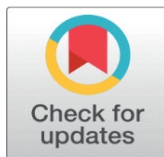


DIGITAL ARTS AND ECO-CONSCIOUSNESS: INTERPRETING ENVIRONMENTAL AND TECHNOLOGICAL POLICIES THROUGH VISUAL CULTURE IN INDIA

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Received 27 January 2026
Accepted 11 March 2026
Published 11 April 2026

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DOI

[10.29121/shodhkosh.v7.i4s.2026.7533](https://doi.org/10.29121/shodhkosh.v7.i4s.2026.7533)

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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ABSTRACT

The interplay between technology and the environment presents a defining challenge of our era, as rapid technological progress brings both advancements in human life and considerable threats to nature. Amidst pressing environmental challenges, the urgency to harness technology for positive transformation while respecting ecological values becomes paramount to secure a sustainable future for generations to come. Therefore, this paper proposes a comprehensive roadmap for harmonizing technology and the environment, promoting a holistic and synergistic approach. The paper explores the intricate relationship between technology and the environment, delving into the potential for these seemingly disparate forces to align towards sustainability. Technological advancements have led to remarkable improvements in communication, transportation, healthcare, and energy efficiency. However, this progress has also engendered escalating environmental issues such as climate change, pollution, and resource depletion. Consequently, striking a delicate balance between technological development and environmental conservation becomes crucial for society's sustainable future.

The paper examines the promising potential of technology as a solution to environmental challenges, emphasizing green technologies, renewable energy sources, and innovative waste management and conservation practices. Moreover, it critically assesses the potential risks and unintended consequences of certain technological endeavours, underscoring the significance of ethical considerations and precautionary measures. The role of various stakeholders, including governments, businesses, and individuals, is highlighted as they jointly shape the interface between technology and the environment, seeking collaborative and proactive solutions.

Keywords: Technology, Environment, Human Progress, Sustainability, Conservation



1. INTRODUCTION

The interplay between technology and the environment is a complex and significant issue that has evolved over time. The relationship between these two factors has both positive and negative aspects, and it is crucial to understand

and manage this interplay to ensure a sustainable future for our planet. Such technological development has helped in monitoring the environment and collection of data via satellites, remote sensors & Internet of Things (IoT) devices by collecting real-time information on air quality, temperature, water depth and biodiversity to central systems. The same network supports wind farms, solar fields, geothermal plants plus hydro stations - each installation replaces fossil output and trims greenhouse gas release.

Furthermore, it facilitated the implementation of sustainable practices in industries and households including the energy-efficient appliances, smart grids, and green building materials which have helped in reducing resource consumption and minimize environmental impact. Also, with the frequent innovations in technology have aided conservation efforts by enabling more effective protection of endangered species, habitat restoration, and monitoring of illegal activities like poaching and deforestation.

But with such upgradation in technology, it has some negative impact on environment as well including the resource extraction and consumption leading to environment degradation and depletion of non-renewable resources, posing significant challenges in recycling of electronic waste (e-waste) leading to toxic substances entering the environment, rapid increase in industrialisation increasing pollution, including air pollution from industry and automobiles, water contamination from chemical runoff & inappropriate waste disposal & due to advanced agricultural practices and urbanization leading to deforestation and habitat loss which is threatening biodiversity and ecosystems.

Hence, there is a need to balance the technology and environment protection for a proper and better future of living beings on land, above land and under the water. Such challenges as mentioned earlier, can be addressed if certain actions are taken in an efficient manner including prioritizing the sustainability and environment responsibility, establishing the regulations and policies through Government and international bodies in adopting environment friendly technologies and practices, bringing awareness and education among the public on environmental impacts of technology and the importance of responsible consumption thereby driving positive change and influence consumer behaviour, and striking a balance between technological advancements and environmental protection to guarantee the planet's sustainable and prosperous future.

Through this paper, the researcher aims to explore the intricate connection between technology and the environment, investigating how these seemingly different forces can align to promote sustainability. While technological advancements have greatly improved communication, transportation, healthcare, and energy efficiency, they have also contributed to growing environmental issues, including pollution, resource depletion, and climate change. Therefore, finding balance between technological progress and environmental protection becomes essential for ensuring a sustainable future for society.

