

October 2023



Kurukshetra

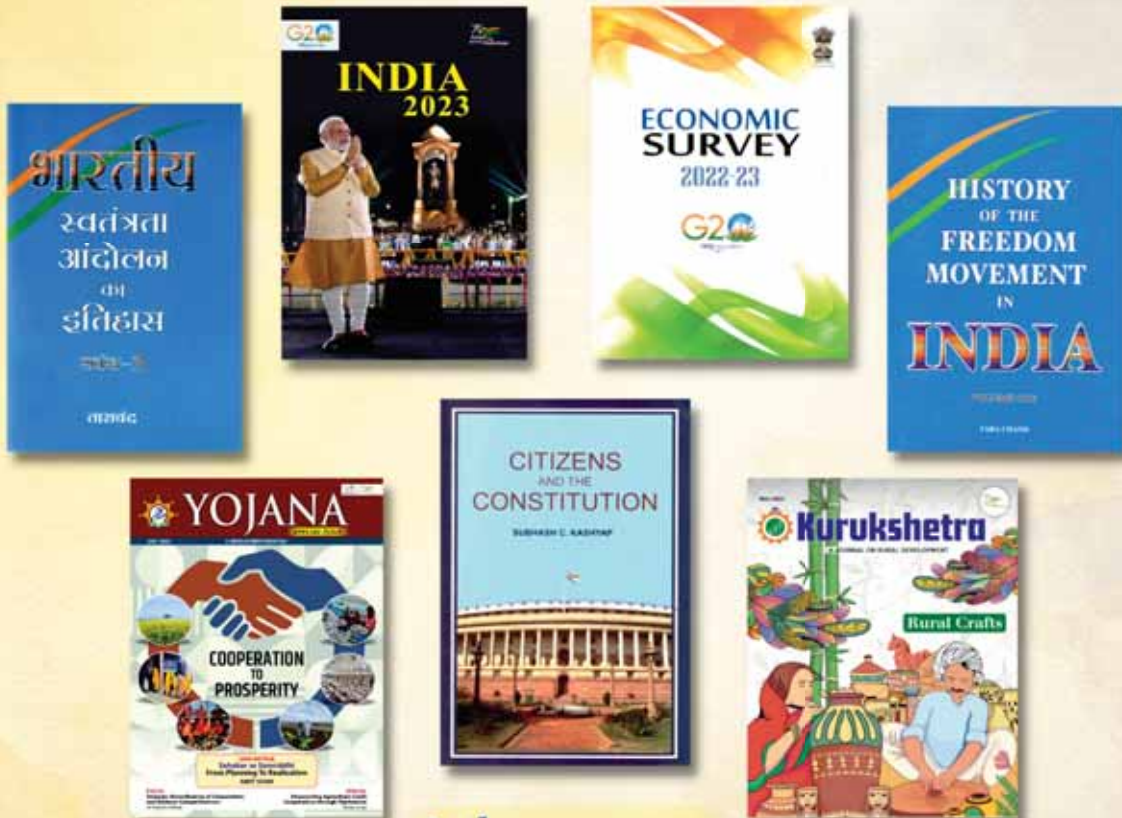
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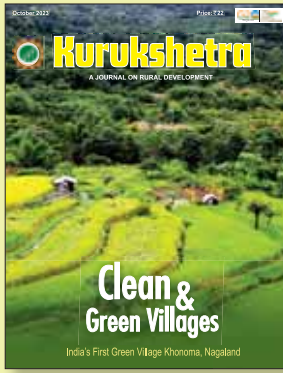
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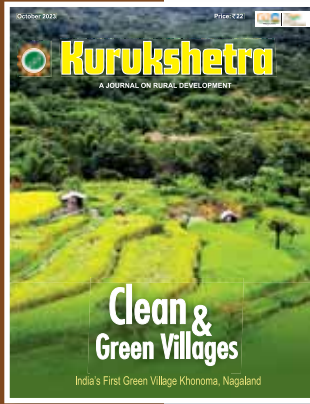
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Editorial

The promise of a sustainable future- a Clean and Green Rural India, lies in the heart of India, where lush fields and beautiful landscapes stretch as far as eye can see. The rural regions of our country are not only the backbone of our economy but also the custodians of our environment. The seeds of a greener tomorrow can be sowed in the tranquility of rural living.

The Sustainable Development Goals (SDGs) are universal development goals for humanity. The goals and related indicators are so intertwined that achieving one goal might serve as a positive stimulant for multiple development indicators. The Government of India has grouped the SDGs into nine topics. Attainment of SDGs at the local level can have a variety of effects on people's quality of life in Indian communities. The Ministry of Panchayati Raj is directing and encouraging Gram Panchayats to collaborate with various departments in order to develop convergent and holistic planning.

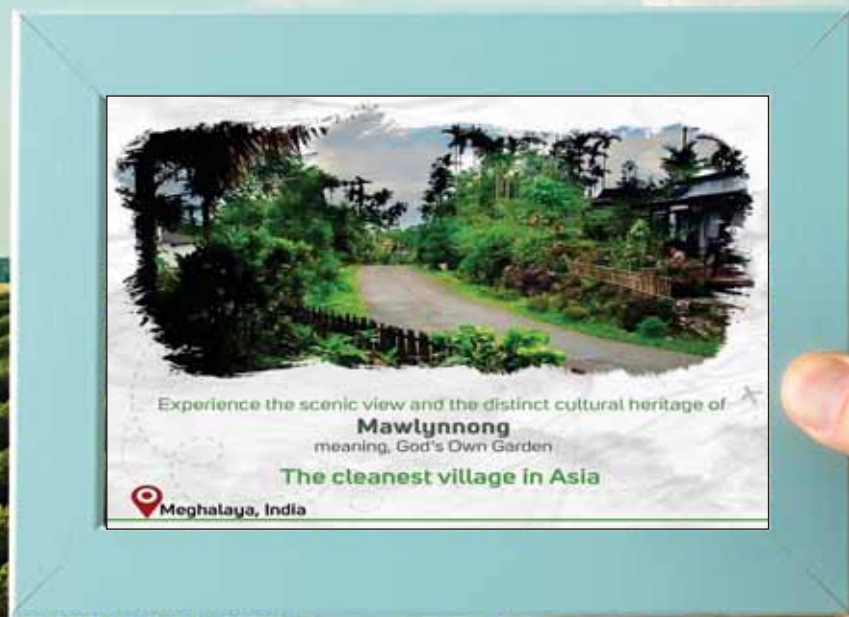
The article '**Vision for Clean and Green Rural India**' provides an insight into steps taken by The Ministry of Panchayati Raj towards implementing the 'Clean and Green Village' theme, including the adoption of renewable energy. This further discusses how Gram Panchayats will evolve as self-sufficient in terms of energy and become producers of energy instead of only being consumers in the upcoming years. The article also includes noteworthy examples of best practices being practised by Gram Panchayats for integration of the Clean and Green Theme in different parts of the country.

The author of the article '**Preserving the Green Cover of Indian Villages**' attempts to delve into the challenges of 'greening villages' to explore complementary pathways for strengthening the 'village system' for posterity. He mentions that the blueprint for conserving green cover must include biodiversity revitalisation and reconsider physical growth principles, with 'green' as its primary stake.

This issue of Kurukshetra also have article on '**Crop Residue Management**', in which the author shares the problems and perspectives involved in the safe management of agricultural wastes, along with the regulations and solutions taken in this direction to curb the harmful practice of stubble burning. Besides, our readers will also get to know about the role of '**Agroecological Approaches**' and '**Digital Technology**' for achieving Clean and Green Villages in this issue.

As we strive for a better future, let us not forget that the rural areas of our country are not just a part of India; they are the soul of India. Their well-being and sustainability are inextricably linked to the well-being and sustainability of our nation as a whole. It is time to nurture and celebrate rural India on its journey towards a cleaner and greener tomorrow.

Vision for Green and Clean Rural India



“ I propose to you today a One-Word Movement. This One-Word, in the context of climate, can become the basic foundation of One World. This is a word- LIFE... L, I, F, E, i.e., Lifestyle for Environment. Today, there is a need for all of us to come together, together with collective participation, to take Lifestyle for Environment (LiFE) forward as a campaign. ”

- The Hon'ble Prime Minister Shri Narendra Modi at the COP26 Summit, Glasgow

Giriraj Singh

Sustainable Development Goals (SDGs) are a blueprint to achieve a better and more sustainable future for all. The Government of India, being a signatory to the United Nations Sustainable Development Goals (SDG) 2030 Agenda is committed to achieving the goals and targets of the SDGs in a time-bound manner. India has also played a crucial role in shaping the SDGs.

The Ministry of Panchayati Raj (MoPR) is supplementing these efforts with the active involvement of Panchayati Raj Institutions (PRI), adopting the vision of the Hon'ble Prime Minister's 'Whole of Government



and Whole of Society', approach to ensure an enhanced level of engagement and meaningful participation of different stakeholders through the localisation of SDGs (LSDGs) under nine themes by subsuming the 17 SDGs for their achievements at the grassroots level of panchayats and villages. These nine themes may be read as follows:



The MoPR has undertaken various initiatives and activities across line ministries, Panchayati Raj Institutions, departments, State Governments/ UT Administrations, civil society, communities, technical institutes such as IITs/IIMs, other academia, NGOs/ CBOs, International agencies, etc. to attain the localised SDGs with a focus on the nine Themes.

A multipronged strategy has been adopted to localise SDGs, through joint advisories and resolution signed with concerned ministries/department. A clear and conscious focus has been on the convergence of both resources and infrastructure.

Key Interventions

Global interest in the idea of a clean and green

society has grown in response to rising pollution, climate change, environmental degradation, and the need for cost-effective and affordable alternative clean energy sources. Key interventions are needed for an efficient implementation of the theme of 'Clean and Green Village' that will require a concentrated effort towards the following:

- Awareness generation amongst the citizens on the importance of reducing waste, ensuring sustainable production and consumption of energy, and reducing the adverse impact on the environment.
- Promotion of measures within the GP that would reduce environmental pollution, such as reducing the use of plastics within the GP area.
- Taking steps to create an in-depth understanding of the term climate change and its impact among the Gram Sabha, Panchayat committees, and other community volunteers.
- Mapping land use patterns, water bodies, forests, hill slopes, wetlands, and degraded forests within the GP; biodiversity registers.
- Developing appropriate norms for sustainable utilisation of resources from common lands, water bodies, and forests on materials like non-timber forest produce, sand, fish, and water. Assessing the water needs, sources, schemes, solid, and liquid waste being generated. Settling the water and sanitation goals and targets.
- Selection of appropriate technology for water supply and sanitation in the GP, based on participatory and area assessment.
- Ensuring maintenance of toilets, public spaces, including those in markets and GP premises.
- Developing a comprehensive energy programme based on need assessment.
- Promoting adoption of Resolution of Mission LiFE and taking steps towards becoming Mission LiFE certified Panchayat.

Gram Panchayats and Theme 5 of Clean and Green Village

To become a Clean and Green Village, a gram

The Ministry of Panchayati Raj is making a concerted effort under the 'Clean and Green Village' theme, wherein panchayats take up activities on natural resource management, biodiversity protection, waste management, afforestation activities, water resources, soil health, and management of land resources.

panchayat must prioritise the preservation and maintenance of water and land resources, and the promotion of the generation and consumption of clean energy. This includes effective management of solid and liquid waste, maintaining Open Defecation Free status, and preventing water source contamination. Additionally, the Green Village initiative entails addressing ecological, economic, and equity concerns through community



participation in activities like tree plantation, organic farming, and promoting renewable energy sources for a self-reliant, eco-resilient rural India.

Rural households are equally vulnerable to climate change effects, and Panchayats play a pivotal role in tackling many of the causes and consequences of global warming.

The Ministry of Panchayati Raj is making a concerted effort under the 'Clean and Green Village' theme, wherein panchayats take up activities on natural resource management, biodiversity protection, waste management, afforestation activities, water resources, soil health, and management of land resources. Across India, 16% of the Gram Panchayats have taken Sankalp (Resolution), with a focus primarily on Clean and Green Village, furthering the efforts under this theme.

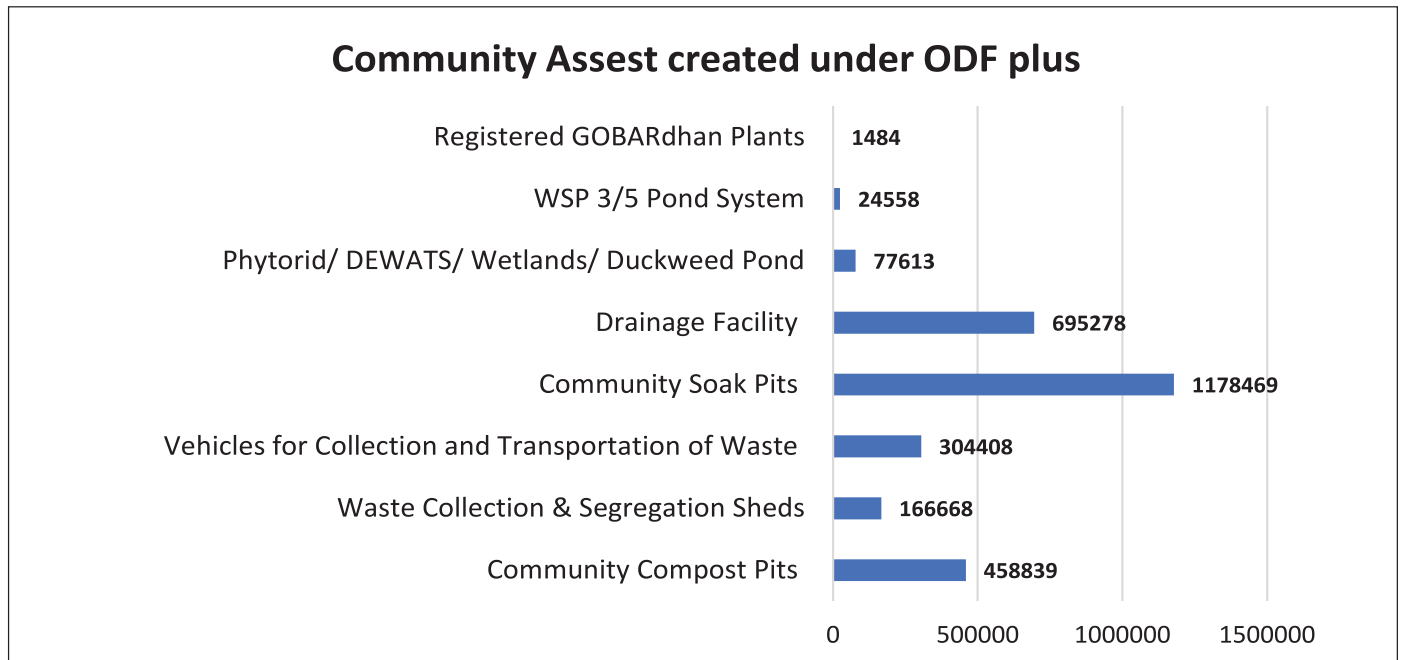
While Gram Panchayats are taking steps towards the 'Clean and Green Village' theme, a wide variety of programmes can be carried out for economic development. Local entrepreneurs can produce LED bulbs as a group activity. Production and supply of smokeless stoves bring more employment opportunities. Organic farming and marketing are yet other areas where Panchayats can focus. Self Help Groups (SHGs) get additional employment opportunities when working for self-reliant energy. Self-sufficient Panchayats can be the target of Panchayats working for carbon neutrality.



Open Defecation Free (ODF)

Around, 52% of villages are ODF Plus villages, i.e., nearly 4,25,691 villages, have sustained its Open Defecation Free (ODF) status along with implementing either solid or liquid waste management systems.

2,22,637 villages having arrangement of Solid Waste Management and 3,60,103 villages have arrangement of Liquid Waste Management. Various community assets have been created across villages, contributing to the ODF plus status of the GPs.



Gram Urja Swaraj Abhiyaan

The Ministry of Panchayati Raj has collaborated with the Ministry of New and Renewable Energy to include the Gram Panchayats under all its schemes focusing on the adoption of renewable energy. This will enable, in the upcoming years, Gram Panchayats to evolve as self-sufficient in terms of energy and become producers of energy instead of only being consumers. Moreover, widespread adoption of renewable energy applications in rural areas would enable the Gram Panchayats to develop own sources of Revenue (OSR) and employment opportunities for the local youth of the villages.

Under the Gram Urja Swaraj Abhiyaan, GPs have developed their own implementation models with the support of Renewable energy development Agencies of the states. For example, Odanthurai Panchayat in Tamil Nadu has its own windmill, Thikekarwadi GP in Maharashtra has established Biogas plant in PPP mode and Meenvallam, a project of Palakkad district Panchayat in Kerala is the first initiative of a Panchayat for micro hydel power generation. Many panchayats

have taken up solar energy models such as solar roof top models, solar kitchens, solar street lighting, and solar high-mast light owned by the Panchayats.

Under the Gram Urja Swaraj Abhiyaan, as on date, 2080 Gram Panchayats have taken up and implemented Renewable Energy Projects. Close to 2020 Gram Panchayats have solar energy systems that are installed and are fully functional. Around 60-70 Gram Panchayats have hydel energy systems and wind energy systems that are installed and there are 106 Gram Panchayats with existing biogas energy systems.

Further, a significant number of Panchayats are interested in making improvements in the clean and green energy domain and have interest through the Gram Urja Swaraj Abhiyaan under the following sectors:

Particulars	Solar Energy Systems	Hydel Energy Systems	Wind Energy Systems	Biogas Energy Systems
Number of Gram Panchayats	4202	296	296	366

Source: <https://egramswaraj.gov.in/urjaDashboard.do>

Mission LiFE

Mission LiFE, launched at COP26, promotes sustainable living by encouraging eco-friendly actions globally. It seeks to replace the prevalent 'use-and-dispose' economic model with a sustainable 'circular economy' by encouraging people worldwide to adopt environmentally friendly practices in their daily lives. With a multi-phase strategy, it begins with 'Change in Demand' by fostering simple actions and envisioning broader policy changes. Panchayats can play a pivotal role in implementing eco-friendly practices at the grassroots level.

