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ENVIRONMENTAL JUSTICE IN DISASTER-PRONE AREAS

Dr. Sudipta Tripathi

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Natural hazards such as floods, cyclones, droughts, landslides, and storms affect millions of people every year. While these events can strike any region, their impacts are not felt equally. Environmental justice focuses on the fair treatment and meaningful involvement of all people in environmental decision-making and protection. In disaster-prone areas, environmental justice becomes especially important because vulnerable communities often suffer the greatest losses despite contributing the least to environmental degradation.

People living in disaster-prone regions are frequently among the poorest members of society. Many reside in low-lying floodplains, unstable hillsides, coastal zones, or informal settlements where land is cheaper but risks are higher. Limited access to safe housing, healthcare, education, and emergency services increases their vulnerability. When disasters occur, these communities face greater damage to homes, livelihoods, and essential infrastructure. Environmental injustice arises when certain groups bear a disproportionate burden of environmental risks. For example, coastal fishing communities may lose their homes and income due to repeated cyclones and rising sea levels. Farmers in drought-prone regions may struggle with crop failures and water shortages. Indigenous peoples and marginalized communities often experience displacement when development projects or disaster-recovery programs fail to consider their rights and needs.



Residents of a disaster-prone community work together to rebuild homes and restore livelihoods after a severe flood

Climate change has intensified many natural hazards, making environmental justice an even more pressing issue. Extreme rainfall, stronger storms, prolonged heat waves, and rising sea levels are increasing the frequency and severity of disasters. Although vulnerable communities contribute relatively little to global greenhouse gas emissions, they often experience the most severe consequences. This imbalance highlights the ethical responsibility of governments, industries, and societies to support those at greatest risk. Achieving environmental justice in disaster-prone areas requires inclusive planning and equitable resource distribution. Local communities should be involved in decisions regarding disaster preparedness, land-use planning, and climate adaptation strategies. Their traditional knowledge can provide valuable insights into managing environmental risks and building resilience. Disaster-risk reduction measures which include constructing resilient infrastructure, improving early-warning systems, strengthening emergency response services, and providing affordable insurance and financial assistance should be reached to vulnerable populations. Special attention should be given to women, children, elderly individuals, persons with disabilities, and marginalized groups who may face additional challenges during disasters.

Environmental justice also involves restoring ecosystems that naturally reduce disaster risks. Mangrove forests, wetlands, and natural floodplains can protect communities from storms and flooding. Conserving these ecosystems not only supports biodiversity but also enhances community resilience. Sustainable development practices can reduce environmental degradation while creating safer living conditions for future generations. Education and awareness play a crucial role in promoting environmental justice. Communities that understand disaster risks and preparedness measures are better equipped to respond effectively. Schools, local organizations, and governments should work together to provide accessible information and training.

In conclusion, environmental justice in disaster-prone areas is about ensuring that all people, regardless of income, social status, or location, have equal protection from environmental hazards and equal opportunities to recover from disasters. Building resilient communities requires fairness, participation, and sustainable environmental management. By prioritizing environmental justice, societies can reduce vulnerability, protect human rights, and create a safer future for everyone.

SOIL EROSION, LAND DEGRADATION, AND DISASTER VULNERABILITY

Dr. Sumanta Das

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Soil erosion and land degradation are a number of environmental problems that have enormous effects on system stability, production of food, and vulnerability to disasters. The erosion of soil occurs mainly through water action but is also caused by wind, removal of forest and grassland, land utilization that does not follow a sustainable approach, mining, and construction of buildings. Globally, approximately 1.56 billion ha of land has already been degraded; it corresponds to roughly 15-16% of the world's reported land areas. On one hand, around 1.3 billion people are affected directly or indirectly by degraded land, while about 1.7 billion people are suffering from decreasing crop yield due to human-induced land degradation. Below, **Table 1** summarizes the global extent, primary drivers, environmental impacts, and disaster-related consequences of soil erosion and land degradation, along with key sustainable mitigation and land restoration strategies.

Table 1: Global trends, impacts, and mitigation strategies related to soil erosion, land degradation, and disaster vulnerability

Aspect	Key information	Implications	References
Global degraded land	~1.56 billion ha degraded globally	Reduced ecosystem productivity and food security	UNCCD (2022)
Population affected	~1.3 billion people are exposed to land degradation	Increased socio-economic vulnerability	Nkonya, et al. (2016)
Crop productivity loss	1.7 billion people are facing reduced crop yields	Threat to global food systems	FAO (2021)
Soil erosion	~35.9 Pg soil lost annually, globally	Decline in soil fertility and carbon storage	Borrelli et al. (2020)
Major drivers	Deforestation, overgrazing, climate change, and unsustainable agriculture	Accelerated environmental degradation	Lal (2001)
Disaster linkages	Increased floods, droughts, landslides, and desertification	Higher disaster risk and livelihood insecurity	IPCC (2022)
Climate interactions	70% of ice-free land is affected by human activities	Reduced climate resilience	IPCC (2019)
Mitigation strategies	Afforestation, conservation agriculture, terracing, and watershed management	Enhanced resilience and sustainable land restoration	Montgomery (2007)

The rate of soil erosion has increased and accelerated with the impact of climate change, land use changes, and resource exhaustion due to unsustainability. Current data of the global estimation show that risk and intensity of soil erosion increased by approximately 11.7% from 2001 to 2013, and the protection against it decreased considerably during the same period. By the year 2012, there was 35.9 Pg soil loss globally, and regions that lost the highest amount were Sub-Saharan Africa, South-eastern Asia, and South America. While deterioration of the soil structure decreases infiltration capacity and soil organic carbon storage, it also leads to a reduction in vegetation cover, and hence it is prone to floods, drought, landslides, and desertification.

Land degradation makes societies vulnerable to disasters by disturbing the ecological equilibrium and eroding the buffering potential of the natural system. In cases of torrential rainfalls, degraded soils lead to high slope instability and excessive flow, contributing to large-scale mass wasting and increased flood risk. In case of prolonged drought, degraded drylands and overgrazed rangelands are the most vulnerable landscapes and pose extreme food insecurity and disaster risk. It has been reported that nearly half of the world's natural pasture lands are already degraded and putting two billion people's livelihoods at risk, according to UNCCD.

Climate change can further influence land degradation and hazard interaction due to an increase in precipitation extremes and intensity of evapotranspiration and accelerated depletion of soil organic matter. Humans have already had impacts on nearly 70% of the ice-free land on Earth, so it becomes crucial to manage land sustainability to combat climate change and disaster risk. Measures such as afforestation, conservation agriculture, contour farming, terracing, watershed management, and others could help to reduce the rate of soil erosion, enhance carbon sequestration, and improve socio-ecological resilience.

CLIMATE CHANGE AND THE FUTURE OF HUMANITY

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The current rising pattern of temperature, precipitation, storms, glacial retreats, rising sea levels, and their cumulative impacts is amplifying threats to humanity. This long-term, impactful global phenomenon is widely acknowledged as climate change in the history of humanity. This produces catastrophes like cyclones, floods, droughts, and many more in the varied regions of the earth. The damaging impacts of these events on the civilizations are beyond measurement and do not follow any administrative boundary.

Rising temperatures and unpredictable rainfall lead to declines in agricultural yields, affecting livelihoods and economies. Droughts and frequent floods are causing loss of lives, food insecurities, water crisis, and infrastructural damage. Unbearable climatic impacts are driving the migration of communities. Ecosystems are experiencing disruptions and struggling with their survival. Hence, climate change could be considered an environmental and human crisis that is affecting millions of people, the earth, and the environmental system in highly unpredictable ways. This indicates the future of humanity relies on efficient planning and timely decision-making to respond to these critical challenges.

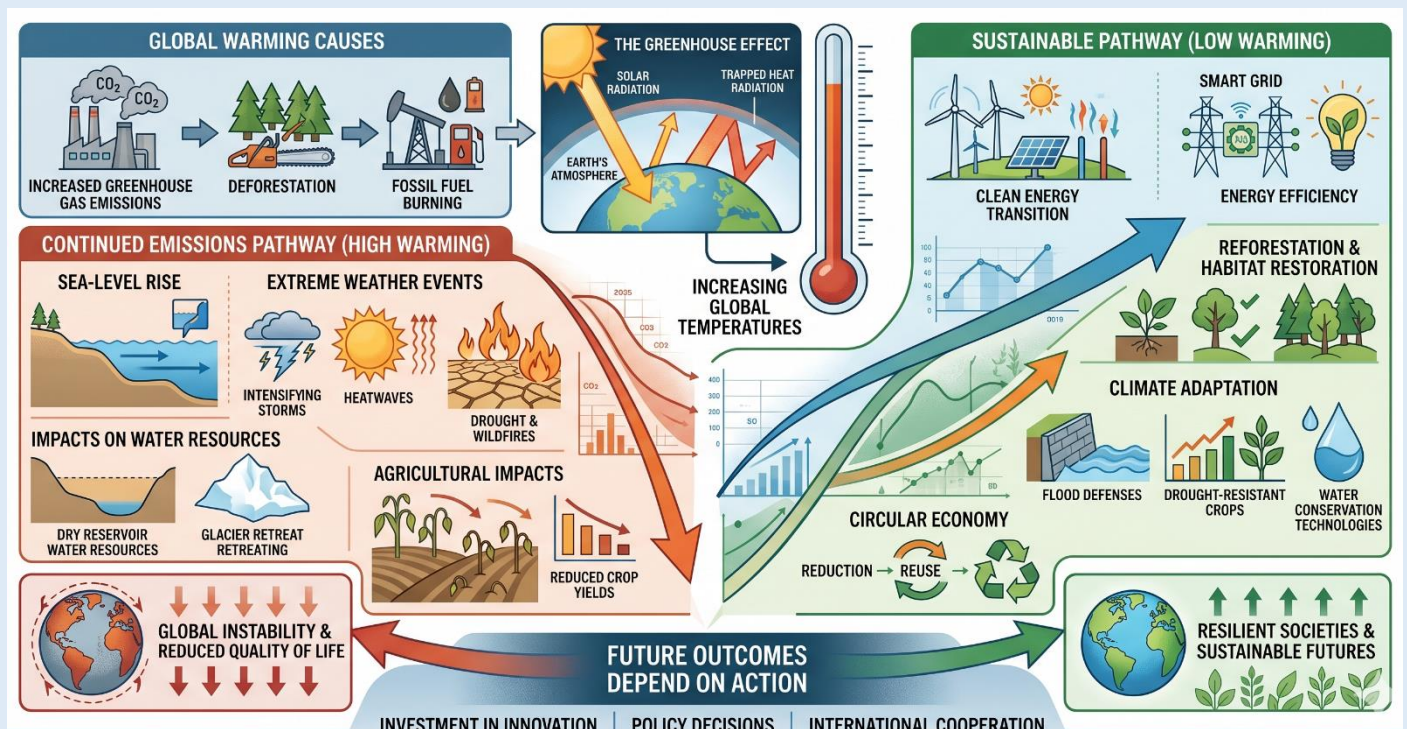


Fig.: Figure shows a stable global climate state against an accelerated high-emissions Anthropocene trajectory, highlighting severe environmental degradation and the critical thresholds determining future planetary stability.

Among the several challenges, the beacon of hope is shown through scientific research, innovations, and strategic action-oriented, timely decision-making. The emphasis shifts towards promoting renewable resources, solar and wind energy, to conserve finite resources, climate-resilient agricultural practices, conservation of water, and developing resilient infrastructures. In addition, worldwide, the voices of the youth activists have immensely shaped the present climate action and accountability.

This defines the future of humanity by today's responses, but not through the crisis and challenges. A resilient and renewed future could be embraced through adapting sustainability, cooperation, and scientific innovations to eliminate conflicts, scarcities, and challenges. Overall, these climate challenges test the unity and responsibilities of humanity and compel them to conserve and safeguard the earth and nature's resources to sustain their life systems over the generations. Their decision-making abilities, responses, and actions determine whether the future of humanity will be at stake or prosper.

GREEN CITIES FOR A SUSTAINABLE FUTURE

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Green cities are becoming an essential part of sustainable urban development across the world. Rapid urbanisation, population growth, and climate change have created serious environmental challenges in urban areas. Problems such as air pollution, traffic congestion, urban heat island effect, water scarcity, flooding, and the reduction of green open spaces are increasing rapidly in many cities. At present, more than half of the world's population lives in urban areas, and this percentage is expected to rise further by 2050. Although cities occupy a small portion of the Earth's surface, they consume a major share of global energy and produce large amounts of greenhouse gas emissions. Therefore, the concept of green cities has gained importance to ensure environmental sustainability, economic development, and better living conditions for urban residents.

Status of Green Cities in the World

Globally, many developed and developing countries are adopting sustainable urban planning strategies to create environmentally friendly cities. Green cities mainly focus on energy-efficient buildings, sustainable transportation systems, renewable energy use, urban forestry, rainwater harvesting, waste recycling, and climate-responsive infrastructure. Countries such as Denmark, Singapore, Germany, and the Netherlands have taken major initiatives towards sustainable urban development. Copenhagen is recognised for its cycling infrastructure and carbon-neutral planning policies, while Singapore is famous for its urban greenery, vertical gardens, efficient public transport, and water management systems. These cities demonstrate that proper planning and environmental policies can significantly improve urban sustainability and public health.

Status of Green Cities in India

India is currently experiencing rapid urban growth, which has increased pressure on infrastructure, natural resources, India is currently experiencing rapid urban growth, which has increased pressure on infrastructure, natural resources, and the urban environment. India's urban population is expected to reach nearly 900 million by 2050. Many Indian cities face serious challenges such as poor air quality, excessive heat, traffic congestion, inadequate drainage systems, and a lack of green open spaces. To improve urban sustainability, the Government of India has launched programmes such as the Smart Cities Mission, AMRUT, Swachh Bharat Mission, and National Clean Air Programme. Green building practices are also increasing in cities like Hyderabad, Bengaluru, Pune, and Ahmedabad. However, many Indian cities still struggle with weak implementation of environmental policies, unplanned urban expansion, and insufficient public participation in sustainable development programmes.

Case Studies of Green Cities

Several cities across the world provide important examples of successful green urban development. Singapore is considered one of the leading green cities because of its extensive urban greenery, rooftop gardens, sustainable transport system, and efficient water conservation practices. Copenhagen in Denmark has successfully promoted cycling culture and renewable energy use, helping reduce carbon emissions significantly. In India, Auroville in Tamil Nadu is an important example of sustainable settlement planning. The township has focused on afforestation, renewable energy, water conservation, and eco-friendly community living for many years. Chandigarh is another example where planned urban design and green open spaces have contributed to a comparatively healthier urban environment. These case studies show that sustainable urban development requires strong governance, public awareness, technological support, and long-term environmental planning.

Scope of Academic Research

The academic scope of research on green cities is expanding rapidly because sustainable urban development has become a global priority. Researchers from architecture, urban planning, environmental science, geography, engineering, and public health are actively studying different aspects of urban sustainability. Major research areas include urban heat island mitigation, green roofs and walls, climate-responsive architecture, renewable energy integration, sustainable transportation, urban biodiversity conservation, and waste management systems. In the Indian context, there is significant scope for research on bioclimatic urban design, thermal comfort, low-cost sustainable housing, flood-resilient infrastructure, and climate adaptation strategies suitable for tropical climates. Modern technologies such as Geographic Information Systems (GIS), remote sensing, artificial intelligence, and environmental simulation tools are also creating new opportunities for advanced urban sustainability research. Therefore, green cities will continue to remain an important research area for achieving climate-resilient and environmentally sustainable urban futures.



WATER CONSERVATION 21ST CENTURY: A KEY TO SUSTAINABLE DEVELOPMENT

Abhijit Pal

Water is one of the most vital natural resources on earth. It is essential for the survival of all living things. Water is used by human beings for drinking, agriculture, industries, sanitation, and daily activities. But in today's world, the 21st century, the world is facing a serious water crisis because of its population growth, pollution, climate change, and overuse of water resources. With the reduction in freshwater sources, water conservation is a pressing concern worldwide. It is also an important part of the United Nations' Sustainable Development Goals, especially SDG 6: Clean Water and Sanitation (Fig. 1).

Growing Water Scarcity:

Almost 71% of the Earth is covered with water, but only a small portion of it is usable by human beings. Due to high consumption and pollution rates, rivers, lakes, and groundwater are fast becoming scarce. Water shortage is already a serious issue in many countries, and millions of people worldwide still lack clean drinking water. World environmental reports indicate that water scarcity could be one of the biggest challenges of the future if action is not taken now.

Causes of the Water Crisis:

There is one major reason for water scarcity, which is the irresponsible use of water by human beings. Water loss occurs significantly from taps left on, watering the house, and not fixing leaking pipes. Water is also used in large quantities in industries, which may discharge toxic chemicals into rivers and lakes, making the water unfit for use. The irregular rainfall, droughts, and increased temperatures due to climate change have made things even more difficult. The natural water cycle has also been disrupted by deforestation and urbanization.

Methods of Water Conservation:

Water conservation is a solution to this ever-increasing problem. Individuals need to learn some basic habits like turning off taps when not being used, fixing leaks, and using water responsibly. Rainwater harvesting is a good technique to conserve rainwater for future use. Drip irrigation and sprinkler systems help farmers conserve water in farming. Wastewater can also be conserved by recycling and reusing it. Tree planting is also critical as forests help maintain rainfall and groundwater levels (Fig. 1).

The role of technology and awareness:

The part played by technology and awareness. Smart water management systems, sophisticated purification facilities, and environmentally friendly irrigation systems have been introduced by modern technology. These innovations are effective in conserving water. But technology can't fix the problem. Awareness is also needed among the public. Children in schools, colleges, media, and environmental groups should be taught the importance of conserving water and living a sustainable lifestyle.

Finally, water saving is one of the greatest needs of the 21st century. Life and development cannot proceed without water. Water resource protection is a responsibility not only of governments but also of every individual. The conservation of water today will guarantee a healthy and sustainable future for generations to come. After all, it's all about the little things.



Fig. 1: Water for a Sustainable Future

RENEWABLE ENERGY: THE KEY TO A CLEANER EARTH

Sujan Mandal

All around the world, renewable power is experiencing historic growth, and this offers a big opportunity for large-scale emission reduction as well as improving air quality. We now need climate action, and electricity is at the core of that. Nevertheless, 2024 saw global power-sector CO₂ emissions reach record 14.6 billion tonnes despite record-high solar and wind expansion. They account for almost half of the new generation capacity today. Global renewable capacity additions were approx. 473GW in 2023 and was 582GW in 2024 (Most solar and wind). These three clean sources grew to deliver the largest amount of power in 2024, with a record addition of 858TWh - more than high enough to (almost) meet the increased demand for electricity. Utility PV costs dropped to \$0.044/kWh and wind reached a record low of \$0.033/kWh, while in some cases auction bids have even gone down to 2.4¢/kWh: this means that solar and wind are now often the cheapest sources so far! In India, while renewables (large hydro included) reached 254GW at the end of 2025 (50% of total capacity) with record additions (44.5GW in Jan–Nov 2025). These trends are permitting sizeable emission reductions: for example, India's solar deployment in 2024 has avoided an estimated additional 11Mt CO₂ of mounting emissions, when demand looked to have elevated. In total, “avoided” 1,658Mt CO₂ from solar power growth globally in 2024 – approximately the emissions of the entire US power sector.

Global and India Statistics

Renewables have seen explosive growth. Worldwide, renewable capacity stands at approximately 3,870GW by the end of 2023 (50% global power capacity) and then expands to 4,443GW globally as of the end of FY24. Solar PV accounts for the new builds: adding 346GW (32% increase) in 2023, wind added 116GW. Asia (China leading the way with 216.9GW solar, 76GW wind in 2023) provided 69% of new capacity.