Further it will examine the promising potential of technology in addressing environmental challenges, with a focus on green technologies, renewable energy sources, and innovative waste management and conservation practices. Additionally, it critically evaluates the potential risks and unintended consequences of certain technological pursuits, emphasizing the importance of ethical considerations and precautionary measures. It highlights the roles of different stakeholders, including governments, businesses, and individuals, in shaping the interaction between technology and the environment and working together to find collaborative and proactive solutions.

2. SUSTAINABLE DEVELOPMENT AND THE ROLE OF TECHNOLOGY

Sustainable development denotes a mode of progress that satisfies present human requirements and at the same time safeguards the capacity of later generations to satisfy their own requirements. It seeks to keep economic expansion, social welfare plus ecological safeguards in an even relationship. Progress achieved under this approach should stay equitable, should avoid damage to the natural world and should allow economic activity to remain stable over time. The importance of sustainable development is widely recognized, and technology plays an important role in supporting this process. In this context, environmental conservation becomes essential, as it focuses on protecting natural resources and ecosystems. Society slows environmental damage and safeguards biodiversity when it adopts cleaner production methods, cuts pollutant releases plus replaces coal, oil and gas with solar, wind but also other renewable energy systems. Sustainable development confronts climate change as a central problem and technical innovation forms an essential part of the response. Solar modules as well as wind turbines emit almost no greenhouse gases during operation - every new installation lessens the need for fossil fuel combustion and drives the transition toward an energy supply that no longer depends on carbon rich fuels.

Moreover, it has been found that technology enables a more efficient use of resources through systems such as smart grids, recycling technologies, and energy-efficient buildings, which help minimize waste and optimize resource utilization. Within this context, sustainable development seeks to secure gains from economic growth for every group in society. Technology serves this aim by driving innovation, widening access to education and healthcare plus generating jobs that protect the environment.

Furthermore, sustainable development enhances a society's resilience to various challenges, including environmental disasters, economic downturns, and social upheavals. Hence, any technological solutions can improve such disaster preparedness, response, and recovery efforts, enhancing overall resilience. It is also pertinent to mention that the technology also facilitates global collaboration and knowledge-sharing among nations, enabling them to work together to address common sustainability challenges.

When we look at the community level, technology further empowers individuals by providing access to vital information on sustainable practices, health, and education, enabling them to make informed decisions. In such cases, there is a need to have continuous monitoring and assessment of such sustainable development goals by tracking environmental indicators and evaluating the progress of sustainability initiatives.

It is pertinent to mention that such technological upgradation further helps in collecting the real-time data thereby identifying areas that need attention and measure the effectiveness of sustainability measures. Moreover, technology drives innovation and research, leading to new solutions and ideas for sustainable development within agriculture, transport and waste handling systems. The approach adopts a circular economy framework that keeps material in use through reduction, reuse plus recycling. Technology functions as an eco-friendly instrument and drives this shift. This can be achieved through improved product design that minimizes waste and advanced recycling technologies that maximize resource efficiency.

3. TECHNOLOGICAL ADVANCEMENTS FOR SUSTAINABILITY

Exploration of green technologies and their potential benefits

In present scenario, the evolution of green technologies is required to focused on, which is also known as clean technologies or sustainable technologies, are innovations and practices designed to have minimal negative impacts on the environment while promoting sustainability. This is the demand of current situation which can offer numerous potential benefits, including reduced environmental impact, resource conservation, job creation, and improved energy security.

Among them, the solar power is one of them which harnesses the sun's energy to generate electricity through photovoltaic (PV) panels or solar thermal systems. Solar energy supplies power in amounts that approach infinity and the source renews each day. This cuts the need for coal, oil plus gas that exist in fixed quantities. Panels and mirrors generate electricity while they release only traces of carbon dioxide but also methane, the rise in global temperature slows. Because the modules sit on roofs and in fields, the network contains thousands of small plants instead of a few giant stations as well as the grid keeps operating when single links fail. Even the wind power also plays a vital role by converting wind energy into electricity, providing a clean and sustainable source of energy. The same industry hires workers to run the plants, fit the panels, keep the equipment in good order plus build the parts. Moreover, such wind farms coexist with other land uses, such as farming, allowing for dual land utilization.