In its inaugural year, 2022-23, Mission LiFE focuses on Phase I, 'Demand Shift', urging individuals, communities, and institutions to adopt 75 specific and measurable eco-actions spanning seven categories. These actions prioritise ease of adoption, minimal supply-side reliance, and economic compatibility, aligning with the mission's core aim of advancing sustainability.

Panchayats hold a strategic position to drive transformative change from the grassroots. They can effectively oversee the adoption of eco-friendly practices and encourage active community involvement in Mission LiFE's endeavours. Panchayats possess the capacity to champion environmentally responsible actions within their domains, spanning waste reduction, renewable energy adoption, and sustainable agriculture, while also providing incentives. Through collaboration with Panchayats, Mission LiFE could gain access to local expertise, resources, and established governance mechanisms, enabling a grassroots-driven approach to sustainable living that seamlessly aligns with the mission's overarching objectives.

Case Studies

MoPR has undertaken concerted efforts at block, district, State/UT and National Level for integration of the Clean and Green Theme. Panchayats are especially making considerable efforts and some noteworthy examples of their best practices are as follows:

a) **Kundal Gram Panchayat of Palus, Maharashtra**, with a total population of 18,287 and total households of 3,835, the Gram Panchayat has achieved 100% solid and waste management

for all the households, government and semi-government buildings. It has implemented a greywater management system, ensuring 100% greywater treatment, and adopted a rooftop rainwater harvesting system to alleviate water scarcity in the village by storing and utilising rainwater. Kundal Gram Panchayat uses LED lights in its domestic consumption and has installed Water Treatment Plant that provides clean water to all the households. Approximately, 4,000 trees have been planted for afforestation and the preservation of wildlife and plants in the GP.

b) **Syasanambagam Gram Panchayat, Hinjilicut, Odisha**, has set up a system of door-to-door garbage collection on a daily basis, segregation, and recycling of waste through Management of Community Composting (MCC). Its village sanitation committee takes up regular cleanliness drives and has made considerable effort to create assets like the MCC Community Compost Pit, Institution Compost Pit, etc. The GP regularly undergoes massive plantation activities to mitigate the effects of afforestation and preserve wildlife and plants. They have installed energy-efficient solar pumps for micro-irrigation and have embraced community-based management of natural resources, including forests, water bodies, and sacred groves, thus ensuring conservation of biodiversity and sustainability of ecosystems.

c) **Sultanpur Gram Panchayat, Eligaid District, Telangana**, has constructed a waste management shed for segregation of waste, wherein wet waste is thoroughly used to separate compost. Additionally, a plantation drive is underway to boost greenery, by planting 50,000 saplings across the Gram Panchayat. A shared sense of responsibility has been imbibed among the villagers in the Gram Panchayat to maintain a clean and green environment by distributing 6 plants to their households. Every house has Individual Household Latrine (IHHL), Kitchen Garden, and well-maintained soak pits. This has helped GP to achieve 100% ODF status. Additionally, for the restoration of all kinds of water, community soak pits are constructed, and grey water is converted

with and purified in preserved pits for irrigation purposes.

- d) **Meenangadi Gram panchayat in Kerala's Wayanad district**, serves as a model to emulate under the concept of carbon neutrality. Several ingenious multi-sector schemes were implemented in Meenangadi to reduce its emissions, increase its carbon sequestration, preserve its ecology and biodiversity, and create resilience among the people. 'Tree Banking' is one of such landmark schemes introduced at Meenangadi to aid the carbon neutral work in the Panchayat. The scheme encourages people to plant and protect trees by providing them with interest-free loans. Around 1,58,816 trees were planted in the Panchayat in three years. Additionally, bamboo trees were planted on riverbanks to conserve soil and water resources. To ensure water availability, Panchayat rejuvenated existing water bodies and constructed new ponds on private lands. Waste and energy audits were conducted at 400 houses in two wards of Meenangadi to improve waste management and energy efficiency. A compost park was established to manage biodegradable waste, compost bins were built, and composting equipment was distributed throughout the Panchayat for decentralised waste management. A plastic shredding unit was established, and plastic and other non-biodegradable waste were collected through Haritha Karma Sena. For all its efforts, the Gram Panchayat has won the prestigious Carbon Neutral Vishesh Panchayat Puraskar under the National Panchayat Awards of the Ministry of Panchayati Raj for the award year 2023 for its work and efforts on attending carbon neutrality in the Panchayat.
- e) **Palli, a remote village in Jammu and Kashmir**, has been recognised for its efforts against Climate Change. During the National Panchayati Raj Day 2022, the Prime Minister recognised the Gram Panchayat striving for carbon neutrality. After his address, the Ministry of Panchayati Raj, along with experts, state representatives, and various stakeholders, began discussions on preparation of local climate action plan for the Gram Panchayat.



Unnat Bharat Abhiyan in collaboration with partners like IIT Jammu, conducted surveys of over 700 households in Palli Gram Panchayat, to assess waste and energy use. After analysing the data, the Jammu and Kashmir Government prepared a local climate action plan with a budget of Rs. 10.18 crore from 2022-23 to 2027-28. The Panchayati Raj Department of Jammu and Kashmir has incorporated these initiatives into the annual plans of relevant line departments, and the ongoing activities are now actively underway in Palli Gram Panchayat. These encompass various aspects such as solar installations, the distribution of solar devices, and dedicated conservation efforts. The J&K Government aims to replicate these efforts in other Gram Panchayats, with the development of a mobile app for energy and waste auditing as a crucial step towards carbon neutrality in local climate planning.

In Palli Gram Panchayat, several eco-friendly initiatives have been implemented, including a 500-kilowatt solar plant, 79 solar streetlights, 755 solar cookers for households, and the operation of six e-rickshaws and one e-bus. Additionally, two solar water pumps have been installed, and conservation efforts protected three out of five ponds while creating 35 soak pits for efficient greywater management. These actions exemplify the Panchayat's dedication to sustainability and serve as a model for other communities.

- f) **Thikekarwadi Gram Panchayat, Junnar Block, Thane, Maharashtra**, was awarded Gram Urja Swaraj Vishesh Panchayat Puraskar under the National Panchayati Raj Awards-2023 of the Ministry of Panchayati Raj. The Thikekarwadi GP

has also come forward to make its effort towards becoming Carbon Neutral Gram Panchayat through convergence of funds.

- g) **Hasudi Ausanpur, Gram Panchayat of Siddharthnagar, Uttar Pradesh** is yet another Panchayat to have come forward to work towards attaining 'Carbon Neutrality'. This Gram Panchayat has already made good progress in afforestation, renewable energy interventions (solar streetlights), installation of a smog tower, etc.

Capacity Building initiatives towards Clean and Green Village

Capacity Building of Panchayati Raj Institutions (PRIs) has been one of the major activities of MoPR. The Ministry has been providing technical and institutional support for strengthening of PRIs including advocacy support for inter-ministerial and multi-sectoral coordination.

Revamped Rashtriya Gram Swaraj Abhiyan (RGSA), a centrally sponsored scheme aims to strengthen the capacities of institutions for rural local governance to become more responsive towards local development needs, prepare participatory evidenced-based plans, leverage technology, and efficiently utilise available resources for realising sustainable solutions to the local problems linked to SDGs. Concentrated effort is being made at the Gram Panchayat level to encourage thematic trainings.

Convergence

A convergence of efforts and adequate support of ministry/departmental functionaries of drinking water and sanitation, new and renewable energy, environment, forest and climate change, rural development, land resources, agriculture, animal husbandry, fisheries and panchayati raj is needed to realise the noble goal of Clean and Green Panchayat. In addition, non-Governmental organisations, college students, youth organisations such as Nehru Yuvak Kendra volunteers, etc. also need to be involved for faster realisation of the goal.

The State Panchayati Raj Departments need to ensure activity and resource mapping are undertaken, factoring in the resources available under various schemes of the Central and State Government



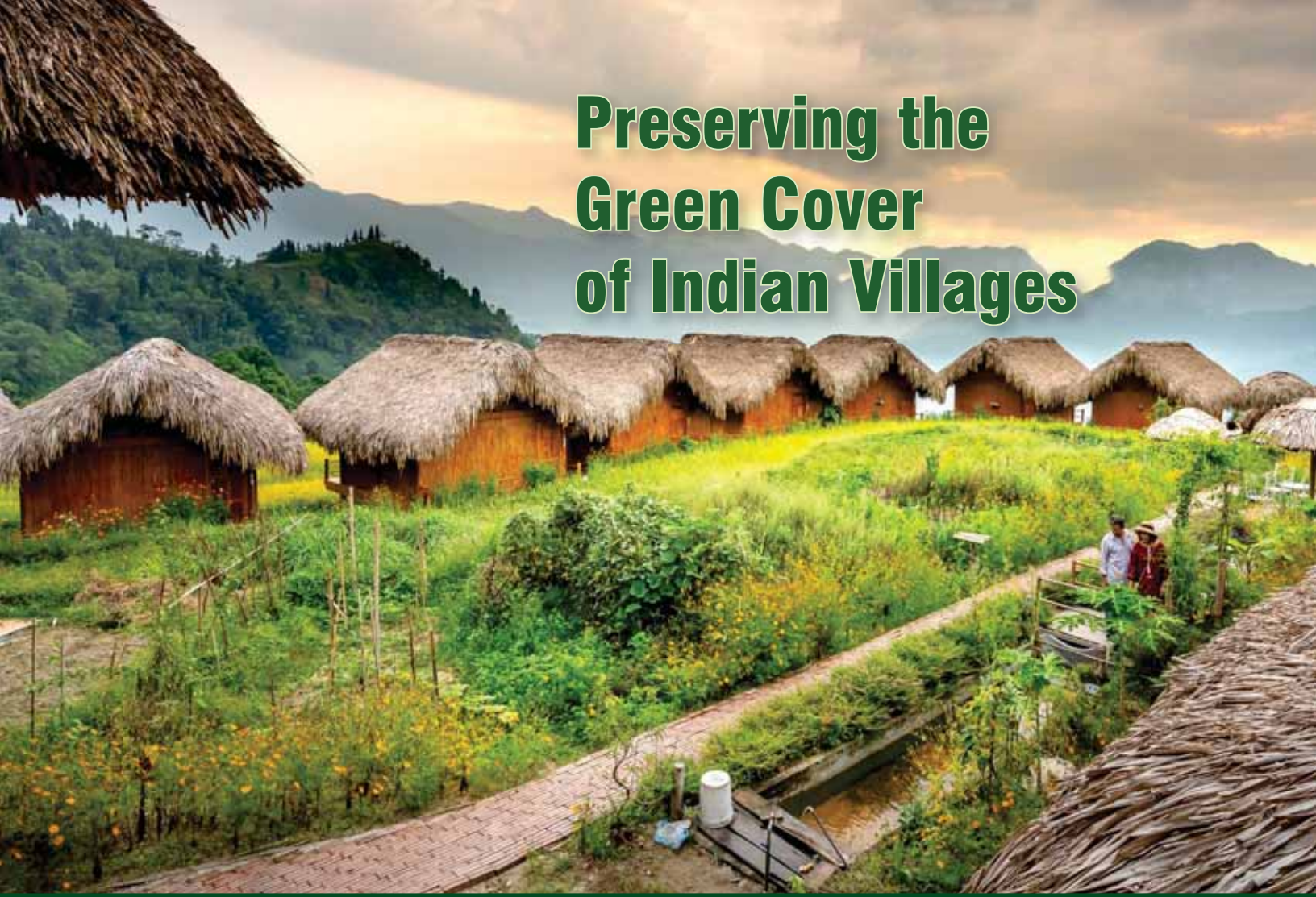
culminating in the implementation of the Panchayat Action Plan on the theme, integrated into the Gram Panchayat Development Plan.

Convergent action by all concerned ministries and departments among others, at the Central and State Government levels will go a long way in protecting the future of the planet. Eventually, all Gram Panchayats/villages need to become Clean and Green, if the LSDGs are to be attained by 2030 and the challenges posed by climate change are to be addressed.

Under the able, strong and visionary leadership of our Hon'ble Prime Minister Shri Narendra Modi, the steps taken towards making rural India green and clean in almost a decade are remarkable and historic. The resolution of Swachh Bharat taken by Shri Narendra Modi on Gandhi Jayanti in 2014 became the world's largest social movement and a historic chapter was written in freeing rural India from open defecation.

The Government under the leadership of the Prime Minister has taken some major green initiatives during the last few years for sustainable energy development. India is among one of the few countries globally which has kept to its Paris Climate Change (COP21) commitments along with an exponential increase in renewable energy capacity. The total installed renewable energy capacity in India, excluding large hydro, has crossed the mile-stone of 100 GW. India stands at 4th position in the world in terms of installed renewable energy capacity, 5th in solar and 4th in wind in terms of installed capacity. Our rural areas have made a significant contribution to this movement. □

Preserving the Green Cover of Indian Villages



India has the privilege of living the heritage of village systems where vernacular systems are a part of the cultural identity of village settlements, the essence of rich diversity. The role of architecture is critical in organising the jigsaw of physical built form as a sustainable village community. Villages are a potential opportunity for niche tourism opportunities where ‘green cover’ is a novelty for urban life.

T

Prof. Virendra Kumar Paul

he identity of villages is central to the identity of India. Villages represent the primary unit of Indian society. However, in recent times, villages are increasingly emulating urban lifestyles and transforming their built environment to reflect the same aspiration. Concretised streets and expanding hitherto functional aangan as embellished palatial forecourts are emerging as symbols of new-age development. While it is becoming increasingly necessary for small village streets to

accommodate private vehicles, spillover parking and congestion are now consuming green cover as an obvious need. Village settlements are witnessing a trajectory of transformation as uncontrolled urban settlements. The notion of village is, in effect, at risk of being confined to revenue records and its physical manifestation becoming akin to a micro-walled city of an eventual town. Some often characterise this as the ‘organic growth’ of urbanisation.

The perception of a village as a human habitat in the countryside, synonymous with green openness and surrounded by farmland, is under threat. As a living heritage of Indian socio-cultural richness, villages must anchor Indian values inherited since ancient times. The relevance of villages is critical to what 'Bharat' is known for. Can preserving the green cover of Indian villages be a theme for a variety of initiatives, involving stakeholders and village communities to mark the revival of villages in the Viksit Bharat paradigm of 2047? In its resolve to mitigate the environmental challenges of the 21st century, the Government, through SDG mechanisms, is already seized of the significance of villages. The initiative of the Local Indicator Framework (LIF) aims to establish traction with Gram Panchayats where 'Clean and Green Villages' is one of the themes. Creating pathways that leads to tangible outcomes under the thematic LIF of 'clean and green villages', is an important step. However, the continual adaptation of efforts is a challenge to ensure effectiveness at the grassroots level. Motivation and inclusivity are strategic intangible layers where embracing 'green' culture is crucial. Hence, can the heritage of 'living with nature' in Indian villages be the fountainhead of contemporary principles of settlement planning? The article delves into the challenges of 'greening villages' to explore complementary pathways for strengthening the 'village system' for posterity.

The Top-down Facilitation

From the perspective of a top-down approach, 278,000 Panchayati Raj Institutions (PRIs) have been interfaced by the Ministry of Panchayati Raj (MoPR) through the revised Rashtriya Gram Swaraj Yojana (RGSY) to carry out a set of social goals that the United Nations has deemed important for sustainable development. Budgetary support makes the intent of the Government explicit by empowering PRI to undertake actions towards tangible outcomes.

Interestingly, the Local Indicator Framework (LIF) is comprehensive and also includes other themes, such as poverty-free and enhanced livelihoods; community health; child-friendliness; water sufficiency; self-sufficient infrastructure; socially secured settlements; good governance; and engendered development. Since these indicators are mutually inclusive, actors engaged with village communities are expected to appreciate their interrelatedness. For instance, the intangible

layer of engagement must recognise that green cover contributes to livelihoods. Similarly, health and green cover are inseparable. To be water-sufficient, the green cover is a necessity, and so on.

The village of Tilonia, Rajasthan, is an inspirational example of an integrated model to revive the essence of a village. Tilonia was resuscitated by Sanjit 'Bunker' Roy, a social activist who employed indigenous and time-honoured techniques to bring into the village healthcare, green solutions, solar energy, electricity, water, education, communication, income generation, wasteland development, women empowerment, and conservation of green ecological systems.

It is apparent that the expected outcomes are measurable, but the approach must recognise that the pathways for achieving outcomes are interactive and iterative. In this respect, the diversity of villages in India is a strength, wherein it is possible that challenges faced in one experience may be a driving strategy for success. Thus, sharing emerging success stories would be important for continual learning and adaptation.

Narrative for Engagement with Village Communities

Unlike many other indicators, trees mature over a long period of time, and they have a cycle of aging. Eventually, they would require timely replacement, preferably through a natural process. For forestation to be effective, the efforts need to be consistent, ongoing, and long-term. The engagement for promotion and preservation of green cover must cut across all age groups of village society. A child today will carry the influence, the sanskar to the next generation, which is critical to the intangible layer of strategy. For instance, the Chipko movement must be a story that one should grow up with as a child. Therefore, as schemes permeate to the grassroots level and actions bear fruition, the engagement of village communities through structured awareness campaigns must commence simultaneously, recognising the centrality of preserving green cover. Similarly, the Indian Cedar, or Deodar is considered sacred, deriving its name from Sanskrit as deva meaning

God and daru meaning tree, thus combined to reflect 'tree of God'. Cultural bonds will be far more effective in preserving green cover when the narrative includes the exclusive use of revered Deodar in Hindu temples.

It is ironic that the medicinal values of trees and their role in life have been overlooked. Fortunately, the recent emphasis of the Government on alternative medicine can be dovetailed with the narrative to emphasise the need for 'living with nature'. The Ministry of AYUSH has already formalised an eco-system that can be a catalyst for the village economy. The statement of the Prime Minister, "India is a treasure trove of herbal plants, it is, in a way, our Green Gold" is explicit and the Gold Mine is the 'green village' that will create Ayurveda-based livelihoods and bring focus back to the villages once again. Thus, 'green village' is an all-encompassing approach for the sustainable transformation of villages in the development paradigm.

