio of the density of a substance to the density of a reference substance (typically water). Aggregates characterized by lower specific gravity is generally weaker than those with higher specific gravity values.

This test measures the quality of strength of material. For performing this test, a 2000 g sample was taken and was contained into the wire basket, merged into the water and weighted by the balance then carried it into the water about $24 \pm \frac{1}{2}$ hrs and then the sample was removed from the wire basket and the sample was dried with the help of a clean cloth after that the sample was weighed again and then the sample was carried into the oven at $100-110^{\circ}\text{C}$ for 24 hrs then the weight of the sample was taken again.

- Specific Gravity of NCA was found out to be 2.7
- Specific Gravity of RCA was found out to be 2.58
- Specific Gravity of Fine Aggregate was found out to be 3.01 by Pycnometer as shown in Figure 4.



Figure 4: Pycnometer

2.2.6. Water Absorption

The level of water absorption provides insights into the internal composition of aggregates. Aggregates with higher absorption tend to be more porous, and, typically, they are deemed appropriate (unless deemed acceptable through strength, impact, and hardness assessments).

In this test, aggregates of weight 2000 g were taken. They were washed and placed in wire basket, then immersed in water for removing entrapped air and this basket was dropped inside water 25 times by taking 25 mm gap below. Then aggregate were kept in water around 24 hrs. Then, the sample was weighted after removing from water after 24 hrs and the water absorption value was calculated.

- Water absorption of NCA was found out to be 2.76%
- Water absorption of RCA was found out to be 3.3%

2.2.7. Abrasion Resistance

Abrasion test is done by Los Angeles Apparatus which is used for measure of toughness and abrasion resistance such as crushing, degradation.

For testing, 5 kg sample of aggregates was taken in which 2.5 kg consists of 10-12 mm and remaining 2.5 kg consists of greater than that size. After that, the aggregates were placed into Los Angeles apparatus along with 11 balls and then

the revolution of aggregates for 500 times was done. Then after the revolution, the samples were removed from apparatus and then sieved it through 1.7 mm and then, the abrasion value was calculated and checked for its suitability.

- Abrasion resistance value of NCA was found out to be 29%
- Abrasion resistance value of RCA was found out to be 31.6%

2.2.8. Compressive Strength of Cubes

The compressive strength test of concrete cubes is done to determine the ability of cubes to carry the loads on its surface without any crack or deflection.

For performing this test, M20 grade of concrete was taken, then after mixing the concrete was placed in cube of size 150mm x 150mm x 150mm (as recommended by the IS 456:2000 for compressive strength of concrete) followed by tamping which was done to remove the air voids from the concrete. After tamping the cube properly, it was placed at room temperature for 24hrs as shown in Figure 5. Finally cubes were placed in water tank for curing. Cube strength was tested at 7th day, 14th day and 28th day and the readings were noted as in Figure 6.

The cube strength at:-

- On 7th day was nearly 65%
- On 14th day was nearly 90%
- On 28th day was nearly 99%



Figure 5: Cubes Casting of M20 Grade of Concrete



Figure 6: Compressive Readings of Cubes

2.2.9. Workability

It is the ease with which one can work with concrete. There are various tests for checking workability, in which the authors have done slump test for checking workability of concrete.

Workability	Slump Value (mm)
Very low	0-25
Low	25-50
Medium	50-100
High	100-175

Table 1: Workability and Slump Value (mm)

The apparatus of this test consisted of steel mould in the shape of frustum and tamping rod. In order to perform this test, mould was placed over the leveled ground and concrete was filled in four layers and in every layer the authors have done 25 number of tamping for the full compaction with help of tamping rod. Once the mould was completely filled it was raised in upward direction that caused concrete to subsidize which indicated the workability of concrete in terms of slump values as reported in Table 1, also the shape of slump indicated the property of concrete in terms of cohesion, as shown in Figure 7 and Figure 8.



Figure 7: Pulling of Mould of Slump Test

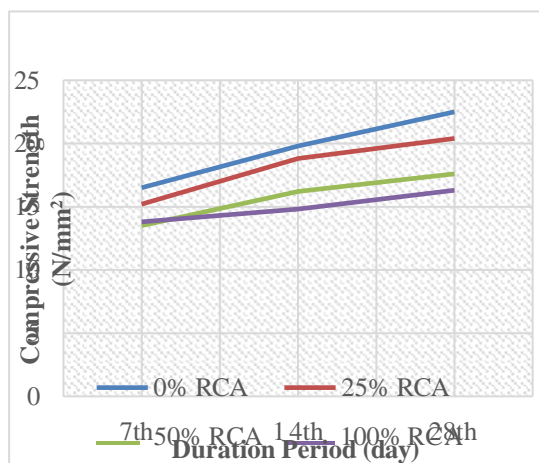


Figure 8: Slump Reading

RESULTS AND DISCUSSIONS

3.1. Observations

Tests Performed	Standard Value as per IS Code	Natural Coarse Aggregate	Recycled Coarse Aggregate
Flakiness Index	<2	14	19.
Elongation Index	5%	.2%	5%
Elongation Index	<1	15	26.
Elongation Index	5%	.8%	2%

Impact Value	10	17	18.
Crushing Value	-20%	.2%	8%
Specific Gravity	≥ 30%	.32%	38 %
Water Absorption	2.	2.	2.5
Abrasion Resistance	5-3%	7%	8%
	<3	2.	3.3
	%	76%	%
	<3	29	31.
	0%	%	6%

Table 2: Tests on Different Types of Coarse Aggregates

The experiment results, the specific gravity, abrasion resistance, the absorption capacity, the crushing value and the impact value of the recycled coarse aggregate was found to be less than the natural aggregates per results and observations – shown in Table 2. (Note: Specific Gravity of Fine Aggregate is found out to be 3.01)

Duration of Cube Samples	No. of Cubes	0% R.C.A.	25% R.C.A.	50% R.C.A.	100% R.C.A.
7th Day	3	16.5	15.2	13.5	12
14th Day	3	19.8	18.8	16.2	14.8
28th Day	3	22.5	20.4	17.6	16.3

Table 3: Compressive Strength of Cubes (MPa or N/mm²) of Concrete M20 Grade

Strength at different compressive strength of different percentage of replacement with RCA after 7 days, 14 days and 28 days test was observed - as one increased the percentage of recycled aggregate-the strength of concrete

reduced continuously at all the ages, as shown in Table 3.