In addition to that, even the hydropower energy helps protect and sustain the environment by generating energy from flowing or falling water. Hydropower delivers steady electricity as long as rivers keep moving. Dams that drive the turbines also hold back floodwater, store drinking water and feed irrigation canals.

Research shows that geothermal energy taps heat stored inside the Earth. This heat turns water to steam and the steam drives turbines that generate electricity. The same heat also warms buildings directly through buried pipes. It operates 24/7 and emits minimal greenhouse gases and require less land compared to other renewable sources. Such energy-efficiency technologies aim to lower energy use and reduce waste. This leads to cost savings for businesses and consumers while also decreasing greenhouse gas emissions by limiting fossil-fuel-based power generation. Through some research, it has been found that green building materials are sustainable, energy-efficient, and environmentally friendly. They often rely on renewable or recycled resources, reduce the need for virgin materials, and help create healthier indoor environments.

For brining such transition, the governments, businesses, and individuals can play an essential role. For instance, the governments can provide incentives, subsidies, and supportive policies to promote research, development, and deployment of green technologies thereby encouraging sustainable practices and discourage harmful ones. Business entities adopt green technologies to improve sustainability performance, lower operational costs and enhance corporate image. They invest in research plus development to innovate and create new green technologies.

Individuals can also contribute by adopting energy-efficient practices at home and in workplaces, supporting renewable energy initiatives, and choosing sustainable products and services. Such consumer demand for green technologies can encourage further innovation and market growth. However, proper education and public awareness remain essential to promote the wider adoption of these technologies among individuals and communities. For such education awareness, sufficient public outreach and organizing the educational programs will be necessary in understanding the benefits of sustainable practices and technologies and to motivate them to make environmentally responsible choices.

3.1. RENEWABLE ENERGY SOURCES AND THEIR ROLE IN MITIGATING ENVIRONMENTAL IMPACT

Renewable sources of energy serve as a key means to lower the harm that energy production and use cause to the environment. Unlike traditional fossil fuels, these sources are sustainable and cause significantly fewer harmful effects on the environment. Society must replace fossil fuels with energy that nature replenishes. This change curbs the gases that alter the climate, leaves more minerals and water untouched plus cuts the soot and chemicals that enter the air but also rivers. One major advantage of renewable sources is their low greenhouse gas emissions. For example, solar and wind energy generate electricity without releasing carbon dioxide (CO₂) or other harmful greenhouse gases, which are major contributors to climate change and global warming. Therefore, shifting toward renewable energy can significantly lower the carbon footprint and help limit the rise in global temperatures.

Further, renewable energy helps reduce both air and water pollution linked to traditional energy sources. For example, fossil fuels such as coal and oil release harmful pollutants, including nitrogen oxides, sulphur dioxide, and particulate matter, when burned. These emissions can cause smog, respiratory problems, and acid rain. In contrast, renewable energy sources generate electricity without producing such pollutants, thereby improving air quality and supporting better public health.

Moreover, renewable energy sources also support the conservation of natural resources. Traditional energy systems depend on limited reserves of oil, coal, and natural gas, which continue to decline over time. In contrast, renewables like solar, wind, and hydroelectric power are virtually inexhaustible. Therefore, harnessing these sources will help to preserve valuable resources for future generations and reduce the need for environmentally damaging extraction and mining activities.

Additionally, deploying renewable energy projects can have positive, economic and social impacts as well. This creates jobs in manufacturing, installation, maintenance, and research, boosting local economies on a larger scale. It can also strengthen energy independence by lowering reliance on imported fossil fuels, thereby improving stability in both energy supply and prices.

To use renewable energy fully, governments, businesses and individuals must keep paying for research, infrastructure plus development. Policies that support renewables, together with funds and incentives, speed the shift to clean energy but also lower its price so that more people obtain it.

3.2. ECO-FRIENDLY TRANSPORTATION AND INFRASTRUCTURE INNOVATIONS

Eco-friendly transport systems and new infrastructure designs help build a future that sustains both human activity plus the natural world. Transport releases large shares of greenhouse gases and airborne pollutants - cleaner options lower climate forcing but also lower the concentration of harmful particles in the air.