Sourcing of Local Material for the Construction

The concept of 'clean and green villages' needs contextualisation. The notion of a green village is inclusive of the idea of using construction materials that are environmentally appropriate. The practice of sourcing materials over long distances by transportation is a significant contributor to environmental pollution. It conflicts with the entwined objective of a sustainable village 'system'. Employing technologies and materials that are not local will eventually create an irreversible, disastrous burden at the end-of-life stage with no environmentally sound disposal mechanism in the countryside. Most of the industrially manufactured materials do not have locally viable recycling technologies. On the other hand, local materials have no consequence of environmental pollution and have a natural process of recycling. Bamboo has always been used as a construction material that is available locally, can be produced through planned plantation, and is an excellent green cover solution. While the main bamboo trunk is a great structural material, its twigs have been used as insulation when mixed with mud.

A number of innovative architects have been promoting clay, mud, stones, grasses, leaves, bamboo, and wood as viable alternatives for walls and roofs. Locally produced materials are the most aesthetically appropriate design solutions. They not only match the local context of topography and geography; they

have proven to be effective in climatic response. Industrialised materials, such as concrete and masonry blocks, have higher heat absorption and their built mass creates significantly warmer conditions. As a result, comfort needs lead to the use of appliances, such as coolers, fans, and air conditioners, necessitating increased dependence on energy. On the other hand, local materials have insulation and heat absorption properties, provide thermal mass, and ensure comfort conditions indoors.

Villages in Ladakh, Rajasthan, and the Himalayan regions have always resorted to locally sourced material technologies with minimal energy needs. It is imperative that the value of local materials be promoted and showcased through the adaptation of local traditional construction wisdom and the use of local material in contemporary construction.

In Himachal, the works of Didi Contractor, a German woman having no formal professional education, designed eco-friendly buildings, created enthusiasm amongst the people to embrace local material-based architecture, and inspired enterprising architects to innovate local solutions. Similarly, Laurie Baker, Padma Shri awardee, created contemporary, cost-effective buildings, reviving regional building practices and local materials. Also known as the 'Gandhi of Architecture', Baker believed that indigenous architecture and methods were the only viable means to deal with local problems. Carrying forward the legacy of Laurie Baker, architect Dr. G. Shankar, another Padma Shri awardee, constructed numerous mass-housing buildings with a focus on locally available materials. According to Dr. Shankar, '...Local materials and resources are critical components of sustainable development. With local material comes utilising local capacities to build the structure...Any material that does not fit this mould is unacceptable'. There is an ample body of knowledge about the use of local materials in construction and adequate experience to learn from. Efforts are required to upscale the experience to revive village-centric sustainable development.

Sustainable Architecture

Connected with the local sourcing of materials is the wider issue of sustainable architecture for villages, where 'green' is the subsumed binding thread. One of the reasons for the village people to embrace the building designs prevailing in towns is their innate competitive aspiration. As a result, one perceives 'town building designs' using industrialised materials as a symbol of prosperity. The practice of construction in villages, whether through professionals or otherwise' is willy-nilly, promoting contextually irrelevant architecture. It is important to create architectural design solutions for the village communities that have design quality and employ locally inspired design elements, such as motifs and carvings. This has the twin objective of empowering local communities through quality designs as well as creating a sense of pride in the local design elements. The role of village architecture in connecting locally sourced materials and delivering quality building designs is indeed challenging. This should herald a contemporary specialisation in sustainable architecture, where the patron to be served is the village community. While it is central to creating pride and interest in village settings, it needs to break the traditional financially rewarding architecture practice model.

Besides, there is also a need for a paradigm shift in the education of various professionals for an understanding of village challenges in the contemporary aspirations of the 21st century. Be it sanitation, water conservation, thermal comfort issues, or effective ventilation, the innovations are rather far and few. If the built environment of the village has to be made attractive for the next generation, proactive architectural interventions are critical to reverse the preferential 'town-building architecture'. The question is whether we have the holistic thinking process aligned.

Minimum Damage to the Green Cover

Construction is an inevitable reality and critical to the survival of green cover. Human habitat needs have codal provisions that prescribe minimum space for habitation; however, there are no guidelines for trees that ensure their roots would grow healthy, have access to nutrients through exposed ground cover, receive water, have access to the sunlight, and maintain timely seeding for natural replacement upon aging. Unnecessary concretisation of paving and masonry boundary walls creates built mass detrimental to green cover and

recharge of groundwater sources. In fact, groundwater is essential for the ecosystem. To maintain groundwater, green cover plays a significant role in stabilising rainfall patterns, preventing runoff, controlling surges of drains and rivulets, keeping soil healthy and micro-organisms active for the rich ecosystem. The traditional practice of drawing groundwater for daily usage maintained a cycle of water management, providing filtered water rich in minerals as it percolates through rocks, rendering it fit for daily use and free of contamination in most cases. Conserving such traditional practices will accrue multiple benefits.

It is also important to emphasise that green cover is not just trees or plantation. Green cover is a hierarchy of trees and supporting flora varieties specific to a particular region. And, in this complex balance, agriculture is essentially a human need that must respect its limits. Any disturbance of this balance is a recipe for disaster, and recent incidents of subsistence in Himachal and Uttarakhand amply demonstrate this phenomenal error. If only the dictum of minimum damage to the green cover had been taken as gospel truth, the situation would have been far different. Village life is a very sensitive model of living and requires extremely careful anthropogenic interventions. Fortunately, traditional Indian knowledge has, since ancient times, had the wisdom to deal with human habitat challenges. It is time to rediscover and contextualise the same knowledge system.

Way Forward

In essence, village is the premise of 'living with nature'. Folk life has revolved around the narrative of Jal-Jangal-Jamin. India has the privilege of living the heritage of village systems where vernacular systems are a part of the cultural identity of village settlements, the essence of rich diversity. The role of architecture is critical in organising the jigsaw of physical built form as a sustainable village community. Villages are a potential opportunity for niche tourism opportunities where 'green cover' is a novelty for urban life. The roadmap for preserving the green cover must embrace revitalisation of biodiversity and revisit principles of physical growth, taking 'green' as its principal stake. Access to educational structures imparting modern as well as traditional Indian knowledge of their settlements is vital for the communities to be active participants in the revitalisation journey. □

India's G20 Presidency

Inclusive, Ambitious, Decisive and Action-oriented

The 18th G20 Summit held in New Delhi on September 9th and 10th, 2023 was a clear indicator of Bharat turning over a new leaf in its long history of international relations. Headed by Prime Minister Narendra Modi, the theme of the G20 summit was "Vasudhaiva Kutumbakam", which translates to "The world is one family", which was evident in all the diplomatic goals achieved by Bharat in two days. From announcing an international corridor, which resuscitates the revered Spice Route of old times, to bringing focus back on sustainable development through the Global Biofuel Alliance, leaders across the globe have applauded PM Modi's approach of diplomacy, non-alignment, and growth for all.

India's Push for Clean Energy **Global Biofuels Alliance (GBA)**

Announced by the PM Modi-led government during
India Energy Week 2023

- Formally inaugurated on 9th September 2023

19 countries have joined GBA,
along with 12 international organisations

GBA will also help accelerate India's existing biofuels programs such as

PM JI-VAN Yojana, SATAT & GOBARDhan scheme

increasing farmers' income, creating jobs and enhancing overall development

20% Ethanol blending, or E20, is estimated to save around
₹ 30 thousand crore annually



The 21st century is a time that has the potential to give a new direction to the entire world. It's a time when years old challenges demand new solutions from us. Therefore, we must move forward by fulfilling all our responsibilities with a Human Centric approach.

- PM Narendra Modi





G21: Addition of the African Union (AU)

On 9th September 2023, the **AU became a permanent member** of G20 under the presidency of India led by PM Modi



Announced in the inaugural session of the two-day summit, PM Modi welcomed the **55-nation union**, making it **the second regional bloc** to become a permanent member after the EU



Reimagining the Spice Route India-Middle East-EU Corridor (IMEC)



UAE

\$76.9 billion worth of bilateral trade between May 2022 & March 2023



Jordan

\$4.4 billion worth of bilateral trade, an increase of 63% over the preceding year



Israel

Bilateral trade worth over **\$10 billion**, excluding defence in 2022-23



EU

\$116 billion worth of trade in goods in 2021-22, accounts for 10.8% of India's total trade



Saudi Arabia

\$42.8 billion worth of bilateral trade in FY 2021-22

G20 Delhi Declaration Diplomatic Progress

DELHI DECLARATION acknowledges a defining moment in India's journey to become a global leader

CONSENSUS ACHIEVED on achieving SDGs, eliminating hunger and malnutrition, education, global economic challenges and many other key issues

ADDRESSES POLITICAL, ECONOMIC & ENVIRONMENTAL CHALLENGES



Integrated Solar Village Scheme for Inclusive Development



States need to conceptualise an integrated solar village development scheme to leverage the opportunity provided by solar for the overall economic development of the rural economy. The scheme will aim to improve the reliability and quality of power supply, boost rural income, strengthen education and health services, and provide employment opportunities by integrating solar in the rural economy.

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* Bhawna Tyagi
** Aryadipta Jena
*** Mukesh Prasad

India's updated Nationally Determined Commitments (NDCs) to achieve the net-zero goal by 2070 focus on undertaking a citizen-centric approach to combat climate change while achieving sustainable development goals. This is a crucial development to ensure the clean energy transition is just and inclusive, with communities playing a key role. But rural India is not behind in this transition. In fact, it offers tremendous opportunities when it comes to the production and use of renewable energy, both through rooftop solar panels and distributed renewable energy applications. Some states in the country have attempted the idea of solarising villages, such as Modhera in Gujarat, Dharnai in Bihar, and Barapitha in Odisha. This not only helps rural households access reliable power, but can also help

communities by enabling institutions such as schools and health centres to run without disruption.

Solar energy helps to provide cheap and reliable renewable power to rural households in a cost-effective way and helps discoms reduce power procurement costs, transmission and distribution losses, and network upgrade costs, among others. However, there is a need to define the concept of solar villages to incorporate comprehensive economic development of rural areas by bringing the elements of livelihoods and strengthening the services of social infrastructure. In addition, solarising villages is a viable proposition for power distribution companies (discoms) because the cost of servicing rural households is high, driven by high electricity subsidies.

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Here, distributed renewable energy (DRE) technology enables us to leverage this opportunity to touch multiple aspects of lives and livelihoods with its distributed and modular design. It provides access to a better-quality power supply even in the remotest places and enables communities to be part of the energy transition by transitioning into the role of 'prosumers', both producers and consumers of renewable energy such as solar and biomass. DRE can be used to improve healthcare and education facilities in rural areas, access to the internet, livelihood opportunities, and grid resilience against extreme climate events. In addition, the installation of distributed solar is a labour-intensive exercise compared to utility-scale solar projects and thereby creates livelihood opportunities. A recent study by the Council on Energy, Environment and Water (CEEW) reported that 22,300 cumulative jobs were generated by installing 2.3 GW of rooftop solar in FY22 and has the potential to generate 2.8 lakh jobs by 2030.

The Governments, both at the centre and the states, have been actively pushing to promote rooftop solar and decentralised livelihood applications through various schemes and policies. The Ministry of New and Renewable Energy (MNRE) offered capital subsidies for the installation of rooftop solar by residential households up to 10 KW of the system under phase II of the Grid Connected Rooftop Solar Programme launched in 2019. India has installed ~11 GW of rooftop solar till August 2023. The scheme has been further extended up to 2026 in October 2022. Further, the Ministry simplified the process for application and securing subsidies for rooftop solar through the SPIN portal. It also issued a framework to promote the integration of DRE livelihood applications by enhancing productivity and income while providing access to clean and reliable energy. As per CEEW-Villgro estimates, DRE-based clean energy innovations, particularly in the agriculture and textile sectors, have a market potential of ~USD 50 billion and can impact 37 million livelihoods in rural India.

Recognising the importance of DRE, many states have also introduced enabling provisions in their own renewable energy policies or solar policies with a targeted focus on rural areas. For instance, Jharkhand introduced financial incentives to facilitate adoption by

rural and tribal communities, such as a 100 per cent capital subsidy for households with an annual income less than Rs. 3 lakh. Further, the states of Uttarakhand and Jharkhand announced the creation of 1,000 solar villages in their solar policies aimed at providing affordable, reliable, and clean energy to all their people. Uttarakhand is targeting villages in hilly regions, which often face the brunt of landslides leading to blackouts for extended periods, to provide reliable electricity through DRE. There is a need to translate these visions into action through concerted efforts by policymakers, industry, and developers.

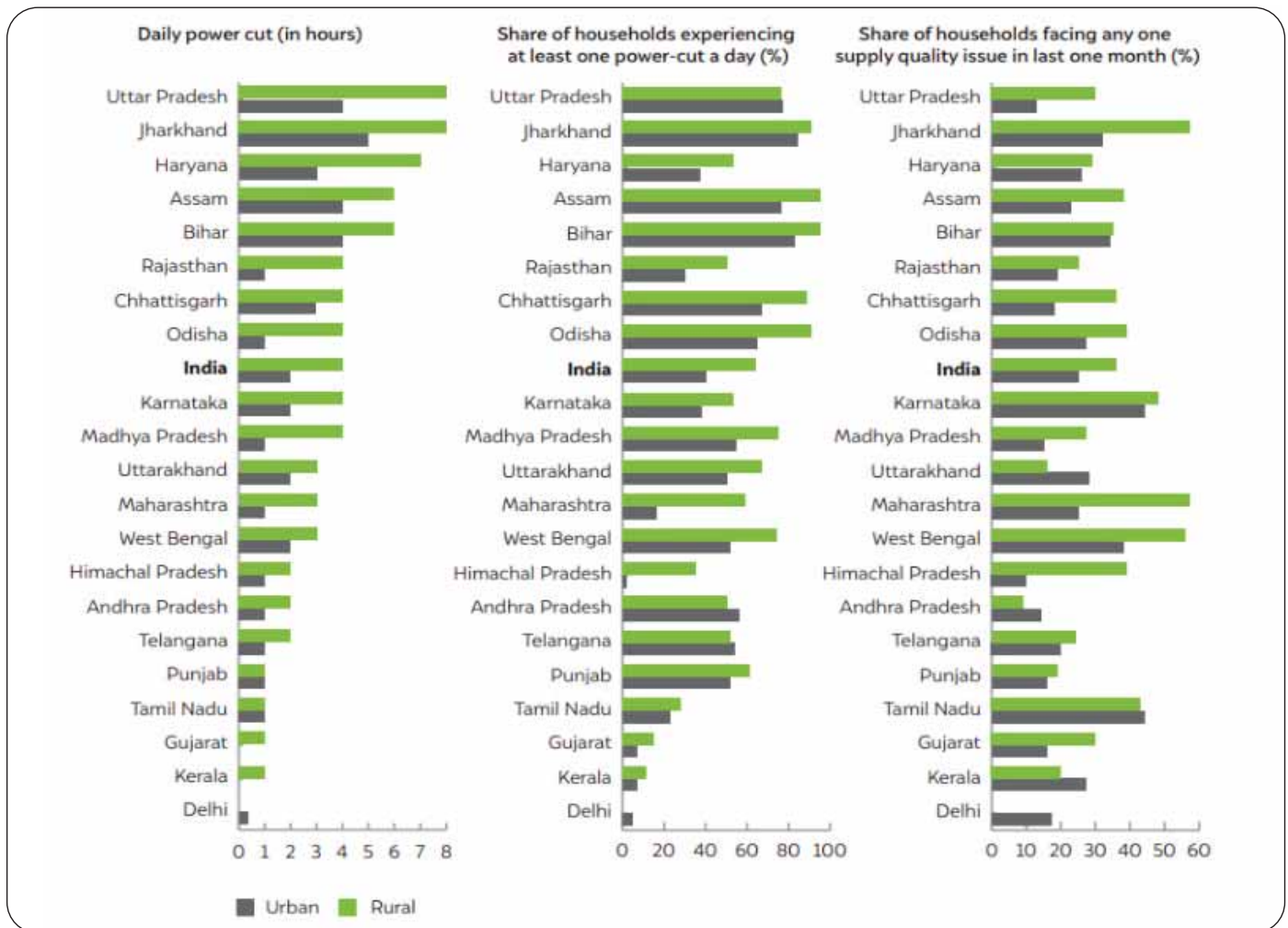
This article captures the need to focus on the integrated development of rural India, highlighting the past experience of village solarisation, and making recommendations to develop an integrated village solarisation scheme.

Rural Economy Needs Energy for Development

As per the United Nations Development Programme (UNDP) 'Energy Plus' framework, access to electricity is a necessary but not sufficient condition for rural livelihood development. The availability of reliable electricity is essential not only for meeting households' requirements but also for the delivery of services (such as health, education, and other social infrastructure) and creating livelihood opportunities. India made significant progress by achieving nearly 100 per cent household electrification. As of March 2023, a total of 2.86 crore households had been electrified across states (PIB, 2023). However, the quality of the power supply remains a challenge.

Current Electricity Supply and Power Quality Situation in Rural Households

The power supply situation has improved over the years in the states, with some progressing towards 24-hour supply, such as Delhi, Kerala, and Gujarat. However, there is significant variation in progress both across states and within states, between rural and urban areas. Rural India faces more power supply outages compared to urban areas, with an average of 20 hours of supply. In addition, power quality issues (such as long blackouts, low voltages, or appliance damage) are experienced more by rural households compared to their urban counterparts due to voltage fluctuations.



Source: Agrawal, Shalu, Sunil Mani, Abhishek Jain, and Karthik Ganesan. 2020. *State of Electricity Access in India: Insights from the India Residential Energy Consumption Survey (IRES) 2020*. New Delhi: Council on Energy, Environment and Water.