Compressive strength of different percentage of replacement with RCA after 7 days, 14 days and 28 days test were observed - as one increased the percentage of recycled aggregate-the strength of concrete reduced continuously at all the ages. When the replacement was more than 25 percent then there was a considerable change in the strength of concrete. So it was preferred to replace less than 25 percentages for important structures.

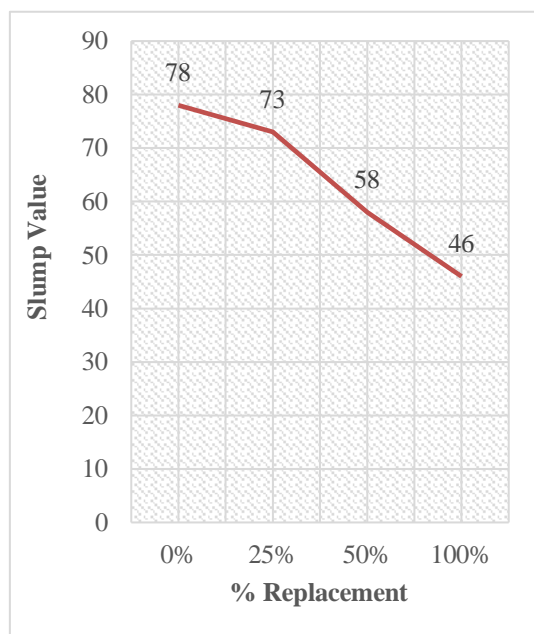


Figure 10: Workability of Samples

Workability increased with the increase in W/C ratio, while the addition of RCA decreased it, as shown in Figure 10 which contained slump value of concrete for different percentage of replacement of RCA too. The decrease in workability values associated with an increase in Recycled Concrete Aggregates (RCA) can be attributed to various significant factors. The increased surface area and rougher shape of RCA, in comparison to Natural Concrete Aggregates (NCA), result in heightened inter-particle frictional resistance among recycled concrete particles, ultimately diminishing workability. Furthermore, the presence of more voids in RCA enhances the water absorption

capacity of the concrete, leading to reduced workability. During the mixing process, recycled aggregates undergo partial transformation into smaller particles. These finer particles, characterized by a larger surface area, exhibit a higher water absorption rate than coarse aggregates, contributing to a decline in workability as their proportion increases.

DISCUSSIONS

High water absorption showed high voids in RCA and this increased W/C ratio to attain a proper workability. The significant impact of curing time on strength is a well-established fact. As curing time increases, there is a notable and considerable improvement in strength. Both NCA & RCA could resist to sudden impact load but NCA was found to be better than RCA. The introduction of recycled concrete aggregate (RCA) into the concrete mix resulted in a decline in compressive strength across all age levels. The reduction in strength became more apparent as the percentage of RCA in the mix increased. The results had shown that replacement of Aggregate, i.e. > 25% made a considerable change in the strength of concrete. 100% replacement of NCA by RCA was found to be not suitable for any kind of construction work. Due to abrasion value of RCA being 31.6% it could not be used in cement concrete pavement as wearing surface, the maximum abrasion value was 30%. RCA could be used in sub-base course because the maximum abrasion value for the Cement Concrete Pavement (other than wearing surface) was 50%.

CONCLUSIONS

After performing various experiments on aggregates and finding the results, the authors could conclude that with the increase in the percentage of replacement of natural aggregate by recycled aggregate there was a continuous decrease in the strength of concrete when the replacement was more than 25%. There was a

considerable change in the strength of concrete; therefore the authors couldn't prefer replacement more than 25%. It was also concluded that the replacement was not suitable for the workability of concrete as increase in the percentage of replacement caused decrease in workability because of water absorption by recycled aggregate. It could also be concluded from statistical analysis that RCA had a great impact on workability. This was due to the rough surface texture of RCA with more pores and cavities compared to NCA. (Not only does the rough texture of RCA absorb more water than NCA, it also increased the friction between particles). Therefore, less effective water for lubrication and greater friction as a result of RCA addition resulted in significant slump reduction. In this study, the use of construction and demolition debris as a replacement for coarse aggregates in concrete was evaluated with regard to workability and compressive strength. The results indicated that the use of recycled coarse aggregate (RCA) had a significant negative effect on workability. Although the

addition of RCA decreases compressive strength, the strength reduction was not significant even by comparing the highest RCA replacement with the lowest one. (Since the effect of W/C ratio from 0.4 to 0.5 was not significant on compressive strength thus, higher W/C ratio could be used in order to compensate the slump decrease due to RCA application). Finally, it could be concluded that as the percentage of recycled coarse aggregate was increased, the compressive strength and the slump of the concrete decreased correspondingly.

ACKNOWLEDGMENT

The authors would like to acknowledge the ADGITM for providing access to key documents that have allowed the authors to perform this study and also like to extend to gratitude to laboratory in-charges of Civil Engineering Department, ADGITM for their help and guidance to performing the experiments effectively.

The authors would express gratitude to the mentor for his guidance, efforts and care.

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Genetically Modified Crops as a Solution to World Hunger

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In some countries who are suffering from hunger and malnutrition, achieving food security is a huge and a major task during these global times. Since the population of the world is rapidly increasing, addressing these issues is a major challenge and a constraint as there are lack of resources such as limited availability of land, where it's not possible to increase crop yield.

Biotechnology which can act as a source in providing Genetically Modified Crops can be a viable solution for these malnourished and poverty – driven countries, however, there are different perspectives given by different people where there is a possibility of severe harmful effects on our health and can also be a serious concern towards environmental damage as well.

As per the scientific methodologies and findings, there is enough researched backed evidence that these crops are grown under suitable favorable environmental conditions with stricter regulations, monitoring and also its risk and health parameters are also assessed. The only way to bridge the gap is to clear out the misconceptions and avoid misunderstanding by spreading awareness and education amongst us and lastly providing conceptual facts and proper information to remove all biasness, so that important decisions can be taken without hesitating.

Thus, the main purpose behind this research is to brainstorm ways in providing all the necessary information about GM Crops to the corner parts of our country.