One major innovation in eco-friendly transportation is the growing adoption of electric vehicles (EVs). Electric vehicles release no exhaust gases at the point of use. Because they lack tailpipes, they emit no particulate matter or nitrogen oxides, the pollutants that form smog and trigger respiratory illness. Advancements in battery technology are making EVs more affordable, extending their driving range, and improving their accessibility for consumers. In addition,

integrating renewable energy sources into the electric grid can further strengthen the environmental advantages of EVs, making them an important component in the shift toward cleaner transportation.

In recent times, the increase demand of electric vehicles (EVs) as compared to traditional petrol and diesel have also attracted the focus of consumers to green technology environment. These EVs are powered by electricity, either from the grid or renewable sources and produce fewer greenhouse gas emissions than internal combustion EVs. It also comes with lower operating costs, and thus contribute to energy diversity. Tesla, the renowned EV manufacturer (US company), has been actively exploring possibilities to enter the Indian market for more than two years, yet progress has been limited in this endeavor.

But with time, as the world is getting used with the EV automobiles, in India, the government is resolving the impasse and engaging the discussion to negotiate the terms. Even the Build Your Dreams (BYD) of China, widely regarded as one of the world's leading electric vehicle companies. With proven innovative technologies for cars, buses, trucks, forklifts, and rail systems such as Sky Rail, the company has helped shape future visions and trends in electric mobility. Recently both Tesla Inc. and BYD Co. have set a fresh sales record i.e., 466,140 and 700,244 for new EVs respectively, thus breaking the previous records. Because of this, when societies adopt and fund green technologies, they move toward a future that endures plus operates within ecological limits.

New public transport ideas that protect the environment help build mass transit networks that move people quickly and last for decades. Those networks now include buses that run on batteries plus trains that draw power from overhead lines. These systems help reduce the number of private vehicles on the road, leading to lower emissions and less traffic congestion. Moreover, initiatives such as bike-sharing, carpooling, and pedestrian-friendly infrastructure encouraging alternative modes of transportation, further reducing carbon footprints.

Such eco-friendly transportation is helping the design of sustainable infrastructure. For instance, in 2015, the Indian government, came with the Smart city planning and urban development schemes by prioritizing walkable neighbourhoods, mixed-use spaces, and improved public transit networks. Therefore, these initiatives reduce the need for long-distance commuting and help create vibrant communities. As a result, energy consumption decreases while residents' quality of life improves. The Indian government also promotes green infrastructure through multiple programs. Those initiatives support the addition of solar, wind and other renewable power to buses, trains plus related transport networks. In that, the solar-powered charging stations for EVs, regenerative braking systems, and solar roads are examples to showcase how the renewable energy can be harnessed to power transportation sustainably.

Moreover, the development of green logistics and supply chain solutions further helps in reducing the environmental impact of transporting goods. For instance, innovations in efficient routing, optimized freight transportation, and last-mile delivery systems can lower emissions and resource use, creating a more sustainable freight industry. Strong cooperation among governments, local communities and private companies remains essential if eco-friendly transport plus infrastructure innovations are to reach their full potential. This can be supported through regulations, subsidies, and tax incentives that encourage clean mobility.

4. ENVIRONMENTAL CHALLENGES OF TECHNOLOGY

4.1. ADDRESSING THE NEGATIVE ENVIRONMENTAL CONSEQUENCES OF TECHNOLOGY

While discussing the positive impact of technology on the environment, it is equally important to examine its negative environmental consequences in the pursuit of sustainability and a healthier planet. Although technology has brought many benefits to society, it has also contributed to environmental degradation in several ways. Businesses, individuals and the technology sector must work together if those challenges are to be solved.

One major area of concern is electronic waste (e-waste). Rapid technological advancement often results in frequent upgrades and replacement of electronic devices, leading to a growing volume of discarded electronics. When e-waste is disposed of improperly, it can release hazardous chemicals and heavy metals into the environment, posing serious risks to both human health and wildlife. To address this issue, responsible e-waste recycling programs and regulations are essential, encouraging proper disposal and incentivizing manufacturers to design products with recycling and resource recovery in mind.