Electricity Supply to Healthcare and Educational Institutions

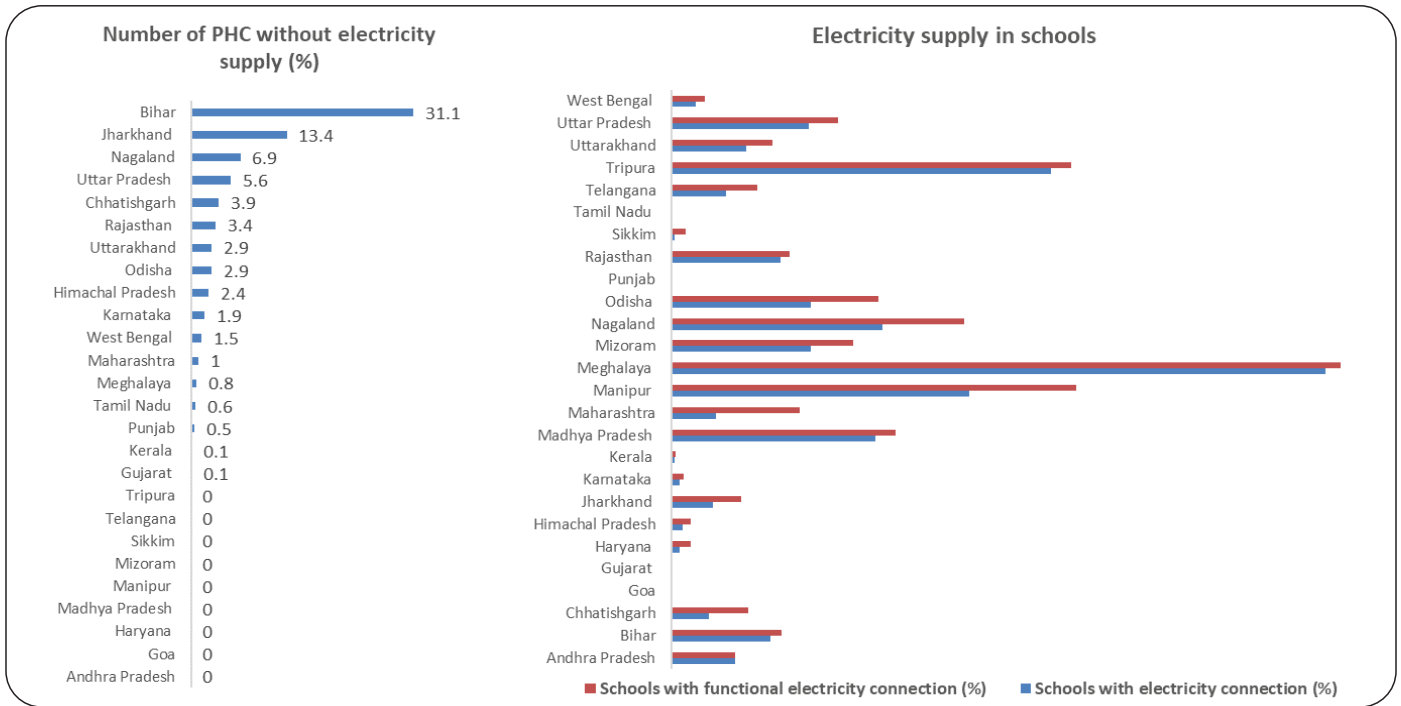
The quality of the power supply also impacts the delivery of services by healthcare and educational institutions. According to a 2021 study, 5 per cent of primary health centres in rural areas function without electricity. The electricity situation is similar in health sub-centres, with ~12 per cent having no electricity supply (MoHFW, 2021). There has been an improvement in the electricity situation in schools. However, ~10 per cent of schools are yet to be electrified, and overall, 13 per cent do not have access to functional electricity facilities, especially in hilly states such as Arunachal Pradesh, Assam, Jammu and Kashmir, among others (MoE, 2022). The situation worsens for areas more prone to extreme events driven by climate change, such as the climate change-induced Kerala floods of

August 2018, which disrupted the health infrastructure significantly.

These statistics make it all the more important to ensure the reach, stability, and access of renewable energy in rural India. It will not only aid the energy transition but also improve lives and livelihoods.

Learning from Past Experiences of Solarisation of Villages

Some states, such as Gujarat, Odisha, and Bihar, have already worked on solarising villages. As states work on their climate action plans and reduce emissions without compromising growth, lessons learned here can be case studies for improving the clean energy potential of other villages. While Gujarat has seen success in the Modhera Solar Village project, Odisha and Bihar have not yet realised the expected result.



Source: MoHFW, 2021; MoE, 2022

Dharnai Village in Bihar

A 100 KW solar mini-grid was installed in Dharnai Village of Bihar in 2014, powering 400 households, one health centre, two schools, one Kisan training centre, and 50 commercial establishments. However, after three years of operation, the battery of the solar mini-grid became defunct, and the lack of proper operation and maintenance of the system made the project non-operational (Mongabay, 2021). This was a classic case of the tragedy of the commons, where the village benefited from the common system but had no exclusive claim, leading to issues of non-operation and maintenance. Later, the village was connected to grid power, and the installed solar system remained non-operational.

Barapitha Village in Odisha

In 2015, Barapitha, a tribal village near Odisha's capital city, Bhubaneswar, was declared the state's first 100 per cent solar village. Under this project, a 1 kW foldable solar system with a battery installed to power 8 street lights and two solar lamps each for 61 households were provided. It also powered the village community centre and provided an LED TV and set-top box for getting weather-related warnings. However, after nearly two years of operation, the system was damaged by Cyclone Fani in 2017. Similar to Dharnai Village, the solar project was not repaired or maintained. At present, the project is non-operational,

and the villagers are fully dependent on the grid supply to meet their electricity requirements.

Modhera Village in Gujarat

The Modhera solar village is a combined initiative between the Gujarat government and MNRE, the Government of India. The project was developed with a capital outlay of INR 81 crore and equal contributions both by the State and the Central government. Under the project, a 6 MW ground-mounted solar project is installed with a 15 MWh battery storage system. In addition, 1 kW rooftop solar systems are installed on the roofs of 1,400 households. The projects provide round-the-clock power to more than 1,700 households in three villages (Modhera, Samlanpura, and Sujjanpura). The consumers are connected to smart meters for the supply of electricity, which helps the officials manage the system in an efficient way. The operation and maintenance of the project have been carried out by technically qualified professionals, which increase the usability and efficiency of the plant. The project not only reduces the electricity bill of the villagers on the grid supply from 60-100 per cent but also supplies excess power to the grid and provides additional revenue for the villagers.

The above cases highlight three key learnings for future projects. First, defining a clear vision and value proposition for each stakeholder is crucial for the success of these projects. For example, Modhera,

with proper operation and maintenance practices, not only provides reliable and free power to the villagers but also contributes towards generating additional income for the villagers by supplying excess generation to the grid. Second, clear identification of roles and responsibilities is crucial to leverage the actual potential of such initiatives as operation and maintenance. Third, evaluating and leveraging the potential of solar across different categories apart from rural households, such as solarising health centres and schools .

An 'Integrated Solar Village Development Scheme'

States need to focus on integrated solar village development while formulating the scheme. The schemes should aim at improving the reliability and quality of power supply, boosting rural income, strengthening education and health services, and providing employment opportunities by integrating solar into the rural economy. The major contours of these schemes could be:

- 1. Demand Assessment** – To develop an integrated scheme, there is a need to assess the overall demand for electricity in the village, such as residential households, agricultural demand, government buildings such as schools, primary health centres, panchayat offices, railway stations, bus stops, community centres, anganwadis, etc. It helps to identify the solarisation opportunity and potential for different solar applications such as solar PV, pumps, and refrigerators.
- 2. Innovative Business Models** – To meet the residential demand, there is a need to assess the viability of different business models. Deploying rooftop solar installations is suitable for pucca houses with roof ownership. However, to overcome the barriers of unsuitable rooftop conditions, high upfront costs, or a lack of consumer awareness, community solar models could be explored. It helps aggregate residential demand and set up projects on community premises.
- 3. Integrating Livelihoods through Decentralised Productive Appliances** – This means identifying the potential applications, creating awareness, and incentivising through credit access, among others. The scheme can consider productive appliances in areas such as agriculture (grain milling, food processing, solar pumps), animal husbandry (feeders, cutters, vertical fodder

grow units), and other allied activities (cybercafé computers, printing machines, blacksmith blowers, refrigerators).

- 4. Integration with Existing Policies and Regulations** – The scheme needs to identify its alignment with other existing state solar schemes, such as solar street lights and solar water heater programmes, among others, which can be leveraged to provide overall development in the identified solar villages. In addition, the responsible agency should work with other relevant departments to identify and integrate the schemes of other departments targeted towards the development of the rural economy in the state.
- 5. Skill Development and Capacity Building** – The scheme should target training youth in these rural areas to become Surya Mitras, enabling solar adoption in the state. There should be a dedicated focus on gender-inclusive skill development, capacity building, and employment opportunities at the local level to cater to these solar villages.
- 6. Models for Sustenance** – To ensure the sustenance of solar villages, there is a need to clearly define the roles and responsibilities of relevant stakeholders, from installation to maintenance. A village-level committee (VLC) needs to be constituted in the shortlisted villages in coordination with the State Rural Livelihood Mission, the Department of Panchayati Raj, and the Department of Rural Development. The committee will include Gram Panchayat members and other active members of the village, such as women's self-help groups and youth groups. This committee will work in coordination with the implementing agency and other relevant departments for the implementation of the scheme.

The clean energy transition has been largely skewed towards urban areas. There is a need to switch gears and leverage the potential in rural areas by integrating rural policies towards a common vision of poverty alleviation and promoting clean energy. Utility-scale renewable energy deployment will help achieve the speed and scale needed to reach these targets. However, a parallel emphasis on accelerating the deployment of distributed renewable energy (DRE) will be equally important to achieve a sustainable and people-centric energy transition. □

Crop Residue Management

Challenges and Opportunities

On-farm burning of CRs causes plenty of environmental problems and has a serious impact on human health. Soil health greatly deteriorates due to the loss of organic matter and other soil nutrients. The Central Government has launched various promotional schemes and programmes to encourage environmentally safe management of CRs, and to promote technologies for its alternative uses.



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Dr. Jagdeep Saxena

cologically sustainable and environmentally safe management of agricultural wastes, technically called crop residues (CR), is one of the major challenges in India. Harvesting, threshing, and primary processing of crops leave behind a variety of plant materials that need safe disposal and recycling. Stubbles, stalks, stover, husk, bran, bagasse, and molasses are generally classified under CR in the Indian context. These residues, once thought to be waste, are now regarded as an important natural resource due to

their versatile utility. CRs are primarily used as bedding material for livestock, animal feed, soil mulching, bio-gas generation, bio-manure and compost, thatching for rural homes, mushroom cultivation, biomass energy production, fuel for domestic and industrial use, etc. However, with the help of innovative technologies, CR can be converted into a variety of value-added products such as papers, boards, eco-panels, etc. In spite of such practical and beneficial options, a large portion of CR is burned 'on-farm', primarily to clear the field for sowing the next crop. This destructive activity deteriorates soil

properties and fertility, along with ambient air quality. Consequently, it leads to a gradual loss of production potential of farms, which has serious consequences for food security. The Government has put various legal, administrative, and strategic interventions in place to stop on-farm burning of CRs. Simultaneously, technologies for reusing, recycling, and decomposing CRs in fields are being pushed for large-scale adoption among farmers. The Central Government, respective state governments, NGOs, and concerned institutions are working hand in hand to spread awareness and control CR burning in fields.

Problem and Perspectives

Every year, in India, about 683 million tonnes of CRs are produced, of which nearly two-thirds are contributed by cereal crops. Nearly 500 million tonnes of residues are recycled in various sectors like industrial, domestic, and livestock fodder but a surplus of 178 million tonnes is left without any single use. Nearly half of it is burned in fields across the states, with Punjab, Haryana, and Uttar Pradesh being the major defaulters. Among cereal crops, rice generates the most gross residues followed by wheat. Fibre crops residue accounts for nearly 20 per cent of the total CR generated in the country. Cotton accounts for 74 per cent of total fibre CR among fibre crops.

On-farm burning of CRs causes plenty of environmental problems and has a serious impact on human health. Soil health greatly deteriorates due to the loss of organic matter and other soil nutrients. It is estimated that burning one tonne of rice straw accounts for the loss of 5.5 kg of nitrogen, 2.3 kg of phosphorus, 25 kg of potassium, and 1.2 kg of sulphur, besides organic carbon. According to a report from Punjab Agricultural University, every year 0.824 million tonnes of NPK (nitrogen, phosphorus, and potassium) are lost from the soil due to CR burning in fields. On the other hand, if the CR is incorporated or retained in the soil itself, it gets enriched, particularly with organic carbon and nitrogen. Heat generated from burning of CRs elevates soil temperatures, causing the death of beneficial soil organisms. Frequent burning of CRs leads to a complete loss of microbial population and reduces the level of nitrogen and carbon in the top 0-15 cm of the soil profile, which is critical for the development of the

root system of crops. Stubble burning is a destructive event which robs soil of its nutrients and also destroys growing media, causing a dent in its productivity and fertility status.

The burning of CRs is a potential source of greenhouse gases, which are responsible for aggravating the global calamity of climate change. When rice straw is burned in open fields, it releases carbon dioxide, carbon monoxide, methane, sulphur oxide, and nitrogen oxide gases. Besides, burning of CRs also emits a large amount of particulates (PM-2.5 and PM-10), which can remain suspended in the air for a long time and travel long distance in the wind. Many of the pollutants found in large quantities in biomass smoke are known or suspected carcinogens and could lead to various airborne or lung diseases. Paddy stubble burning in neighbouring states is responsible for almost one-quarter of the air pollution that practically blankets the whole capital city of Delhi every winter. The Delhi pollution index increased to 12 times the maximum limit for safe air in November 2018. As per reports, every year, approximately 22 million tonnes of carbon dioxide, 0.92 million tonnes of carbon monoxide, and 0.03 million tonnes of sulphur dioxide are emitted in Punjab alone by the burning of 15 million tonnes of paddy residues. The emission of particulates from the burning of CRs is 17 times higher than emissions from other sources such as motor vehicles, waste incineration, and industrial waste. Besides respiratory, skin, and eye problems, inhaling particulates can aggravate existing pulmonary and cardiac conditions, which may lead to premature death. The burning of CRs also puts the lives of milk-producing animals in danger and affects the longevity of animals, birds, and insects.

In spite of many long-term damages to soil and human health, farmers in north-western India often opt for the burning of paddy stubbles, mainly due to three factors:-

1. A shortage of farm labour at a critical time of field operation;
2. A very short span or window for the preparation of the field for the next wheat crop; and
3. Large-scale use of a combine harvester for the harvesting of paddy.



DEMONSTRATION ON SOWING OF WHEAT WITH SUPPER SEEDER UNDER CRM PROJECT IN THE FIELDS OF BHUPNAGAR AND TAJPURA VILLAGE OF MOHALI DISTRICT, PUNJAB



Earlier, farm labour was plentiful, which helped farmers with manual harvesting, and no stubble was left in the field. But, of late, an acute shortage of labour prevails due to various socio-economic changes. Hence, farmers largely use combine harvesters, which are fully automated machines to collect the grains in

one go through multiple processes. It leaves nearly 20-30 cm of stubble on the ground, which needs to be removed or incorporated into the field for sowing the next crop. Farmers have only 10 to 20 days in hand for sowing the next wheat crop, during which stubble needs to be removed. Moreover, paddy straw is not a preferred livestock feed in this region due to its high silica content. Hence, farmers prefer to set the field ablaze to save time and money. There are implements like rotavators, happy seeders, super seeders, etc. that help to manage stubbles in the field. But majority of farmers are not inclined to invest in such machines, while others can't afford the cost. Farmers take up the burning of stubbles as a convenient, time-saving, and cost-saving practice to prepare fields for the next crop in record time.

Regulations and Solutions

Viewing stubble burning as a serious health hazard, the National Green Tribunal, in an order dated 10 December 2015 directed and prohibited agricultural residue burning in any part of the NCT of Delhi and the states of Punjab, Rajasthan, Uttar Pradesh, and Haryana. "In the case of persistent defaulters in crop residue burning, appropriate coercive and punitive action could be taken by the State Government concerned, including the launch of prosecution," said a bench headed by the Chairperson, NGT. Any person or body that is found to be violating the directions of NGT is liable to pay environmental compensation, which is collected by the concerned State Governments. The Governments of Punjab, Haryana, and Uttar Pradesh have collected Rs.167.58, 61.72 and 28.60 lakh, respectively, during 2018-19 as environment compensation. The Supreme Court has taken a very serious view of stubble burning and has directed defaulter states to make efforts for curbing this harmful practice. In addition, the State Governments have their own set of rules and regulations to tackle offenders.

The Central Government has launched various promotional schemes and programmes to encourage environmentally safe management of CRs, and to promote technologies for its alternative uses. During 2018-19, a new and comprehensive central sector scheme on CR management was launched with a multifaceted strategy. Under this scheme, financial assistance @50% is provided to the farmers for

purchase of CRM machinery, and @80% is provided to cooperative societies, Farmer Producer Organisations and Panchayats for the establishment of Custom Hiring Centres in villages. These centres provide CRM machinery to farmers on rental basis at affordable rates. The scheme promotes usage of machines such as super straw management systems, happy seeders, smart seeders, mulches, crop reapers, etc. for 'on-form' management of CRs, and balers & rakes for straw collection in the form of bales to facilitate its other uses. Supported by the central finances, the states (Punjab, Haryana, Uttar Pradesh, and NCT of Delhi) have distributed more than 2.07 lakh machines to the individual farmers and established over 38,000 Custom Hiring Centres during the last four years.