Keywords – Genetically Modified Crops, Food Security, Controversial Topic, Undernourished Population, Dynamic / Multifaceted Strategy, Agricultural Productivity, biodiversity / sustainable agriculture, Existing Farmland, Biotechnology, Organic Farming, Artificial Selection, Biofortification, Precise DNA Integration, Stress Tolerance, high – yielding, disease resistant, climate – resilient crop varieties, Sustained Investments and partnerships, Intellectual Property and regulatory affairs, genetic engineering, genetic modification, Unsustainable Farming Practices, Environmental Degradation, Stress – Resistant Crops, Disease – Resistant Animals, CGE Model, GTAP – BIO, sperm head, motility, abnormality and fertility index, Social and Economic Development.

INTRODUCTION

Hunger is one of the global challenges faced by our nation of this century. Even after some improvements within 20 years, global hunger is gradually pacing its level and the 2016 data shows that around 800 million people in the world are malnourished. Out of 150 million people, there are 3 million children below the 5 years of age category who struggle to death.

Thus, Genetically Modified Crops is among the proposed and recommended solutions to tackle this crisis.

These crops have been modified, using genetic engineering, to change their DNA sequences for producing and maintaining higher quality standards of the food. These crops can withstand environmental challenges and they are completely free from pesticides and chemicals because of which it is eco and environmentally friendly and these are created in the sense to tackle poverty, enhance nutrition by providing critical vitamins to those malnourished people who do not get specific nutrients needed for healthy living.

Since the world population is rising rapidly in most of the developing countries and due to unsustainable farming practices and environmental degradation the requirements cannot be met which lead to higher expenditures incurred by the government on agricultural imports and higher food prices and thus, people should utilize their savings and money in investing

in biotechnological projects for increasing their income and boosts employment opportunities for rural populations in many parts of the world to achieve sustainability and can avert crisis situation easily. The rise in the income not only benefits the individuals (especially farmers), but also it enhances the dietary quality and maintains the level of the calorie consumption of the person as well.

These crops produce high yield, disease resistant and climate resilient crop varieties in a short span of time compared to using traditional methods.

These plants are mainly produced by only few large profit making corporations who owns the intellectual property and regulatory framework for the genetic variations and because of which there is a corrupt political relationship which is strike between the industry and the government and thus, the marginalized farmers are forced out of the business. There is also exploitation amongst people where distribution of income is not equal and lastly there is lack of resources in developing countries where there is limited availability of land of growing and less supply of farming supplies for producing nutritious food. However, in order to make sure that food security is achieved, Genetically Modified Crops can be used as a viable option for growing better quality of food on the existing farmland.

However, there are some controversies and challenges which are faced by the population while using GM food.

Since there has been a rise in the consumption of GM Crops, there have been issues among the public with regards to their potential negative and harmful effects on the environment and on our health such as causing cancer because of which the countries are hesitant in adopting them and won't be able to achieve food security and with the sudden rise in population, there was social and political unrest in many developing nations and was susceptible towards danger and thus, there were partial and complete bans by the

policymakers in those countries.

There are some people who personally feel that Organic Farming is the only sole key for eliminating hunger and there is always a question in our mind that whether it would be able to improve the quality of the food or not, and on the secondhand, the GM Crops can be used as an alternative resource to combat food insecurity and hunger, but again the question arises with respect to its technology. Organic Farming can enhance long term sustainability and improve biodiversity, but due to insufficient availability of land, its efficiency cannot be increased, whereas on the other hand, GM Crops can maximize the efficiency of the crops on the existing land.

Therefore, the compilation and coexistence of Organic Farming Systems and GM Crops will open and boost up more market opportunities, maintain cultural values, conserve and preserve biodiversity to ensure food security and safety in developing countries.

Therefore, a dynamic and a multifaceted strategy is required to tackle and solve the problems of hunger and malnutrition. There are appropriate policies and regulatory frameworks designed, formulated and prioritize the needs of poor farmers and consumers and should avoid negative social consequences as well and it is always advisable and beneficial in reevaluating the policies with regards to supply chain and GM crops and these crops should be grown under health and risk assessments before being introduced in the market as many genetically modified products like rice, potatoes, corn, wheat and soy should be verified and certified as safe for consumption by health institutes worldwide because of which the conflict can be mitigated and trust and acceptance can be built socially amongst people in order to achieve food security in the world.

OBJECTIVES

1. To study and analyze the strategic ways of dealing with Global Food Crisis.
2. To study and analyze the shift from Organic crops to Genetically Modified Crops
3. To study and understand the transformational change in the Agriculture Industry
4. To study and understand the experience and opinions among the people for consuming GM Crops
5. To study and understand the consumption of these crops in the long term sustainability

LITERATURE REVIEW

1. (Qaim, Kouser, 2013) This paper says that using Genetically Modified crops as a tool to address food security issues is a controversial topic. Although the availability of food production can be maximized, but there is a higher chance of possibility that it might affect the food quality and nutrient composition and lastly the income of the farmers and getting access to food is also a serious concern, especially the smallholder farmers who are a part of the world's undernourished population.

In order to study this problem, primary data was collected from the rural areas where GM cotton was widely adopted where it produces higher yields in farmer fields and also it is free from various pesticides and chemicals. This cotton helps in increasing the farmer's income and also it increases the dietary quality and maintains the calorie consumption of an individual as well.

Thus, GM Crops cannot be used as the only tool for addressing the challenges and solving the problems of hunger and malnutrition, it requires a dynamic and a multifaceted strategy to tackle this problem. There are appropriate policies and regulatory frameworks designed in such a way to prioritize the needs of poor farmers and consumers and should avoid negative social consequences as well.

2. (Sherman, 2012) According to the Researcher, In 2050, there will be a sudden rise in the world's population which would reach towards nine billion and because of which the demand and supply of food would also rise. GM Crops have the necessary features in increasing and maintaining agricultural productivity and also ensure food security as well.

However by consuming these crops, there is a higher chance of harmful effects of the environment and also our health could be susceptible towards danger. These crops are owned by the profit making corporations and because of which there is a corrupt political relationship which is strike between the industry and the government and thus, the marginalized farmers are forced out of the business.