Another significant challenge is the energy consumption associated with technology. As our reliance on digital devices and data centres grows, so does the energy demand of the technology sector. Data centres require large amounts of electricity to store, process, and transmit data. Those facilities often run on coal, oil or gas - when they burn that fuel,

they release carbon dioxide and other greenhouse gases. Those gases trap heat in the atmosphere plus drive climate change. Therefore, shifting data centres and other technology infrastructure toward renewable energy sources is essential to reduce their environmental impact. Additionally, energy-efficient design, better power management, and data consolidation can help minimize energy consumption.

The extraction of raw materials for technology manufacturing also takes a toll on the environment. For instance, the mining for metals like lithium, cobalt, and rare earth elements often involves destructive practices that harm ecosystems and disrupt local communities. Hence, if we start promoting responsible sourcing of raw materials, encouraging recycling of electronic components, and exploring alternative materials it can mitigate these environmental impacts.

In addition to above negative impacts, the technology-enabled transportation further contributes to air pollution and greenhouse gas emissions. The manufacturing, use, and disposal of automobiles, as well as the transportation of goods and people, are significant sources of carbon emissions. Therefore, encouraging the adoption of electric vehicles, promoting public transportation, and supporting sustainable urban planning are vital steps toward reducing the environmental consequences of transportation but it will take some time especially in India where changing the habit of people is quite difficult.

Further the digitalization of information and services has led to a surge in data consumption and storage. Therefore encouraging more efficient data storage and transmission, data compression, and the use of server virtualization can reduce the environmental impact of data usage. It has also been seen that because of unintended uses and harmful applications, the environment is getting damage. For instance, technologies like pesticides and genetic engineering, when not used responsibly, can harm eco-systems and threaten biodiversity. For that there is a need to have ethical considerations, strict regulations, and continuous monitoring to ensure technology's responsible use and minimize negative ecological impacts.

In order to effectively address these challenges, there is a need to have collaboration among stakeholders and Government should enact policies and regulations to promote sustainable technology development by mandating eco-friendly practices and supporting research into cleaner technologies. The corporations should adopt green practices, prioritize environment friendly innovations and operations. Even consumers to make informed choices by supporting environmentally responsible products.

4.2. E-WASTE MANAGEMENT AND RECYCLING

In addition to previously discussed, the electronic waste (e-waste) management and recycling has been the growing environmental challenge. As technology continues to advance rapidly, the disposal of electronic devices such as computers, televisions, and smartphones has become a serious concern because of their hazardous and non-biodegradable components. In such scenario, an effective e-waste management will be essential to prevent environmental pollution, conserve valuable resources, and promote a circular economy.

One key aspect of e-waste management is the responsible disposal of electronic devices at the end of their lifecycle. At present, improper disposal is still common and can lead to the release of toxic substances such as mercury, lead, cadmium, and brominated flame retardants. These pollutants contaminate soil, water, and air, posing serious health risks to both humans and wildlife. Thus, the governments and regulatory bodies must establish and enforce strict e-waste recycling policies, ensuring that electronic devices are collected, treated, and recycled in an environmentally friendly manner. Research shows that recycling electronic waste yields clear advantages. The process separates and collects plastics, gold plus silver and copper from old equipment. Those components then re-enter manufacturing lines for new phones, computers but also similar products. Because industries draw on this secondary supply, they extract less ore, oil and rock from the forests, soil as well as subsoil remain intact. Recycling electronic waste further reduces the amount of energy and the volume of greenhouse gases that are released when new electronic devices are produced. This reduction helps to slow the rate of climate change.

Public awareness and education within local communities serve as fundamental requirements. Collaboration among all involved parties must operate effectively so that a reliable infrastructure for electronic waste recycling emerges. In this process, the roles of governments, consumers, non-profit organizations, and businesses become significant. Businesses, in particular, can support this by promoting product take-back programs, financially backing recycling initiatives, and designing products that are easier to recycle and disassemble, thereby helping create a coordinated system for collecting, processing, and recycling e-waste.