The Central Government has recently revised guidelines for off-site crop residue management in the above mentioned four states to facilitate its alternative uses and develop a paddy straw supply chain. Techno-commercial pilot projects will be established under the bilateral agreement between beneficiaries (farmers, FPOs, Cooperative Societies, panchayats etc.) and industries utilising paddy straw. Financial support @ 65% of the project cost will be jointly borne by the Central and State Governments; 25% will be contributed by the industry; and the balance 10% will be the share of beneficiary. Under the project, about 333 biomass collection depots with a capacity of 4,500 million tonnes will be built in the states of Punjab, Haryana, Uttar Pradesh, and Madhya Pradesh. During the three-year tenure of the interventions, 1.5 million

Prime Minister Appreciates Punjab Farmer for His Commitment To Stop Burning of Stubbles in Village

“ A few days ago, I was reading about a farmer brother Gurbachan Singh from Punjab. The son of this hard working farmer Gurbachan Singh ji was to be married. He had told the bride's parents that the marriage would be performed in a solemn manner. There is no need to spend much on wedding reception or any other item. We have to keep it a very very simple event. But then he suddenly said that he had one condition. And, when a condition is put these days, generally it is thought that the other side is going to make a big demand which will be really difficult for the bride's family to fulfill. But, you will be surprised to know that Bhai Gurbachan Singh was a simple farmer and what he told the bride's father and the condition he placed reflects the true strength of our society. He asked them to promise that they will not burn parali or stubble in their fields. You can well imagine the social strength this statement had. This point made by Gurbachan Singh ji appears quite ordinary but this reveals how tall and strong his personality is and we have seen that there are many families in our society who connect their individual matters with the benefit of society as a whole. Shriman Gurbachan Singh ji's family has presented one such example before us. I have also read about a village Kallar Majra which is near Nabha in Punjab. Kallar Majra came into lime light as the farmers there mix the stubble with the sand by ploughing their fields rather than burning the stubble and adopt the necessary technology for the process. Congratulations to Bhai Gurbachan Singh ji! Congratulations to the people of Kallar Majra and of all those places who are making their best efforts to keep the environment clean and pollution free. ”

- Prime Minister Shri Narendra Modi
(49th Episode of Mann ki Baat,
28 October, 2018)

Shri Gurbachan Singh is a progressive farmer of Burj Deva Singh village in Taran Taran who is using happy seeder since 2007, long before the existence of any policy support for such machines. Incorporation of crop residue has substantially improved soil quality of his farms, so that he is not using fertilisers any more. He has also led the adoption of short-duration varieties of rice in his village, which provides more time for field preparation. He has also motivated and persuaded 40 other farmers from his village to abandon harmful practice of stubble burning in open fields.



Pusa Decomposer

A microbial consortium for management of paddy straw

Pusa Decomposer (both in liquid and capsule form) is microbial solution for accelerating decomposition of paddy straw.

Four capsules can be scaled up to 25L of liquid formulation. 25L can be applied to 1ha of field (@10L/acre having 4-5 tonne of straw per acre). Pouch of 4 capsules cost Rs 20/-

The acceleration process makes the field ready for wheat sowing in 25 days. This has been demonstrated in farmers fields in Punjab, Haryana, UP and in NCR

Its use enriches the soil with OC, nutrients and soil biological & physical properties were also improved. Pusa Decomposer is a long term sustainable solution for management of paddy straw

metric tonnes of surplus paddy straw are expected to be collected, which would otherwise have been burned in fields. The supply chain will help in making paddy straw available for various end uses such as power generation, heat generation, bio-CNG, bio-ethanol production, etc.

The Indian Council of Agricultural Research has developed an innovative Pusa Decomposer technology to biologically decompose paddy stubbles in the farm. It's a microbial solution available both in liquid and capsule form for accelerated decomposition of straw. Its application makes the field ready for wheat sowing in 25 days, and also enhances chemical, biological, and nutritional profile of soil. During the year 2021, decomposer has been used in the states of Punjab, Haryana, Uttar Pradesh, and NCT of Delhi in around 5.7 lakh of hectare area, which is equivalent to about 3.5 million tonnes of straw managed. Satellite monitoring and imaging showed that 92% area of the decomposer sprayed plots has been managed through decomposition and only 8% area in these plots was burned. To promote the use of bio-decomposer technology, the operational

guidelines of the crop residue management scheme have been revised in August 2022, and provisions have been made for large-scale demonstrations of bio-decomposer on farmer's fields by way of utilising flexi funds under the scheme. The application of composted residues to soil adds organic carbon and other essential plant nutrients to the soil and promotes microbial activity in the soil. Farm residues and other agricultural wastes after partial decomposition can be converted to valuable vermi-compost for individual use and marketing. During Swachhata (cleanliness) Special Campaign 2.0 (2 Oct 2022-31 Oct 2022), the ICAR – Krishi Vigyan Kendras adopted over 900 villages across the country to demonstrate and promote microbial-based crop residue management and vermicomposting technologies were demonstrated to nearly 22,700 farmers in their fields.

Compared to wheat straw, rice straw is not a preferred livestock feed due to certain nutritional quality issues. But now a number of physical, chemical, and biological treatments are available to enhance its nutritional value. Crop residues can be utilised as

(To be continued on page no. 30)

India's foray into the vast expanse of space has been nothing short of remarkable, capturing the imagination of the world and showcasing the nation's commitment to scientific exploration and technological innovation. The Indian Space Research Organisation has steadily evolved into a global space powerhouse with the objective of enhancing the overall progress of India through the most effective and efficient utilisation of space sector applications.

This transformation has been made possible through unwavering government support that has consistently nurtured and propelled India's space missions to new heights.

Under the visionary leadership of Prime Minister Narendra Modi, the importance of space exploration as a catalyst for national development has been recognized. His trust with the space sector began when he was the Chief Minister of Gujarat. His vision ensured that space sector applications were translated into solutions for effective governance. The same technology is being leveraged in PM Gati Shakti, where space technology is extensively used for planning and executing infrastructure projects seamlessly. Only visionary leaders can understand that space technology and exploration are keys to unlocking mysteries in space and accelerating effective governance on Earth.

"India is on the Moon. We have our national pride placed on the Moon. We reached the spot where no one had ever reached before. We did what no one had ever done before. This is today's India, fearless India, warrior India."

- Prime Minister Narendra Modi, 23rd August 2023

PM Modi highlighted that, India's successful moon mission is not India's alone, it is India's human-centric approach that has been welcomed universally and our moon mission is also based on the same human-centric approach and hence this success belongs to all of humanity.

PM Modi is confident that all countries in the world, including those from the Global South, are capable of achieving such feats and like India all can aspire for the moon and beyond.

SKY

IS NOT THE LIMIT

A rocket launch is shown against a dark, starry sky. The rocket is ascending, with a large plume of white smoke and orange fire at its base. The word "SKY" is written in large, bold, orange letters across the top of the image. Below it, the phrase "IS NOT THE LIMIT" is written in smaller, bold, blue letters.

Chandrayaan 3

Big Bang Moment for ISRO and India

- First country to reach lunar south pole.
- Fourth country globally to reach moon.
- **23rd August** declared as the National Space Day celebrating Chandrayaan 3 landing.
- Laser-Induced Breakdown Spectroscopy (LIBS) instrument onboard the Rover Pragyan unambiguously confirms the presence of Sulphur (S) in the lunar surface near the south pole.



Chandrayaan-3 on Moon surface

India's 2 Decades of Moon Voyage Unravelling the Lunar Mysteries

Chandrayaan 1 The Maiden Flight

- Prime Minister Atal Bihari Vajpayee announced the Chandrayaan project on 15 August 2003. Launched in October 2008 it operated until 2009.
- Objective - Orbiting Moon for upgrading and testing technological capabilities in space.
- Cost - Rs. 386 crore.

Chandrayaan 2 An Attempt to Remember

- Launched in July 2019.
- Objective - To soft-land on the lunar surface and operate a robotic rover on the surface.
- Cost - Rs. 603 crore.

Chandrayaan 3 Lightening the Dark Side

- Launched on 14 July 2023.
- Objective - Safe and soft landing on moon, through Vikram Lander, validating capabilities of Pragyan rover and to conduct in-situ scientific experiments.
- Cost - Rs. 615 crore.
- **Landing point - Shiv Shakti Point.**



PM Modi inspecting a model of the Vikram Lander part of the Chandrayaan-3 mission at the ISTRAC, Bengaluru.

ISRO's Space Record of Last 9 years

- Out of 431 foreign satellites, 396 were launched in the last nine years by India.
- 396 foreign satellites were launched, earning Rs. 3,300+ crore in just 9 years.
- In 2017, India launched a record 104 satellites, out of which 101 belonged to international customers, creating a world record.
- India's space sector budget soars from Rs. 5,615 crore to Rs. 12,543 crore in last decade providing better infrastructure.
- ISRO launch rate skyrockets from 1.2 yearly launch missions before 2014 to an impressive 5.7
- ISRO's launch tally for student satellites increases from 4 before 2014 to 11 since 2014 manoeuvring young minds towards the infinite possibilities of space.
- 160+ new startups have come up in space sector manoeuvring the space ecosystem to new heights.

Defying Gravity, Space Sector of India

- IN-SPACE established to create an eco-system of industry, academia, and start-ups.
- Vikram-S, India's first privately built rocket, was launched successfully.
- India's 1st private launchpad and mission control center established by Agnikul Cosmos.
- Aditya L1, first space-based observatory-class Indian solar mission to study the Sun, launched in September 2023.
- In near future, Gaganyaan project envisages human spaceflight capability.

(Continued from page no. 27)

Crop Residues From Fabrics to Fuel

Trunk portion of banana, called pseudostem, is a major crop residue/agricultural waste in chief banana producing states such as Tamil Nadu, Maharashtra, Karnataka, Kerala, Andhra Pradesh and Gujarat. Huge quantities of pseudostems are generally left to rot in open causing unhygienic conditions or are burned leading to many environmental problems. However, it is a rich source of natural fibres which can be used to produce a variety of articles. Technologies have been developed and extended to prospective entrepreneurs for efficient and eco-friendly extraction of fibres. Banana fibres are biodegradable, have somewhat shiny appearance, and have good receptivity of dyes. These can easily blend with other natural fibres such as cotton, rayon, silk, etc. for enhanced performance and properties. Sarees and other fashion garments are the most sought after articles made of banana fibres or its blends. However, supportive technologies are also available for making shipping cables, power transmission ropes and cordage, fishing nets, bio-pesticides and fertilisers, banana paper, and a variety of handicrafts. Banana fibres are suitable for making high value paper having shelf-life of over 100 years. These are also being used to manufacture low-cost sanitary pads for rural women. Special sanitary pads made from composite banana fibres can be re-used many times.

In Odisha, a startup is building electric vehicle batteries using crop residues. These batteries charge 8 to 10 times faster, offer 20-30% longer battery life and cost 30-40% cheaper than regular batteries. Besides, these are 100% bio-degradable. Every 100 batteries produced can help one farmer earn an additional Rs. 25,000 and prevent burning of crop residue. Among other bio-energy options, 300 cubic meter bio-gas may be produced by anaerobic digestion of one tonne of rice residue. One tonne of paddy biomass may provide 300 kwh of electric energy through gasification. Rice straw is a potential source for production of bio-ethanol. Production of rice-straw briquettes as fuel in brick kiln and straw pellets for domestic use are also viable options for energy production.

animal bedding and then placed in dung pits to make compost. Paddy straw is a nourishing substrate for mushroom cultivation. Each tonne of dry rice straw can produce 50 to 100 kg of mushroom depending on other conditions. A special product called biochar can be made from rice straw, which is a carbon-rich material used as a soil amendment. Its application improves soil fertility, carbon storage, and water filtration. Rice straw is also a valuable material for surface mulch in various other crops. Sowing short-duration varieties (160 days of traditional varieties vs. 135-145 days) allows farmers to clear fields and avoid residue burning. Diversification of crops in the traditional wheat-rice system is also one of the technical solutions to minimise CR burning.

Moving Forward

The concerted efforts of the Central Government, Government of Punjab, NCR State Governments, and other stakeholders towards better on-farm management of CRs and facilitating various options for their off-site uses have helped significantly in reducing the CR burning events. As per the figures based on standard ISRO protocol for monitoring paddy crop residue events, their total numbers (15 September 2022 to 30 November 2022) in Punjab, Haryana, Delhi, NCR districts of Uttar Pradesh, and Rajasthan have come down from 78,550 in 2021 to 53,792 in 2022, that is, a reduction of 31.5%. The Central Government, under its CR management scheme has released more than Rs. 3,062 crore (2018-19 to 2022-23) to respective State Governments for efficient management of stubble in the region. Punjab, Haryana, and Uttar Pradesh (NCR) have procured 1.20 lakh, 72,700 and 7.480 machines respectively through this scheme, besides the establishment of 38,400 Custom Hiring Centres in the region. Maximum contribution of farm fires to the daily PM 2.5 levels in Delhi was 34% on 3 November 2022 as against 48% on 7 November 2021. The daily average AQI of Delhi in November 2022 registered an improvement at 320.60 as compared to 376.50 in November 2021, that is, a reduction of about 56 points. Concerned states have prepared action plans to control stubble burning and regular monitoring for effective management of CRs across the region. In addition to technical and financial support, intensive educational campaigns and awareness camps are also required to have the best impact. □

Water for Clean and Green Village

A sustainable and self-sufficient village with the theme of a 'Clean & Green Village', as thought by Mahatma Gandhi will improve village life and reduce the rate of migration to the cities.



I

Suneel Kumar Arora

India is a signatory to the United Nations 2030 Agenda for achieving inclusive, people-centric, and holistic sustainable development through 17 identified goals. To this extent, the Government of India is operating with strategic visioning, prioritisation, and implementation methods to achieve Sustainable Development Goals (SDGs) with the motto of 'Leaving No One Behind', through the 'Whole of Government and Whole of Society' approach.

SDGs are cross-cutting in nature, and a particular SDG can be mapped to many ministries that can be addressed through various schemes. Keeping this aspect in view, the Ministry of Panchayati Raj has initiated a

thematic approach of relevance for Gram Panchayats, which are the last mile institutions, by remapping 17 UN-SDGs into 9 broad themes for localisation of SDGs at the grass-roots level and their attainment through concerted and collaborative efforts of all concerned stakeholders. One of the themes is "Clean and Green Village".

Mahatma Gandhi, the father of the nation, once said that "India lives in its villages". "If villages perish, India perishes". Gandhiji had a vision of self-reliant villages; now we call them green villages. Therefore, village ecosystems need a closer study, emphasising the interactions between societal needs and life support systems.

Clean and green is not merely about removing garbage or planting some tree saplings; it is about health, climate action, water conservation, increasing life expectancy and well-being, and so on. Clean refers to clean houses, clean institutions, clean community settlements, and clean environments that embrace all the elements of complete village sanitation, which manifest through visible cleanliness. There are different aspects of a clean village, such as water supply, sanitation, indoor air quality, solid waste management, etc.

Though there is no proper definition of a green village, a green village is a village that can be developed economically and by using natural resources like solar energy, wind energy, etc. without affecting the natural environment.



Components of a Clean and Green Village

The broad components that constitute a clean & green village are appended below. Each component consists of many elements. Each component vis-a-vis the elements is made of specific action points at the village level.

Action Points at the Village Level

1. Open Defecation Free Village.
2. Clean & Green Schools.
3. Clean & Green Anganwadis.
4. Scientific management of solid waste.
5. Waste Water management.
6. Affordable & Clean energy including solar & wind energy.
7. Greening Development.

8. Promotion of organic farming and progressing reduction of chemical fertilisers & pesticides.
9. Celebrate clean and green living.
10. Strengthening local committees and enhancing larger participation.
11. Supply of clean & safe drinking water.
12. Improvement of indoor air quality.
13. Energy conservation.
14. Rainwater conservation including Rainwater Harvesting.



Green refers to a world in which natural resources, including oceans, land, and forests, are sustainably managed and conserved to improve livelihoods and ensure food security, and most importantly, protect the environment for future generations.

Clean refers to access to safe and adequate drinking water and sanitation services in a low-pollution, low-emission world in which cleaner air, water, and the oceans enable people to lead healthy and productive lives. Thus, a Gram Panchayat (GP) that chooses to focus on becoming a clean and green village would need to have clarity regarding the preservation and maintenance of the components that cover water resources and their link to rivers and streams, land resources, and soil health.

Government Initiatives for Clean and Green Village

A joint letter/advisory has been signed by as many as nine Secretaries to the Government of India on the localisation of Sustainable Development Goals (SDGs) through Panchayati Raj Institutions (PRIs) based on theme 5: Clean & Green Village. The letter dated 31 March 2022 indicates the willingness of the Ministries and the Departments that are signatories to the joint letter to provide full support under their ongoing schemes to this effort at the Gram Panchayat/Village

level. The Department of Drinking Water and Sanitation (DDWS), Ministry of Jal Shakti is the nodal Ministry for this theme. The other initiatives of the Government of India are elaborated in succeeding paragraphs.



SWACHH BHARAT MISSION

Improving access to water, sanitation, and hygiene can save 1.4 million lives per year, according to new WHO report.

We all know the proverb ‘Cleanliness is next to Godliness’. Under the Clean India component, the Government wants to make India clean and hygienic. To accelerate the efforts to achieve universal sanitation coverage and to focus on safe sanitation, the Prime Minister of India launched the Swachh Bharat Mission on 2 October 2014. The mission coordinator shall be the Secretary of the Department of Drinking Water and Sanitation (DDWS) with two Sub-Missions, the Swachh Bharat Mission (Gramin) and the Swachh Bharat Mission (Urban), which aims to achieve Swachh Bharat by 2019, as a fitting tribute to the 150th Birth Anniversary of Mahatma Gandhi, which in rural areas shall mean improving the levels of cleanliness through solid and liquid waste management activities and making gram panchayats open defecation free (ODF), clean and sanitised.

“A clean India would be the best tribute India could pay to Mahatma Gandhi on his 150th birth anniversary in 2019,” said Shri Narendra Modi as he launched the Swachh Bharat Mission at Rajpath in New Delhi, On 2 October 2014. The Swachh Bharat Mission was launched throughout the length and breadth of the country as a national movement. The campaign was aimed at achieving the vision of a ‘Clean India’ by 2 October 2019.

The Swachh Bharat Mission was launched to

achieve Open Defecation Free (ODF) in India in five years. ODF would mean the termination of faecal-oral transmission, defined by, a) no visible faeces found in the environment/village and b) every household, as well as public/community institution(s), using a safe technology option for disposal of faeces, as defined by the Ministry. The Mission shall strive for this by removing the bottlenecks that were hindering progress, including partial funding for individual household latrines from MGNREGS, and focusing on critical issues affecting outcomes.