And global renewables generation also reached all-time highs: 1,600TWh for solar (25% increase y/y) and 2,330TWh for wind in 2023. Combining, they added 858TWh in 2024 FY alone, about x4 that of any supply source. As it happens, clean sources (renewables + nuclear) provided 41% of world electricity as early as 2024. Hence, every gigawatt of renewables growth each year displaces oodles of coal and gas: the growth in solar capacity alone from 2023 to 2024 displaced 1.66Gt CO₂. Renewables, however, also drove down fuel costs – saving ~ US\$520 billion (billions) in 2022 – and thus often made it cheaper to run existing coal- or gas-fired plants out of business.

In India, non-fossil capacity (renewables + hydro + nuclear) in total was just over 51% of the total capacity at Nov 2025, around 262.7GW. Notably, those renewables (solar, wind and small hydro and biomass) peaked at 253.96GW a q/q gain of 23% YoY with solar contributing the most (+41%) to end up topping out at 132.85GW while wind just came in below that mark at ~54GW. The pace of new capacity addition more than doubled in 2025 compared to previous year. The share of renewables was a record 51.5% on 29 July 2025 (October 2023) – driven not only by higher capacity but due to a massive hike in demand as well.

Case Studies

Dubai's Mega-Solar Park (Global): Dubai is developing the 5,000MW Mohammed bin Rashid Al Maktoum solar complex; At capacity (by 2030), it will reduce ~6.5 million t CO₂/yr. It hit world record low wholesale solar bids in Q4 2023 (PV at 2.4¢/kWh), further demonstrating the capabilities of utility solar at scale.

Pavagada Solar Park (India): At the same time, within India, the Pavagada Park (2.25GW) in Karnataka is one of the largest solar facilities anywhere in the world. It produces approximately 3.6TWh a year, which is enough to power around 1 million homes and avoids an estimated 20Mt CO₂ per annum by displacing diesel/gas generation. It has a unique land-lease approach that earns farmers 300/acre/year while still owning their land, highlighting social benefits and clean power.

Policy and Individual Actions

Governments & Utilities: Establish strong renewable targets (for example, India 500GW by 2030), expedite auctions and fundraising, and combat fossil subsidies. Expand and upgrade grids (both transmission and storage) to accommodate variable renewables. Design carbon pricing and clean-energy rules to compel polluters to pay.

Businesses & Communities: Invest in corporate renewable procurement and community energy projects (e.g., solar farms, wind co-ops). Implement energy-efficient technologies across industries, buildings, and transport. Investing in storage and smart grid research.

Individuals: Cut back on consumption (LED lights, high-efficiency appliances) and put solar panels on your roof if you can. Opt for green power plans or community solar. Utilize public transportation, cycle, or walk; avoid wasting. Promote and educate on clean energy policies.

Conclusion

The technology is there — now it needs to be deployed and innovated by governments, businesses, and citizens alike. The choices that need to be made for investment in clean energy sources like wind, sun, water, and any other clean sources can guarantee a safer climate and healthier lives by saving the environment. Every solar panel or turbine gets us closer to a sustainable future — so let us use renewables' potential now!

THE AIR WE BREATHE: AIR POLLUTION AND HUMAN HEALTH

Diksha Kar

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Every breath we take carries more than oxygen. Invisible to the naked eye, a mixture of particulate matter, nitrogen dioxide, ozone, carbon monoxide, and sulphur dioxide drifts through the air of nearly every major city on Earth and increasingly, into the countryside beyond. Air pollution is no longer a local inconvenience. It is a global public health emergency hiding in plain sight.

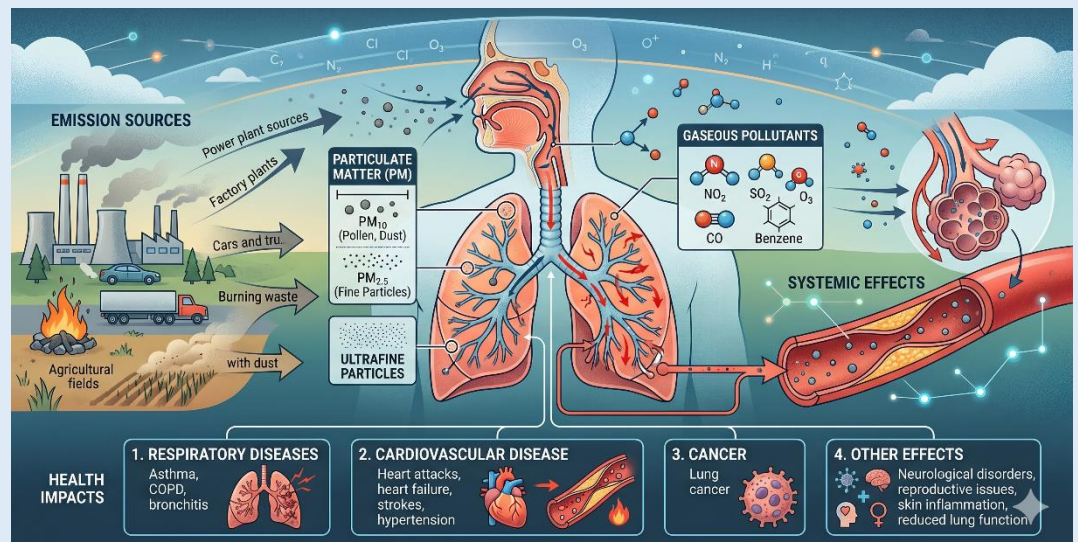
"Air pollution is the new tobacco — a slow, silent killer embedded in the fabric of everyday life."

What exactly are we inhaling?

The most dangerous culprit is PM_{2.5}, fine particulate matter measuring less than 2.5 micrometres in diameter. These microscopic particles, emitted by vehicle exhaust, industrial smokestacks, agricultural burning, and construction dust, are small enough to slip past the body's defences and lodge deep in the lungs. From there, they enter the bloodstream, triggering inflammation that reaches the heart, brain, and virtually every organ system.

A full-body assault:

The health consequences are staggering in their breadth. Short-term exposure can cause eye irritation, coughing fits, and worsened asthma. But long-term exposure is where the real damage accumulates. Chronic inhalation of polluted air is now firmly linked to lung cancer, chronic obstructive pulmonary disease (COPD), heart disease, stroke, and even cognitive decline. Emerging research has connected air pollution to preterm births, childhood developmental disorders, and a heightened risk of dementia in older adults. The lungs bear the first blow, but the entire body pays the price.



Who bears the heaviest burden?

Vulnerability to air pollution is far from evenly distributed. Children, whose lungs are still developing, face disproportionate harm, stunted lung growth, and increased susceptibility to respiratory infections. The elderly, whose immune and cardiovascular systems are already under strain, face greater risks of fatal cardiac events. And across the globe, in low-income communities and developing nations. Those who contributed least to industrial pollution tend to breathe the dirtiest air, a stark environmental injustice.

Reason for cautious hope:

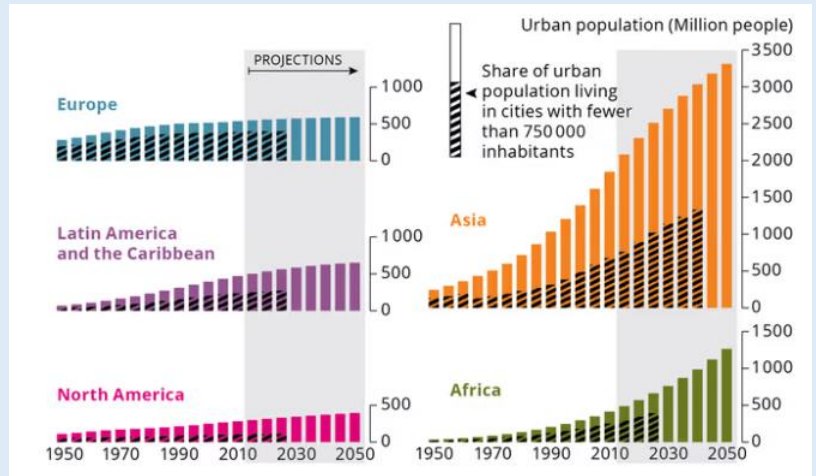
The picture, though grim, is not without light. Cities that have enforced strict vehicle emission standards and invested in clean energy have seen measurable improvements in air quality and corresponding drops in respiratory hospital admissions. On an individual level, monitoring local air quality indices, using air purifiers indoors, and reducing personal emissions all contribute to a cleaner shared atmosphere. More importantly, political will driven by informed citizens remains the most powerful force for change.

The air is our most fundamental commons. Protecting it is not merely an environmental issue; it is the most pressing public health challenge of our time.

THE IMPACT OF URBANIZATION ON NATURE

Suchismita Roy

Urbanization is one of the defining transformations of the Anthropocene era. The twenty-first century has become the “urban century,” when cities both power and promote as engines of economic growth as well as centres of innovation and major ecological stressors. UN-Habitat 2022 indicates that currently more than half of the world population lives in urban areas compared to only about one-third in 1950. Urbanization is not simply a demographic transition but rather a planetary ecological process that transforms the relationship between human systems and changing natural ecosystems. Fundamentally, it alters the natural landscapes. Impermeable built environments consisting of concrete, asphalt, steel and glass increasingly replace forests & wetlands as well as agricultural lands and coastal ecosystems. Such intrusive development breaks up ecological connectivity and fractures habitat, resulting in impaired ecosystem resilience. Satellite-based studies of urbanization in developing countries show that expanding urban land is outpacing growing populations.



Urbanization is one of the main drivers of biodiversity loss globally. Ecologists increasingly warn that habitat fragmentation and ecosystem simplification undermine ecological resiliency and degrade foundational ecosystem services such as pollination, flood buffering, carbon sequestration and groundwater recharge. Studies from North America reveal that mammalian diversity declines sharply in warmer and less-vegetated cities, while larger species are disproportionately affected by urban landscapes. The scientific literature increasingly recognises that biodiversity loss and climate change are two interlinked crises. Joint scientific assessments by global climate and biodiversity institutions emphasise that addressing these crises independently is no longer sufficient. Urbanisation also produces environmental inequalities. Wealthier urban populations in greener more climate-resilient neighbourhoods, while economically marginalised communities suffer more pollution, flooding, heat stress and lack of good sanitation. According to the World Health Organisation (WHO, 2021), nearly 91% of urban dwellers globally breathe polluted air, and millions still live without having safe sanitation and drinking water.

Urbanization alters not only the physical appearance of land, but also changes local and regional climate systems. The Urban Heat Island (UHI) effect is one of the most well-studied observations linked to urbanization. Urban warming raises demand for cooling, intensifies air pollution and has an impact on vulnerable populations who live in informal settlements. Research on the “social cost of carbon” suggests that urban areas contribute nearly 78–93% of climate-related economic losses through concentrated exposure and urban heat amplification.

Innovation, Sustainability, and the future of urban nature

Contemporary sustainable urbanism emphasises integrated ecological planning through multiple innovative approaches. Contemporary urban planning increasingly emphasises “Nature-Based Solutions” (NbS), green infrastructure, and climate-resilient urbanism. These approaches include urban rewilding, biodiversity corridors, flood absorption performances of sponge city models, green rooftops and vertical forests for carbon capture and cooling effects, circular economy systems, smart mobility network, blue-green infrastructure integration, and AI-driven urban climate modelling. In the Anthropocene era, the future of nature is increasingly inseparable from the future of cities. The challenge before humanity is not whether urbanisation will continue, but whether future urban development can evolve into an ecologically resilient, socially inclusive, and climate-sustainable model of civilisation.

WASTE MANAGEMENT AND RECYCLING PRACTICES

Br. Soumitra

Waste management and recycling practices have become essential components of sustainable urban development and environmental protection. Rapid population growth, urbanisation, industrialisation, and changing lifestyles have significantly increased the generation of solid waste across the world. Improper disposal of waste creates serious environmental and public health problems, including air pollution, soil contamination, water pollution, greenhouse gas emissions, and the spread of diseases. Therefore, effective waste management systems are necessary to ensure cleaner cities, resource conservation, and a healthier living environment. Waste management mainly involves the collection, transportation, segregation, treatment, recycling, and safe disposal of waste materials generated from households, industries, commercial areas, and institutions.

Recycling is one of the most important methods of sustainable waste management because it helps reduce the amount of waste sent to landfills and conserves natural resources. Materials such as paper, plastic, glass, metal, and electronic waste can be processed and reused for manufacturing new products. Recycling also reduces energy consumption and carbon emissions associated with the extraction and processing of raw materials. For example, recycling aluminium saves a large amount of energy compared to producing aluminium from bauxite ore. Similarly, composting of biodegradable waste helps produce organic manure, which can improve soil fertility and reduce dependence on chemical fertilizers. Thus, recycling not only protects the environment but also supports the circular economy and sustainable resource utilisation.

Globally, waste generation is increasing at an alarming rate due to economic development and consumer-oriented lifestyles. According to international environmental reports, the world generates more than 2 billion tonnes of municipal solid waste every year, and this figure is expected to rise further in the coming decades. Developed countries have adopted advanced waste management systems that include waste segregation at source, recycling industries, waste-to-energy technologies, and strict environmental regulations. Countries such as Germany, Sweden, and Japan are considered successful examples of efficient recycling practices because of strong public awareness, government policies, and technological advancement. Sweden, for example, converts a major portion of its waste into energy through waste-to-energy plants, while Japan follows highly organised waste segregation systems to maximise recycling efficiency.

In India, waste management has become a major urban challenge due to rapid urban expansion, increasing population, and changing consumption patterns. Indian cities generate millions of tonnes of solid waste every year, but a significant portion remains untreated or improperly disposed of in open dumping sites. Poor segregation of waste at the household level, inadequate infrastructure, lack of public awareness, and informal disposal practices continue to create environmental problems in many urban and rural areas. Plastic waste, biomedical waste, and electronic waste have become serious concerns because of their harmful effects on ecosystems and human health. To address these issues, the Government of India has introduced several initiatives such as the Swachh Bharat Mission, Solid Waste Management Rules 2016, Plastic Waste Management Rules, and waste segregation campaigns. Many cities have also started door-to-door waste collection, composting projects, material recovery facilities, and awareness programmes to improve waste handling practices.

Several Indian cities have shown positive examples of effective waste management and recycling practices. Indore in Madhya Pradesh is widely recognised for its successful implementation of waste segregation, door-to-door collection, composting, and public participation programmes, making it one of the cleanest cities in India. Pune has also developed an effective waste collection and recycling model with the active involvement of waste-picker cooperatives. In Kerala, decentralised waste management systems and household composting practices have helped reduce the burden on municipal waste disposal systems. These examples demonstrate that proper planning, community participation, and awareness can significantly improve urban cleanliness and environmental sustainability.

The scope of academic research on waste management and recycling practices is continuously expanding in fields such as environmental science, urban planning, and public health, engineering, and sustainability studies. Current research areas include waste-to-energy technologies, plastic recycling, electronic waste management, circular economy approaches, composting systems, landfill management, and smart waste monitoring technologies. Researchers are also exploring the role of artificial intelligence, GIS, Internet of Things (IoT), and sensor-based technologies in improving waste collection and recycling efficiency. In the Indian context, more research is required on low-cost waste treatment methods, community-based waste management, rural waste handling systems, and sustainable alternatives to plastic materials.

ECO-FRIENDLY LIFESTYLE AND GREEN LIVING

Chetana Tunga

The growing intensity of climate change, environmental degradation, and resource depletion has made eco-friendly lifestyles and green living increasingly important in our society. Green living refers to the adoption of sustainable practices that reduce negative environmental impacts while promoting human well-being and long-term ecological balance. Although sustainability is often discussed in policy frameworks and scientific debates, its practical implementation begins with everyday human behavior and consumption patterns.

An eco-friendly lifestyle primarily emphasizes on the efficient use of natural resources and the reduction of carbon emissions. Simple behavioral changes, such as switching to energy-efficient LED lighting, minimizing electricity consumption, and using public transportation, can significantly reduce household carbon footprints. The Netherlands provides a notable example of sustainable urban mobility through its extensive cycling infrastructure. Cities such as Amsterdam and Utrecht have developed bicycle-friendly transport systems that encourage citizens to use cycles instead of private vehicles, thereby reducing greenhouse gas emissions and improving urban air quality. Similarly, the increasing adoption of rooftop solar panels in Dutch households demonstrates how renewable energy technologies can support sustainable energy transitions at the community level.

Waste management also represents a fundamental aspect of green living. The excessive use of single-use plastics and unsustainable consumption practices has intensified global pollution problems, particularly in marine ecosystems. Consequently, the “3Rs” principle—Reduce, Reuse, and Recycle—has become central to environmental sustainability strategies. In the Netherlands, circular economy initiatives have gained considerable attention, where materials from discarded products are reused in manufacturing and construction industries. Rotterdam, for instance, has implemented innovative waste management and recycling systems aimed at minimizing landfill dependency and promoting resource efficiency. Similar approaches are also evident in Sweden, where waste-to-energy plants convert household waste into electricity and heating energy.

Sustainable food consumption further contributes to eco-friendly living. The preference for locally produced and seasonal food reduces transportation-related emissions and supports local agricultural economies. The Netherlands, despite its relatively small geographical size, is one of the world’s leading agricultural exporters due to its advanced sustainable farming technologies. Dutch greenhouse agriculture utilizes precision irrigation, controlled environments, and reduced pesticide application, significantly lowering water consumption and environmental stress while maintaining high productivity. Urban farming initiatives in cities such as The Hague and Rotterdam additionally promote local food production and community participation.

Importantly, green living is not solely an environmental responsibility but also a social and ethical commitment. Eco-conscious lifestyles encourage individuals to recognize the direct relationship between human actions and environmental health. Small actions such as conserving water, avoiding fast fashion, reducing food waste, and planting native trees collectively create substantial ecological benefits over time.

Despite increasing awareness, barriers such as economic limitations, inadequate infrastructure, and insufficient environmental education continue to hinder widespread adoption of sustainable practices. Therefore, stronger policy interventions, public awareness campaigns, and institutional support are essential to encourage environmentally responsible behavior. Ultimately, eco-friendly lifestyles and green living represent practical and necessary pathways toward achieving sustainable development and ensuring environmental resilience for future generations.

WILDLIFE CONSERVATION IN A CHANGING CLIMATE

Saswati Ghosh

*As the planet warms, the habitats, rhythms and survival of countless species are being rewritten.
Conservation is no longer just about protecting nature - it is about helping it adapt.*

Climate change is one of the greatest environmental challenges of the twenty-first century, significantly affecting biodiversity and ecosystems worldwide. Rising temperatures, shifting rainfall patterns, melting glaciers, sea-level rise and increasingly frequent natural disasters are disrupting wildlife habitats and threatening the survival of many species. Against this backdrop, wildlife conservation has become more important than ever - to protect biodiversity, maintain ecological balance and ensure sustainable ecosystems for future generations.

Impact of Climate Change on Wildlife

Climate change affects wildlife both directly and indirectly, and the consequences are already visible across every major ecosystem on Earth.

