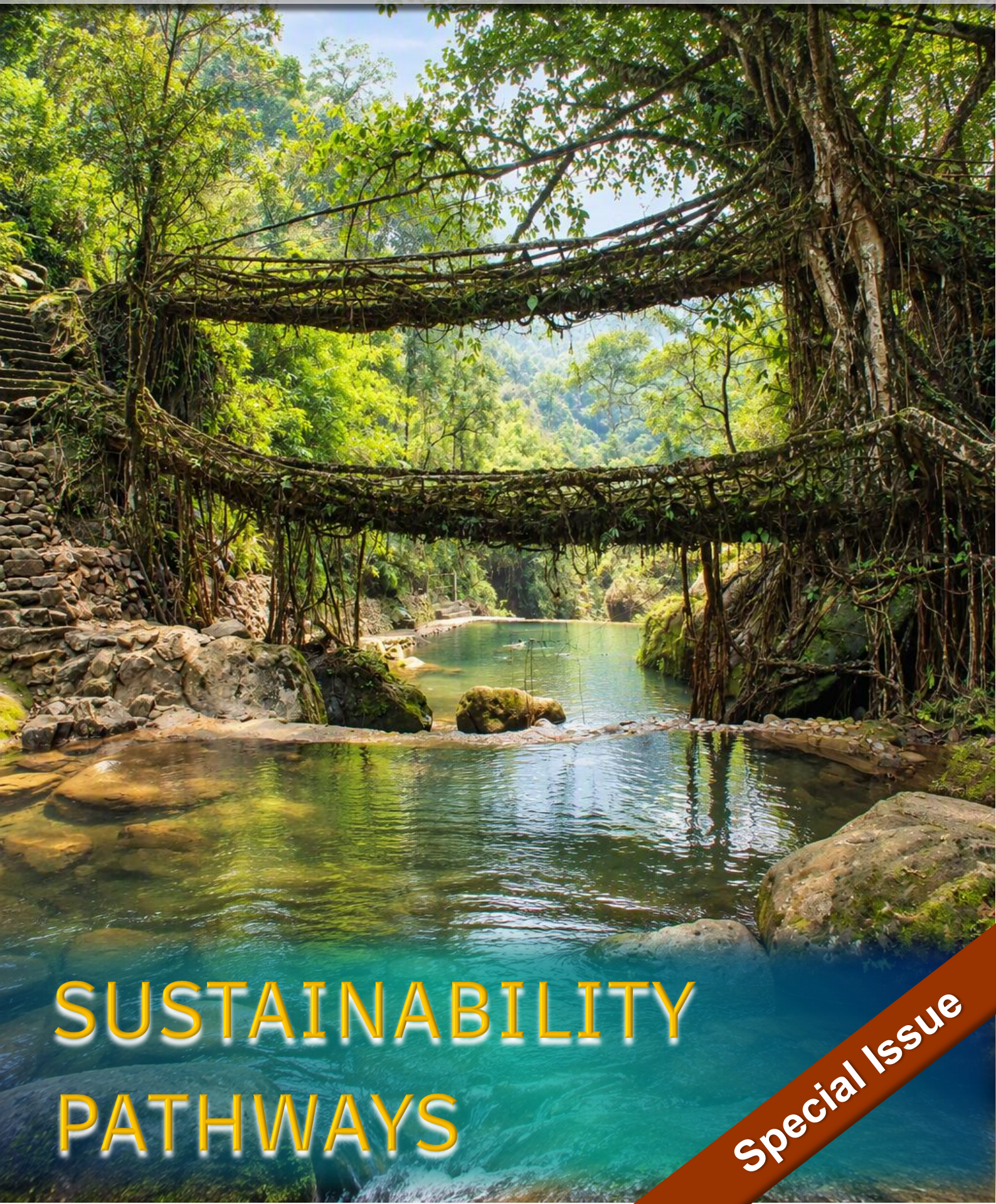


Vigyan Setu e-magazine



**SUSTAINABILITY
PATHWAYS**

Special Issue

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About Vigyan Setu e-magazine

A quarterly, bilingual publication by Vigyan Setu Foundation that bridges the gap between science and society. Curated with creativity, curiosity, and critical thinking, this e-magazine features insightful articles, creative expressions, and real-world applications of science, technology, and innovation. It aims to nurture scientific temper, celebrate young minds, and spotlight emerging researchers whose work is shaping a sustainable future.

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About the Cover

Umshiang Double Decker Living Root Bridge, Meghalaya, India

By Editorial Team

Meghalaya's Living Root Bridge is a suspension type architecture naturally created by how the roots of the trees propagate. It is truly a sight of absolute marvel and awe, considering the wonders that nature has to offer us.

Made from the roots of a special kind of rubber tree, these living bridges get stronger the more the roots grow. They need roughly 25 years to mature, but once ready, they can hold the weight of 50 people and last for up to five centuries.