4.3. ENERGY CONSUMPTION AND CARBON FOOTPRINT REDUCTION IN THE TECH INDUSTRY

Another challenge that the researchers believes needs to be addressed is the high level of energy consumption and the resulting carbon footprint. Although technology companies have begun taking steps to reduce these impacts, further efforts are necessary to mitigate the sector's environmental effects and respond to climate change. However, these efforts are still insufficient to achieve the desired goals. Moreover, as the use of technology grows rapidly, its energy demand also rises, which may increase greenhouse gas emissions and further intensify global warming. To address these challenges, the technology sector must prioritize sustainable innovation, adopt renewable energy sources & implement energy-efficient practices.

In this context, data centres play a vital role in storing and processing large volumes of digital information are major energy consumers and should be regularly used. Data centers use less energy when designers select efficient layouts, install modern cooling equipment and choose hardware that needs minimal power. Moreover, optimizing software and data management can lead to more efficient processing and storage, reducing energy demand further. The transition to renewable energy marks a key advance in reducing the technology sector's carbon footprint. Several large technology firms now fund wind farms and solar arrays to supply electricity for their data centres, offices plus networks. Hence, entering power purchase agreements with clean energy providers and purchasing renewable energy credits can help decarbonize the sector's electricity consumption. Additionally, on-site solar installations and energy storage solutions can further provide sustainable and reliable power to tech facilities. Even the innovative approaches like server virtualization (workload consolidation and resource utilization), cloud computing (optimize data center efficiency by efficiently distributing workloads and resources across various servers), encouraging consumers to extend the lifespan of their devices through repair services and software updates can also increase public awareness. It further helps ensure that technology is used more efficiently while addressing environmental challenges.

5. POLICY AND REGULATORY FRAMEWORKS IN INDIA

At International level, several countries and international bodies have together to raise the issue of rapid environmental issues, for instance, certain international agreements like the Paris Agreement (2016) and the Convention on Biological Diversity have been used as a method to reduce the increasing global warming and work for the Climate Justice by protecting the climate change which will facilitate collective action and accountability. Through such agreements, the sustainable development goals (17) have been set up so that every country can work in coordination to fight this climate change and bring climate justice.

Even India has implemented several policies and initiatives aimed at promoting sustainable technology and addressing environmental challenges. These policies focus on various aspects of sustainability, including renewable energy, energy efficiency, e-waste management, and sustainable manufacturing as some of them have earlier discussed. In this part, we will be identifying and analyse the some of the existing policies promoting sustainable technology in India.

Among them, the National Action Plan on Climate Change (NAPCC), introduced in 2008, is India's comprehensive strategy to combat the challenges of climate change. Being comprised in eight missions, the NAPCC encompasses diverse aspects of sustainable technology and development. These initiatives set out to advance renewable energy sources like wind and solar power, to raise energy efficiency in multiple sectors plus to embed sustainable methods in water management and agriculture, as noted earlier. The NAPCC aims to lessen the harm caused by climate change and to support economic growth that is sustainable.

Another innovative policy was regarding the Jawaharlal Nehru National Solar Mission (JNNSM) or the National Solar Mission, launched in 2010, which stands as a pivotal component of India's clean energy efforts. With ambitious goals to expand solar energy capacity and reduce the cost of solar power generation, the mission has catalyzed significant growth in the country's solar industry. The National Solar Mission used new technologies and drew in investment. It broadened India's energy sources plus placed the country at the front of worldwide renewable energy use. The Solar Park programme set up full scale solar farms throughout the nation. Those parks cut greenhouse gas releases and lower the need for coal, oil plus gas.

Earlier in 2001, to enhance energy efficiency, the Indian government had enacted the Energy Conservation Act of 2001 which mandates energy audits, enforces energy efficiency labelling for appliances, and sets energy consumption

benchmarks for industries. Overseen by the Bureau of Energy Efficiency (BEE), the Act has increased awareness and encouraged the adoption of energy-saving practices across various sectors. This has contributed to lowering both energy consumption and carbon emissions.

Furthermore, recognizing the need for responsible electronic waste management, the E-Waste (Management) Rules of 2016 establish a regulatory framework for the proper disposal and recycling of electronic waste. These rules hold producers, consumers, and recyclers accountable for handling e-waste through methods that protect the environment. Governments must also observe the same duty. The requirement responds to the steady rise in harmful effects that discarded electronics exert on human health plus on air, water and soil. We have already discussed the practical part of e-waste management in the previous sections.