The strategy is to move towards a ‘Swachh Bharat’ by making it a massive mass movement that seeks to engage everyone in the task of cleaning homes, workplaces, villages, cities, and surroundings in a collective quest. The focus is to provide flexibility to State Governments, as sanitation is a state subject, to decide on their implementation policy, use of funds, and mechanisms, taking into account State-specific requirements. This is to enable States to develop an Implementation Framework that can utilise the provisions under the Mission effectively and maximise the impact of the interventions. The Government of India’s role would be to complement the efforts of the State Governments through the focused programme being given the status of a Mission, recognising its dire need for the country.

Behaviour Change has been the key differentiator of the Swachh Bharat Mission, and therefore emphasis is placed on Behaviour Change Communication (BCC) management activities. Since Open defecation-free villages cannot be achieved without all the households and individuals conforming to the desired behaviour of toilet use every day and every time. Community action and generation of social norms are the keys of SBM.

Inter-Personal Communication (IPC): The focus will be on the use of Inter-Personal Communication (IPC), especially for triggering demand and use of toilets through social and behavioural change communication and house-to-house interventions. Hygiene and sanitation interventions include an essential element of social behaviour change alongside infrastructure, without which the desired outcomes cannot be achieved.

The mission is one of the largest social programmes



in the world because of the huge population of India who are the intended beneficiaries of the mission. There has been substantial improvement in the levels of access to drinking water and the establishment of toilets in rural households. During the course of its implementation thus far, the mission has achieved an enhancement in the levels of cleanliness and sanitation facilities across the country. However, there is still a significant way to go before the goals of the mission are achieved in its entirety.

This progressed the country towards SDG 6.2, which aims for adequate and equitable sanitation access for all, especially for women & girls in rural areas. Through approaches such as people's participation, by 2019, the campaign realised over 100 million household toilets were constructed benefiting over 500 million people across 6,30,000 villages.

Effective maintenance of Open Defecation Free (ODF) status, attained in 2019, efficient and effective functioning of solid and liquid waste management practices & systems, grey water treatment, and prevention of water source contamination are certainly other major works that need to be focussed upon if a village is to be a clean village.

To become a green village the Gram Panchayats would need to address ecological, economic, and equity issues by bringing about changes through community-level social regulations, cooperation, and their proactive participation for a green, clean, non-toxic, low carbon self-reliant, eco-resilient rural India. The green village initiatives focus on activities like plantation, organic farming conservation of the village ecosystem & biodiversity, conservation of water through Jal Shakti Abhiyan, and promotion of new & renewable energy sources.

Jal Jeevan Mission (JJM)

The Prime Minister of India launched the Jal Jeevan Mission on 15 August 2019 from the rampart of the Red Fort. The mission envisioned providing clean, safe, and adequate drinking water to all rural households, schools, anganwadis, and public health centres through functional tap connections by 2024. This mission is monitored at the highest level.

Quality of water was given the utmost importance and not the infrastructure only. The main focus was on the functionality of taps. At the commencement & launching of the mission, i.e., on 15 Aug 2019, only 3.23 crore households had functional tap connections. As of 15 Aug 2023, 12.85 crore (66.8%) households, out of a total of 19.23 crore households in India have functional tap connections. Nine states/UTs, 140 districts, and more than 1.83 lakh villages have achieved Har Ghar Jal.

This mission has also pushed the very idea of the theme 'Clean & Green Village' up to a great extent and was very much instrumental in achieving the goal of Clean and Green Village.

Jal Shakti Abhiyan - Catch the Rain (JSA CTR)

To make water everyone's business, to make the Jal Andolan a Jan Andolan, the Government of India launched the Jal Shakti Abhiyan in 2019, a national call to action that involved States, districts, and millions of people in water conservation and recharge. The campaign was implemented in 1,592 water-stressed blocks in 256 districts of the country.

After the successful implementation of Jal Shakti Abhiyan in 2019, the Jal Shakti Abhiyan: Catch The Rain (JSA:CTR) campaign was launched by the Prime Minister on 22 March 2021, the World Water Day, which was to nudge the stakes and stakeholders to create and maintain appropriate Rainwater Conservation Structures, suitable to the soil strata & climatic conditions of the area, with active people's participation, before the onset of monsoons taken up in all districts (rural as well as urban areas) of the country during the pre-monsoon and monsoon period, i.e. from March 2021 to 30 November 2021. The campaign was implemented with the main theme 'Catch the Rain, where it falls when it falls'.

The campaign had the following five focused interventions-

- (a) Rainwater harvesting & water conservation
- (b) Enumerating, geo-tagging & making an inventory of all water bodies; preparation of scientific plans for water conservation
- (c) Setting up Jal Shakti Kendras in all districts
- (d) Intensive afforestation and
- (e) Awareness generation

Building on the success of the Jal Shakti Abhiyans of 2019 and 2021 in generating awareness among the citizens of the country, this year Jal Shakti Abhiyan: Catch The Rain-2022 (JSA:CTR-2022) campaign was launched by the Hon'ble President of India on 29 March 2022. JSA:CTR-2022 is being taken up in all districts (rural as well as urban areas) of the country with the main theme 'Catch the Rain, where it falls, when it falls' The campaign was implemented from 01 Apr 2022 to 30 November 2022 - the pre-monsoon and monsoon period in the country. Under this campaign activities were also undertaken under the following new interventions in the campaign in addition to the activities considered under interventions of JSA: CTR-2021:

- (a) Spring Shed Development and Management
- (b) Wetland Development and Management
- (c) Catchment area protection and development
- (d) Amrit Sarovars: Creation/ Rejuvenation of 75 Amrit Sarovars in every district to commemorate Azadi ka Amrit Mahotsav (AKAM)

Reduction in water run-off and rise in water table across the country due to the successful

implementation of the 'Jal Shakti Abhiyan: Catch the Rain' campaign is acknowledged by those who monitor it for their cause.

Convergence of the Ministries/ Departments/ NGOs/ Institutions

Efforts of these missions/ abhiyans would require the full support of the Ministry/Departmental functionaries of Drinking Water & Sanitation, Department of Water Resources, the Ministry of New & Renewable Energy, Ministry of Environment Forest & Climate Change, Departments of Rural Development, Land Resources, Agriculture, Animal Husbandries & Panchayati Raj among others. In addition, if Non-Governmental Organisations, College Students, Youth

India's First Green Village – Khonoma

Khonoma is a village in India, which has been declared as India's first green village out of approximately 7,00,000 villages in India, by the Government of Nagaland and the Government of India. This has been made possible by the joint efforts of indigenous habitants of Khonoma, the Government of Nagaland, and Government of India through launching the 'Green Village project' of INR 30 million in 2005. The tribes of Nagaland are born warriors, who used to play head hunting as a game and it is said that they may eat anything that can move. But to make the village, a green, self-reliant, and sustainable village; the villagers stopped hunting animals and cutting off the trees. They are practising jhoom cultivation, terraced farming, forest conservation, bamboo handicrafts, and more. They are following and fully utilising the Govt. initiatives and funds allocated for different schemes like Swachh Bharat Abhiyan, MNGREGA, and others. Along with this, the village is also preserving its inherent culture, heritage, and tradition.



Organisations, such as Nehru Yuvak Kendra Volunteers, etc. are also involved in the task of facilitating the GPs to become a 'Clean & Green Village', then the goal can be realised faster.

Role of Gram Panchayat

If a Green Panchayat resolves to transform itself into a clean and green village, it should focus on: -

- Awareness generation among the citizens on the importance of reducing wastage, ensuring sustainable production and consumption, and reducing the adverse impact on the environment.
- Promotion of measures within the GPs that would reduce environmental pollution, such as reducing the use of plastics within the GP area.
- Taking steps to create an in-depth understanding of the term climate change and its impact among the Gram Sabha, Panchayat committees, and other community volunteers.
- Mapping land use patterns, water bodies, forests, hill slopes, wetlands, and degraded forests within the GP.
- Developing appropriate norms for sustainable utilisation of resources from common lands, water bodies, and forests on materials like non-timber forest produce, sand, fish, and water.
- Assessing the water needs, sources, schemes, and solid and liquid waste being generated and preparation of District and Village Water Conservation Plans.
- Setting the water and sanitation goals and targets for the Gram Panchayats.
- Selection of appropriate technology for water supply and sanitation in the GPs, based on participatory and area assessment in markets and GP premises.
- Ensuring maintenance of toilets, public spaces, including those in markets and GP premises.

Developing a comprehensive energy programme based on need assessment.

Conclusion

India is taking a lead role in developing its villages in a sustainable model. A sustainable and self-sufficient

village with the theme of a 'Clean & Green Village', as thought by Mahatma Gandhi will improve village life and reduce the rate of migration to the cities. Khonoma village is a successful example of such an initiative and became the first green village in India. Social reformers Anna Hazare and Popatrao Pawar have given practical thought to Gandhiji's vision. Both have worked for Water Shed Development, Deforestation, and overall development of villages Ralegaon Sidhi and Hiware Bazar to convert them into ideal villages.

The task of cleaning villages poses multiple challenges. A lot of work has been done by the Government, NGOs, and the public to support the villages in this aspect in the area of water supply sanitation, solid waste management, indoor air pollution & solar energy. The Government has taken initiatives such as 'The National Mission for a Green India', 'Jal Jeevan Mission', 'Swachh Bharat Mission', 'Jal Shakti Abhiyans', 'Amrit Sarovar Yojana', 'Atal Bhujal Yojana', and other missions for making our villages 'Clean and Green'.

There is nothing that can be called garbage until we create garbage. Almost all human activity generates some kind of garbage- either physically or in the form of anxiety and stress. Like the yogic breathing exercises clean the toxins from the body, meditation purifies the mind. Keeping our house & our surroundings clean ensures environmental cleanliness.

Local institutions such as Gram Panchayats have a crucial role to play in achieving water-sufficient, clean, & green villages. However, the diversity in the level of awareness, socio-economic development, education, poverty, practices & rituals, and water availability make this goal a bit complex and challenging. Infusing the idea of a 'Clean and Green Village' in the minds of all villagers must be the nation's priority.

Gram Panchayats would need to be encouraged with special hand-holding support to work towards this goal. It is felt that convergent action by all concerned Ministries/ Departments, among others, at the Central, State/UTs Governments level will go a long way in protecting the future of the planet by making all villages 'Clean and green', if SDGs are to be attained by 2030 and challenges posed by climate changes are to be addressed. □

Leveraging Agroecological Approaches for Clean and Green Villages

Villages in an agrarian economy like India are the focus points for transforming the country's developmental journey. 'Clean and Green' villages are the key to rural development and the transformation to Viksit Bharat by 2047. Promotion of agroecological practices in sectors, such as agriculture, energy, forestry can play a pivotal role in developing a roadmap for rural empowerment with assured sustainability objectives – social, economic, environmental, nutritional, health, and cultural. Adoption of natural farming, organic farming, biogas, and waste management practices can leverage the circular economy in rural ecosystem and accelerate achievement of the objectives of clean and green villages and the UN-SDG's.



R

*** Dr. Neelam Patel**

**** Dr. Tanu Sethi**

***** Dr. Athira S.**

rural India is an asset to speed up socio-economic development and attaining the targets of the Sustainable Development Goals (SDG). About 65 per cent of the country's population lives in rural areas, and 47 per cent of the population is dependent on agriculture for livelihood (MoF, 2023). There are about 6,40,000 villages in India, with 83.3 crore people.

Over a decade, the rural population grew from 74.3 crore in 2001 to 83.3 crore in 2011 (Census, 2011). Similarly, the work force participation rate of rural women has also increased over the years. The work force participation rate of rural women has also increased from 19.7% in 2018-19 to 27.7% during 2020-21 (MoF, 2023).

Aspre of schemes and programmes was initiated by the Government of India to achieve the holistic development of villages and rural communities and achieve the development goals. Agroecological approaches can play a key role in transforming rural ecosystems and achieving the targets of green and clean villages.

With the advantages of the demographic dividend, these rural areas are an opportune area for transformation and achieving the vision of Viksit Bharat by 2047. As envisioned by the Hon'ble Prime Minister of

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India, Sh. Narendra Modi, “a transformation of villages would ensure a transformation of India.” This was also iterated in one of his addresses that “Jan dhan, Van dhan, and Gobar dhan” can play an instrumental role in bringing economic transformation to villages (PM Speech, 2018). The Government of India has initiated multiple schemes and programmes to ensure equitable and inclusive grassroots development towards the empowerment of rural India.

Dynamic agroecological approaches can play a key role in improving villages’ conditions, providing sustainability to food systems, preserving natural resources, and mitigating climate change. Agroecology principles simultaneously applies ecological and social concepts for management of food and agricultural systems. It seeks to optimise the interactions between plants, animals, humans, and the environment while taking into consideration the social aspects that need to be addressed for a sustainable food system.

In India, agroecological approaches are adopted in various sectors of the economy, viz. agriculture, forestry, energy, etc., and are promoted through practices such as natural farming, organic farming, agroforestry, biofuel production, etc. that support transforming villages, socio-economic development, a clean environment, and achieving the UN Sustainable Development Goals (MoPR, 2021; UNEP, 2021).

Clean and Green Villages

The Clean and Green Village is the fifth among the nine themes adopted by the Ministry of Panchayati Raj to transform rural ecosystems with the support of the Gram Panchayat Development Plan (GPDP). In that, ‘Green’ refers to a world in which natural resources, including oceans, land, and forests, are sustainably managed and conserved to improve livelihoods, ensure food security, and most importantly, protect the environment for future generations, and ‘Clean’ refers to access to safe & adequate drinking water and sanitation services, low-pollution, low-emission, cleaner air, water, and oceans that enable people to lead healthy and productive lives.

To integrate the ‘Green and Clean Village’ approach, many ministries joined the movement. The Ministry of Jal Shakti, the Ministry of Agriculture and

Farmers Welfare, the Ministry of Fisheries, Animal Husbandry and Dairy, the Ministry of Environment, Forest and Climate Change, the Ministry of New and Renewable Energy, the Ministry of Rural Development, and the Ministry of Panchayati Raj are actively involved in achieving the objectives under clean and green villages (SBM-G, 2022).

A spree of schemes and programmes was initiated by the Government of India to achieve the holistic development of villages and rural communities and achieve the development goals. Agroecological approaches can play a key role in transforming rural ecosystems and achieving the targets of green and clean villages.

Agroecological approaches for Clean and Green villages

Agroecology is an integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of food and agricultural systems. It seeks to optimise the interactions between plants, animals, humans, and the environment.

As per the High-Level Panel of Experts (HLPE) on Food Security and Nutrition (2019), agroecology and its approaches are defined as “Agroecological approaches favour the use of natural processes, limit the use of purchased inputs, promote closed cycles with minimal negative externalities, and stress the importance of local knowledge and participatory processes that develop knowledge and practice through experience, as well as more conventional scientific methods. Agroecological approaches recognise that agrifood systems are coupled social–ecological systems from food production to consumption and involve science, practice, and a social movement, as well as their holistic integration, to address food and nutrition security” (HLPE, 2019).

The 10 agroecological elements are diversity, synergies, efficiency, resilience, recycling, co-creation, and sharing of knowledge, human and social values, culture and food traditions, responsible governance, and a circular and solidarity economy (FAO, 2018). Agroecological practices involve processes such as nutrient cycling, biological nitrogen fixation, improvement of soil structure and health, water conservation, biodiversity conservation, carbon

sequestration, biological pest control, diversification, mixed cultivation, intercropping, waste management, etc. (HLPE, 2019).

The Green and Clean Village initiative focuses on activities like tree plantation, organic farming, conservation of village ecosystems and biodiversity, promotion of new and renewable energy sources, and eco-friendly innovations, while the Green Village addresses ecological, economic, and equity issues by bringing about changes through community-level social regulations, cooperation, and their proactive participation for a green, clean, non-toxic, low-carbon, self-reliant, eco-resilient rural India (MoPR, 2023).

The agroecological practices, such as natural farming, organic farming, biofuel production, agroforestry, waste recycling, etc. can support in achieving the objectives of green and clean village and the SDG targets (SBM-G, 2022).

Organic and Natural Farming for Green Villages

Organic and natural farming practices are based on agroecological principles and exclude the use of synthetic or chemical inputs. These practices resonate with India's ancient agricultural heritage and the integration of livestock. Organic and natural farming provides chemical and pesticide-free food grains and crops, improves soil health, and reduces environmental pollution. It can contribute to a clean and green village by helping in the conservation of natural resources, improving livelihoods, and providing safe and nutritious food. Apart from this, it can increase women's participation in agriculture, generate rural employment opportunities owing to labour intensiveness, and develop rural industries based on value chain development and marketing.

Organic and natural farming are promoted by the Government of India through various schemes and programmes. Organic farming is promoted through two dedicated schemes since 2015-16, viz. Paramparagat Krishi Vikas Yojana (PKVY) and Mission Organic Value Chain Development for North Eastern Region (MOVCDNER), through cluster and Farmer Producer Organisations. Through the PKVY, 11.85 lakh ha of land have been converted to organic farming since 2015-16 by developing 32384 clusters involving 16.19 lakh farmers (MoA&FW, 2023). The Government also

plans to convert another 6.00 lakh ha of land to organic farming through PKVY between 2022-23 and 2025-26 (MoA&FW, 2023). Likewise, under MOVCDNER, 1.73 lakh ha of land have been brought under organic farming, benefiting 1.89 lakh farmers. A total of 379 FPOs and FPCs were formed, involving the creation of 205 collection, aggregation and grading units, 190 custom hiring centres and 123 processing units and pack houses. (MoA&FW, 2023)

Natural farming has been promoted under Bhartiya Prakratik Krishi Paddhati (BPKP), a sub-scheme under PKVY, since 2019-20. Under BPKP, 4.09 lakhs ha area has been brought under natural farming.

To promote alternate use of chemical fertilisers, the PM Programme for Restoration, Awareness Generation, Nourishment, and Amelioration of Mother-Earth (PM-PRANAM) is launched during June 2023 by the Ministry of Chemicals and Fertilizers. This programme is initiated as a mass movement to save the health of Mother Earth by promoting sustainable and balanced use of fertilisers, adopting alternate fertilisers, promoting organic farming, and implementing resource conservation technologies. Under this scheme, 50% of the fertiliser subsidy saved by a State/UT in a particular financial year by way of reduction in consumption of chemical fertilisers (Urea, DAP, NPK, MOP) compared to previous 3 years' average consumption will be passed on to that State/UT as a grant.