Instead of utilizing and focusing our resources towards technology – driven crops, it will be more realistic and beneficial in allocating the resources in promoting biodiversity and natural methods of sustainable agriculture for the world to feed itself.

3. (Bansode, Andhare, 2015) As per this paper the issue of food security has become a hard pressing concern because of the sudden rise in the population because of which there is social and political unrest in many developing nations and for increasing the food production and tackle the challenges with respect to the population growth, increasing crop production on existing farmland is the only possible approach for addressing food security concerns.

Genetically modified crops have so much potential in combatting poverty, enhancing nutrition and health and promoting sustainable development and it is proven beneficial for the smallholder farmers. Biotechnology has the immense potential to promote sustainable development in two important ways –

With the help of advanced technology, the quality of production can be increased at reasonable prices beyond what can be used via traditional /

conventional methods which can be eco and environmentally friendly also.

It also increases the income and boosts employment opportunities for rural populations in many parts of the world.

4. (Taheri, Azadi, D'Haese, 2017) As per the estimates, the population will reach to 9.2 billion by 2050 which in turn leads to an increase in demand & supply of agricultural production. But there are some controversies and conflict situations amongst both Genetically Modified Crops and Organic Farming.

Some people have this opinion that Organic Farming is the only viable option to eradicate hunger, however there is a question about its ability to improve food security, whereas GM Crops can be considered as an alternative source to tackle food insecurity and hunger, but the question arises with respect to its technology.

Organic Farming can upgrade long term sustainability and enhances biodiversity, but there is limited land available to increase the efficiency, but GM Crops can maximize the efficiency of the crops on the existing land.

The study has shown that the coexistence of Organic Farming Systems and GM Crops will open up more market opportunities, maintain cultural values, and conserve biodiversity to ensure food security and safety in developing countries.

5. (Kavhiza, Zargar, Prikhodko, Pakina, Murtažova, Nakhaev, 2022) According to the Researcher, there is a Global Food Security Crisis specifically in Sub – Saharan Africa (SSA) and due to the increase in their population, they are not able to afford nutritious food and thus the problem continues to persist. GM Crops have the potential to meet and satisfy the food requirements of the people, but however they are not fully aware about them because they take precautionary steps in taking informed decisions.

It's important to be educated and have a clear cut and general understanding about the features and benefits of GM Crops and should increase their investments in biotechnological projects to have a sustainable development and can adapt to the food crisis in SSA.

6. (Raman, 2018) As per this paper, the GM Crops used to be selectively bred via artificial selection, but these crops were in a controversy as there were concerns related to insect resistance & health risks, because of which there were partial and complete bans by the policymakers in some countries.

Despite this, there has been an advancement and increase in these crops which helps them to tackle current and future challenges in commercial agriculture, as there is an increase in the growing rate of 9.83 – 10% CAGR and research into areas such as biofortification, precise DNA integration and stress tolerance.

The Agriculture Industry and the society should address these issues in making sure to avoid unethical research and make sure that conceptual facts and proper information is being delivered about the Genetically Modified Crops to the society by ensuring stricter regulations, monitoring and implementations with globally risk mitigation strategy and communication to combat imperfections and ensuring greater acceptance.

7. (Bhajan, Hasan, Haque, Islam, 2022) This paper says that during the sudden rise in the world's population, one of the challenges which needs to be met is the food requirements and since there is insufficient of cultivable land and because of the severe impact of climate change have made it more difficult for fulfilling the necessary requirements. GM Crops creates high – yielding, disease – resistant, and climate – resilient crop varieties in a shorter period of time than traditional methods. However, there has been a complete misconception that it causes harmful effects on the environment and on our health such as causing cancer because of which the countries are hesitant in adopting them and won't be able to achieve food security.

There is evidence to back the fact that they do not exhibit these risks grown under proper and supervised environmental conditions. Like Organic Farming produces low productive crops and cannot meet crop yield without the use of synthetic chemicals. But when excessive chemicals are used, then it can be fatal to us. The GM Crops should be grown under health and risk assessments before being introduced in the market and education and awareness should be provided to the public about the benefits of these crops guidelines to build trust to convince people to socially accept them and achieve food security in the world.

8. (Szenkovics, Tonk, Balog, 2020) As per this paper, there are certain factors such as Urbanization, Climate Change, Migration and Food Insecurity which are responsible for the rise in the conflict because the population is significantly increasing to 10 billion by 2100. This significance rise in the conflict led to global malnutrition in those countries where there are political conflicts.

For tackling food insecurity in those countries, sustained investments and partnerships are required to develop GM Crops, which can improve food security and can reduce political conflicts in developing countries.

It is always advisable to revisit and reevaluate the policies concerning the food supply chain and GM Crops, otherwise it won't be possible to mitigate the conflict and food insecurity would not be improved at all.

9. (Wong, Chan, 2016) According to the Researcher, GM Crops are only developed and is a commercial success because they are supervised by regulatory affairs and intellectual property (IP). Since there is an increasing influence of biotechnology, it is inevitable to use genetic engineering in the food industry. Although GM Crops have already been a developmental and a commercial success and they are widely available

in the market, but it's not possible all the time for the government's supervision to ensure safety of these crops as there is a rational call from the public which warrants attention and action.

Chinese and US Governments review their regulations on these crops and new, emerging laws can impact the development and commercialization of these crops. Supervising regulatory and IP landscapes, adaptation of evolving policies, working with experienced professionals is a realistic strategy to move the business strategy.

10. (Azadi, Taheri, Ghazali, Moghaddam, Siamian, Goli, Choobchian, Pour, Ozguven, Janeckova, Sklenicka, Witlox, 2022) This paper says that the use of genetic modification has been employed to increase crop yields for consumption purposes. But people, especially the farmers are still in doubt about the effects of the GM Crops. However, as per the study, it has been found out that in the short term, this technology improves the environmental, social and economic efficiency of farmers in developing countries. But in the long term the sustainability impact of these crops tend to reduce. There are various legal and administrative challenges and with limited access to relevant information, farmers find it difficult in dealing with GM Crops.

Most of the citizens have this perception and belief that these crops can have harmful effects on our health and has a negatively impact on the biodiversity, whereas scientists has a positive view and an approach that these crops can increase food production in an environmentally sustainable way.