In alignment with sustainable development goals, the Make in India initiative, launched in 2014, aimed to bolster domestic manufacturing while encouraging environmentally conscious practices. The policy encourages the adoption of sustainable technologies and responsible production practices. In doing so, it aims to balance environmental preservation with continued economic growth.

Smart Cities Mission, launched in 2015, as already discussed, envisions the development of 100 smart cities that incorporate advanced technology solutions for urban planning, energy management, and waste disposal. These cities are designed to optimize resource utilization, enhance quality of life, and minimize environmental footprints. The primary goal of the Mission is to advance urban areas that offer fundamental infrastructure, an eco-friendly and lasting atmosphere, and a respectable standard of living for their residents by employing intelligent and innovative approaches. The emphasis is on fostering sustainable and all-encompassing growth by establishing models that can be duplicated and serve as guiding beacons for other ambitious cities.

The Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) India program, initiated in 2015, plays a pivotal role in India's transition to electric mobility. It offers incentives and subsidies for electric vehicle adoption, production, and charging infrastructure development. It also helps reduce carbon emissions from the transportation sector and supports the nation's commitment to sustainable mobility.

The Atal Mission for Rejuvenation and Urban Transformation (AMRUT), was also launched in 2015, aimed to modernize urban infrastructure in a sustainable manner. It basically focused on water supply, sanitation, and waste management. It also helps people live better in cities and it puts the environment first while it uses resources with care.

Further the rapid promotion and use of the Digital India campaign, focusing on leveraging technology to improve governance and deliver public services more efficiently. It has helped in the digitization of land records to prevent illegal deforestation and real-time monitoring of pollution levels in cities to address air quality concerns.

Even, India's space agency, the Indian Space Research Organisation (ISRO), has launched several satellite missions for environmental monitoring. In addition to that, India has also implemented technology-driven initiatives to protect its rich biodiversity and combat wildlife poaching. The deployment of unmanned aerial vehicles (UAVs) and drones in national parks and wildlife reserves helps in monitoring and protecting the endangered species, such as tigers and rhinoceroses.

Further the Swachh Bharat Mission being launched on 2nd October 2014, aimed at improving waste management practices in India has played, and continues to play, an important role in recycling and waste segregation. In addition, the establishment of waste-to-energy plants contributes to a cleaner environment while also reducing the pressure on existing landfills. Others like the Green Building Initiatives and certificates such as Green Rating for Integrated Habitat Assessment (GRIHA) & Leadership in Energy and Environmental Design (LEED) encourage eco-friendly designs, resource-efficient materials, and energy-saving technologies and promotion of Green transport and electric mobility (as discussed) have shown India's commitment to integrating technology and environmental conservation to achieve sustainability goals.

Recently, the Aarogya Setu Application developed by the Government of India in 2020 to track and curb the spread of COVID-19 Pandemic through technology like Bluetooth and Global Positioning System (GPS) by collecting individual's interaction with others. In relation to environment connection, it is not immediately apparent but can be considered, for instance, helping in analysing the persons behaviour changes during pandemic, reducing the paper-based record keeping when doing health assessments and contact tracing and encouraging for remote work. In summary, while the direct environmental impact of Aarogya Setu might not be profound, its use of technology intersects with environmental considerations, particularly in terms of data management, paper reduction, remote work, and electronic waste.

Therefore, the Indian government's continuous focus on renewable energy, digital initiatives, space technology, and waste management showcases its determination to balance economic development with environmental protection. These initiatives show that technology can serve as a significant enabler in tackling environmental challenges. The authors also seek to point out that the policy package will help India shift to an economy that harms the environment less and that keeps its resources for a longer time. This paper claims that the programmes launched by the Indian government already prove that the state wants to meet its clean technology targets. But the same paper stresses that planners must study earlier attempts that did not deliver and must study the obstacles that blocked those attempts. Such study will give clearer guidance plus will let future schemes protect nature with fewer wasted resources.