- Habitat loss. Rising temperatures and altered climatic conditions are reshaping natural habitats. Wildfires, droughts, floods and the melting of polar ice all shrink the living space available to animals. Polar bears, for instance, are losing critical hunting ground as Arctic sea ice disappears.
- Disrupted migration and breeding. Many species rely on seasonal cues to time migration and reproduction. Climate change scrambles these signals, creating mismatches between breeding cycles and food availability. Birds, butterflies and marine animals are especially vulnerable to this kind of ecological mistiming.
- Threats to biodiversity. Many species simply cannot adapt quickly enough to rapid environmental change, raising the risk of extinction. Already-endangered species are particularly exposed to climate-related stress.
- Disease and invasive species. Warmer conditions favour pests, parasites and pathogens, which can spread rapidly through wildlife populations. Invasive species may also expand into new territory, outcompeting native flora and fauna.
- Ocean and marine change. Ocean warming and acidification are damaging marine life, from coral reefs to fish and sea turtles. Coral bleaching, driven by rising sea temperatures, is among the most striking consequences.

Why Wildlife Conservation Matters

Wildlife conservation is essential for maintaining the stability of ecosystems. Animals and plants underpin food chains, pollination, nutrient cycling and the broader ecological balance on which all life depends. Conserving wildlife also safeguards human well-being through ecosystem services such as clean air, fresh water and food security - making conservation not only an environmental priority but a human one.

Protecting wildlife today means protecting the air, water and food systems that human societies depend on tomorrow

Strategies for a Warming World

- Habitat protection and restoration. Safeguarding forests, wetlands, grasslands and marine ecosystems helps species withstand climate stress, while reforestation and restoration rebuild ecosystem resilience.
- Protected areas and corridors. National parks and wildlife corridors give animals room to migrate safely and adapt to shifting conditions.
- Cutting greenhouse gas emissions. Reducing carbon emissions through renewable energy, sustainable practices and reduced deforestation slows climate change at its source and eases pressure on wildlife.
- Strong policies and laws. Governments and international bodies must enforce robust legislation to protect endangered species and critical ecosystems.
- Community awareness and participation. Public engagement and local involvement are decisive for success. Education encourages sustainable behaviour and a shared sense of environmental responsibility.
- Scientific research and monitoring. Ongoing observation of species and ecosystems helps scientists understand climate impacts and design conservation strategies that actually work.

Conclusion

Climate change poses serious threats to wildlife and biodiversity across the globe. Without sustained conservation, many species may face extinction, tipping ecosystems out of balance. Wildlife conservation, paired with decisive climate action, is essential to preserve ecosystems and protect the natural world. Governments, scientists, communities and individuals must work together to confront climate change - and to secure a sustainable future for wildlife and humanity alike.

CARBON CREDIT

Md Hasanujjaman

Ph.D. Scholar, School of Environment and Disaster Management, RKMVERI

Introduction:

Climate change is one of the most serious environmental challenges facing the world today. Rapid industrialization, deforestation, urbanization and the excessive use of fossil fuels have increased greenhouse gas (GHG) emissions in the atmosphere. These emissions are responsible for global warming and climate instability. To reduce greenhouse gas emissions and encourage sustainable environmental practices, the concept of carbon credit was introduced through international climate agreements such as the Kyoto Protocol in 1997 and the Paris Agreement in 2015. Carbon credit has now become an important market-based tool for global climate change mitigation.

A **Carbon Credit** is a tradable certificate or permit that represents the right to emit one metric ton of carbon dioxide (CO₂) or an equivalent amount of other greenhouse gases into the atmosphere. (Jez et al, 2022) It is designed to limit carbon emissions and encourage industries and countries to reduce pollution levels.



Carbon credits are typically divided into two categories: those that **avoid emissions** (e.g., avoided deforestation, renewable energy, and energy efficiency) and those that **remove emissions** (e.g., reforestation and afforestation, engineered carbon dioxide removal), although some nature-based climate solutions may both avoid and remove emissions. Carbon credits are traded primarily on the voluntary carbon market, although they can sometimes be used in the context of compliance market (government-regulated markets driven by enforceable caps on greenhouse gas emissions).

How Carbon Credit Works?

The carbon credit system generally operates through a “cap-and-trade” process. Governments or international environmental authorities set a maximum limit on greenhouse gas emissions for industries. Companies that emit less than their assigned limit earn surplus carbon credits, while companies exceeding the limit must purchase additional credits from others.

Importance of Carbon Credit:

Carbon Credit plays a crucial role in mitigating climate change, reducing greenhouse gas emissions, promoting sustainability, and supporting corporate social responsibility initiatives. It encourages industries to adopt cleaner technologies through financial incentives rather than relying only on strict regulations. Carbon credit also supports renewable energy development, forest conservation, and green economic growth.

Conclusion:

Carbon Credit is an important environmental and economic mechanism for reducing greenhouse gas emissions and promoting sustainable development. Through financial incentives, it encourages cleaner industrial practices. Despite existing challenges, effective implementation and global cooperation can make carbon credit a powerful tool in addressing global climate change.

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GREEN TECHNOLOGY AND ENVIRONMENTAL SUSTAINABILITY

Aveek Roy

In this era of massive industrial growth along with rapid urbanization, which has helped mankind to improve their quality of life at a significant scale. However, such progress does come at a cost, which often goes unnoticed that cause serious threats to environment such as pollution, deforestation, and climate change, global warming and depletion of resources at an unprecedented scale. In order to address these negative impacts, various environmental concepts and technologies have emerged, and among them, green technology and environmental sustainability, in today's day and age has become crucially important. The concept of green technology is pretty straightforward, it refers to the application of science and innovation for creating products and system which does not put a negative burden on the environment. The primary goal of green tech is of two folds, firstly, to reduce the negative impacts on the environment and secondly to promote sustainable development, which is achieved through focusing on energy conservation, recycling and conservation of water and replacing conventional source of energy with renewable sources.

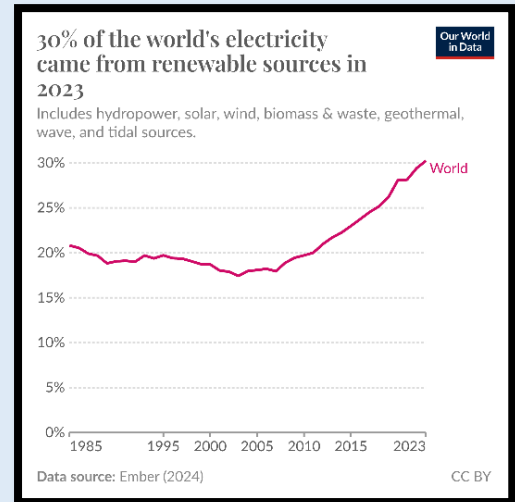


Figure 1: Graph showing 30% of the world's electricity came from renewable sources in 2023.
Source: <https://ourworldindata.org>

Renewable energy is one of the most significant examples of green technology, which replaces traditional energy sources such as oil, natural gas and coal which are known to release harmful substances in the air, influencing polluted atmosphere and contributing significantly to global warming. The major sources of renewable energy are wind energy, solar energy, tidal and hydrothermal energy, which uses natural forces to generate electricity without majorly affecting or damaging the environment. Currently, 32% of the total electricity generation of the world is contributed by renewables, with the most popular forms of renewable energy being, Hydropower, which accounts for 44%, followed by Wind (25%) and lastly Solar, accounting for 22% of the total electricity generation by renewables. Sustainable transportation has recently experienced a boom, with the emerging of latest EVs, and has become an important area of green technology. Mainly, petrol- or diesel-powered vehicles are known sources of air pollution, whereas, EVs, offer a cleaner and ecofriendly solution by reducing the carbon emissions and fuel consumptions leading to its wide popularity. Various countries now, are pushing towards EVs, by promoting it, providing dedicated policies and subsidies as they have multifold benefits. Firstly, countries with a burden of oil imports gets a breathing space by replacing traditional vehicles with EVs, as the import bills go down, secondly, it helps to significantly reduce air pollution, maximizing public health and promoting overall wellbeing.

Another important sector, which is seeing a rapid shift towards sustainable development is the housing and real estate sector. Nowadays, Green buildings has emerged as a modern and ecofriendly substitute for traditional concrete buildings. This type of building use energy efficient lighting, rainwater harvesting structures along with solar panels and plenty of natural ventilation to reduce the energy use and environmental impact. These building helps in both reducing the impacts on the environment along with minimizing water and electricity bills. Environmental sustainability is the concept which focuses on the balance between human needs and environmental protection, so that future generations can also enjoy the benefits. Environmental sustainability is not only the sole responsibility of the governments or industries, rather it is the collective effort of all individuals and systems. It is a concept, where simple actions such as, saving electricity, conserving water, planting trees and reducing the use of fossil fuel at an individual level can collectively create a significant difference. Even though its numerous benefits, it faces with various challenges. Challenges involve, high initial cost, lack of public awareness, unavailability of service everywhere and limited infrastructure creates a hindrance to its adoption, which is mainly seen in developing countries. It is the duty of the governments, educational institutions, NGOs and industries to promote and aware the general mass about the benefits of sustainable solutions. Green technology is crucial for the creation of an ecofriendly and sustainable future for all, by providing solutions to global environmental problems along with supporting economic growth and improving lifestyle. Only by embracing the sustainable practices, humanity can move towards a healthier, cleaner and greener future.

ENVIRONMENTAL POLLUTION IN DEVELOPING COUNTRIES

Biplab Pal

Environmental pollution has become one of the most severe crises of the developing world. Millions of people in the developing world experience daily exposure to toxic air, toxic water, and poisoned soil due to rapid industrial growth, urbanization, lack of governance, and lack of resources.

In 2024, only seven countries in the entire world had air quality levels below the WHO's recommended annual average levels. The rest of the countries were well above that level. The burden of pollution is heaviest in the Global South. Chad was the country with the worst population-weighted PM2.5 concentration at 91.8 $\mu\text{g}/\text{m}^3$, which was 18 times higher than the WHO's acceptable level of safety (5 $\mu\text{g}/\text{m}^3$). One reason is that these developing nations are experiencing extremely high levels of pollution. The habitats largely depend on coal-powered plants and have insufficient technologies and funds to address air pollution. These developing nations may also have even weaker regulations than other regions in the world, such as less stringent restrictions on vehicular emissions. The 2024 State of Global Air report determined that 8.1 million people died due to air pollution in 2021, which makes it the second-highest risk factor for death in the world (after cardiovascular disease).

The largest contributors to the pollution of water are industrial discharges, agricultural runoffs, and untreated sewage. Approximately 1 million people die annually due to unsafe drinking water. Habitats in developing areas are most at risk due to inadequate access to clean water. As of 2020, there were approximately 150 million metric tonnes of plastic waste in the oceans and rivers, and beyond that, this is expected to double by 2040. In sub-Saharan Africa and South Asia, entire communities rely on rivers as their primary source of water, and these rivers are also used as a channel for sewage and industrial waste.

A lack of effective waste management systems worsens the problem. Waste collection systems in numerous developing cities are either nonexistent or overburdened with garbage. Many times, industrial chemicals, pesticides, and heavy metals leach into agricultural land. So, growing food from those land is introduced by contaminated soil, which penetrates toxins into the food chain for the long term.



Sources: IQAir 2024 · WHO · State of Global Air 2024 · Statista · DevelopmentAid

The pollution crisis in the developing world can be seen most clearly in India. In 2024, Delhi was ranked as the most polluted city in the world among capital cities, and also out of the top 100 polluted cities, 74 were located in India. The overall PM2.5 level for India was 50.6 $\mu\text{g}/\text{m}^3$, which is 10 times higher than the WHO's safe guidelines. Every day, around 40 million liters of wastewater are released into the waters in India, and approximately 90% of this is from untreated sewage. Each year, industries are discharging about 300 to 400 million tonnes of waste into the water bodies. As of 2024, more than 2 million people were affected by groundwater pollution, with most of this due to heavy metals and nitrates. The cost to India for environmental degradation is over \$80 billion annually. Despite massive government spending, the problem persists. Waste from India constitutes 17% of the total municipal solid waste around the globe, and municipal solid waste from India contributes 10% of the total waste that flows into rivers globally.

Developing countries must address their problems in a dual way: emergency cleanup and systemic reform. The World Bank has invested over \$52 billion for over 20 years in helping countries to reduce pollution through clean production, better waste management, and better air quality. However, financial support alone is not enough. Developing countries must have better laws and regulations regarding the environment. They need transparent monitoring mechanisms and those mechanisms that hold polluters accountable for their actions.

SUSTAINABLE TOURISM AND NATURE PROTECTION

Disha Roy

“In the end, we will conserve only what we love; we will love only what we understand.” -- Baba Dioum

Tourism is one of the fastest-growing industries in the world, contributing significantly to economic development, employment generation, and cultural exchange. Millions of people travel every year to experience mountains, forests, beaches, deserts, and wildlife-rich regions. International arrivals more than doubled between 2000 and 2019, demonstrating the exponential growth of global tourism. However, the tourism industry is currently at a crucial environmental turning point. Unmanaged mass tourism—often referred to as "overtourism"—causes serious ecological harm to the planet's most delicate ecosystems, despite contributing 10% of the world's GDP and driving essential economic growth. In the absence of rules, the swift influx of tourists leads to serious resource depletion, pollution, trash accumulation, habitat fragmentation, and biodiversity loss. As a result, sustainable tourism has emerged as an essential strategy for protecting nature while allowing tourism to continue benefiting society.

Sustainable tourism is defined by the United Nations World Tourism Organization as travel that addresses the needs of visitors, local people, and ecosystems while considering current and future economic, social, and environmental implications. As the cost-of-living increases and housing becomes unaffordable, especially as a result of the conversion of residential units into short-term rentals, overtourism frequently incites community anger. This structural shift from massification to sustainability contrasts sharply with traditional tourism models:



Figure 2: Concept of Eco-Tourism and green tourism and their role in the sustainable development of the State of Himachal Pradesh. H. G. (2020, June 15).

Dimension	Traditional Mass Tourism	Sustainable Ecotourism
Environmental Focus	High waste production, ecosystem clearing, and severe resource strain	Resource conservation, zero-waste targets, and biodiversity protection
Economic Structure	High revenue leakage to external corporations and low-wage local jobs	High local sourcing, community equity, and stable local employment
Flow Management	Unchecked visitor volumes and severe seasonal overcrowding	Carrying capacity caps, timed entry, and visitor dispersal

One of the most effective approaches to nature conservation within tourism is ecotourism. Ecotourism is centered on eco-friendly travel that promotes conservation and improves local economies. Promoting sustainable practices requires the involvement of key stakeholders, such as local communities, governments, tourism businesses, and researchers. Effective strategies, such as environmental regulations, capacity limits, and waste management, reduce ecological impacts at tourist destinations. Many accommodations are adopting renewable energy sources and implementing eco-friendly initiatives to lower their environmental footprint. To tackle overtourism, cities globally have begun enforcing rigorous tourism policies, such as Amsterdam's restrictions on hotel construction and Dubrovnik's cruise ship visitor caps, aimed at preserving local environments. Tourists are also encouraged to adopt responsible practices, like minimizing waste and respecting local cultures and ecosystems. Successful examples of ecotourism, such as those in Costa Rica and the Himalayas, illustrate how tourism can be economically beneficial while safeguarding biodiversity and indigenous cultures. This concept clearly illustrates how governments and tourists must work together to ensure environmental sustainability. In order to ensure ecological integrity, cultural preservation, and general environmental responsibility in future travel attempts, tourism must shift from exploitation to conservation as environmental difficulties intensify. By adopting sustainable tourism practices, humanity can protect natural ecosystems, empower local communities, and ensure that future generations continue to experience the beauty and diversity of this planet.

THE FUTURE OF ELECTRIC VEHICLES AND CLEAN TRANSPORT

Falguni Murmu

Electric Vehicles (EVs) are leading a major transformation in the global transportation sector by offering a cleaner, smarter, and more sustainable alternative to traditional petrol and diesel vehicles. As concerns over climate change, air pollution, and the rising cost of fossil fuels continue to grow, governments, automobile companies, and consumers are increasingly turning toward electric mobility. With rapid advancements in battery technology, expanding charging infrastructure, and supportive government policies, the future of electric vehicles looks highly promising.

The environmental benefits of EVs are among their greatest advantages. Electric automobiles have zero tailpipe emissions, which helps lower air pollution and greenhouse gas emissions. EVs contribute to healthier urban settings, while fuel-powered vehicles' harmful pollutants cause respiratory illnesses and environmental harm. EVs can significantly lower transportation's carbon footprint when they are powered by renewable energy sources like solar and wind. EVs are also pretty energy-efficient and a lot quieter compared to vehicles powered by internal combustion engines, which helps in reducing energy waste and general noise pollution. At the same time, clean transit options such as electric buses, metro rail, bicycles, and shared public transport are helping with more sustainable city growth. In many places, governments are promoting EV adoption via subsidies, tax advantages, and money put toward public charging stations.

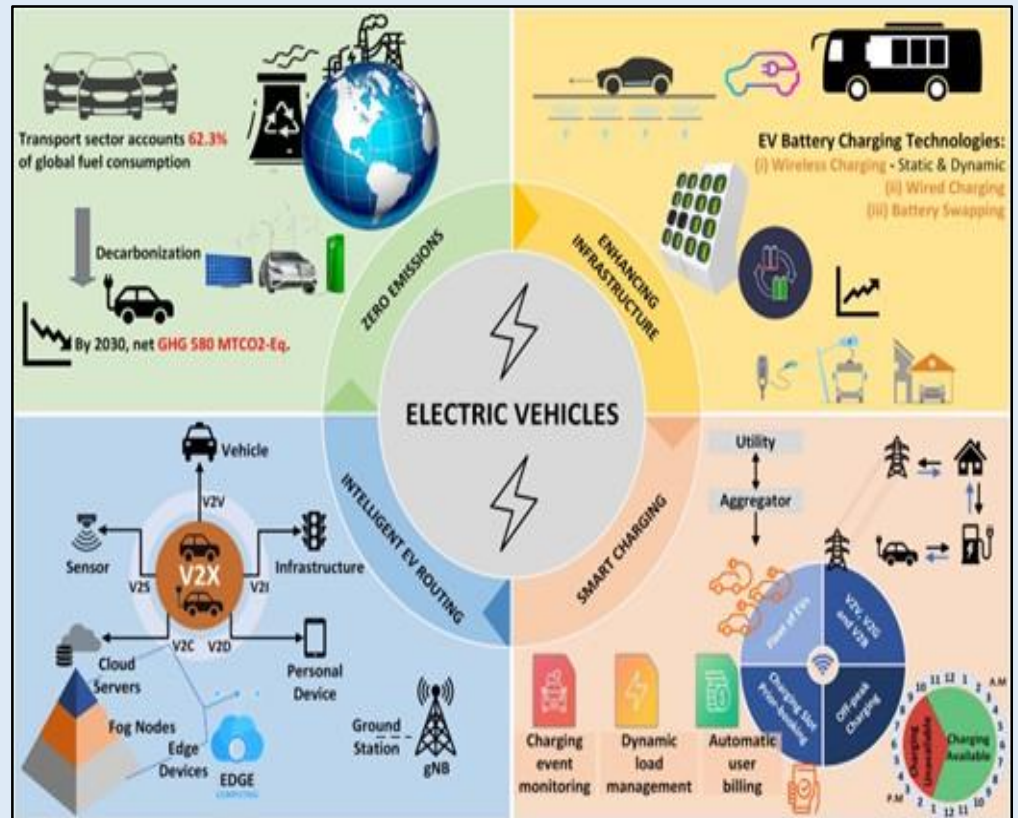


Fig. 1: Sustainable Transportation and the Rise of Electric Vehicles (Aldhanhani et al., 2024)

This figure highlights how Electric Vehicles (EVs) and Smart IoV technologies support clean and sustainable transportation. It shows smart charging, V2X communication, and renewable energy integration that help reduce pollution and improve transportation efficiency. The growing EV industry is creating economic opportunities through investments in battery manufacturing, vehicle production, and charging infrastructure, generating jobs in the green energy sector. Scientists are continuously improving battery life, charging speed, and driving range, making EVs more affordable and convenient for consumers. Smart transportation systems and autonomous electric vehicles may soon become a common part of future cities. However, some challenges still remain. For long-distance drivers, a lack of charging facilities in rural and isolated locations causes "range anxiety." Proper management of battery recycling and disposal is also necessary to prevent environmental issues. Furthermore, the increasing use of EVs will raise electricity demand, making smart grids and renewable energy integration essential for a sustainable future. Ultimately, electric vehicles are poised to revolutionize transportation by promoting cleaner energy, reducing pollution, and supporting sustainable development. Although challenges related to infrastructure, battery technology, and energy management remain, continued innovation and cooperation among governments, industries, and citizens will accelerate the transition toward a greener, healthier, and more efficient transportation future.