11. (Olabinjo, Okunola, Olumurewa, 2019) This paper says that in many developing countries, such as Nigeria, there is a significant higher demand for food and due to unsustainable farming practices and environmental degradation the requirements cannot be met. This led to the higher expenditures incurred by the government on agricultural imports and higher food prices. Apart from incurring expenses, there are sustainable food

options available to address this issue and combat hunger and poverty.

This study focuses on GM Crops and its potential to improve food security and with the help of this study, it was found out that Nigeria faces a shortfall in domestic food production due to population growth rate of 3.2% compared to food production rate of less than 1%. Genetic Modification involves altering the natural gene sequence of living organisms and with the help of this technology virus, stress resistant crops, disease resistant animals are produced.

There are many genetically modified products like rice, potatoes, corn, wheat and soy which have been verified and certified as safe for consumption by health institutes worldwide. But although there are still concerns and controversies around the possible effects of intake of these products.

12. (Taheripour, Mahaffey, Tyner, 2016) According to the Researcher, the main aim of this research was to analyze that incase if one of the traits of GM Crops are removed, then what would be the side effects on economy and environment in US on major crops like Corn, Soybeans and Cotton. With the help of this study, CGE model and GTAP-BIO determined that some portion of land (pasture & forests) needs to be converted to meet the food demand globally.

This land expansion would be similar to the entire US ethanol program and the resulting emissions greater than those from ethanol. The prices of both Corn and Soybeans would be high as 28% and 22% respectively and food prices in US increases by \$14-\$24 billion annually.

Without the adoption of GM Crops, the welfare would decrease nationally and globally.

13. (Keshani, Sharifi, Heydari, Joulaei, 2020) This paper says that as there has been a rise in the consumption of GM Crops, there have been issues among the public with regards to their potential negative effects. In order to address this issue, a study was conducted to assess the potential impact

of GM Crops on sperm parameters such as sperm head, motility, abnormality and fertility index.

On the basis of this research study, there hasn't been any significant negative impact on fertility measures such as sperm head, motility, abnormality, and overall fertility.

In order to be 100% sure of the fact, further studies should be conducted in long term to ensure that these plants do not pose any threat to consumers, particularly in relation to infertility.

14. (Tenente, 2007) As per this paper, if the communities within specific countries wants to completely eradicate global hunger, then one can't rely on food provided by other neighboring countries if it involves food dumping. Instead the communities should always accept food from others in such a way that they can be motivated to be self-sufficient in increasing their capability of food production and that can be the only way to address hunger levels.

Combating and tackling the issue of global hunger is complex and in order to make successive progress, some necessary changes needs to be made in the foreign food programs.

These communities should find more alternatives to current foreign food aid programs to reduce global hunger. Like for example, "GM Seeds for Africa" plan needs to be taken into careful consideration as they can increase food growth in rural areas and these communities can be self-sufficient as well.

15. (Sruthi, Srinivas, Ramesh, 2013) According to the Researcher, India has an important decision to take to eradicate hunger by improving their food security. Either it can adopt GM Crops to sustain the social and economic development of the country or the management of food distribution can be improved using existing techniques. If there is a disruption in the supply chain management, the government can address these issues by using the expertise of Wal-Mart and Carrefour to improve the supply chain management and thus there

would be innovation in the agricultural and food supply business in which the food security is better and malnutrition is reduced.

For further improvement in the food security, first priority should be given to climate – resilient agriculture, including methods like rainwater harvesting, aquifer recharge, promotion of fertilizer trees and improvement of soil quality and secondly regulatory structures should be established and implemented to support innovations like genetic modification. Lastly Agricultural Transformations Centre should be set up where the farm graduates should be driven and motivated to provide services during production and post-harvest phases of farming, helping male and female farmers during the entire crop cycle.

FINDINGS

Since there is insufficient amount of cultivable land available and due to the severe impact of climate change, urbanization, migration and food insecurity, it has been difficult to fulfill necessary food requirements and because of which there was a rise in the conflict due to the significant increase in the population and thus it led to global malnutrition in our nation. Therefore, in order to tackle this situation, resources should be allocated evenly to increase their investments in biotechnological projects like developing Genetically Modified Crops for achieving food security in order to attain sustainable development. But there are various misconceptions and beliefs amongst people that there are harmful effects on our health and also causes environment degradation.

However, there have been sufficient amount of laboratory tests which have been conducted and the results shows that these crops do not exhibit any health and environmental risks as long as they are grown under proper and supervised environmental conditions and before being introduced in the market, risk and health

assessments should be conducted and monitored to ensure the wellbeing of the society.

More importantly, it is also important to be educated and have a clear cut and a general understanding about the attributes of these crops. The Agriculturists and the society's people who are aware about these crops should take important steps to make sure that conceptual knowledge and adequate information should be delivered to those people who are malnourished and are living in poverty and by enforcing strict regulations, and developing, monitoring and implementing risk mitigation strategies to tackle and eliminate the faults of these crops can provide a complete assurance to people, so that they can socially accept and gain trust in consuming those food and eventually achieve food security.

Lastly, it is also advisable and suggested to revisit and reevaluate the policies concerning the food supply chain and GM Crops, otherwise it won't be possible to mitigate the conflict and food insecurity would not be improved at all.

CONCLUSION

In a lot of developing countries, there is always a rise in the demand for food and because of unsustainable and irrelevant farming practices and environmental damages, the necessary requirements cannot be met. Thus, the government had to incur heavy expenditures on agricultural imports and the cost of the food was also high which involved food dumping. The communities should always accept food from others in such a way to get motivated to be self – sufficient and independent for enhancing their capability in producing food in order to sustain themselves and this can only be the way to reduce hunger levels.

Using different strategies and the massive amount of money involved in eradicating global hunger is complex and for the nation to make successive progression, some certain and necessary changes needs to be made in the foreign food aid programs. There are other sustainable food options present to resolve this issue and combat hunger and poverty.

There are people who have different perspectives about this Farming Sector, some feel that Organic Farming is the only appropriate and a recommended solution available to resolve this global issue, however, it's not that effective and efficient enough to improve food security, whereas Genetically Modified Crops can be taken into consideration as an alternative solution to resolve the issue of food insecurity and hunger, but there is no surety about its technology.