Also, initiatives like construction of Soak pits, Vermicompost/NADEP pit and Waste to Wealth initiatives such as reuse of waste materials, vermicomposting, recycling of non-biodegradable waste are promoted through Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) by the Ministry of Rural Development towards village cleanliness (MoRD, 2021).

The green coverage in the villages can also be increased by adoption of agroforestry, a cost-effective land management system that integrates crops, trees and/ livestock and provides economic and environmental benefits to small and marginal farmers.

Waste to Wealth: Towards Clean Villages

Biogas and organic manure are promising green technologies that convert agricultural, industrial,



animal, and municipal wastes into useful forms, viz., energy, agri-input, etc. The biogas sector can fulfil the energy needs of the country and help regulate greenhouse gas emissions, reduce pollution, and improve waste management.

The Galvanising Organic Bio-Agro Resources Dhan (GOBARDhan) programme, launched in 2018, is an integral component of Solid Waste Management under Phase-II of the Swachh Bharat Mission (Grameen) for ensuring clean and green villages by converting organic and biodegradable waste, including cattle dung, kitchen leftovers, crop residue, market waste, etc., into biogas and bio-slurry to improve the lives of villagers. It is a ‘waste to wealth’ initiative wherein waste generated in villages is used to generate bio-gas or CBG as well as bio-slurry or bio-fertiliser and is in tune with the circular economy and Mission LiFE initiatives of the Government of India. Under the SBM-G, financial assistance of up to Rs.50 lakh per district is available for the entire programme period from 2020-21 to 2024-25 for the setting up of community-level biogas plant(s) (MoJS, 2023). A total of 683 functional bio-gas/CBG plants have been set up across 206 districts. This has numerous advantages, including an eco-friendly energy source, nutrient-rich slurry to enhance soil quality, reduce dependence on chemical fertilisers, clean surroundings, a reduced incidence of vector-borne diseases, savings in economic costs arising out of poor

sanitation and health conditions, reduced greenhouse gas (GHG) emissions, a reduction in the import of crude oil (Forex saving), employment opportunity for the local community, augmenting the incomes of farmers, fostering entrepreneurship, and private investment in the green energy sector.

The Ministry of New and Renewable Energy (MNRE) is also supporting the installation of biogas plants and their use as a source of alternative fuels for cooking purposes in the country, including rural areas, under the National Biogas Programme. The programme was notified in November 2022 with a budgetary outlay of Rs. 1715 crore for a period from 1 April 2021 to 31 March 2026 to be implemented in two phases. The Ministry of Petroleum and Natural Gas launched the Sustainable Alternative towards Affordable Transportation (SATAT) initiative in October 2018, which assures offtake of BioCNG or Compressed Biogas (CBG) after purification through Oil Marketing Companies (OMCs) for sale as automotive fuels (MNRE, 2023). As per the Union Budget announcement 2023-24, 200 compressed biogas (CBG) plants, including 75 plants in urban areas, and 300 community- or cluster-based plants will be established to promote the circular economy. The Organic fertiliser, i.e., Fermented Organic Manure (FOM)/ Liquid Fermented Organic Manure (LFOM), produced from the processing of slurry left after biogas extraction will be provided with market development assistance as per Fertilizer Control Order (1985).

Rural Industries

The agroecological practices can augment rural industries especially through the production of biogas, manure, processing, marketing, and waste management practices that couples with clean and green programmes. It can also support the animal husbandry and dairying activities due to the integration of livestock.

Biogas, a smoke-free fuel, is emerging as a promising renewable energy industry in India that is labour-intensive and can provide employment opportunities to both skilled and unskilled categories. It fulfils the rural energy demand and provides a residue of organic waste that has nutrient qualities over the usual organic fertiliser and cattle dung. The use of biogas systems

in an agrarian community can increase agricultural productivity. The Community Biogas & Fertiliser Plant by SUMUL dairy, Navapur, Bhagirath Gramvikas Pratisthan in Sindhudurg and Ratnagiri districts of Maharashtra, CBG Plant, Ms Goverdhannathji Energies LLP, Kheda, Gujarat, Mahindra Waste to Energy Solutions Ltd., Tirupati, Andhra Pradesh, are a few success stories of the establishment of biogas plants that improved villages environment and rural economy (Vaibhav Nasery, 2011; MoPnG, 2022; MoJS, 2023b). Over 1200 Biogas Plants spread across 450 districts of the country.

A study by the Indian Biogas Association mentioned that job creation by the biogas industry is approximately 55,000 skilled plant designers and site engineers, 200,000 semi- and low-skilled workers for construction activities, 10,000 highly skilled engineers to oversee administration, data monitoring, and other critical operations, and 150,000 unskilled workers to carry out routine plant operation and maintenance (IBA, 2023).

The Organic and natural farming are improving rural livelihood and creation of value chain, export for natural/organic commodities. Also, the Government is planning to establish bio-input resource centres to scale up BPKP as the National Mission on Natural Farming, which will facilitate 1 crore farmers to adopt natural farming.

Conclusion

Clean and Green Village objectives can be expedited by scaling up agroecology-based programmes and schemes and their implementation at the grassroots level with support from panchayats, cooperatives, Self-Help Groups (SHG), and women-SHGs. □

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New India's mantra: Reform, Perform and Transform

Prime Minister Narendra Modi's Independence Day speeches have aimed at engaging with the nation. As he addressed the public from the ramparts of the Red Fort for the 10th time, he referred to them as 'parivaar jan', a sign that he regards Indians as his chosen family. With the longest average duration among all previous Indian Prime Ministers, his speeches averaged 83 minutes. By doing so, he demonstrated his commitment to communicating with the nation about his government's performance, India's progress in transformation, and his vision for a Vikasit Bharat. Presented below are some highlights based on his latest speech on India's Independence Day, blending India's past achievements with reminders of our duties in the Kartavya Kaal.

“

Today we have
Demography,
Democracy and
Diversity, and this
'Triveni' has the
potential to make every
dream of India come
true.

Prime Minister Narendra Modi

”

Highlights from the 77th Independence Day Speech

Nurturing Reverence for our National Heroes who helped us

PM Modi remembered the revered
Nation Builders.

Vishwa-Mitra Bharat

Mother of democracy now leads the
world order, as India advocates for new
stability that is fruitful for humanity.

Sins of Appeasement, Corruption, Dynasty

The sins endanger the idea of Bharat,
PM Modi ensured to end it for the growth
of the nation.

A Millennium Lost, a Millennium to Look Forward to

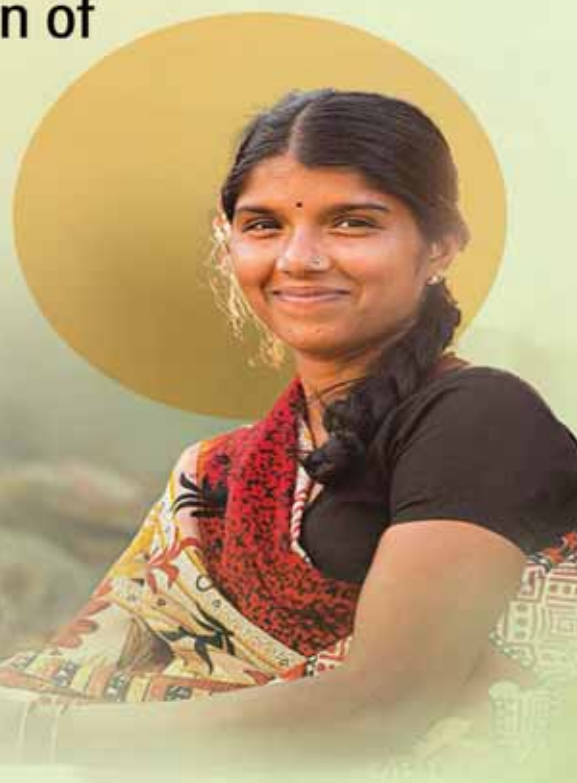
India's development was ruined by 1,000
years of subjugation however the
coming thousand years will be
different as India will rise to newer
heights.

Resolutions of

77th
INDEPENDENCE
DAY



Encapsulating the transformation of **Vikasit Bharat** in the 77th Independence Day Speech



Rs. 20 lakh crore+ in loans disbursed under **MUDRA Yojana** and **8 crore** new entrepreneurs.



Savings of Rs. 20,000 crore with low cost, high quality medicines under **Jan Aushadhi Kendras**.



Ease of Doing Business enables India to become the **3rd Largest Startup Ecosystem of the world**.



Honouring our Bravehearts with **One Rank One Pension** by providing Rs. 70,000 crore to soldiers.



13.5 crore people lifted from **Poverty** (in just 5 years) who entered the neo-middle class.



Central Government devolution to State Governments increased from Rs. 30 lakh crore to Rs. 100 lakh crore, indicating government's commitment towards **co-operative federalism**.



Over 4 Crore houses sanctioned under **PM Awas Yojana**. Spending on affordable housing increased from Rs. 90,000 crore to Rs. 4 lakh crore.



Local development spends increased from Rs. 70,000 crore to Rs. 3 lakh crore. No more glitches due to lack of budget, the only path now is local development.



Rs. 2 lakh crore spent for **tap water connections** under Har Ghar Jal of the Jal Jeevan Mission.

Interest subsidy on bank loans for urban poor living in urban slums, chawls, rented houses, unauthorised colonies.

The Government has announced to **increase the number of Jan Aushadhi Kendras** from 10,000 to 25,000 for sale of medicine at reasonable prices benefiting the poor.

Government announced to provide **skill development to 2 crore women** from rural areas to encourage them for starting micro-enterprises under '**Lakhpati Didi**'.

Government has announced **15,000 women Self-Help Groups (SHGs)** would get agri-drones.

Vishwakarma Yojana, financial outlay of Rs. 13,000 crore where 18 Traditional trades to be covered in 1st instance



Harnessing the Power of Digital Technology for Greener Villages



India is making remarkable strides in harnessing digital technologies to empower its rural communities and propel them towards the creation of green villages. Government departments, agencies, non-profits, and other stakeholders are leveraging digital tools to disseminate valuable knowledge and resources on sustainable practices. As these initiatives continue to evolve and expand, India is on a promising trajectory towards a greener, more sustainable future where rural populations are equipped with the information and support they need to thrive in harmony with the environment.

Balendu Sharma Dadhich

Similar to the global scenario, India is contending with substantial environmental problems and witnessing their consequences in the form of health threats, declining biodiversity, and the threat of climate change. Both urban and rural India are affected by this environmental crisis. While rural areas may exhibit lower awareness of environmental concerns compared to urban centres, it is the rural regions that bear a greater burden of challenges stemming from an overburdened environment. This can be primarily attributed to the heavy dependence of a significant rural population on agriculture, horticulture, and animal husbandry, along with their closer connection to nature.

The Digital India initiative has connected lakhs of villages with broadband internet, bridging the digital divide and providing rural communities with access to information and opportunities. These endeavours underscore India's commitment to leveraging digital technology for a more sustainable and connected future.

Rural India is dealing with several pressing environmental issues. Inadequate waste disposal systems contribute to water and air pollution, despite government efforts to improve sanitation. Increased food demand fuels deforestation as more land is required for farming, depleting forest cover. Growing populations exacerbate this issue, leading to over cultivation. Air pollution affects both urban and rural areas, with crop residue burning and agricultural activities as major contributors. Water pollution arises from poor sanitation, limitations in sewerage planning and ignorance of basic hygiene issues. Soil degradation is another concerning problem due to the excessive use of chemical fertilisers and pesticides in rural India.

To tackle environmental concerns, legislative measures like the Forest Conservation Act, the Air (Prevention and Control of Pollution) Act, and the Water (Prevention and Control of Pollution) Act have been put into effect. We also have important initiatives such as the National Action Plan on Climate Change and the Green India Mission in place. Nonetheless, challenges such as insufficient infrastructure, a shortage of technical know-how, and limited resources have hindered their effective implementation and enforcement. Technology can play a pivotal role in addressing these issues, as it offers promising avenues to enhance the implementation and enforcement of environmental laws and build greater awareness of related issues. We have an opportunity to harness the benefits of emerging technologies to bolster our efforts to safeguarding the environment across the country, including our rural population.

Role of Digital Technology

In the ever-evolving landscape of our digital age, technology has woven itself into the very fabric of our lives and society. And here lies a profound opportunity—one that has the power to usher in a greener, more sustainable future for India's urban centres and its rural heartlands. It is a force that can be harnessed to champion environmental sustainability in ways that resonate far beyond our cities and towns. Today, our villages are better connected than ever with communication networks and the Internet. Recent data suggests that rural India has overshadowed urban India in terms of the growing numbers of Internet users.

It is within this transforming landscape that

we discover a potent catalyst for change: digital technologies. If leveraged wisely, they can offer a unique means to raise awareness about environmental issues and foster sustainable practices. Picture a scenario where farmers, even in the remotest hamlets, can tap into digital platforms for insights on sustainable farming methods and timely weather forecasts. Imagine the ability to remotely monitor air and water quality, track deforestation, and pinpoint ecological red flags, all through the marvels of digital technology. Consider the impressive reach of social media and telecommunication technology to disseminate and deliver the message and know-how to make our villages green.

It's heartening to note that many such developments are already taking place in India. Today, we can see many examples of how digital technology is transforming rural areas into eco-friendly communities by aiding farmers in better crop management, promoting renewable energy adoption, and reducing waste through tracking and recycling. There are many instances where it is helping to improve transportation efficiency and connect people. All of this is contributing to a more sustainable and connected future for our villages.

By leveraging various digital initiatives, the nation is equipping its people with sustainable agricultural practices using content and mobile technology, benefiting millions of farmers, increasing yields, conserving water, and promoting sustainable farming. India is also addressing waste management through the Swachh Bharat Mission, employing digital tools like geo-tagging and mobile apps to track progress and engage communities in sanitation efforts. Furthermore, the Digital India initiative has connected lakhs of villages with broadband internet, bridging the digital divide and providing rural communities with access to information and opportunities. These endeavours underscore India's commitment to leveraging digital technology for a more sustainable and connected future.

The Government's Approach

The Government of India is employing digital technologies to advance environmental protection and awareness in a multifaceted strategy. This includes utilising social media platforms such as Facebook, Twitter, and Instagram to disseminate information



about environmental policies, initiatives, and successes, fostering increased awareness among the public. Additionally, the Government has developed mobile applications that serve as educational tools, offering citizens information about environmental issues and solutions and empowering them to take meaningful actions. Digital maps and data play a crucial role in tracking progress towards environmental goals, allowing for informed resource allocation and the identification of areas requiring further attention.

Furthermore, the Government leverages digital technologies to directly engage citizens in environmental protection efforts, utilising online platforms to gather feedback, solicit innovative ideas, and mobilise individuals for active participation in environmental conservation initiatives. Through this comprehensive approach, the Government harnesses the power of digital tools to champion environmental causes, shaping an informed and environmentally conscious society committed to sustainability.

Considering the fabric of our rural society, such initiatives don't go without facing their share of challenges. Some of these challenges are:

- **Lack of Awareness:** There is still a lack of awareness about environmental issues among many people in India. This makes it difficult to engage people in environmental protection and awareness efforts.

- **The Digital Divide:** A significant portion of our rural population still exists at the far end of the digital ecosystem. Lack of access to digital devices, limitations to connectivity, an uninterrupted power supply, and a lack of digital literacy pose challenges to the success of digital initiatives.
- **Lack of Resources:** Given the size of our country, there will always be limitations to the resources (funds, human resources, and others) that can be employed to implement all of the Government's environmental protection and awareness initiatives. This means that it has to prioritise its efforts and focus on the most pressing issues.
- **Lack of Coordination:** There can be a lack of coordination between different stakeholders involved in the processes, including the Central and State government agencies, non-profits, rural bodies, communities, and the private sector. This can lead to duplication of efforts and a lack of focus.

Despite such challenges, the Government is committed to using digital technologies to promote environmental protection and awareness among the rural population. The following examples present a shining testimony to these efforts and their impact.

Use of Social Media

The Ministry of Environment, Forest and Climate

Change (MoEFCC) in India is actively using social media platforms like Facebook, Twitter, and Instagram, along with a multilingual website, to educate villagers about environmental issues such as air and water pollution, as well as deforestation. They also share inspiring stories of environmental successes and call on people to take action. Beyond digital outreach, the MoEFCC conducts workshops and training sessions in villages to enhance environmental awareness and empower residents to engage in environmental protection efforts.

Additionally, the ministry provides financial support to villagers for various environmental projects, including tree planting and rainwater harvesting systems. Despite their commendable efforts, challenges persist, including limited internet access among villagers and illiteracy, which hinder some from benefiting fully from the available resources and initiatives. Nevertheless, the MoEFCC remains committed to raising environmental awareness among villagers and addressing these obstacles to foster a greener and more sustainable future for rural India.

The Namami Gange Project

The Namami Gange project, a government-led initiative aimed at revitalising the Ganga River, has harnessed the potential of digital technologies to facilitate its ambitious cleanup mission. With a multifaceted approach, the project leverages these digital tools to monitor progress, pinpoint pollution hotspots, and rally citizens to participate actively in the restoration of the sacred river.

One key aspect of this endeavour involves utilising satellite imagery to meticulously track the extent of pollution within the Ganga River. This data is invaluable in identifying areas most severely affected by pollution and subsequently prioritising cleanup efforts. Additionally, geospatial technologies play a pivotal role in mapping the river's intricate course. This mapping serves as a foundational tool for planning cleanup activities and continuously monitoring project advancement.

Harnessing the reach and connectivity of social media, the Namami Gange project actively engages citizens in the cleanup drive. It utilises platforms such as Facebook, Twitter, and more to disseminate information about the project, elicit feedback, and mobilise individuals to join the cause. The Namami

Gange project stands as a compelling illustration of how digital technologies can be harnessed to champion environmental protection. This initiative bears significant potential to effect substantial change in the condition of the Ganga River, demonstrating the transformative power of technology in environmental conservation.