ECO-ANXIETY: PSYCHOLOGICAL EFFECTS OF CLIMATE CHANGE

Joyeta Basu

Climate change not only degrades or harms the environment, but it also affects human mental health, such as trauma, stress, etc. this climatic change, such as temperature rise, floods, cyclone, air pollution, and water scarcity, leads to psychological effects, including anxiety, trauma, stress, worry to many people, they feel worried about future disasters and environmental devastation; called eco-anxiety.

These eco-anxieties mainly strike young people, students, farmers, and primarily those who are at risk. For example, after a drastic cyclone like Amphan (20th May in the eastern part of India), many people had lost their family members, loved ones, farmer had lost their homes and land, fields, especially the vulnerable people faced the most dangerous situation and had experienced trauma, emotional stress due to cyclonic effects. A severe example of drought in 2016 in Maharashtra, especially the Marathwada region, led to erratic rainfall, leading to food shortage, anxiety, and stress for their income and survival conditions.

The climate-related news on television, radio, or social media, listening continuously increases mental stress, which may lead to being unable to relax. Many young students are thinking about their future generation, how to live in this situation, and then they face eco anxiety-related issues like sleeplessness, hyper stress, anxiety, lower concentration, etc. Still, the eco anxiety can be reduced by social awareness, community participation and support, environmental action in a positive way, discussing with each other without any fear, and meditation can improve mental health and wellbeing. Always take positive action rather than any action or hopelessness.



In India, the government has introduced many activities to manage and deal with eco-anxiety and encourage environmental sustainability. Many programs are like the National Action Plan on Climate Change (NAPCC): 2008, Swachh Bharat Abhiyan:2014, and the National Clean Air Programme (NCAP):2019 for reducing pollution and promoting sustainable development. Tree plantation program on a large scale promotes renewable energy via the International Solar Alliance (ISA), which helps increase confidence and awareness in people. If educational institutions and local communities organise awareness programs and campaigns, it also helps to reduce mental pressure related to eco-anxiety and promotes activities like afforestation, water conservation, recycling, etc., which can address the issues.

Therefore, nowadays, eco anxiety is turning into a very serious psychological consequence of climate change. The environmental disruption creates fear and stress. The collective efforts, governmental action, and people's involvement can reduce the stress and help to recover the people's mental health and make them emotionally stable for our future planet.

THE IMPACT OF FAST FASHION ON THE ENVIRONMENT

Lopamudra Mukherjee

Fast fashion has redefined the clothing industry by making fashionable outfits more affordable and easily accessible. A popular brand made new trendy clothes every week to engage communities in buying more clothes, rather than in the past few years. While rapid production meets the targets of low-cost fashion, it also poses a threat to the environment. The clothing industry contributes to various forms of environmental degradation, posing threats to air quality, resource depletion, greenhouse gas emissions, and excessive waste generation. That's why it becomes one of the most harmful industries in the world.

Plenty of water is required for dyeing, washing, and fabric processing; that's why water scarcity has become one of the major problems caused by the clothing industry. For example, 2700 litres of water is required to make a cotton t-shirt, which is enough drinking water for one person for 900 days. On the other hand, without proper treatment and handling, chemical substances from the clothing industry are often released into nearby water bodies, which disrupts the aquatic life of that water body, polluting the water as well. Approx 20% of waste water generated from the clothing industry, and it creates threats to the nearby communities as well. Water-stressed areas face difficulties as the demand for cheap clothing increases and creates pressure on freshwater sources.

Waste generation is another major problem of the fashion industry, where clothes are discarded after a few uses if it is not trendy or if its not fit a person correctly. As we know, synthetic fabric does not decompose easily, and there is no such recycling method for it; that's why millions of clothes end up in landfills every year in different places. Additionally, materials like polyester take over 100 years to decompose and release microplastics into water and soil during decomposition. Sometimes these microplastics enter the food chain, creating effects on the food system, ecosystem, and human health.

Fast fashion plays a major role in climate change and harm to the environment. A huge amount of greenhouse gases is released during the time of making and transporting the clothes, which exacerbates the level of air pollution. For maintaining cotton farming and fibre production, huge numbers of forests are being cut down, which is destroying the lives of wild animals as well as those people who depend on the forests and creating an ecological imbalance. Natural resources are also being deployed, such as synthetic fabrics, which rely on fossil fuels.

Many sustainable solutions have been developed to reduce the environmental impact. People can reduce this adverse effect by taking some steps, such as recycling old garments, buying durable clothes, and avoiding unnecessary shopping. With the help of the government, the fashion industry can promote eco-friendly clothing. Though we are getting affordable and stylish clothes with the help of the fashion industry, sustainable solutions are also required for safeguarding our environment and conserving resources for our future generations.



CARBON FOOTPRINT REDUCTION AT THE INDIVIDUAL LEVEL

Maitreyee Biswas

A carbon footprint is an environmental measure that calculates the total amount of greenhouse gas (GHG) emissions, expressed in CO₂ equivalents, released directly or indirectly as a result of certain actions. According to the change in the UNFCCC shift between data, carbon footprint is a global climate change that is due to human activity that alters the composition of atmospheric clude. The carbon footprint of a person is solely consumption based and only recognizes GHG emissions tied to travel, the heating and cooling of household powered by fossil fuels, food preferences and product consumption.

Transportation typically contributes 20–30% of an individual footprint, a significant share of personal emissions. Commute with carpooling, public transit, and then walking/biking short distances to cut down emissions. Long trips are thus better served by trains than airplanes, and switching to electric or CNG cars for local travel decimates carbon output even more.

Electricity usage for general lighting and other household appliances increases carbon emissions from an individual's home. The energy used could be lowered by using 5-star rated appliances and energy saving LED lighting. Energy efficiency will be greatly improved through minor activity changes such as running ceiling fan while using air conditioning, turning off electrical appliances and computers when they are not in use, using windows or skylights to provide natural light for work spaces and keeping A/C units set initially between 24-26°C. A small roof-top solar power system is another way that you can reduce your costs and your reliance on fossil fuels.

Eating consciously leads to positive results; By using the three R's - reduce, reuse, recycle, by utilizing cloth bags and metal containers, we will have less reliance on single use plastic (practicing mindful consumption). To reduce greenhouse emissions, buy products that will last a long time or repair things instead of discarding them and choose sustainable options.

Reducing one's carbon footprint is one of the simplest and most effective ways to combat climate change. Our daily decisions about energy use, transportation, and purchasing patterns have a big impact on greenhouse gas emissions. People can significantly lessen their environmental impact by adopting sustainable practices including using public transportation, conserving electricity, choosing energy-efficient equipment, cutting waste with the 3Rs (Reduce, Reuse, Recycle), and supporting renewable energy sources. Global emissions can be significantly reduced by the combined actions of many people, even though no single action can end the climate catastrophe. Therefore, cultivating a more sustainable future and protecting the environment for future generations depend heavily on adopting deliberate and responsible lifestyle choices.



THE ROLE OF ARTIFICIAL INTELLIGENCE IN ENVIRONMENTAL MONITORING

Mir Wasif Ahammed

“As climate change redefines the parameters of global ecosystems, traditional environmental monitoring techniques are falling short. Enter Artificial Intelligence (AI) - a powerful catalyst transforming how we sense, analyze, and preserve our planet.” - Sophia Thorne

Artificial Intelligence (AI) is increasingly reshaping our perception and actions towards protecting our environment. Increasing environmental issues like climate change, air pollution, deforestation, biodiversity loss, natural disasters, etc., have made it difficult for traditional monitoring techniques to be fast, affordable, and widespread. AI technologies are truly essential tools to assist scientists, government, and organizations in gathering, analyzing, and interpreting environmental data of the environment in a more efficient and accurate manner.

From Data Deluge to Decision Clarity:

Historically, environmental scientists used to collect samples manually from local areas or use satellite information to assess ecological health in a one-off way. Today, with thousands of IoT sensors, high-resolution orbital arrays, and drone fleets generating data, it's too much for humans to handle. The amount of earth monitoring systems data generated for satellite images is more than 2,500 gigabytes each day. In the Amazon, the public satellite data and neural networks are used to predict illegal logging routes before the roads are cut, by an AI model named PrevisIA.

Climate Prediction with AI:

One of the most important applications of AI in environmental monitoring is climate change analysis. Satellite, weather station, and sensor data can be processed by AI algorithms to make very accurate weather and climate predictions. AI can predict extreme weather events like floods, cyclones, droughts, and heatwaves, which can aid authorities in taking proactive steps to mitigate disaster risks.

The Air We Breathe:

Air quality stations are not well-distributed. AI's role here is to combine data from the satellites with traffic cameras and low-cost IoT sensors. In such urban areas as Beijing and Los Angeles, hybrid models now forecast air quality 72 hours in advance with 90% accuracy, allowing cities to close schools and restrict traffic before air quality spikes. In urban and industrial settings, smart sensors with AI algorithms can be used to continuously monitor pollutants like carbon dioxide, sulphur dioxide, and particulate matter.

Monitoring Biodiversity:

AI image recognition is changing the face of biodiversity and environmental monitoring. AI can recognize species using drones, camera traps, acoustic and hydrophone sensors, and it can detect wildlife movements, pollution, and act as a deterrent against poaching with minimal human intrusion. What Microsoft's Sparrow can do is help distinguish threats like chainsaws from the sounds in an actual forest, and AI models can even determine chemical pollutants in rivers—even those that people can't see—with surprising precision. The innovations are helping to make conservation quicker, smarter, and more effective.

Future of AI in Environmental Monitoring:

AI is revolutionizing environmental monitoring, from enhancing climate forecasting to detecting pollution, managing disasters, and conserving wildlife. Environmental analysis benefits from AI-powered tools, which are faster, smarter, and more accurate, and have the potential to preserve ecosystems and facilitate sustainable development. Despite these advantages, it is still not widely used due to difficulties like high implementation costs, limited technical knowledge, data privacy issues, and energy use. Though these are some of the restrictions, with intelligent technologies and human expertise, AI can make a significant contribution to a sustainable and environmentally friendly future.

ENVIRONMENTAL CHALLENGES IN MEGACITIES

Priti Biswas

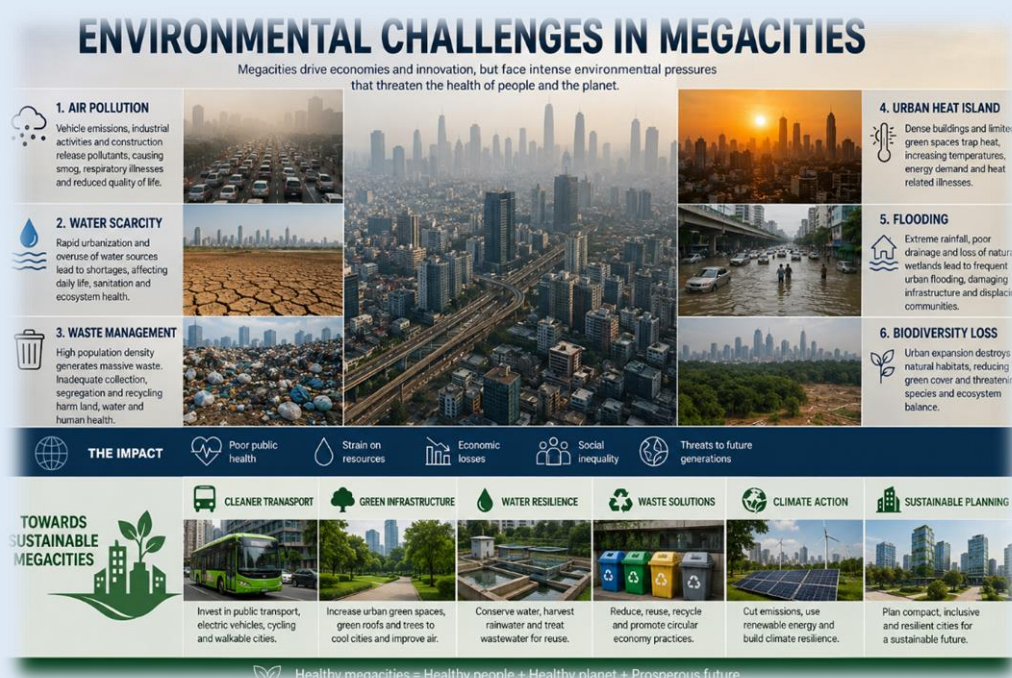
Megacities, defined as urban agglomerations exceeding ten million inhabitants includes both economic vitality and acute environmental stress within finite geographies. The rapid expansion of megacities in India has emerged as one of the defining features of the country's urban transformation in the twenty-first century. Cities such as Delhi, Mumbai, Kolkata, Bengaluru, and Chennai have evolved into major economic and industrial centres, attracting millions of people in search of employment, education, and improved living conditions. However, this unprecedented urban growth has also intensified environmental degradation, creating severe ecological and public health challenges. The increasing concentration of population, industries, transportation networks, and infrastructure within limited urban spaces has placed enormous pressure on natural resources and urban ecosystems.

One of the most significant environmental problems in Indian megacities is air pollution. Vehicular emissions, industrial activities, and construction dust contribute heavily to deteriorating air quality. Delhi, for instance, frequently records hazardous levels of particulate matter (PM2.5 and PM10), especially during winter months. Respiratory illnesses, cardiovascular diseases, and reduced life expectancy have become increasingly common among urban populations

Water scarcity and water pollution constitute another major environmental concern in Indian megacities. Rapid urbanisation has led to excessive groundwater extraction, depletion of water tables, and contamination of freshwater sources. Rivers flowing through urban centres, such as the Yamuna in Delhi and the Hooghly in Kolkata, are heavily polluted by untreated sewage, industrial effluents, and solid waste disposal. Inadequate wastewater treatment infrastructure further aggravates the problem. Simultaneously, the rising demand for potable water due to population growth has created severe inequalities in water distribution, particularly affecting low-income communities and informal settlements.

Solid waste management also presents a critical challenge. Indian megacities generate enormous quantities of municipal waste on a daily basis, much of which remains untreated or poorly managed. Landfills such as Ghazipur in Delhi have become symbols of unsustainable urban consumption and inadequate waste disposal systems. Although recycling initiatives and waste segregation policies have been introduced in several cities, the lack of public awareness, infrastructure deficiencies, and weak regulatory enforcement limit their effectiveness.

While they contribute significantly to economic growth and modernization, they also face severe environmental crises that threaten long-term sustainability. Addressing these environmental challenges requires an integrated and sustainable approach to urban governance.



THE IMPORTANCE OF POLLINATOR CONSERVATION

Sanchita Saha

When we imagine global food security, visions of expansive wheat farms, sophisticated agricultural equipment, or elaborate logistics chains come to mind easily. However, what we fail to realize is that one of the essential components of our survival is tiny. The role of pollinators such as bees, butterflies, moths, bats, and beetles should not be overlooked. These organisms contribute to plant reproduction by helping pollinate, or transfer pollen, from the stamens (male parts of the flower) to the pistils (female parts). In effect, pollination allows for biodiversity on Earth and supports our very existence.

The economic and agricultural significance of these minute organisms is tremendous. According to FAO, about 75 percent of all types of crops produced around the world depend in part upon animal pollination. That means one in every three mouthfuls we eat is attributable to the efforts of pollinators. Wind pollination is characteristic of basic crops such as rice and wheat; however, the nutritious crops that give color and nourishment to our diets, such as fruits, vegetables, nuts, and oils, need insect pollinators. Right from our first cup of coffee, our favorite apple, tomatoes, and almonds, pollinators add many billions of dollars to agriculture worldwide each year, in addition to providing humans with nutrients.

Aside from the crops we eat for dinner, pollinators serve as the backbone of natural environments. More than 90% of the flowering plant species in nature rely on animal intervention to procreate. The plant species make up the foundation of our ecosystem since they hold soil together, cleanse our water supplies, and remove carbon dioxide from our air. Additionally, the fruiting bodies that emerge as a result of insect pollination represent the staple diet for hundreds of bird and mammalian species. In summary, when we protect pollinators, we protect life itself.

Moreover, not only does this endanger our food security, but it will affect the human race's cultural heritage and the field of medicine as well. Indigenous people have certain plants that need insects to reproduce for their cultural, religious, or ethnic identity. As much as 50% of all medicines used around the globe come from wild plant life, which is pollinated by animals. In addition, many plant compounds have yet to be discovered because pollinators have been left extinct, thus closing the doors to possible treatments for new diseases.

It should be noted that the fight for the survival of pollinators is moving closer to our very doorsteps and cities. For many years, conservation was considered an activity that was taking place only in remote wilderness preserves. Yet, researchers have found that properly managed cities and suburban communities may turn out to be a lifeline for endangered insect species. With urban parks, gardens, and verges covered with native species of flowering plants instead of green grassy lawns, we get patches of quality habitat that can protect pollinators from excessive pesticide use in industrial farmlands.

Despite their invaluable importance, these species are now confronted with a crisis of unprecedented magnitude. Due to human intervention, the present rate of pollinator extinctions is said to range from 100 to 1,000 times above average. This is because of a series of factors that include habitat destruction, urban sprawl, the widespread application of artificial pesticides, and climate change, where there would be a mismatch between flower blooming and insect emergence periods. The destruction of their habitats is brought about by the replacement of the fields with concrete or monoculture cropping, where only one type of plant is cultivated in huge expanses of land.

It is imperative that we work together to protect these precious animals. In general terms, agriculture needs to adopt more sustainable methods of crop cultivation, like minimizing the use of chemicals and pesticides, as well as planting native wildflowers among the farmlands. In specific terms, anyone can make their own small contribution by converting their personal gardens or balconies into sanctuaries for the animals with the use of native plants and without the use of heavy-duty herbicides. The protection of our pollinators is a form of investment for the future generation.

ENVIRONMENTAL IMPACT OF E-WASTE

Sneha Bhattacharyya

E-waste, which stands for electronic waste, represents electronic and electric devices such as televisions, cell phones, computers, batteries, refrigerators, and digital equipment that no longer serve their purpose. The advancement in technology and increased consumerism, along with the accelerated life cycle of electrical appliances, result in the generation of a huge amount of e-waste around the world. Electronic appliances play an important role in the process of development and modernization of society and facilitate effective communication; however, improper disposal of these appliances causes numerous environmental hazards. The majority of electronic devices consist of valuable metals such as gold, silver, copper, and aluminum, as well as hazardous chemicals, such as lead, mercury, cadmium, chromium, and brominated flame retardants. These chemicals pose numerous environmental hazards when improperly disposed of and treated.



Impact of e-waste

Soil contamination constitutes another impact of e-waste on the environment. Soil contamination occurs as a result of e-waste being disposed of by informal means such as open dumping. The hazardous chemicals in the electronic devices leak into the soil and accumulate to become a health hazard to people as well as animals. The soils become infertile and thus do not support agriculture as well. In areas where e-waste is dumped without being treated using science, the soil quality around that region becomes poor and does not support vegetation anymore.