Traditional Farming can organically and naturally develop long term sustainability and improve biodiversity, but it would be only possible, only if there is sufficient amount of land available to increase and improve its efficiency, but technology – aided crops can maximize and improve the efficiency of the crops on the used land.

This research proves that there can be a mixture and a blend of both Organic Farming and Genetically Modified Crops which will open up and expand more market opportunities, while maintaining market values and conserving biodiversity to make sure that Food Security is achieved and there is safety in these developing nations.

Although, as per this research conducted, there is evidence shows that this technology improves the efficiency of the environment, society and economy in developing countries. But in the long term, the sustainability impact of these crops tend to reduce.

As per the Researcher, India has an important and a lifetime decision to take to eradicate hunger by improving their food security and it has two choices, i.e., either it can incorporate GM Crops to improve and enhance the social and economic

sustainability and development of the country or the food supply chain and its management can be improved using existing techniques. Incase if there is any disruption in the food supply chain, the government can always take help and use the expertise of Wal-Mart and Carrefour to improve the efficiency of the food supply chain's management and therefore, there would be innovation and recreation in the agricultural food supply chain business in order to enhance the food security.

For further long term improvement in the food security, the first and utmost priority should always been given to climate – resilient agriculture, including sustainable methods like rainwater harvesting, aquifer recharge, promotion of fertilizer trees and improvement of the quality of soil. Secondly, regulatory structures should be established, implemented and monitored to support innovations like genetic modification. Lastly Agricultural Transformation Centre should be established where all the Farm Graduates should be highly driven and motivated to provide services during production and post – harvest phases of farming, helping male and female farmers during the entire crop cycle.

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Climate Change and its Effects on Human Behavior

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INTRODUCTION

From the past 3 decades, terms like “ global warming, climate change, sustainable development ” have become buzzwords for any association, community, or individual. What do we actually mean by" climate change"? It's the unforeseen shift in the rainfall patterns and temperatures across the globe. The shifts may be natural or indeed caused by man," the most dominant critter on the earth".

We, as humans, have been exploiting the gift of our mama nature, i.e., natural coffers like coal, timbers, petroleum, essence, water, etc. These coffers help us get through our diurnal chores similar as bathing, driving an auto, or indeed rest conditioning like lighting a campfire on New Year's Eve. We use air-conditioners when we feel hot or turn on the light switch when it gets dark. All these electric bias and widgets make our lives easier, but in turn, harm the terrain. The CFCS emitted by these electronic biases are man- made composites that destroy the ozone subcaste in the upmost atmosphere(stratosphere). Stratospheric ozone loss can affect in implicit detriment to mortal health and the terrain, including an increase in the prevalence of skin cancer.

The purpose of this study is to connect the blotches between the behavioural, social, and artistic confines with respect to climate change. Climate change has been an issue all over the globe. Some of them are social, behavioural, and artistic.

Climate change has an impact on heritage and biodiversity, as demonstrated by UNSECO's response to climate extremities; destruction of artistic heritage in Tonga as a result of Tropical Cyclone Gita. It might come as a shock to you, but mortal geste also affects climate change as environmental changes, including temperature elevation, and extreme rainfall events can affect the terrain, along with interpersonal and intergroup conflict, and possible cerebral torture. All the factors affecting the confines have been explained completely in the paper with expansive exploration and practical explanations

The Research Paper on Global Climate Change by Olufemi Adedeji, Okocha Reuben, and Olufemi Olatoye of the University of Ibadan, Nigeria discusses global climate change and the negative goods of climate variability, and claims that we've been using the term" global warming" in the wrong environment with regard to climate change, as stated," Global warming(as well as global cooling) refers specifically to any change in the global average face temperature." Global warming is frequently misknew to indicate that the world will warm slightly. In fact, as the average global temperature rises, the atmosphere's rotation will shift, causing certain regions of the world to warm up more and others to warm up less. Many places might indeed be cool." According to the IPCC's most recent report, the Earth's climate is changing in every region and across the whole climate system. Over hundreds to thousands of times, climatic change, similar as ocean- position rise, is unrecoverable. While global temperatures would take 20 – 30 times to homogenise. There are also profitable consequences, along with behavioural, social, and artistic changes which will be bandied latterly.

*Scholar, Asian School of Business

OBJECTIVES

- To probe the core problems of climate change.
 - Rising maximum temperatures.
 - Rising ocean situations.
 - An increase in heavy hustle.
 - Ozone subcaste reduction

- To spread mindfulness about the programs & proffers on changes passing in the terrain along with sustainable development.
 - What are Environmental Policies?
 - Policies around the world and Indian perspective
 - Legal Framework
- To understand what are the confines of climate i.e.; behavioural, social and artistic confines
- The goods of climate change on the confines using sampling analysis to compare the different goods on climate in a decade
- What can be prognosticate for the future.

METHODOLOGY

I employed a combination of qualitative and quantitative analysis in my exploration. As collecting secondary data was a task, analysing that data to read unborn issues in order to exercise care and prudence, as well as conserving it for unborn generations" sustainable development," was also a task. Sustainable development is defined as 'development that meets current demands without jeopardising unborn generations' capability to meet their own requirements.'

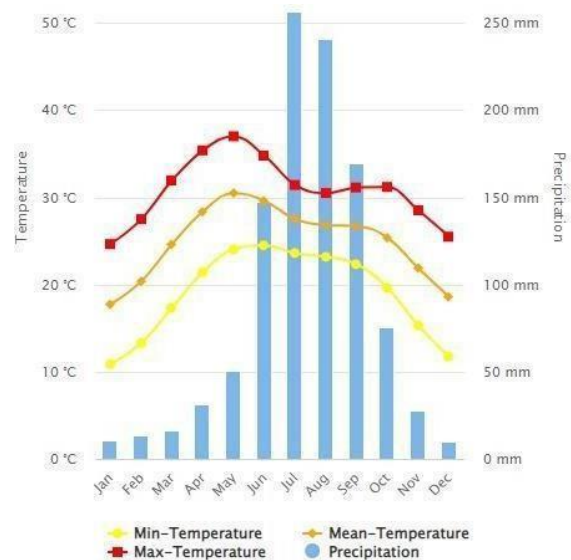
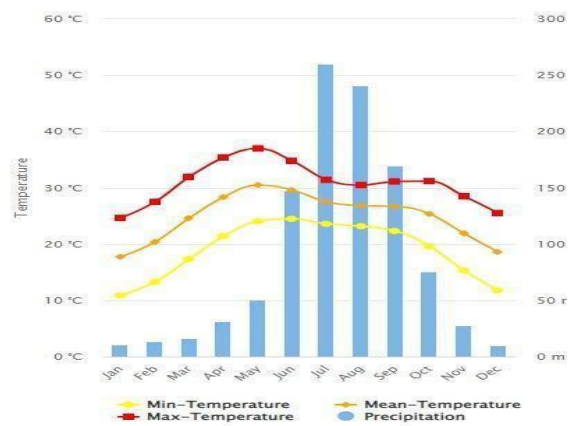
CAUSES OF CLIMATE CHANGE