The Watershed Organisation Trust

Established in 1993, WOTR, an internationally recognised nonprofit organisation and think tank, operates at the convergence of practice, knowledge, and policy, collaborating with diverse stakeholders across sectors to address the multifaceted challenges faced by vulnerable rural communities in India. Their overarching mission centres on ensuring water and food security, livelihoods, and income stability to support the sustainable development and well-being of disadvantaged rural populations. Their focus areas encompass watershed management, natural resource conservation, and community capacity building, collectively contributing to enhanced water resource management, reduced soil erosion, and biodiversity preservation.

WOTR harnesses various digital technologies to further their environmental sustainability objectives in villages. These tools encompass geospatial technologies like satellite imagery and geographic information systems (GIS) for mapping water resources and land use, information and communication technologies (ICTs) like mobile phones and the internet for communication,



information sharing, and training, as well as social media platforms like Facebook and Twitter for raising awareness and fostering community engagement on environmental issues.

Through their innovative use of digital technology, WOTR has significantly improved water availability, reduced soil erosion, and promoted biodiversity conservation in rural India. They've also empowered communities with the skills and knowledge needed to manage their natural resources effectively. WOTR's exemplary work exemplifies the potential of digital technology in advancing environmental sustainability, and as technology continues to evolve, we can anticipate even more innovative approaches to building sustainable and resilient communities.

The Centre for Environment Education

The Centre for Environment Education (CEE), a nonprofit organisation founded in 1984, is dedicated to promoting environmental education and sustainable development in India. With a vast network of over 1,000 partner organisations across the country, CEE employs a diverse array of strategies to raise environmental awareness and drive positive change.

As a national institution, CEE's mandate is to promote environmental awareness nationwide. CEE develops innovative programmes and educational material and builds capacity in the field of Education for Sustainable Development (ESD). It is committed to ensuring that Environmental Education (EE) leads to action for sustainable development. It undertakes field projects that demonstrate and validate the role education can play in sustainable development.

CEE leverages social media as a powerful tool to extend its reach, particularly in rural India. They maintain a Facebook page with thousands of followers, utilising it to share information on environmental matters, promote educational initiatives, and foster community connections. With a large number of followers on Twitter, they disseminate concise environmental messages, highlight successes, and engage in meaningful conversations. Their YouTube channel serves as a repository for environmental videos, educational activities, and success stories.

CEE's adept use of social media significantly amplifies awareness of environmental issues in rural

India. This approach offers several advantages, including cost-effective mass outreach, precise targeting of specific demographics, real-time and interactive information sharing, and the mobilisation of individuals to actively address environmental concerns. Ultimately, CEE's strategic application of digital platforms aligns seamlessly with their overarching mission to advance environmental education and sustainability in India.

The Digital Green Initiative

Digital Green is a global development organisation dedicated to improving the lives of smallholder farmers in countries like India, Ethiopia, and Afghanistan. They achieve this through a combination of digital technologies and local partnerships. One of their primary focuses is promoting sustainable farming practices and enhancing food security. The organisation utilises a range of digital tools, including video production, mobile phones, and data analytics, to deliver locally relevant agricultural information to smallholder farmers. They also leverage digital platforms to connect farmers with markets and offer them access to financial services.

Environmental protection is a significant aspect of Digital Green's work. They collaborate with farmers to advocate sustainable farming practices like crop diversification, agroforestry, and conservation agriculture. Moreover, they harness digital technologies for monitoring soil health, water quality, and deforestation.

India is making remarkable strides in harnessing digital technologies to empower its rural communities and propel them towards the creation of green villages. Government departments, agencies, non-profits, and other stakeholders are leveraging digital tools to disseminate valuable knowledge and resources on sustainable practices. From school-based education to community engagement and policy advocacy, these initiatives are fostering environmental awareness and action. With an expansive social media presence and innovative use of technology, they're not only raising awareness but also actively involving village communities in these efforts. As these initiatives continue to evolve and expand, India is on a promising trajectory towards a greener, more sustainable future where rural populations are equipped with the information and support they need to thrive in harmony with the environment. □



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Strengthening Rural Economy with Clean and Green Initiatives

India has implemented the National Action Plan on Climate Change, which includes eight missions focusing on various sectors such as solar power, energy efficiency, sustainable habitats, and more. India is poised to achieve its energy independence target through clean technology by 2047, with a major emphasis on the 'Make in India' initiative.



Dr. Harender Raj Gautam

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ur natural environment is our most precious inheritance, which we need to preserve for future generations.

India is blessed with a wonderful variety of natural landscapes and habitats, and we need to undertake clean and green initiatives on a long-term basis to protect and let them flourish on a sustainable basis for future generations. The World Bank's 2019 'Beyond the Gap' report finds that 940 million people live without electricity, 663 million lack improved sources of drinking water, and 2.4 billion lack improved sanitation facilities. We need to find solutions to these problems through green development initiatives. There is a need to adopt green technologies as more than a quarter of the planet's population rely on forests for their livelihood, while 1.2 billion people in tropical countries rely on nature for their basic needs.

Need for Green and Clean Technologies

India needs to focus on a green economy at the village level that is low-carbon, resource-efficient, and socially inclusive. Global access to clean energy is of paramount importance because, as per the World Health Organization (WHO), about 3.8 million people die prematurely each year from the adverse effects of indoor air pollution, and the vast majority of these deaths occur among the 2.6 billion people in poor countries who still burn wood, coal, charcoal, or animal dung indoors for cooking. Women and children are most vulnerable because, while doing household chores, they are particularly exposed to this toxic smoke, which penetrates deep into the lungs. WHO has lauded the effective initiative of switching to bottled cooking gas promoted on a large scale in India is saving countless lives.

Clean and green initiatives are important for improving the overall human development index and ensuring sustainable development. Sanitation, hygiene, and the availability of portable and clean drinking water are all vital for the improvement of the human development index, as 1.4 million people die annually and 74 million will have their lives shortened by diseases related to poor water quality, sanitation, and hygiene (WHO 2022). Further, almost half of the global population, counting up to 3.6 billion people, lacks safe sanitation (WHO/UNICEF 2021). WHO estimates that ensuring safely managed drinking water for all households in the country could avert nearly 400,000 deaths caused by diarrheal diseases and prevent approximately 14 million Disability Adjusted Life Years (DALYs) related to these diseases, which otherwise can immensely contribute to our development. This achievement alone would result in estimated cost savings of up to \$ 101 billion. India has made significant interventions to address these vital issues, and WHO has highlighted the substantial benefits of the *Har Ghar Jal* programme in India. There has been an increase in rural tap water connections from 16.64% in 2019 to 62.84% in 2023, which resulted in averting 13.8 million DALYs, which means an improvement in the human development index.

Potential of Renewable Energy Generation- Vision and Mission

Energy is vital for development, and renewable energy can ensure sustainable development in harmony with nature and the environment. The National Institute of Solar Energy has assessed the country's solar potential at about 748 GW, assuming 3 per cent of the waste land area will be used for installing such facilities. The National Solar Mission is one of the key missions in India's National Action Plan on Climate Change, which was launched on 11th January 2010, and it will promote ecologically sustainable growth while addressing India's energy security challenges. The mission's objective is to establish India as a global leader in solar energy, and India's cumulative installed renewable capacity reached 179.322 GW as of July 2023. Among renewable sources, while solar energy maintained its dominance contributing 67.07 GW, wind energy contributing 42.8 GW. India aims for 500 GW of installed renewable energy capacity and five million tonnes of green hydrogen by 2030. India aims to produce five million tonnes of green hydrogen by 2030.

This will be supported by 125 GW of renewable energy capacity, for which 57 solar parks with an aggregate capacity of 39.28 GW have been approved.

Renewable energy in India is given a major thrust to advance economic development, enhance energy security, facilitate access to energy, and mitigate the impact of climate change. As some parts of our country receive over 300 days of sunshine every year due to India's natural location along the equator, it lends us a strategic advantage in solar energy production. We also have a similar advantage in wind energy due to our 8,000-kilometre coastline. Additionally, India's vast hydropower potential is estimated at over 100,000 MW due to the wealth of rivers in different parts of the country. These natural bounties have provided India with a unique opportunity to lead the way in renewable energy production and create a green economy. Renewable energy can bring prosperity to our rural landscape. Results are quite visible, as we see Modhera village in Gujarat, which is India's first village to be powered by solar all day, every day, with 1,300 rooftop panels on residential and government buildings that are connected to a power plant. The solar power plant in this village has not only reduced the energy bills of the villagers but is also becoming a source of income as any surplus power they generate is being sold back to the grid. Such initiatives are being taken in many States. The State Government in Himachal Pradesh is progressing on a path to becoming a green energy state with a number of initiatives, including the target of 500 MW of solar energy installation for the financial year 2023-24. The State Government has decided to develop two green Panchayats in each district with the installation of 500 KW to one MW.

Green development initiatives are needed mostly to be focussed on rural areas, as problems contributing to nature and environmental degradation are more prevalent here. Green rural development can stimulate rural economies, create jobs, help maintain critical ecosystem services, and strengthen the climate resilience of the rural poor. According to the joint report of the Council on Energy, Environment and Water (CEEW), the Natural Resources Defense Council (NRDC) India, and Skill Council for Green Jobs (SCGJ), India can create about 3.4 million jobs by installing 280 GW solar and 140 GW wind capacity as it moves towards accomplishing its goal of 500 GW non-fossil electricity generation capacity by 2030. The wind and solar

energy markets have already employed a workforce of 111,400 people. In addition, our renewable energy sector could potentially employ around one million people by 2030, which would be ten times more than the existing workforce. To augment this workforce, our skill development programme is in place, as more than 100,000 people have been trained between 2015 and 2021, and 78,000 trainees have been certified under the national-level solar energy Suryamitra training programme.

Government Policies and Initiatives

The Union Budget 2023 has taken significant steps towards promoting a green energy transition in the country with the allocation of Rs. 35,000 crore for priority capital investment towards energy transition and Net Zero objectives. To strengthen the nation's renewable energy sector, the Government has allotted Rs. 10,222 crore to the Ministry of New and Renewable Energy, which will help reduce reliance on fossil fuels and foster the use of clean and sustainable energy sources. Further, there is an uptick in the budgetary allocation for the solar sector, with an allocation of Rs. 5,331.5 crore in this current budget. Further, Rs. 20,700 crore has been allocated for the inter-state transmission line being created for the evacuation and grid integration of 13 gigawatts of renewable energy from Ladakh.

India has implemented the National Action Plan on Climate Change, which includes eight missions focusing on various sectors such as solar power, energy efficiency, sustainable habitats, and more. India is poised to achieve its energy independence target through clean technology by 2047, with a major emphasis on the 'Make in India' initiative. Investors are showing increased interest in the sectors of battery storage, electric vehicles, and green hydrogen. The Government has also taken a policy decision by permitting foreign direct investment (FDI) up to 100 per cent under the automatic route in the renewable energy sector to shape the global narrative in favour of decarbonisation and encourage green energy. As some states have location advantages for the generation of renewable energy, the decision to waive inter-state transmission system charges for the inter-state sale of solar and wind power, and the declaration of a trajectory for renewable purchase obligation up to the year 2029-30 is significant towards promoting

green energy. Another initiative for the development of ultra-mega renewable energy parks has been undertaken to facilitate solar project developers in setting up projects expeditiously.

Another important Central Government initiative for green and clean technologies is PM-PRANAM (Prime Minister Programme for Restoration, Awareness, Nourishment and Amelioration of Mother Earth), which seeks to incentivise the entire country to promote alternative fertilisers and the balanced use of chemical fertilisers. The programme aims to promote the use of bio-fertilisers and simultaneously reduce the use of chemical fertilisers, which pose multiple risks, including health hazards, by entering our food chains and are responsible for environmental degradation as well. This will help our farmers and the people in rural areas.

Adoption of green hydrogen as an alternative source of energy can enable India to abate 3.6 gigatonnes of CO₂ emissions cumulatively till 2050 and reduce industrial coal imports by 95 per cent. Approval of the National Green Hydrogen Mission is a step ahead to make India a global hub for the production, utilisation, and export of Green Hydrogen and its derivatives. New energy trading platforms specifically for the renewable energy market, i.e., the Green Term Ahead Market (GTAM) and the Green Day Ahead Market (GDAM) have been introduced for selling off the power by the renewable developers in the open market without getting into long-term Power Purchase Agreements (PPAs). The Indian Energy Exchange (IEX) traded 275 million units (MU) of renewable energy in July 2023 alone. The UJALA LED bulb campaign is transforming the energy landscape and reducing emissions by a staggering 40 million tonnes annually. The Skills Council for Green Jobs continues to integrate environmental awareness into job training across skilling programmes through 'Green National Occupation Standards' for the workplace.

Role of Self-Help Groups

Self-Help Groups (SHGs) have become the fulcrum and catalyst for majority of developmental activities. There is a need to rope in these groups in popularisation and adoption of green and clean energy initiatives, as India has around 1.2 crore SHGs, mostly in rural areas and 88 per cent being all-women SHGs. But now their potential is also harnessed through clean and green

initiatives, such as the Swachh Bharat Mission Grameen (SBM-G). SBM-G is currently in its second phase, and its main aim is to sustain India as Open Defecation-Free, alongwith solid and liquid waste management. This comprises bio-degradable waste management, including GOBARdhan, access to improved ways of non-biodegradable waste management, greywater management, and faecal sludge management leading to visual cleanliness. Only the women in our villages can appropriately describe the ordeal of defecating in the open, and being the biggest beneficiaries of the ODF drive, it led to more and more women coming forward to lead this movement and becoming the key to its success. As many as 30 to 40 percent of women volunteers known as ‘Swachhagrahis’ triggered the process of bringing about collective behavioural changes through the emergence of natural leaders. Women representatives, elected in Panchayati Raj institutions, also played an active role in many places. It was established without doubt that the involvement of women led to the success of SBM-G, in comparison to earlier sanitation drives.

Emerging Opportunities with Green Development Initiatives

- Significant market opportunity exists in India’s rural economy for mechanisation through clean energy innovations in the farm sector. Potential uses of these alternative energy options include pesticide spraying, rice transplanting, and harvesting grain crops, all of which cumulatively have a total market potential of about USD 40 billion.
- Clean energy innovations could transform enterprises engaged in activities such as custom tailoring, food processing, poultry, and livestock rearing among others.
- In rural areas, 20 odd livelihood appliances such as solar pumps, solar-powered milking machines, milk chillers, sewing machines, solar charkhas, cold storage, and knapsack sprayer can effectively run on decentralised renewable energy (DRE). As the Government has incentivised these initiatives, it will help in cost cutting in the crop of production with overall gains.

Focus Areas to Accelerate Use of Renewable Energy

- Existing livelihood appliances prevalent in rural areas are not designed for efficiency, but for

unreliable and subsidised/flat-priced electricity. Hence, there is need to develop such farming equipment, which are reliant on renewable energy sources with efficiency.

- There is a need for reduction in battery costs and development of cost-effective, super-efficient, small-sized motors, which could significantly improve the economic viability of DRE.
- There is a need to expand the market for smaller livelihood solutions, which are presently significantly fragmented and cluster-based, potentially requiring hundreds of small and medium scale enterprises to capture the same.
- There is need for initial financial support system to the farmers in the rural areas as customer awareness and financing are major barriers to adoption of clean energy solutions for livelihood applications.

Challenges for the Shift to Green Technologies

Change in technology and its adoption are always investment intensive, and globally, at least \$ 4 trillion a year is needed to be invested in renewable energy until 2030, including investments in technology and infrastructure to allow us to reach net-zero emissions by 2050. However, this investment will result in the reduction of pollution and climate impact, which alone could save the world up to \$ 4.2 trillion per year by 2030. These and other low-carbon technologies could create a market worth up to \$ 80 billion in India by 2030. Support from International Organisation like the World Bank and developed nations is essential to Make a shift in India’s development onto a low-carbon path. To reach net zero emissions by 2070, the International Energy Agency (IEA) estimates that \$ 160 billion per year is needed till 2030, which is three times more of today’s investment levels. A recent report by the Institute for Energy Economics and Financial Analysis revealed that India witnessed a record-high investment in renewable energy in the year 2022, with a whopping investment of \$ 14.5 billion, depicting a significant increase of 125 per cent from the previous year. The country is poised to attract over \$ 20 billion in renewable energy investments in 2023 alone. Therefore, access of low-cost long-term capital is key to achieving net zero. □

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Swachhata Hi Seva

Swachhata Hi Seva (SHS) campaign is being celebrated from 15th September to 2nd October this year to generate jan andolan through community participation and provide impetus on implementation of SBM. The campaign will focus on disseminate the importance of a sampurna swachh village.

Theme of SHS-2023 is 'Garbage Free India' with focus on visual cleanliness and welfare of Safai Mitras. Like earlier years, the spirit of cleanliness activities is voluntarism/ shramdaan. The focus of these swachhata drives would be on high footfall public places like bus stands, railway stations, cantonment boards, beaches, tourist places, zoos, national parks & sanctuaries, historical monuments, heritage sites, river fronts, ghats, drains and nallahs etc. in both rural and urban areas of State/ UT.

Activities proposed for States / Districts / Blocks to organise SHS from 15th September 2023 to 2nd October 2023 are as follows :-

- Removal of garbage from all important places
- Repair, painting, cleaning and branding of all sanitation assets like litter bins, public toilets, dhalaos, waste transport vehicles, MRFs etc. in the area;
- Assist in drives to clean riverbanks and removal of waste (including plastic) from water bodies especially in Ganga Grams and Ganga Towns;
- Cleaning of zoos, national parks, wildlife sanctuaries etc. under MoEFCC along with regulation of plastic materials into protected areas to prevent littering;
- Cleanliness drives of tourist spots, ASI protected monuments along with IEC initiatives to discourage usage of single use plastic items, saturating dry and wet waste bins in line with the Hara Geela Sookha Neela campaign, etc.;
- Cleanliness drives and awareness activities may be taken up in schools with children understanding the importance of waste segregation at source, journey of waste, waste to wealth, alternatives to SUP. Where possible Sanitation Clubs may be formed at schools/colleges;
- Conducting special programs, cultural events promoting the sanitation journey of the country.





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