Water pollution is another environmental problem associated with the improper disposal of e-waste. The toxic substances in the e-waste get into water systems such as groundwater, rivers, lakes, and pond water. Water sources become polluted as a result, making them unsuitable for use either by living organisms in the water or by human beings. Aquatic life in the rivers is affected, and aquatic plants and microorganisms die as a consequence. Informal activities of recycling e-waste occur near water sources in many developing nations.

The second important environmental effect caused by electronic waste is that of air pollution. The methods used for informal recycling include the burning of wires, plastics, and other electrical materials to obtain valuable metals from them. In this manner, various toxic chemicals, including dioxins, furans, and particulates, are released into the air. These substances lead to respiratory problems, acid rain, and climate change. Greenhouse gases emitted by burning plastics and other electrical materials cause global warming. Those who work at such recycling plants breathe in these toxic emissions, thus suffering from respiratory and skin ailments.

Improper handling of e-waste also leads to the depletion of natural resources. Electronic devices contain rare and valuable metals that require extensive mining activities for extraction. When e-waste is not recycled efficiently, these resources are lost, leading to increased mining and environmental degradation. Mining operations consume large amounts of energy, destroy natural habitats, and generate additional pollution. Proper recycling and recovery of materials from e-waste can reduce the demand for raw material extraction and promote sustainable resource management.

Furthermore, the growing volume of e-waste creates challenges for waste management systems worldwide. Developing countries often lack advanced recycling technologies and strict regulations for safe disposal. As a result, large quantities of e-waste are handled informally, increasing environmental and health risks. Effective management of e-waste through recycling, reuse, public awareness, and implementation of environmental regulations is essential for minimizing its harmful impacts. Sustainable practices and responsible consumer behavior can significantly reduce environmental pollution and support long-term ecological balance.

GREEN ENTREPRENEURSHIP AND ECO-INNOVATION

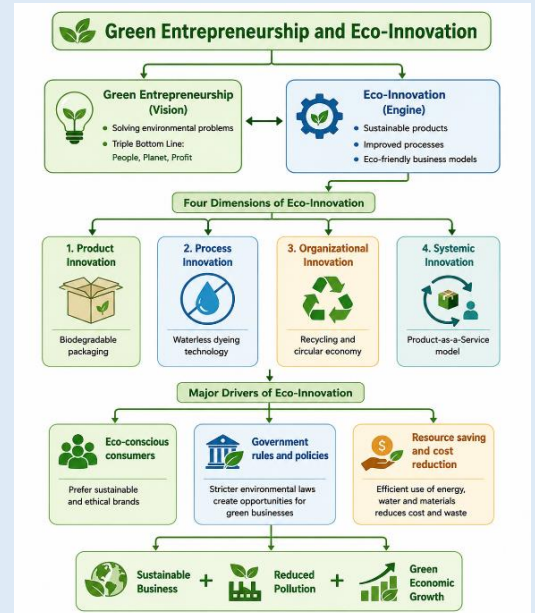
Souvik Dey

Today, a profound paradigm shift is underway. Driven by climate urgency, changing consumer values, and resource scarcity, the dual forces of **Green Entrepreneurship** and **Eco-Innovation** are proving that the most profitable businesses of the future will be those that heal the planet rather than deplete it. To understand this green business revolution, we must look at how green entrepreneurship and eco-innovation work together as a team. While they are closely linked, they represent two distinct components of sustainable commerce: the vision and the technical engine.

Green Entrepreneurship (The Vision): This is the practice of creating and managing a venture whose core mission is to solve environmental problems. Unlike traditional entrepreneurs who focus solely on financial returns, green entrepreneurs build their entire business strategy around the "**Triple Bottom Line**": **People, Planet, and Profit**.

Eco-Innovation (The Engine): This is the technical engine that makes that vision a reality. It refers to the creation or implementation of new or significantly improved products, manufacturing processes, or business structures that dramatically reduce environmental impacts compared to conventional alternatives.

The Four Dimensions of Eco-Innovation



- ❖ **Product Innovation:** Product innovation focuses on creating eco-friendly products that reduce environmental harm throughout their life cycle. A good example is mushroom-based biodegradable packaging made from mycelium, which replaces non-degradable Styrofoam and decomposes naturally without causing pollution.
- ❖ **Process Innovation:** Process innovation improves manufacturing methods to reduce the use of water, energy, and raw materials while minimizing waste generation. For example, waterless dyeing technology in textile industries uses pressurized CO₂ instead of water, reducing wastewater pollution and conserving freshwater resources.
- ❖ **Organizational Innovation:** Organizational innovation involves changing company policies, management systems, and supply chains to achieve sustainability goals. Many fashion companies now follow circular economy practices by recycling used garments and converting waste textiles into reusable products.
- ❖ **Systemic (Business Model) Innovation:** Systemic innovation changes traditional business models by shifting from product ownership to service-based approaches. Under the “Product-as-a-Service” model, companies provide services such as lighting on lease, encouraging durable and energy-efficient product design while reducing waste.

Major Drivers of the Eco-Innovation Movement: 1. **Eco-Conscious Consumers:** Today, many people, especially younger generations, prefer to buy products from companies that care about the environment. They support brands that use sustainable and ethical practices and are often ready to spend more money on eco-friendly products. 2. **Government Rules and Policies:** Governments around the world are introducing stricter environmental laws, such as banning single-use plastics, imposing carbon taxes, and making companies responsible for waste management. These rules increase costs for polluting industries and create opportunities for green businesses and startups. 3. **Saving Resources and Reducing Costs:** Eco-innovation helps companies reduce waste by using less energy, recycling water, and efficiently using raw materials. This not only protects the environment but also lowers production and operating costs, making businesses more profitable in the long term.

GLOBAL ENVIRONMENTAL MOVEMENTS LED BY STUDENTS: THE GENERATION THAT REFUSED TO WAIT

Srinjoy Roy

In an era defined by escalating climate crises and mounting ecological uncertainty, it is not seasoned diplomats or veteran policymakers who have most forcefully demanded accountability—it is students. Across continents, young individuals have emerged as the most vocal advocates for environmental reform, demonstrating that age is no barrier to influence and that grassroots mobilisation can reshape global discourse. This generation has grown up witnessing **floods, wildfires, and species extinctions** with alarming frequency, and unlike those before them, they have refused to simply inherit the consequences of inaction.

Perhaps no individual embodies this spirit more powerfully than **Greta Thunberg**, the Swedish activist who, in August 2018, began a solitary school strike outside the Swedish Parliament, demanding stronger climate action ahead of the nation's general elections. What began as a lone protest with a handwritten placard evolved, within months, into Fridays for Future, a global movement of extraordinary scale. By September 2019, an estimated four million people across 161 countries participated in a single coordinated climate strike, with students walking out of classrooms in cities ranging from Berlin and New York to Nairobi and Mumbai. Thunberg's address to world leaders at the United Nations Climate Action Summit that same month underscored the moral clarity that student voices were bringing to a conversation long dominated by political abstraction.



Greta Thunberg (Sources: The Guardian)

In the United States, the Sunrise Movement, founded in 2017 primarily by young Americans in their twenties, pursued a more explicitly political strategy. Rather than limiting its activities to public demonstrations, the organisation sought to reshape legislative agendas and electoral outcomes. Its members famously staged a sit-in at the office of then-incoming House Speaker Nancy Pelosi in November 2018, and their sustained lobbying played a meaningful role in elevating the concept of a Green New Deal to mainstream political discourse. Their approach illustrated that student activism need not confine itself to the streets; organised youth movements possess the capacity to engage directly with the institutions responsible for environmental governance.

Student-led environmentalism is by no means confined to the Western world. In India, **Licypriya Kangujam**, who began her activism at the age of seven, addressed the UN Climate Change Conference in Madrid in 2019 at just **eight years** old, calling upon policymakers to enact stronger environmental legislation. Her advocacy reflects a broader pattern across South and Southeast Asia, where student groups have challenged industrial expansion and demanded governmental accountability on issues ranging from plastic pollution to river contamination. Similarly, Jamie Margolin, who founded Zero Hour at sixteen, broadened the environmental conversation by connecting ecological degradation with racial justice and socioeconomic inequality, ensuring that the movement reflected the voices of those most affected by climate change.



Licypriya Kangujam (Sources: The Hindu)

The growing inclusion of youth delegates at successive COP summits and the establishment of the UNFCCC's Youth Constituency, YOUNGO, confirm that student voices are no longer tolerated merely at the margins of policy debate; they are shaping its direction. The global environmental movements led by students represent something genuinely unprecedented: a generation that, faced with systemic failure, chose organised action over despair. The challenge now is for governments and institutions to meet that urgency with the seriousness it unambiguously demands.

ENERGY CONSERVATION IN EVERYDAY LIFE

Susmita Sarkar

Energy conservation in everyday life plays a vital role in reducing energy consumption, protecting natural resources, and minimizing environmental pollution. As global energy demand continues to rise due to population growth, urbanization, and technological development, the responsible use of energy has become increasingly important. Energy conservation refers to the practice of reducing unnecessary energy usage through efficient methods and mindful behavior. Simple daily actions such as switching off lights and electrical appliances when not in use, using energy-efficient devices, and reducing excessive fuel consumption can collectively make a significant impact.

One of the most effective ways to conserve energy in daily life is through the efficient use of household appliances and transportation systems. Modern energy-efficient appliances such as LED bulbs, inverter air conditioners, and five-star-rated electrical devices consume less electricity while providing the same level of performance. Proper insulation, natural ventilation, and the use of daylight during daytime



hours can further reduce dependence on artificial lighting and cooling systems. In transportation, choosing public transport, cycling, walking, or carpooling can significantly reduce fuel consumption and air pollution. Maintaining vehicles regularly and avoiding unnecessary engine idling also improves fuel efficiency. These practical measures demonstrate that energy conservation does not require drastic lifestyle changes; rather, it involves adopting smarter and more sustainable habits in everyday activities.

Educational institutions, workplaces, and communities also play an important role in promoting awareness about energy conservation. Schools and colleges can organize awareness programs, seminars, and campaigns to encourage students to develop energy-saving habits from an early age. Offices and industries can implement energy management systems, optimize equipment usage, and adopt renewable energy technologies such as solar power to reduce overall energy demand. Governments and organizations across the world are encouraging energy conservation through policies, incentives, and public awareness campaigns. Initiatives promoting renewable energy, energy-efficient construction, and sustainable urban planning are helping societies transition toward a cleaner and more energy-conscious future. Public participation and collective responsibility are essential to ensure the success of such efforts.

Energy conservation in everyday life is a simple yet powerful approach to achieving sustainable development and environmental protection. Every individual has the ability to contribute by making conscious decisions regarding energy use at home, in transportation, and in workplaces. Small actions performed consistently by millions of people can lead to substantial reductions in energy consumption and environmental degradation. As energy resources are limited and the effects of climate change continue to intensify, conserving energy has become a global priority. By adopting energy-efficient practices and encouraging others to do the same, society can create a healthier environment, reduce economic burdens, and secure a sustainable future for coming generations.

SUSTAINABLE PACKAGING AND CONSUMER RESPONSIBILITY

Triparna Pal

Environmental sustainability is among the many “global problems” facing our planet today. The growing recognition of environmental degradation, climate change and pollution, as well as the urgent need to respond, will impact upon both consumers' purchasing patterns and businesses' methods of operating in a more sustainable manner. Sustainable packaging has emerged as one of the more rapidly growing and popular practices because of its direct correlation to environmental waste. According to studies, one-third of all pollution results from the use of packaging for consumer purposes, mostly in the food sector.

Packaging is not only used for protection purposes but it is also used as a means of communication between companies and end-users. Studies suggest that consumers have started behaving with an attitude that they should contribute towards sustainable development, particularly towards environmental protection. This change in consumer behaviour has made industries to design their packaging systems through recyclable, biodegradable, and reusable packaging materials.

Green packaging is the term used to refer to packaging materials which are environmentally friendly or can be termed as sustainable packaging. According to the Sustainable Packaging Coalition, sustainable packaging is good for people and communities throughout its lifecycle. It is also resource efficient through the use of recycled and renewable energy sources. Examples of sustainable packaging include paper, cardboard, glass, and other biodegradable materials which prevent pollution and facilitate recycling. Research conducted among Romanian consumers revealed that most consumers are concerned about the environmental effects of packaging and prefer packaging made up of paper, glass, and cardboard.

It is also important to consider the consumers' role in encouraging sustainable packaging. Sustainable development will not be achieved solely based on technological innovation in industries, without consumers adopting responsible buying and disposal practices. It is found that consumers tend to prefer goods that use eco-friendly packaging since they feel that such products contribute towards protecting the environment and being socially responsible. Moreover, studies also find that purchase intention related to eco-friendly packaging is greatly affected by personal norms, attitude, environmental concern and willingness to pay. This shows that consumer awareness and ethical responsibility affect the trends in the market. Consumer responsibility requires environmentally responsible behaviour, such as waste reduction, packaging reuse, and product recycling. The concept of the 4Rs - reduce, reuse, recycle, and rethink has become an important component of sustainable consumption. Many major firms have adopted these strategies. For instance, Walmart's goal is to achieve package neutrality by 2025 using 4Rs strategies.

In conclusion there is a correlation between sustainable packaging and a consumer's willingness to commit to sustainability through their behaviour (i.e., recycling, decreasing pollution, conserving natural resources, and encouraging sustainable behaviour), which leads to an increase in the beneficial use of sustainable packaging and will help provide for a better planet.

THE ROLE OF MEDIA IN ENVIRONMENTAL AWARENESS

Trisha Ghosh

Environmental issues are one of the most concerned problems in global media in recent decades. Communication a vital tool for creating environmental awareness for better future. At recent decades human actions influence climate anomalies like global warming, acid rain, and ozone depletion. These actions put a negative impact on quality of life. Environmental education is a critical field for sustainable life. Path to a sustainable future is blocked by societal problem like the lacks of adequate environmental knowledge, active media is an effective platform to solve that issue.

A newspaper allows readers to revisit and deeply process structured, long-form stories but information on television or social networks is naturally short, fragmented, and temporary the diversity that educate large number of audiences. This combination of government action and media reach can be used together for better implementation of proposed plan.

Social media is now a central part of daily life which share information to large number of target audience. Casually it motivates citizens every day to track the quality of their local air, water, and other climatic data. With the advent of globalization and access to information, social networks came to be widely used by different generations. However, environmental issues have been causing global impacts, as well as issues of social vulnerability. Environmental awareness awakens new consumption habits, implementing a new socially responsible posture. Use of press media, awareness raising campaigns, incorporation in mainstream education (basic, secondary and tertiary), public participation in environmental matters, celebrities in media campaigns and civic education are some of the ways by which environmental education can be heralded. Educating adult, community, traditional and religious leaders on the importance of environmental health and on the well use of the natural environment is also very critical to sustainable development. The more aware the public is about environmental issues, the stronger the debate will be, and a solution will be found as a result. Due to a stronger and defined agenda, the print press continues to play a role in community awareness. The more knowledge the public has about the environment, the more it demands the design and implementation of policies for the protection of the environment and nature. The collaboration between the internet and culture can provided significant benefits by enhancing the accuracy of information and understanding its boundaries. In the context of the 21st-century digital era, environmental issues have become a primary focus that challenged the sustainability of human life and the planet. Social media is not just a communication tool but also a source of knowledge for the formation of environmentally conscious communities. Discussions on responsibility, ethics of social media use, and collaboration between the government, environmental organizations, and social media platforms are crucial foundations for developing effective and sustainable environmental campaign strategies. Media has the capability to turn everyday people from passive consumers into active data contributors who observe local climate metrics globally.

By focusing on digital strategies on targeted, interactive media, passive screen time can be turned into an active movement for environmental survival.



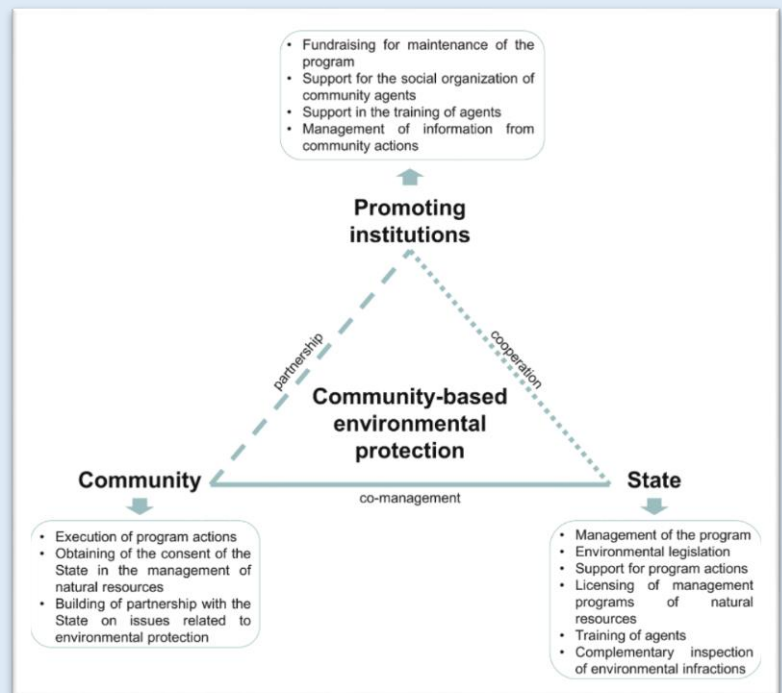
COMMUNITY PARTICIPATION IN ENVIRONMENTAL PROTECTION

Trisha Mondal

“Environment is the total of all the Physical things that surround human beings”

Environment protection has become one of the most important global concerns of the 21st century. Rapid urbanization, industrial growth, deforestation, pollution, climate change, and unsustainable resource use are continuously degrading natural ecosystems. Governments and international organizations alone cannot effectively address these environmental challenges. Active community participation plays a crucial role in achieving environmental sustainability and ensuring long-term ecological balance. Community participation refers to the active involvement of local people in planning, decision-making, implementation, and monitoring of environmental protection activities. It creates environmental awareness, strengthens social responsibility, and promotes sustainable development.

Community participation is crucial in environmental decision-making and conservation activities, enhancing effectiveness and sustainability by integrating local traditional knowledge. Key areas include waste management, where communities engage in practices like recycling and cleanliness campaigns to combat pollution. In forest and biodiversity conservation, local populations contribute to afforestation and forest management, notably in India through Joint Forest Management initiatives. Additionally, community involvement in water conservation, via rainwater harvesting and watershed management, addresses water scarcity issues while improving public health and agricultural productivity. Climate change mitigation and adaptation necessitate robust community engagement. Increasing temperatures and extreme weather events pose significant threats to vulnerable populations. Communities can enhance climate resilience by engaging in activities like tree planting, embracing renewable energy, promoting sustainable agriculture, and improving disaster preparedness. Community-driven adaptation strategies yield better results as they align with local environmental and socio-economic contexts, while public involvement bolsters disaster risk reduction and emergency response systems.



Community based Environmental protection (Ekarini et al.,2022)

Environmental education and awareness programs are vital for engaging community participation, with schools, NGOs, and local institutions playing a key role. Campaigns focused on pollution control, energy conservation, and sustainable lifestyles encourage responsible behaviour. Scientific literacy aids communities in understanding environmental degradation and supports evidence-based decision-making. Technology and social media enhance participation by enabling information sharing, incident reporting, and volunteer mobilization. Tools like GIS and citizen science initiatives empower communities to monitor environmental changes, improving data collection and governance. Community participation in environmental protection is hindered by issues such as lack of awareness, poverty, insufficient funding, weak institutional support, and limited policymaking involvement. Additionally, industrial activities and urban expansion can create conflicts between economic development and conservation. To address these challenges, governments need to create inclusive policies that promote public participation, offer environmental education, and support local initiatives.