The land area of India may be divided into six physiographic areas, each with its own climate

profile and vulnerability. The climate of the country is told by the presence of the Himalayas in the north and the Thar Desert in the west. The thunderstorm season lasts from June to October, with the rains coming latterly in the northerly regions and counting for about 80 of the home's periodic rush.

→ Increase in the Maximum and Minimum Temperature:

Monthly Climatology of Min-Temperature, Mean-Temperature, Max-Temperature & Precipitation 1991-2020 India



◆ In the interim, India's average annual mean temperature, 1901–2020 increased by 0.62°C per 100 years, with a very little rise in the lowest temperature (0.24°C/100 years) and a large increase in the maximum temperature (0.99°C/100 years). The winter season (0.68°C/100 years) is preceded by the post-monsoon season (0.88°C/100 years), which has

the strongest warming tendency.

→ *Rising sea levels.*

◆ Global mean sea level is directly rising due to the planet's systematic warming in two main ways: (1) melting polar ice sheets and mountain glaciers add water to the ocean; (2) warmth of the ocean water produces expansion and therefore higher volume. The worldwide mean sea level has risen by around 210–240 millimeters (mm) since 1880, with the last 25 years accounting for over a third of this rise. Right now, the annual growth is about 3 mm. Regional variations can endure for days, months, or even decades due to natural variability in local winds and ocean currents.

◆ Rising ocean conditions are putting stress on the physical bank as well as coastal habitats. Saltwater irruptions have the potential to contaminate brackish aquifers, many of which sustain natural ecosystems and external and agricultural water sources. Ocean position will rise for a long time since there is a significant lag between reaching equilibrium and the world temperatures continuing to climb. Global warming and unborn carbon dioxide emigrations will have a significant impact on the rise's magnitude, and the rate at which glaciers and ice wastes melt may lose significance.

→ *Precipitation*

◆ Precipitation trends have been significantly impacted by ENSO, which causes sea surface temperatures to rise and reduces monsoon rainfall in India.

◆ In the past, there were behavioural, social, and cultural aspects to climate change. Recent observations indicate that there have been more frequent dry spells (27 percent more often between 1981 and 2011 than between 1951 and 1980) and more intense rainy episodes during the summer monsoon season. Globally, there has been a rise in

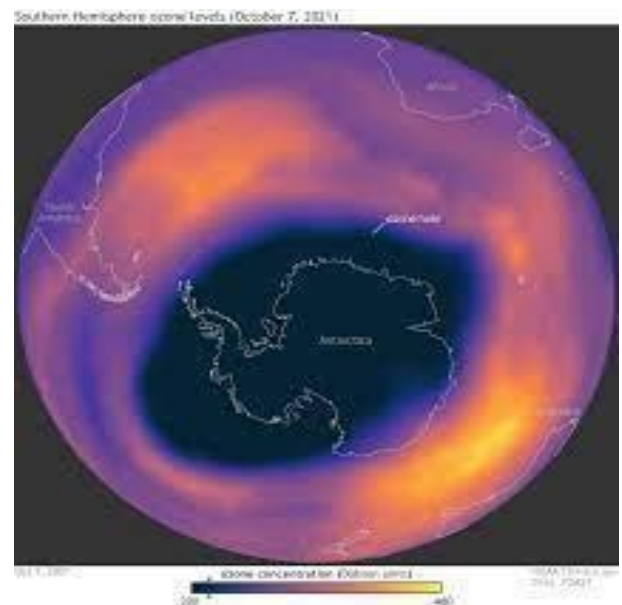
the frequency of localized heavy precipitation events in response to elevated atmospheric moisture content. In central India, the frequency of rain gauge extremes with daily rainfall intensities greater than 150 mm increased by over 75% between 1950 and 2015.

→ *Ozone layer depletion in Antarctica*

◆ The 2021 Antarctic ozone hole is the 13th largest since 1979. A colder than usual Southern Hemisphere downtime led to a deep and larger-than-average ozone hole that will probably persist into November or December. The vitality over shows the elaboration of ozone over the South Pole between January 1 and October 7, 2021.

NASA and NOAA cover the ozone hole via reciprocal necessary styles. This time's Antarctic ozone hole reached an outside of 24.8 million square kilometres (9.6 million square long hauls) before beginning to shrink in mid-October, NASA says.

◆ At the South Pole, NOAA scientists use ground-grounded measures and rainfall balloon releases to gauge the subcaste's consistence. Scientists observed a total- column ozone attention of 102 Dobson units on October 7, 2021, which is the 8th- smallest reading since 1986.



An association's adherence to environmental laws, rules, and other policy mechanisms is reflected in its environmental programs.

The preservation of biodiversity, waste management, ecosystem management, air and water pollution, wildlife protection, and endangered species are a few of these challenges.

Environmental programs correspond to two major terms: terrain and programs. Let us now break this into two corridors and understand it in summation. The term "terrain" refers to physical ecosystems, but it can also include a social dimension (quality of life, health) and a profitable dimension (resource operation, biodiversity). And policy can be defined as a "course of action or principle espoused or proposed by a government, party, business, or individual."

Environmental policy, thus, focuses on issues resulting from human influence on the environment, which affects human society by acting negatively on human ideals like health or a "clean and green" environment.

Through Environmental Performance Reviews, the United Nations Economic Commission for Europe (UNECE) assesses how well its member nations' environmental policies are working.