One significant lesson can be the importance of integrating sustainable technology efforts with comprehensive policy frameworks and long-term planning. It has been noticed that the past initiatives that lacked a clear roadmap and coordination often faced implementation hurdles and failed to achieve their intended outcomes. Additionally, understanding the local context and engaging communities in sustainable tech projects emerged as crucial factors for success. Some projects encountered resistance or failed to gain community buy-in, emphasizing the need for inclusive decision-making processes. Furthermore, financial viability and affordability are critical aspects to consider, as some sustainable tech projects faced challenges in securing necessary funding or remaining economically sustainable. India now uses the insights it gained to plan and run technology projects that last. The projects cut environmental harm, welcome every social group plus build a future that endures.

India achieved clear advances in sustainable technology after the government issued these series of policy measures. Despite those measures, officials still struggle to translate rules into field level action. Citizens often lack detailed information about the new systems and inspection bodies do not but enforce every standard in a uniform way. Continued and focused efforts are therefore necessary to ensure proper monitoring, effective implementation, and timely evaluation of these policies so that the intended environmental outcomes can be achieved and a more resilient, sustainable future for India can be realized.

6. CONCLUSION AND SUGGESTIONS

In conclusion, it can be said that the imperative of sustainable development extends its reach beyond the present moment, resonating profoundly with both current and forthcoming generations. In that, technology, an unparalleled force in shaping the modern world, emerges as a dynamic enabler in the pursuit of sustainability's multifaceted goals. The ascent towards a more equitable, environmentally conscious, and prosperous global paradigm hinges on our collective embrace of sustainable technologies and practices.

The realm of green technologies, exemplifying its potential, emerges as a beacon of hope in mitigating the daunting environmental challenges that beset us. These technologies cover a range of innovations - they include methods that draw power from clean and renewable sources. They also include systems that lower greenhouse gas emissions. They involve practices that protect limited natural resources. In addition, they include tools that raise energy efficiency. Therefore, by channelling efforts into the development and implementation of these technologies, we can forge a trajectory towards a future marked by environmental harmony and responsible stewardship. It is in the interplay between governments, businesses, and individuals that the canvas of change unfurls. Together, they orchestrate the transition towards a more sustainable world by adopting, adapting, and innovating.

Researchers note that new transport and infrastructure systems that protect the environment form a core part of any workable long term plan. Key steps include wider use of electric vehicles, reliable expansion of buses plus trains, direct supply of power from sun, wind and water to those networks but also city layouts that reserve space for clean movement. Together, these initiatives contribute significantly to addressing the challenges posed by climate change. Their combined effect helps in lowering greenhouse gas emissions while also improving air quality. At the same time, such efforts support the development of healthier and more livable communities for both present populations and future generations.

Although confronting the adverse environmental consequences of technology is an intricate, yet time-sensitive mission and for that responsible e-waste recycling protocols, pivoting to renewable energy paradigms, advocating sustainable material sourcing, endorsing eco-conscious transportation systems, and imbuing ethical technology applications, we can cultivate a multidimensional tapestry of change.

Further the e-waste management and recycling, with their imperative to curtail electronic waste's environmental toll, demand our unwavering attention. To comply with it, there is a need to do responsible disposal, recycling of precious materials, resource preservation, and pollution mitigation through e-waste recycling threads the fabric of a circular economy and environmental preservation. With the existing policies and initiatives, the Indian government required to sustain and continuously work on it implementation and maintaining the harmonization balance between the technology and environment.

Therefore, it can be said that the tech industry's pursuit of energy efficiency and carbon footprint reduction garners utmost significance in addressing its environmental impact. Encompassing energy-conscious methodologies, embracing renewable energy alternatives, and fostering sustainable innovations, the sector can carve a significant path towards mitigating climate change. In that, role of government (primary regulator and policymakers) in encouraging eco-friendly innovations, financial incentives, tax rebates, subsidies, grants, or low-interest loans, the public procurement policies encouraging businesses towards research and development, fostering partnerships through collaboration and knowledge sharing among businesses, research institutions and Non-Government Organizations and platforms for information exchange to hasten the adoption of sustainable technologies.

Most important, the international cooperation and collective action among nations is required to tackle the present and increasing environmental issues. Through sharing of best practices, providing financial resources, and transferring technology to developing countries can promote global equity in sustainability efforts.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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