Ultimately, protecting the environment and achieving sustainable development requires strong community participation. When local people are actively involved, conservation and environmental management become much more effective. By combining scientific research with local knowledge, we can better tackle major issues like pollution, climate change, and resource depletion. Government action alone is not enough; true progress depends on collective responsibility and public engagement. Empowering communities to take part is the key to building a cleaner, healthier, and more sustainable future for generations to come.

THE ENVIRONMENTAL COST OF MODERN TECHNOLOGY

Abhijit Paul

The exacerbation of the climate crisis has intensified debates on the role of technology in addressing the environmental and social challenges it entails. While international agendas, such as the Sustainable Development Goals (SDGs), prioritise technological adoption and innovation as a solution, critical scholarship suggests scepticism about an increase in technology as a beneficial step. Many of the world's frameworks (such as sustainable development, the United Nations' Agenda 2030, and the Sustainable Development Goals) rely on technology for their fulfilment. Considering that technological adoption has caused many of the challenges expected to be overcome, e.g., biodiversity loss due to pesticides or carbon emissions from combustion engines, a sceptical perspective towards technology is warranted. Big tech refers to large, dominant multinational technology companies that are the key drivers of the global digital economy. This type of sector has expanded rapidly in recent years and is expected to grow strongly throughout the decades. But the digital sectors generated emissions and environmental pressures through the energy-intensive data sector, continued dependence on fossil fuels for electricity, that increase the volume of e-waste and thermal waste. Globally, digital equipment is responsible for 4% of greenhouse gas emissions. The manufacturing process of many digital technologies is basically carbon-intensive, accounting for 47% of the sector's emissions. The international ICT sector produces approximately 730 million tons of CO₂ annually. The ICT sector's activity produces roughly 2 million tons of CO₂ emissions for the average person in the UK finds 24 hours a week online. And in the US, teen screen time averages over 7 hours a day, excluding homework. Data centres are the backbone of the internet that consumes massive amounts of electricity to power servers, cool equipment, and maintain operations 24/7, some of estimation says data centres contribute to approximately 1% of global electricity consumption, and this figure is expected to rise as our demand for digital services grows. The increasing demand and tech innovation lead to frequent upgrades of devices such as smartphones, laptops and other tech gadgets. In 2019 alone, the world generated over 50 million metric tons of e-waste. E-waste contains hazardous materials that can leach into the environment, contaminating soil and water.



While digital technology and the internet have transformed our lives, bringing unprecedented convenience and efficiency, they come with hidden environmental costs. The expansion of servers, data centres, cloud computing, and electronic devices is fuelling a dramatic rise in energy use, which in turn accelerates global warming. New technologies, the underlying digital infrastructure, and the escalating production of e-waste all play a pivotal role in exacerbating climate change. Every time you send an email, stream a video, or search the internet, energy is consumed. Internet services are powered by massive infrastructures, including data centres, networks, and end-user devices, all of which require electricity to operate. For instance, it is estimated that streaming video alone accounts for nearly 1% of global CO₂ emissions, with platforms like Netflix, YouTube, and others seeing rapidly growing energy demand as more people consume media online.

Moreover, digital technology itself can be a powerful tool in combatting climate change. The rise of smart cities and AI-powered solutions can help industries optimise their energy consumption. For instance, AI can be used to improve the efficiency of supply chains, reducing waste and emissions.

“Modern technology owes ecology an apology” — Alan M. Eddison

ENVIRONMENTAL POLICIES AND GLOBAL COOPERATION

Ananya Basak

Historically, the evolution of global environmental policy can be traced through landmark events such as the 1972 Stockholm Conference, which marked the first major international gathering focused on environmental issues. Global environmental issues require global solutions, necessitating cooperation among the involved nations. It is well established that cooperating countries tend to undertake less pollution mitigation than is socially optimal. Nations focused on their own welfare naturally prefer to minimize pollution abatement costs. Since mitigating global pollution essentially means contributing to a public good, achieving optimal worldwide levels is impossible without international coordination and understanding. This is very important to fill the gap and deepen the understanding of the exchange of information on various international conventions on cooperation on global environmental issues. In today's world, where news travels faster than ever before, and our actions have global consequences, international environmental protection treaties are an ideal tool for planetary teamwork. Think of it as a global video conference where everyone shares news, issues, and strategies.

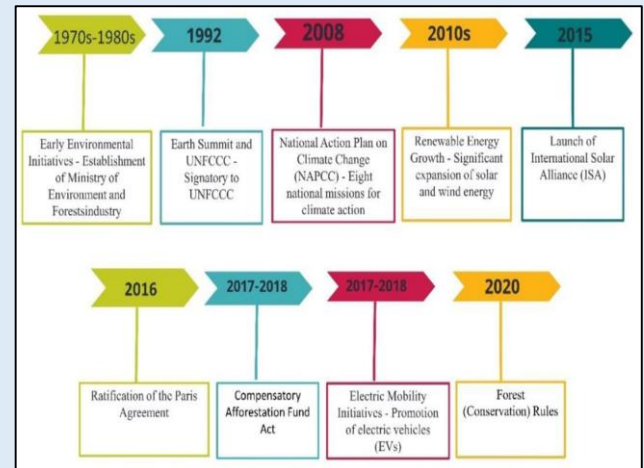


Fig: International environmental policies

Global environmental issues are complex and interconnected challenges that require coordinated international action. Among the most pressing concerns are climate change, biodiversity loss, pollution, and water scarcity. Each of these poses major threats to ecosystems and human well-being, making comprehensive policy frameworks and governance strategies essential. Effective global environmental governance relies on various policy strategies designed to tackle the multifaceted challenges of environmental degradation. These strategies can be broadly categorized into regulatory approaches, economic instruments, and voluntary agreements. Each category plays a crucial role in shaping environmental policy and facilitating compliance among different countries and stakeholders.

As environmental challenges continuously evolve, global governance must also adapt to address these issues effectively. The future directions of global environmental governance focus on enhancing cooperation, adopting innovative approaches, and promoting inclusivity and resilience. The case studies of the Montreal Protocol, Kyoto Protocol, Paris Agreement, Convention on Biological Diversity, and Basel Convention demonstrate both the progress achieved and the barriers faced in international environmental governance. While significant successes have been reached, such as the recovery of the ozone layer and the widespread adoption of climate action plans, persistent challenges remain in ensuring compliance, achieving equity, securing funding, and fostering technological innovation.

Current consensus shows that despite landmark frameworks like the Paris Agreement; there remains a persistent ambition and compliance gap. Future policy research emphasizes the need for stricter, universally accepted monitoring and reporting mechanisms to bridge the distance between pledge and practical emission reduction. Traditional isolation environment policy is increasingly viewed as inadequate to address the scope of the Anthropocene. Future perspectives advocate for polycentric governance models that manage interconnected planetary boundaries, such as the nitrogen cycle and land use, rather than focusing solely on carbon emissions.

BUILDING CLIMATE-RESILIENT COMMUNITIES

Ananya Das

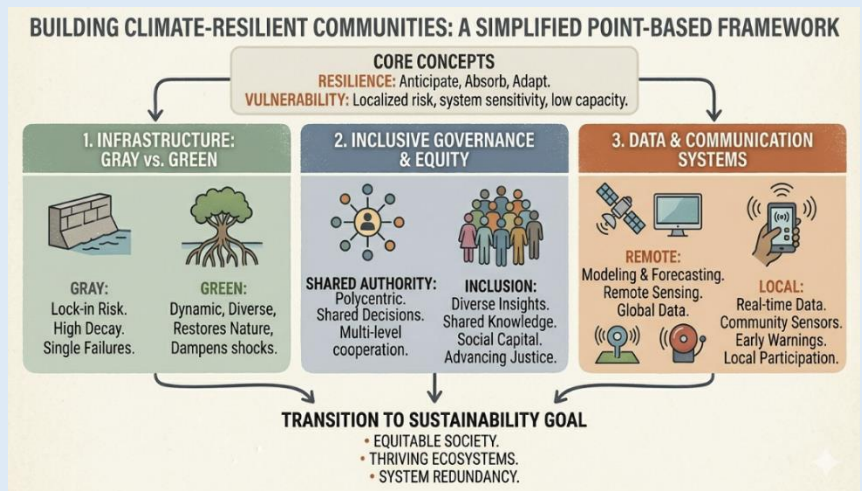
As humanity faces the epoch of rapid anthropogenic climate change, local environmental disturbances become systemic disturbances that endanger both urban and rural socio-ecological systems (SES). The transformation towards resilient cities entails a transition from disaster response to transformative adaptation. Resilience is defined under the IPCC model as the ability of a SES to prepare for, withstand, recover from, and adapt to climate-related impacts without significantly impairing its basic functionality. For reducing vulnerability, a concept that traditionally represents the interplay of exposure, sensitivity, and adaptive capacity, climate adaptation efforts require designing highly resilient infrastructures, implementing nature-based measures, and adopting polycentric governance models.

Engineering and Ecological Integration:

A key dimension of resilient communities involves the integration of robust engineered design and Nature-based Solutions (NbS). Conventional "gray" engineering (such as sea walls and inflexible concrete water drainage systems) can induce path dependency "lock-in," failure modes, and adverse environmental consequences. However, innovative spatial planning advocates for hybrid infrastructural systems. Integrating nature-based components, such as urban bioswales, permeable pavements, mangrove reforestation, and green roofs, allows resilient communities to establish systemic redundancies. Not only do nature-based solutions reduce hydrological hazards and alleviate urban heat island (UHI) impacts, but they also foster local biodiversity.

Socio-Economic Equity and Polycentric Governance:

Nevertheless, structural responses alone cannot address the socio-economic dimensions of climate vulnerability. The socio-political nature of vulnerability manifests itself through the differential sensitivity of socially disadvantaged communities due to systemic inequality and past failures in accessing resources. Effective adaptation thus necessitates the implementation of polycentric governance structures that allow for cross-scale collaboration between institutions. In particular, combining indigenous ecological knowledge and the results of empirical research in climate science allows for designing measures that would help communities adapt to climate change. The integration of social capital on different levels ensures democratic adaptive capacity and eliminates the risk of maladaptation. The inclusion of socio-economic issues related to climate impacts is encouraged by international frameworks like the Paris Agreement and the Sendai Framework for Disaster Risk Reduction.



Technological Synthesis and Predictive Analytics:

Moreover, achieving resilience involves the use of advanced technology and synthesizing the data collected in climate research projects. Predictive analysis, combined with remote sensing and GIS technologies, contributes to the creation of detailed maps of hazards and vulnerabilities. When coupled with IoT sensors in community settings, this combination contributes to implementing a networked approach in which early warning systems are used to develop climate-smart building codes.

In the end, however, resilience for climatic impacts cannot be seen as a destination but a process of continuous socio-ecological co-evolution. This demands a careful balance of hybrid infrastructure, democracy, and forecasting technology. By continually improving local adaptive capacities and addressing the root socio-economic causes of vulnerability, communities can move from mere survival to sustained prosperity amid a world that is increasingly climatically uncertain.

GREEN JOBS AND THE FUTURE ECONOMY

Bidhan Mondal

As the world faces serious environmental challenges such as climate change, pollution, deforestation, and depletion of natural resources, the importance of sustainable development is increasing rapidly. This has given rise to the concept of “green jobs,” which are occupations that help protect the environment and promote sustainable growth. Green jobs are becoming an important part of the future economy because they support cleaner technologies, renewable energy, conservation, and environmentally responsible industries. These jobs can be found in sectors such as solar and wind energy, sustainable agriculture, waste management, recycling, forestry, public transport, and environmental research. Workers in these fields help reduce pollution, conserve natural resources, and create eco-friendly solutions for modern society. For example, solar panel technicians, environmental scientists, electric vehicle engineers, and waste management professionals all contribute towards building a greener future.



One of the greatest advantages of green jobs is that they create employment opportunities while also benefiting the environment. As countries move towards clean energy and sustainable production systems, the demand for skilled workers in green sectors is growing steadily. Governments and organisations around the world are investing heavily in renewable energy projects and sustainable infrastructure, opening new career opportunities for young people. The future economy is expected to rely more on clean energy, resource efficiency, and environmentally friendly technologies rather than industries that heavily damage the environment. Green jobs, therefore, represent a balance between economic progress and environmental protection. By promoting sustainable industries and encouraging innovation, societies can build a healthier planet while also ensuring economic growth and better employment opportunities for future generations.

In conclusion, green jobs are not only important for protecting the environment but also for creating a more secure and sustainable future economy. They encourage people to develop solutions that reduce environmental damage while improving the quality of life for society. As awareness about climate change and sustainability continues to grow, green careers are expected to become even more significant in the coming years. By supporting green industries and sustainable practices, societies can achieve economic development without compromising the health of the planet.

THE ROLE OF SCHOOLS IN BUILDING ENVIRONMENTAL AWARENESS

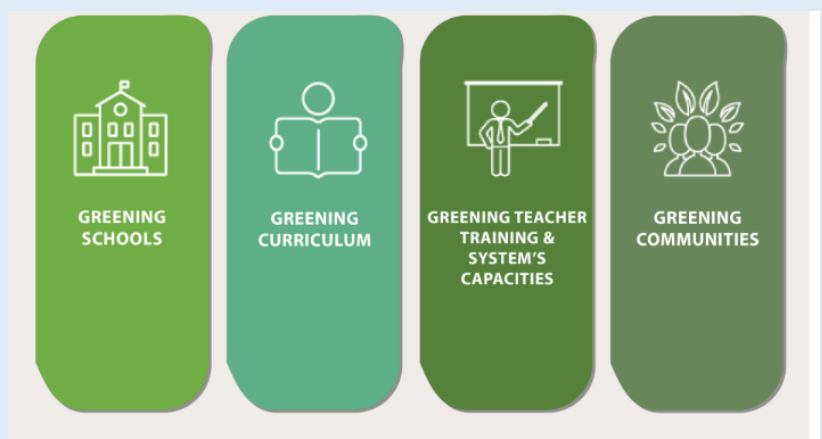
Biprorshi Ghosh

“It shall be the duty of every citizen of India to protect and improve the natural environment, including forests, lakes, rivers and wildlife and to have compassion for living creatures.”-Constitution of India, Article 51A(g).

In a stable and functioning society, school plays the most valuable place where the society’s future generation gets their education, preferably in all spheres for their all-round growth and development. In that sense, it is an important part where schools have been recognized for a long time as the place to induce environmental consciousness and stewardship among children, where the curriculum is being implemented in the spirit to induct children to fundamentally know, create, and encourage them to think and take action on the core ideas of sustainability at their own pace and situation. As a part of Sustainable Development Goal 4 to provide equitable education and learning opportunities to all, it is well worth recognizing that schools and educational institutions are the main nodes, from which dissemination of awareness for knowledge, issues, actions to implement and follow environmentally friendly practices and habits among the future generation is a fundamental requirement.

As per the COP28 conference of 2023, the Greening Education Partnership Multi-Partner Trust Fund (By UNESCO) was established as the first dedicated fund on climate change education. It aims to mobilize resources in a synergistic manner, overcome silos, increase coherence among a wide range of actors, reduce transaction costs for governments, and create new pathways for innovative and impactful financing. At that point, it continues UNESCO's longstanding work in Education for Sustainable Development (ESD), with particular focus on education’s role to tackle climate change. UNESCO aims to equip individuals and communities with the skills, values, and attitudes for shaping green, low-emission, and climate-resilient societies. More than 70+ countries have committed to this, along with 700+ organizations involved.

In India, the policies involving the evolution of environmental awareness, being implemented in school curricula first implemented by the National Policy of Education, 1986, and modified in 1992, included environmental protection, where teaching in schools and colleges should be guided by environmental consciousness.



The Greening Education Partnership of UNESCO in COP28 2023

In the recent National Education Policy, 2020, environmental education is being mandatorily implemented across all educational curricula in academia. In that regard, UGC has prepared Guidelines for Institutional Development Plan, where the key policy document includes: Promotion of energy efficiency, waste reduction, and minimizing environmental impact. Along with that, the institutions are being encouraged to promote a green campus strategy for preserving the ecosystem by safeguarding the natural landscape, reducing carbon emissions, and conserving water resources. Importance is being given to Awareness campaigns, prioritizing recycled materials, and considering heat island effects in sustainable infrastructure designs, like phasing out fossil fuels by efficient transport strategies, eco-friendly technologies & alternative energy sources. In this regard, the implementation is being slowly adapted despite challenges across various sectors, on the brighter side.

India’s future generation needs to be well versed in environmental consciousness and to protect our natural resources as Gifts of nature in the coming days, and to implement environmentally friendly lifestyle choices bit by bit in everyday life. Mere knowledge is not only the solution; adapting sustainable solutions and lifestyle choices is the way forward.

URBAN FORESTS AS ECOLOGICAL AND SOCIAL IMPERATIVES FOR SUSTAINABILITY

Debanjana Das

Though forested regions were preserved as sacred groves in ancient times, since the era of the industrial revolution, the extent of forest destruction has emerged as the standard for the advancement of human civilization—a process that has fundamentally accelerated industrial and urban expansion, thereby giving rise to the concrete cities of the present day and simultaneously reducing the amount of natural forest. In an era where more than half of the population lives in urban areas, an assessment of climate and health risks suggests that the quality of life depends significantly on the coexistence of nature with us within the cities. The concept of urban forests includes all kinds of forest resources present in and surrounding urban regions, such as street trees, parklands, domestic gardens, peri-urban forests, green roofs, and many others, representing the living infrastructure. Nowadays, the involvement of forestry management in urban planning becomes more urgent than ever because, besides making the area look better, its involvement becomes crucial to counter climate change issues, protect human health, and ensure the sustainability of urban settlements.

Urban forests are very significant because they provide a wide range of ecological services, such as carbon sequestration, stormwater management, heat island mitigation, and air purification, along with many other socioeconomic benefits. There are two major mechanisms through which urban forests impact the climate of a region. First, urban trees become a physical barrier for the sun's energy and generate moisture, thus cooling the environment and reducing the effect of heat island formation. Second, tree canopies act as an air filtration medium and filter out air pollutants and nitrogen oxides, preventing respiratory disorders among the urban population. Because there is no natural vegetation in urban areas and impervious surfaces prevail, rapid drainage of rainwater takes place from pavements. The urban forest is equally important in terms of being a habitat for birds, pollinators, and other small wildlife.

Besides the ecological significance of urban forestry, they hold great importance for the process of restoration, not only physically but psychologically too. This is due to the fact that they help in lowering cortisol levels, reducing depression and anxiety, and performing physical activities that do not lead to cardiovascular diseases and obesity. In addition, effective urban forestry helps in increasing social cohesion and reducing crime rates.

In terms of economic benefits, urban forests have vast opportunities. Shade trees planted around residential and business premises reduce the cost of air conditioning. This can reduce the requirement of cooling energy by changing the grey infrastructure into green. The shading of asphalt streets helps them withstand extreme variations in temperatures, thus avoiding any damage due to UV exposure, which results in cracking and increases their longevity, as well as that of other infrastructures in the same way. Shaded streets with trees and closer proximity to well-maintained green areas always contribute to increasing the property values of homes.