PRINCIPLES FOR ENVIRONMENTAL PROTECTION POLICY

➤ *The Polluters' Pays Principle*

○ The Organisation for Economic Co-operation and Development (OECD) has suggested the Polluter Pays Principle (PPP) as a general base for environmental policy. According to this, the expenditure of any measures taken to minimise pollution should be covered by the polluters.

➤ *The User Pays Principle*

○ The "User Pays" tenant is regarded as an element of PPP. According to the guiding principles, each stoner of a resource should cover the whole long-term borderline cost of using it and any connected services, including any treatment costs. When coffers are being used and consumed, it's applied.

➤ *The Precautionary Principle (PP):*

○ The preventative principle's primary thing is to help environmental detriment from being caused by substances or conditioning that pose a hazard to the terrain, indeed when there is not any solid scientific substantiation to support an unproductive relationship. Mortal intervention is what gives the words "substance" and "exertion" their meaning.

ENVIRONMENTAL POLICY OF INDIA

National Environmental Policy (2006)

The following are the objects of the public environmental policy:

1. Conservation of Critical Environmental Resources
2. Inter-governmental Equity
3. Efficiency in Environmental Resource Use
4. Environmental Governance in the management of resources
5. Enhancement of Resources
6. Livelihood Security for the Poor
7. Integration of Environmental Concerns for Socio-economic Development: To integrate environmental concerns into policies, plans, programmes, and projects for socio-economic development.

LEGAL FRAMEWORK

There are formerly numerous laws to deal with the problems of environmental pollution in India. These are the Environmental Protection Act 1986, the Water(Prevention and Control of Pollution) Act 1974, the Water Cess Act and the Air(Prevention and Control of Pollution) Act 1981. The law in respect of operation and conservation of timbers and biodiversity is contained in the Indian Forest Act 1927, The Forest(Conservation) Act 1980, The Wildlife(Protection) Act 1972 and The Biodiversity Act 2003.

CASE STUDIES

Effect of Climate Change on Tribal People.

The IPCC Second Assessment Report (1995) summary of climate change impacts mitigation of climate change does not take into account the role of indigenous peoples (Salick and Byg resources are among the most vulnerable to climate change). This is an example of the neglect of the human and social dimensions of climate change on Indigenous and other and public discourses on climate change, despite the fact that they will be greatly impacted by it.

When we approach climate change from the perspective of social development, we are first forced to consider how closely the effects of climate change are linked to worldwide trends in inequality.

Climate change acts as a multiplier of being vulnerabilities in a warming and transubstantiation the IPCC(2007) understand the social confines of climate change through the assiduity, agreement social surrounds that climate change can make a difference, easing or exacerbating multiple stresses IPCC(2007) further explains that climate change affects mortal society in three top ways. India is also passing the impacts of climate change.

Cultural Dimension.

Understanding culture fully is essential for both mitigating and adapting to climate change, as culture is a fundamental factor in framing the issue in society. It affects every aspect of life, including production, consumption, and social organisation. Therefore, cultural interpretation can be used to better understand the effects of these emissions, and culture acts as a mediator in risk assessment, responsible decision-making, and implementation.

As a result, climate change will have a negative impact on their home, causing them to lose attachment to it. Climate change is a concern on a global scale, but the effects will differ. Cultures in industrialised countries or metropolitan locations, in contrast to rural places and coastal villages, will be less impacted by climate change. As a consequence, rural residents will lose access to the cultural components that they appreciate the most. If they emigrate from one location to another, they will lose their culture because culture can only be created in a "collective" setting.

These people do not want to move since they are connected to their social and emotional support systems. It's also been discovered that place attachment has an impact on people's adaptive responses.

Henceforth, People with a strong sense of place attachment are more motivated to prepare for climate change disasters like flooding because of their social and economic links to their community. To introduce adaptation into climate change models, a simple cause-and-effect link was proposed between environmental hazards and societal responses. However, this method has failed to explain why various groups respond to the same climatic dangers in different ways. Different groups

of pastoralists in Burkina Faso, for example, have reacted to periodic droughts in different ways; the Rimaiibe have diversified their livelihoods by relying more heavily on labour migration.

Social Dimension.

Climate change will have varied degrees of impact across all cultures, from minor to major. Douglas and Wildavsky: Environmental changes, many of which are already well-known and under investigation, will not have a significant influence. They claim that climate change is allowing civilizations to recognise and actively engage in future decisions. In "Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers," Douglas and Wildavsky argue that societies with shared values and beliefs have a unique understanding of the natural environment and climatic events, and respond to climate change accordingly. Climate change adaptation is feasible, but it is limited because culture is dynamic and frequently encounters nonlinear changes.

When people relocate, they lose contact with their culture and migrate to various locations. Climate change has an impact on the culinary traditions of many tribes.

Whitefly infestations have been found in several crops, and excessive rainfall or crop loss can cause agricultural devastation. For example, India's Taj Mahal is a cultural and historical icon. India is a country rich in diversity, whether in terms of religion, caste, or culture. For instance, Niue is a Polynesian island with a population of roughly 1,500 people

CONCLUSION

To conclude this study, I'd want to state that predicting anything, whether it's the likelihood of rain today or a shift in the global climate in a decade or two, is not a simple task. However, based on

historical tendencies, if we as humans do not take responsibility on an individual or organisational level, the Earth's surface temperature will rise to a point where no micro or macro species will be able to survive. The advances and discoveries made by talented scientists and researchers will now be for naught. It also tells us that there is a direct relationship between human actions towards the environment and constant change occurring in the environment. In the case study mentioned in the methodology on the effects of climate change on Tribes, they have been neglected from the laws made by our legislature on Environment Protect though they are the ones interacting with nature constantly. I have also talked about how people's culture is dependent on the region in which they live. And our data suggest that we still have a long way to go in the context of learning the correlation of the social and cultural elements of society on the environment.

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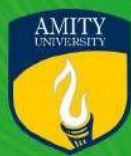
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2. Periodicity of its Publication : Bi-annual
3. Printer's Name : Venus Print Solutions
Whether citizen of India : Yes
Address : D-45, Okhla Industrial Area,
Phase-I, New Delhi-110020
4. Publisher's Name : Amity Business School
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Address : Amity Business School
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