Urban forests provide the most effective illustration of the interaction between ecology, public health, economics, and social sciences. Urban forests have been identified as the most economically viable means for addressing climate change adaptation and mitigation measures in urban environments. Management of urban forests demands continued investment and adequate governance. The Food and Agriculture Organization states, **“Forests and trees in urban areas, if managed properly, can play an important role in the planning and design of sustainable and resilient urban landscapes.”** Thus, the future of our cities and the future of our forests are going to be interconnected. Urban forests are not going to emerge on their own, nor are they going to survive without being protected, maintained, and having a strategic framework put in place to ensure that the benefits of urban forests will be shared equally by all urban dwellers. Urban forestry is one of those rare investments that not only tackles climate change, public health, equity, and economic resilience at once but is imperative for the 21st century.

ONE EARTH, ONE FUTURE: COLLECTIVE RESPONSIBILITY

Manaswita Guha

The Earth is not only a stage upon which human history unfolds but is as lively as the rustling forest, like the drifting cloud, like the tide that rises faithfully beneath the moon. It breathes through evergreen rainforests, pulses through winding rivers, and whispers through deserts shaped by centuries of wind. Humanity is not separate from this living world; rather, we are those fragile threads woven into a vast and intricate tapestry of life. Yet somewhere along the path of progress, we have forgotten to behave as caretakers of the Earth; we started to act like masters.

With the silent retreat of glaciers in the distant pristine mountains to bleached dying coral reefs beneath warming seas that were once colourful, the planet is warning us about the approaching doomsday. The great ice fields that once stood like eternal guardians are now melting down into memory. Forests that once echoed with chirps are now falling quiet as species vanish forever. Oceans choke on plastic and oil while storms grow fiercer, heatwaves unbearably longer, and droughts more merciless. These are no longer isolated tragedies; they are chapters of the same story, the story of imbalance between humanity and the natural world that sustains it.

The Earth, the tiny blue sphere suspended in silence from the vast darkness of space, the only home humanity has ever known, the only place where rivers flow, where children laugh beneath the open skies. There are no borders visible from that distance, no nations, no segregation based on wealth or power. There is only one Earth, which carries every dream, every civilization, and generations yet to come. And now, this delicate world stands at a crossroads.

Environmental collapse is a democratic catastrophe in disguise. It does not discriminate between the rich and the poor. Floodwaters do not ask for nationality before swallowing up homes. Polluted air enters every pair of lungs exposed. Rising temperatures scorch fields regardless of political ideologies. The poorest communities often suffer first and worst, yet no society remains untouched for long. In a destabilized world, privilege becomes fragile. The illusion that some can still escape while others endure the consequences is slowly being crushed by nature itself.

Much of this crisis has escalated due to decades of unsustainable industrial expansion and a culture that often mistakes endless consumption for prosperity. The magnanimous mountains have been hollowed for fuel, rivers poisoned for convenience, forests reduced to ash for profit. Humanity learned to produce more, buy more, waste more, as if the Earth possessed infinite abundance. But nature operates through balance, not excess. Every tree cut without renewal, every ocean polluted without restraint, every species pushed to extinction weakens the delicate web that supports all life, which includes our own, too.

Perhaps the greatest tragedy is that this destruction steals not only from the present but from the future as well. The reckless exploitation of finite resources is a form of inheritance theft. Future generations are being denied the clean rivers that they did not pollute, stable climates they did not disrupt, and forests they will know only through photographs and stories. A child born tomorrow deserves the same wonder that humanity once inherited freely, the sight of the thriving coral reefs, the call of wild birds at dawn, the certainty of seasons arriving as they should. To trade that inheritance for just temporary comfort is not merely irresponsible but profoundly unjust.

Nevertheless, despair cannot be our final response. The scale of the crisis may feel overwhelming, but history has always shown that collective human action possesses extraordinary power. No single raindrop believes it can create a flood, yet together they reshape landscapes. In the same way, every act of care, every shared effort, every community choosing responsibility over indifference contributes to something larger than itself. Real change does not begin in grand speeches alone; it begins when humanity remembers that survival is a shared condition and not a responsibility of a single person.

There is still hope because people across the world are beginning to awaken to this truth. Young voices rise demanding accountability. Communities rebuild forests, protect rivers, and rediscover sustainable ways of living. Scientists, farmers, artists, teachers, and ordinary citizens are united by a growing understanding that the future cannot belong to exploitation alone. Humanity is capable not only of destruction, but also of compassion, innovation, and renewal.

The story of Earth is not yet finished. We still possess the ability to choose what kind of ancestors we will become. We can continue down a path of careless extraction until silence replaces birdsong and concrete replaces forests, or we can choose stewardship over greed, responsibility over apathy, and unity over division.

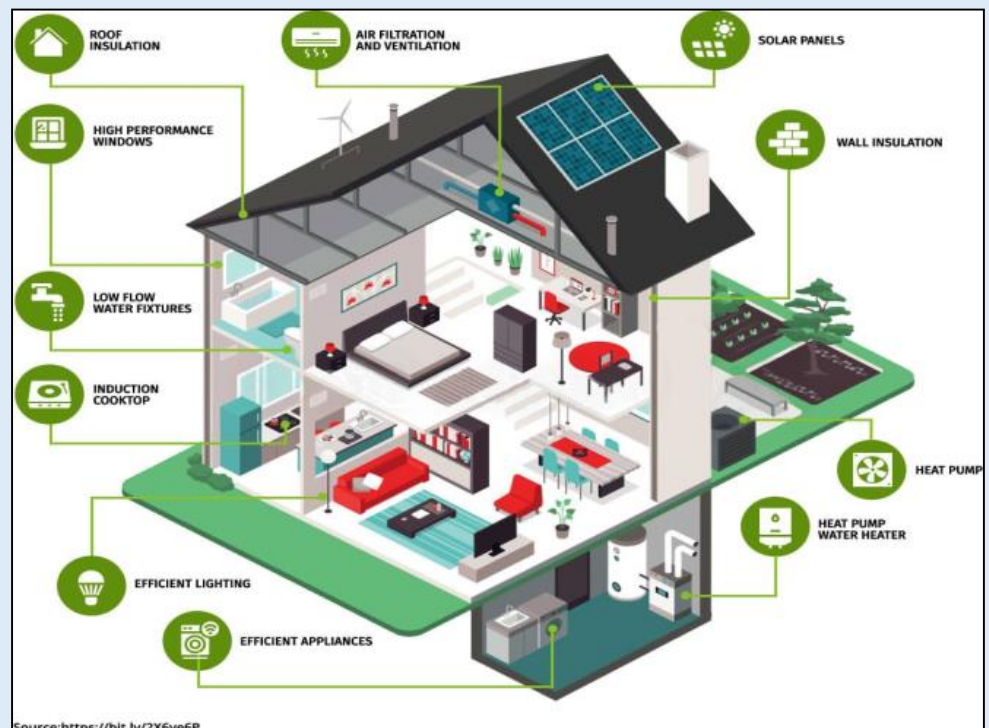
One Earth. One future. The fate of both rests not in the hands of a single nation or generation, but in all of us together.

GREEN BUILDING AND ECO-FRIENDLY ARCHITECTURE: A SUSTAINABLE APPROACH TO MODERN DEVELOPMENT

Nabanita Kundu

Rapid urbanization and industrial growth have increased environmental problems such as pollution, excessive energy use, and depletion of natural resources. To address these challenges, the concepts of green building and eco-friendly architecture have become important for sustainable development. These approaches focus on constructing buildings that are environmentally responsible, energy-efficient, and healthier for people. A green building is designed to reduce negative environmental impacts throughout its life cycle. The main objectives include:

- Green buildings reduce energy consumption through smart design, insulation, and renewable sources like solar and wind energy.
- Sustainable structures use rainwater harvesting, greywater recycling, and low-flow fixtures to minimize water wastage.
- Eco-friendly architecture encourages the use of recycled and renewable materials to reduce environmental impact and resource depletion.
- Proper ventilation, natural lighting, and non-toxic materials improve indoor air quality and support better human health.



One of the key features of green buildings is the use of renewable energy and energy-saving technologies such as solar panels, LED lighting, and natural ventilation systems. These methods reduce electricity consumption and dependence on fossil fuels. Water conservation is another important aspect. Rainwater harvesting, wastewater recycling, and low-flow plumbing systems help in reducing water wastage and improving groundwater recharge. Eco-friendly architecture also encourages the use of sustainable building materials like bamboo, recycled wood, and fly ash bricks. Green roofs and vertical gardens help reduce urban heat and improve biodiversity. In India, organizations such as the Indian Green Building Council (IGBC) and GRIHA Council promote sustainable construction practices. Buildings like Indira Paryavaran Bhavan and Suzlon One Earth Campus are successful examples of eco-friendly infrastructure.

Green building and eco-friendly architecture have emerged as essential approaches for achieving sustainable urban development amid climate change and environmental degradation. These practices emphasize energy efficiency, water conservation, sustainable materials, and climate-responsive design to reduce ecological impacts. Modern concepts such as passive architecture, net-zero energy buildings, embodied carbon reduction, and adaptive reuse improve environmental performance and resource efficiency. Features like basophilic design, blue-green infrastructure, urban carbon sinks, and smart technologies enhance biodiversity, regulate urban microclimates, and improve human well-being. Thus, sustainable architecture not only minimizes environmental stress but also promotes resilient, healthier, and future-ready cities such as CII-Sohrabji Godrej Green Business Centre, Hyderabad. Infosys Campus, Mysore.

SOLAR ENERGY REVOLUTION IN DEVELOPING NATIONS

Samima Khatun

The use of solar energy has not been opened up because the oil industry does not own the sun. -Ralph Nadar

Nowadays, across much of the developing world, how people get their power is shifting fast. As cities grow bigger and factories multiply, more electricity gets used every year. Even so, millions still deal with blackouts, weak grids, or no access at all. Fossil fuels remain dominant, despite their limits. Into this gap steps sunlight - free, everywhere, ready. It powers homes once left in darkness. Lives shift when lights stay on after sunset. Factories hum without smoke. Cleaner air follows. Economies begin moving differently. Progress takes new shape under open skies.

Most of our planet's endless energy supply comes from the sun. Places near the equator, usually poorer nations, soak up strong light without pause through every season, so using solar becomes a smart financial move there. Burning fossil fuels pumps poisons into the sky; sunlight creates electricity without that damage. Because of this difference, clear skies mean cleaner breathing for cities, plus a better shot at slowing global warming.

One reason solar power spreads fast? Panels now cost much less than before. Because technology keeps getting better, nations such as India are adopting it more quickly. India launched a big plan meant to lift clean energy output while cutting fuel imports. In another part of Asia, Bangladesh earns praise worldwide for wiring homes with solar kits. Thanks to that effort, entire villages far from cities finally got electric light. China pushes forward, too, adding vast fields of panels across wide open spaces. Kenya joins them, using sunlight to reach places that grids cannot touch. Where people live off main networks, change shows strongest. Power from above shifts daily life below.

Out past the edge of big power lines, sunlight runs machines in far-off places. Lights let kids read after dark, clinics keep drugs cool without risk, while pumps pull water when skies stay clear. Workshops hum later into the evening, stores open longer than before - money comes easier now. Farms grow more food thanks to steady drops from sun-fed pipes.

Jobs sprout up where sunlight hits factories and rooftops alike. Manufacturing gear, setting panels in place, fixing systems - these tasks need hands and minds now more than ever. Training courses open doors for younger workers eager to step into clean power roles. Because fuel no longer ships across oceans, money stays closer to home instead. Nations hold tighter to stability when sunshine powers homes and businesses.

Still, getting solar power going faces hurdles in poorer nations. Cost at the start stops many from setting it up. Money worries slow things down, too. Know-how about how these systems work is missing in several places. Roads and networks often fall short. Elsewhere, keeping batteries charged proves tough. Fixing panels when they fail becomes a problem. Support from national leaders helps push change forward. Partnerships across borders bring more strength. Teaching people what solar can do makes a difference. Progress waits on these pieces falling into place.

One big shift with sunlight isn't only about new gadgets. This move opens doors - cleaner power shows up where it's needed most. Progress grows quietly when villages gain light without smoke. Cheaper tech means more people can reach for panels instead of pipes. Step by step, bright rooftops replace old systems. Not every country moves at once, yet many are starting now. Sunlight keeps pushing changes that feel slow but run deep.

THE ENVIRONMENTAL IMPACT OF SOCIAL MEDIA AND DIGITAL TECHNOLOGY

Sanchari Sarkar

In the present time uses of social media and digital technologies are increasing. But it affects our environment positively and negatively. The rapid growth of internet users and digital platforms like social networking platforms, video streaming services, artificial Intelligence (AI), online gaming, remote work and online education has increased the production of global data. More than two-thirds of the world population now uses social media (Source: International Telecommunication Union). For increasing smartphone penetration and high-speed internet, digital technologies continues to grow.

The Environmental Impact:

Carbon footprint

Digital technologies contribute to carbon emissions by electricity consumption, manufacturing processes, data centre, device transportation, cooling systems. For this carbon footprint amount of greenhouse gases, mainly carbon dioxide (CO₂), released into the atmosphere.

Uses of Electronic Waste (E-Waste)

E-waste like smartphones, computers, televisions, batteries, chargers etc create environmental problems like soil contamination, water pollution, toxic chemical leakage, heavy metals contamination (lead, mercury, cadmium), air pollution from informal recycling.

Effect of social media

Now days social media promotes a fast fashion, frequent shopping, influencer marketing, online advertising which affects our environment. It can cause of more factories, more raw material extraction, and more energy use. This online shopping generates plastic waste, cardboard waste, delivery emissions, and also clothing trends increasing textile waste and water pollution.

Conclusion

Now social media and digital technology are important parts of modern life but their environmental impacts are increasingly significant which contribute to global environmental challenges. In future we have to focus on a balanced approach which is essential to ensure that technological progress does not affect our environment negatively and will not be the reason of environmental degradation. Nature based solution, sustainable digital practices, renewable energy use, responsible consumption, and green technological innovation can help reduce the negative impact of social media and can provide its social and educational benefits.



CIRCULAR ECONOMY: REDUCING WASTE THROUGH REUSE

Sanku Mondal

A circular economy is a system in which products and materials are saved in use for as long as possible rather than being discarded after a single use. It is diverse from the traditional linear economy, which follows take, make, use, and dispose. Circular economy follows reduce, reuse, repair, refurbish, and recycle. Its main aim is to decrease waste, save natural resources, control pollution, and protect the environment.

Reuse is one of the most important parts of the circular economy because it extends a product's lifespan. When we reuse an item, we reduce the need to produce a new one. This saves raw materials, energy, water, and money. Reuse also reduces pollution from factories and transport. It is often better than recycling because recycling needs machines and energy, but reuse preserves the product in use with little or no processing.

How reuse helps in the circular economy

- **Reduces waste generation:** Usable items like clothes, books, furniture, bottles, and containers do not go directly to landfills.
- **Saves natural resources:** Reusing products reduces the demand for new raw materials such as wood, metals, plastic, water, and fuel.
- **Reduces pollution:** Less production means less air pollution, water pollution, and greenhouse gas emissions.
- **Saves money:** Repairing, sharing, or buying second-hand products is cheaper than buying new items.
- **Creates employment:** Reuse supports repair workers, tailors, carpenters, electronic technicians, scrap collectors, and second-hand sellers.



Examples of reuse

1. Using cloth bags instead of single-use plastic bags.
2. Reusing glass jars and bottles for storage.
3. Composting kitchen waste and using it as organic manure.
4. Donating or exchanging old clothes.
5. Refill steel or glass water bottles instead of buying plastic bottles.



Recommendations

- **Every household should follow reuse first:** Families should reuse cloth bags, bottles, containers, clothes, and furniture before throwing them away. This is important because India generates over 1.6 lakh tonnes of municipal solid waste per day, so waste reduction must start from home.
- **Refill system in shops and markets:** Shops should allow customers to refill oil, detergent, shampoo, pulses, rice, and spices in their own containers. This can reduce packaging waste, especially plastic. India generated about 41.36 lakh tonnes of plastic waste in 2022–23, so refill systems are needed.
- Schools and colleges should start book banks and book exchange programmes.

In conclusion, the circular economy is a practical solution for reducing waste and protecting the environment. Reuse is a simple but powerful method because it saves resources, reduces pollution, lowers waste generation, and supports local employment. If reuse becomes a daily habit, society can move towards a cleaner and more sustainable future.

CLIMATE CHANGE AND PUBLIC HEALTH EMERGENCIES

Sinjini Lahiri

Climate change is no longer just an environmental issue; it has turned out to be a profound and escalating public health crisis. With recent issues of rising global temperatures, weather patterns are shifting, leading to ecosystem changes and increasing intensity, frequency, and unpredictability of human health emergencies. These crises manifest in ways like heatwaves, catastrophic storms, the spread of infectious diseases, and severe disruptions to food and water security. Thus, understanding the link between climate change and public health crises is essential for developing resilient systems and emergency response strategies.

Impact of extreme weather events

One of the obvious ways in which climate change triggers public health issues is through the intensified impact of extreme weather patterns. There is a prevalence of prolonged and more frequent heat waves that induce health-related issues in humans, like heat strokes, cardiovascular diseases, particularly among the elderly and more vulnerable populations. Simultaneously, other severe weather events like typhoons, hurricanes, cyclones, and cloud bursts cause flooding and harm to human lives and property. Beyond the immediate physical danger, these events damage critical healthcare infrastructure, disrupting medical supply chains and cutting off communities from emergency medical services when they need them most.

Threats to food and water security

Climate change factors affect global agricultural systems through prolonged droughts, flooding, shifting of growing seasons, and soil degradation. These situations threaten local and global food security, causing acute and chronic malfunctioning. Many populations remain deprived of basic food supplies, making them more prone to infectious diseases. Prolonged heat waves over a certain area dry up the freshwater resources, forcing communities to rely more on unsafe and compromised water resources. Declining groundwater levels increase the chance of arsenic contamination and accumulation of heavy metals and pollutants in water. These increase the risk of dehydration, systemic toxicity, and large-scale public health crises driven by water scarcity. Furthermore, heavy rainfall and flooding contaminate drinking water sources with pathogens, leading to outbreaks of water-borne diseases like typhoid, cholera, etc.

Air quality deterioration and respiratory emergencies

Rising global temperatures are induced by greenhouse gases. This combination of rising temperatures and changing atmospheric conditions significantly degrades air quality. Photochemical smog, persistent air pollutants, ground-level ozone, and increased airborne allergens give rise to chronic respiratory problems like asthma, lung irritation, and Chronic Obstructive Pulmonary Disease (COPD). Additionally, there is a presence of suspended Particulate Matter, triggering acute respiratory and cardiovascular emergencies among humans.

Impact on mental health

The psychological toll of climate change is an emergent public health priority. Surviving extreme weather events, losing homes, and experiencing the gradual degradation of one's livelihood can lead to severe psychological trauma, anxiety, depression, and post-traumatic stress disorder (PTSD).

Strengthening resilience

To minimize the compounding impacts of climate change, global health systems have to transform from reactive crisis management to proactive climate resilience. This can be ensured by implementing climate-resilient infrastructure to combat extreme weather patterns, establishing early warning systems, and ensuring proper healthcare to manage emerging climate-induced conditions. Addressing climate change at its source through carbon mitigation, while simultaneously investing in public health adaptation, is essential to safeguarding human well-being in an unstable climate future.

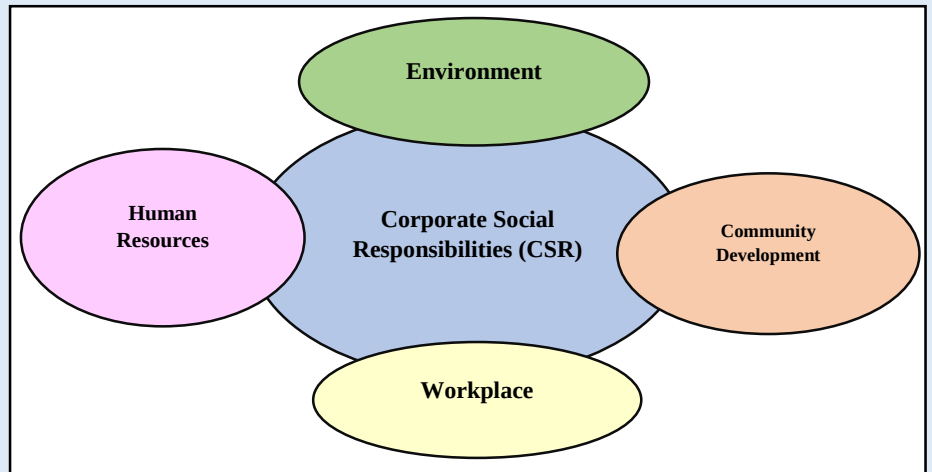
ENVIRONMENTAL RESPONSIBILITY IN CORPORATE SECTORS

Sneha Saha

Environmental responsibility in the corporate sector is the responsibility of companies and industries to act in a manner that protects the environment and promotes sustainable development. Today's world is a world of rapid industrialization and economic growth, but it has brought serious environmental problems like air pollution, water contamination, deforestation, climate change, and depletion of natural resources. Corporations are a major part of industrial activity and therefore have a significant role to play in reducing environmental damage and ensuring ecological sustainability.

Environmental responsibility is now an integral part of corporate management. Increasingly, companies are realizing that environmental protection is not only a social responsibility but also good for long-term business success. Consumers, governments, and international organizations are now expecting industries to adopt sustainable practices and reduce their environmental impact. As a result, many firms are adopting green technologies and environmentally friendly policies.

One of the major responsibilities of corporations is the control of pollution. Industrial activities release three categories of pollutants into the environment, such as harmful gases, chemicals, and waste, which not only harm human health but also damage the quality of water bodies and soil, as well as undermine biodiversity. Currently, the industrial sector uses pollution control equipment while pushing enterprises to transition to clean production to reduce waste and greenhouse gas emissions.



Environmental responsibility also includes proper waste management. Industries produce large quantities of solid and hazardous waste through their manufacturing processes. Recycling and proper waste disposal are good for the environment. **“Reduce, Reuse, and Recycle”** is the slogan of many corporations to reduce the amount of waste produced. In many industries, the use of biodegradable materials and the reduction of plastic packaging are also becoming common.

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In the corporate world, energy savings are just as important. The overuse of fossil fuels is the cause of environmental degradation and climate change. Several corporate firms have started to invest money in renewable energy sources, such as solar and wind energy. Other techniques, such as energy efficiency and green transport systems, have been introduced to minimize carbon emissions and save natural resources. The role of environmental protection has increased through Corporate Social Responsibility (CSR). Many firms conduct tree plantation campaigns, cleanliness campaigns, water conservation campaigns, and environmental education campaigns. All these activities play a vital role in ensuring that industries maintain cordial relations with the community and become environmentally sustainable. Governments and various international institutions have established several types of environmental regulations to make sure that companies are sustainable. The ISO 14001 standard plays a significant role in making organizations more efficient in their environmental management processes. Organizations meeting such standards are obviously building a reputation in the world.

In conclusion, corporate environmental responsibility is very important for sustainable development and ecological balance. Businesses need to ensure minimum pollution, conservation of resources, proper disposal of wastes, and participation in environmental programs. Environmentally sustainable firms not only conserve nature but also promote economic growth, social well-being, and a better future for upcoming generations.

“Earth provides enough to satisfy every man's needs, but not every man's greed” -Mahatma Gandhi

THE ROLE OF CITIZENS IN ACHIEVING NET-ZERO EMISSIONS

Soumik Mukherjee

The concept of Net-Zero emissions follows the balance of the total amount of Greenhouse gases (GHGs) released into the atmosphere and the amount of GHGs removed from the atmosphere. Net-zero emissions play an important role in achieving the 13th SDG Goal, Climate Action. The United Nations explicitly calls for global carbon dioxide emissions to be reduced by 45% by 2030 (from 2010 Emission levels) and to reach global net-zero emissions by 2050. While the global target year is 2050, India has made a national commitment to achieve net-zero emissions by 2070. Achieving it is not only the job of governments; it also depends on the citizens of our country and their day-to-day activities at home, in transport, in consumption, and in Social life. Climate change is already affecting rainfall, heat, food systems, water security, and health in different parts of the world. For this reason, the idea of net zero has become central to climate policy, not just as a technical target but as a social transformation.

Citizens matter because climate action becomes real only when people change routines, support policy, and take part in local solutions. The UN also advised that actions by individuals and institutions should be taken across homes, schools, workplaces, and communities to get the Maximum benefit. The citizens influence emissions in daily life through electricity use, transport choices, waste generation, food habits, and community participation. The Organisation for Economic Co-operation and Development states that engaging citizens builds trust in government decisions and helps climate policies work better, while the UN says individual and collective actions add up across home, school, work, and community.



Figure: UN Urges India to Lead Global Push for Clean Energy and Climate Action, photo by Kristine Liao, September 11, 2020. Global Citizen.

There are several effective strategies for involving citizens in the net-zero transition.

- Governments and institutions should run awareness campaigns that explain how household energy use, transport, and consumption affect emissions. The UN guidance shows that simple daily actions can add up quickly when millions of people participate.
- Participatory governance should be strengthened. Citizens should be included in climate planning, local consultations, and community decision-making so that policy reflects real needs and social realities.
- Clean options must be affordable and accessible. Rooftop solar, efficient appliances, public transport, and low-carbon infrastructure should not be available only to wealthy households.
- Behavioural change can help. Energy-use feedback, social-norm messages, and simple defaults can encourage people to save electricity, reduce waste, and choose low-carbon options without forcing them.
- Youth and community leadership should be encouraged. Students, resident associations, neighbourhood groups, and local volunteers can lead campaigns, host discussions, and model sustainable habits.

Citizens are not passive observers in the race to net zero; they are active agents of change. Their daily choices, public support, and community actions influence whether climate policies succeed or fail. A fair and effective net-zero transition, therefore, depends on public participation, affordable clean alternatives, and strong trust between people and institutions.

WATER SCARCITY AND FUTURE GLOBAL CONFLICTS

Soumita Biswas

Water scarcity has ascended as one of the greatest serious global challenges of the 21st century. With rapid population growth, climate change, urbanization, and increasing industrial demand, freshwater resources are becoming increasingly insufficient in many places around the world. However, water covers closely 71% of the Earth's surface, leaving a slight proportion that is accessible as usable freshwater. As a result, rivalry over water resources is cumulative and may lead to upcoming regional as well as global conflicts. One of the main reasons for water shortage is climate disparity. Increasing temperatures, uneven rainfall, droughts, and melting glaciers are reducing the suitability of freshwater in frequent regions. Countries that depend intensely on river systems and periodic rainfall are mostly susceptible. In addition, extreme groundwater withdrawal, pollution of rivers and lakes, and poor water management practices are worsening the crisis. Developing nations frequently face severe lacks due to insufficient infrastructure and unsatisfactory distribution of water resources. Water has continuously played an important role in geopolitical relations. Many main rivers, such as the Nile, Indus, and Tigris-Euphrates, are shared by many countries. Arguments may arise when upstream countries shape dams or divert water, disturbing downstream lands. For example, pressures between Egypt and Ethiopia over the Grand Ethiopian Renaissance Dam highlight how control over water resources can affect political relations. Similarly, conflicts between India and Pakistan regarding the Indus River system establish the strategic importance of shared water resources.



In the future, water shortage may not only trigger conflicts among countries but also cause social turbulence within countries. Shortages of drinking water and irrigation amenities can increase poverty, food insecurity, migration, and financial instability. Rural inhabitants may be forced to migrate to urban areas, putting additional pressure on cities and increasing the cumulative risk of social stress. Though upcoming conflicts over water can be prevented through sustainable management and global cooperation, Governments must make the most of water conservation, rainwater harvesting, wastewater recycling, and operative irrigation methods. International agreements and political discussions are also vital for the fair sharing of transboundary water resources. Public consciousness and responsible use of water can additionally help in reducing wastage. In conclusion, water insufficiency is not only an environmental issue but also a foremost political, economic, and social concern. If instant steps are not taken, opposition over inadequate freshwater resources may lead to thoughtful global battles in the future. Therefore, sustainable water management and international partnership are vital to safeguard water security and peace among nations.

ENVIRONMENTAL SUSTAINABILITY AND ECONOMIC GROWTH

Sumi Roy

Two main goals drive modern development: environmental sustainability and economic growth. Economic growth improves living standards, employment opportunities, industrial development, and income generation, but environmental sustainability ensures the conservation of natural resources and ecological balance for the present and future generations. One of the greatest challenges of the modern world has become the balancing of these two goals.

Economic growth and environmental protection were seen as contradictory for many years. Fast industrialization and urbanization, and over-exploitation of natural resources, often resulted in deforestation, pollution, loss of biodiversity, and climate change. According to the United Nations, three-quarters of the land surface of the Earth has been significantly altered by human activities, demonstrating the serious environmental consequences of uncontrolled development. But recent decades have shown that long-term economic development is impossible without environmental sustainability. Therefore, the countries of the world are now focusing on sustainable development. The concept of sustainable development was proposed in the United Nations Brundtland report (1987). It is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It promotes governments, industries, and communities to carry out economic activities in an environmentally responsible manner. Sustainable Development: Sustainable development is a harmony between economic progress, social well-being, and environmental protection. The use of renewable energy is one of the key examples of balancing economic growth with environmental sustainability. Countries like India and Germany are investing a lot of money into solar and wind energy projects. India is now among the world's top renewable energy producers, with solar capacity growing at a rapid pace over the last decade. Large-scale solar parks in Rajasthan and Gujarat have generated employment, lowered dependence on fossil fuels, and reduced greenhouse gas emissions. Investment in renewable energy industries also spurs technological innovation and boosts energy security. Renewable energy is, therefore, the key to economic progress and environmental protection.

Sustainable agriculture is another effective strategy. Practices like organic farming, crop rotation, rainwater harvesting, and integrated pest management promote agricultural productivity while conserving soil fertility and water resources. These methods give economic support to the farmers and also reduce environmental degradation. Global cooperation is important since environmental problems like global warming, climate change, and biodiversity loss affect all countries worldwide. International treaties, like the Paris Agreement, promote countries to work together to cut down on carbon emissions and safeguard the environment.

In conclusion, economic growth and environmental sustainability are not incompatible goals. Instead, they should collaborate to ensure the long-term sustainability of ecological stability and human well-being. There is a future in which economic progress and environmental protection go hand in hand, and it is one of sustainable policies, technological innovation, responsible resource management, and global cooperation. "We need a balanced approach to development for present prosperity as well as for ensuring a safe and healthy planet for future generations."

Lastly, the task of balancing sustainability and development is not only the task of governments and industries but also of individuals within society. Each little thing, such as saving energy, using less plastic, planting trees, conserving water, and traveling by public means, will help protect the environment. Sustainable living ensures better health and prosperity for future generations.

ECO-FRIENDLY FESTIVALS AND CULTURAL CELEBRATIONS

Suvarun Nag

Festivals are a beautiful part of human culture. They bring people together through joy, music, food, lights, and traditions. From Durga Puja and Diwali to Christmas, Eid, and Holi, celebrations help people feel connected with their communities and beliefs. However, many modern festivals also create large amounts of waste, pollution, and environmental damage. Plastic decorations, chemical colours, loud firecrackers, and non-biodegradable materials often harm nature. Because of this, the idea of eco-friendly festivals has become increasingly important today.

Eco-friendly festivals focus on celebrating traditions while also protecting the environment. These celebrations encourage the use of natural, reusable, and biodegradable materials instead of harmful products. For example, during Durga Puja and Ganesh Chaturthi, many idols are now made from clay instead of plaster of Paris, which pollutes rivers and water bodies. Natural colours and decorations made from flowers, jute, bamboo, and paper are also being used more frequently.

One major step towards sustainable celebrations is reducing plastic waste. Disposable plates, cups, and thermocol decorations are often thrown away after festivals and remain in the environment for many years. Replacing them with leaf plates, reusable utensils, or cloth decorations can greatly reduce waste generation. Communities can also arrange proper waste segregation and recycling during large public celebrations.

Another important aspect is reducing air and noise pollution. Firecrackers during festivals such as Diwali release harmful gases and create loud noise that affects humans, birds, and animals. Elderly people, small children, and patients often suffer because of excessive noise. Instead of using large amounts of crackers, people can celebrate with lights, music, cultural programs, and community gatherings that are safer for both people and nature.

Eco-friendly celebrations also help spread environmental awareness among younger generations. Schools, colleges, and local clubs now organise green campaigns, tree plantation drives, and clean-up activities during festivals. Such efforts teach people that cultural traditions and environmental responsibility can go hand in hand.

In recent years, many communities across India and around the world have started adopting greener ways of celebrating festivals. Eco-friendly decorations, clay idols, and plastic-free celebrations are becoming more common as people grow more aware of environmental issues. Festivals are meant to spread happiness, unity, and positivity, and protecting nature should also be a part of these celebrations. By making simple changes such as reducing waste, avoiding excessive firecrackers, and using natural materials, people can celebrate responsibly without harming the environment. In this way, eco-friendly festivals help preserve both cultural traditions and the beauty of Mother Earth for future generations.

ENVIRONMENT STEWARDSHIP: A MORAL DUTY

Tanushree Bag

Environmental stewardship is a moral and practical responsibility that every human being must recognize and fulfill. It is defined as the responsible management of environmental resources that emphasizes pollution prevention and continuous improvement, focusing on informed choices that address root causes rather than merely fixing problems. It encompasses actions throughout the entire life cycle of products, including their design and release into the environment.

Environment provides the resources needed for living. However, due to rapid urbanization, deforestation, pollution and excessive exploitation of resources, the environment is facing serious threats. Climate change, global warming, loss of biodiversity, water scarcity and increasing natural disasters are clear signs that nature is under pressure. In such a situation, environmental stewardship becomes a moral duty for the survival and well-being of humanity and all living creatures.

Environmental stewardship begins with awareness and respect for nature. Since humans are the most intelligent species on earth, it is the responsibility to protect and preserve nature for present and future generations. Governments, industries, educational institutions, and communities also have major roles to play in promoting sustainable development and implementing policies that protect natural ecosystems.

Environmental stewardship is not limited to protecting forests, rivers, and wildlife; it also includes maintaining cleanliness, reducing carbon emissions, and ensuring a balance between human progress and ecological balance. In India, nature has often been worshipped in the form of rivers, trees, mountains and animals, reflecting the deep connection

between humans and the environment. If humans continue to exploit nature irresponsibly, future generations will face severe consequences, including food shortages, health crises and environmental disasters. Therefore, protecting the environment is not merely an option or a social activity; it is a duty linked directly to human survival.



Environmental stewardship also promotes social justice because environmental destruction affects poor and vulnerable communities the most. Technology and scientific advancement should be used wisely to support environmental conservation rather than destruction. The main purpose of environmental stewardship is to protect the resilience of crucial ecological processes, including those of flora, fauna and atmosphere. Environmental stewardship has also become a key aspect of corporate responsibility, with companies and customers recognising the importance of safeguarding our natural resources, resulting in increased environmental consideration within many businesses.

WILDLIFE CORRIDORS AND HABITAT CONNECTIVITY

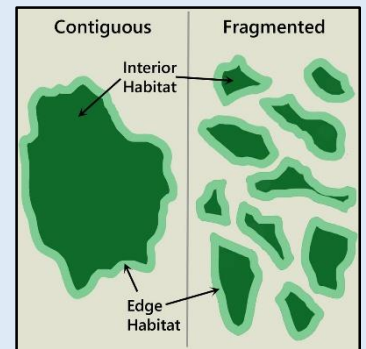
Uma Bala

“In the end, we will conserve only what we love; we will love only what we understand”

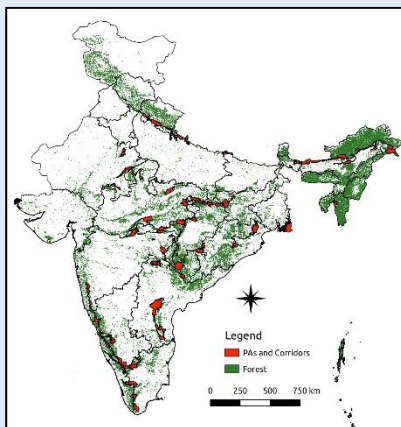
— Baba Dioum

Wildlife corridors and habitat connectivity is important concepts in modern conservation biology. A wildlife corridors are a natural or semi-natural pathway that connects separated habitats and allows animals to move safely from one region to another. Habitat connectivity refers to the ability of landscapes to support movement of species, genes, and ecological processes across ecosystems. These ideas have become highly significant because rapid urbanization, deforestation, mining, highways, and agricultural expansion are continuously fragmenting natural habitats worldwide. According to the Food and Agriculture Organization, about 420 million hectares of forest were lost globally between 1990 and 2020, causing severe ecological fragmentation.

Habitat fragmentation is one of the biggest causes of biodiversity loss. The International Union for Conservation of Nature states that fragmented habitats isolate wildlife populations and reduce access to food, breeding sites, and migration routes. Small isolated populations often face challenges from inbreeding and reduced genetic diversity, increasing extinction risk. A global assessment published in Nature reported that nearly 1 million species are threatened with extinction mainly due to habitat destruction. Wildlife corridors help reconnect fragmented ecosystems and restore ecological balance.



Habitat Diagram. Source: Conservation Biology and Landscape Ecology Studies



India Wildlife Corridors Map Source: Wildlife Institute of India (WII)

Scientifically, habitat connectivity supports gene flow and ecological resilience. Connected populations maintain greater genetic diversity, improving their ability to adapted diseases, environmental stress, and climate change. Corridors also support migration and dispersal of animals. For example, elephant corridors in India enable movement of more than 27,000 Asian Elephant across fragmented forests. The Wildlife Institute of India has identified over 100 elephant corridors that help reduce human–elephant conflict. Similarly, the Kanha–Pench corridor in Madhya Pradesh maintains connectivity among Bengal Tiger populations.

Several methods are used to strengthen habitat connectivity, including afforestation, restoration of degraded habitats, wildlife overpasses and underpasses, and ecological buffer zones. Modern conservation planning also uses GIS, remote sensing, GPS telemetry, and ecological modelling to identify suitable wildlife movement routes. The Yellowstone to Yukon

Conservation Initiative is an important international example of large-scale connectivity conservation.

Government policies and conservation programmes also play a crucial role. In India, the Wildlife Protection Act (1972), Project Tiger, and the National Wildlife Action Plan emphasize corridor protection and landscape-level conservation. Internationally, the Convention on Biological Diversity recognizes ecological connectivity as an important strategy for biodiversity conservation and climate adaptation.

In the context climate change, habitat connectivity has become increasingly important because many species must shift their geographic ranges to survive changing environmental conditions. Therefore, conservation policies today focus more on connected landscapes than isolated protected areas.

“The continued existence of wildlife and wilderness is important to the quality of life of humans.”

— Jim Fowler

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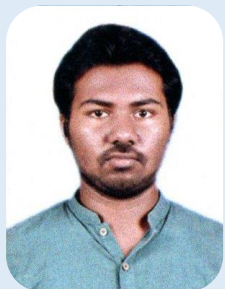
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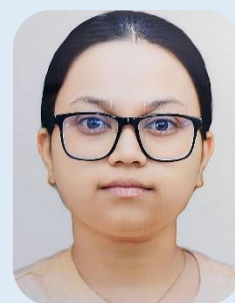
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