Living root bridges, shaped over generations by working with nature rather than against it, make a fitting cover image for this Special Issue on Sustainability Pathways.

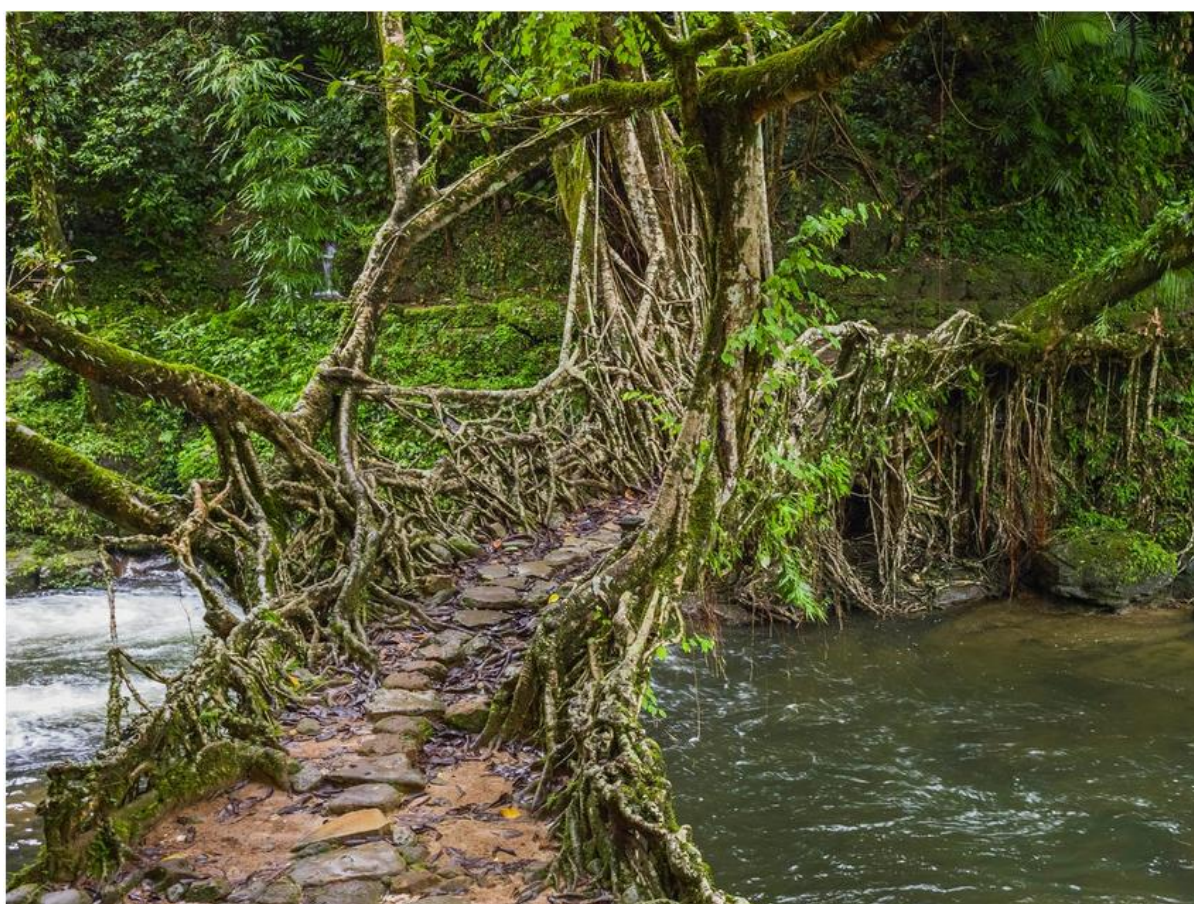


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From the Editor's Desk

By Dr. Neha Sharma

This special issue of *Vigyan Setu* refuses to settle for one definition of sustainability. It moves from the classroom to the laboratory, from the village stepwell to the satellite orbiting above it, from a school's Green Brigade to a gene-edited crop in a farmer's field. And yet a single thread runs through all eight contributions. Every article, in its own way, asks the same question: *who gets to walk these pathways?*

Where Pathways Begin

We open in the classroom, where sustainability is learned long before it is practised. Amol Sharma reminds us that progress does not have to mean endless consumption; the aim is better, not just bigger. Kuldeep Gupta shows how scientific temper turns a leaking tap or a pile of household waste into an investigation worth starting. Anurita Koul takes that idea to Army Public School, Damana, where the Brimming Minds Room and the Green Brigade give every child a role, whatever their ability. Dr. Dinesh Kumar then widens the frame, tracing the journey from a child's question to a national innovation. Teachers are the catalyst, and no child's potential should be limited by geography, gender or circumstance.

Innovation with a Conscience

Two articles ask what happens when science meets real lives. Poonam Rautela's essay, written in Hindi, is deeply felt. From biodegradable pads to cleaner cooking and safer water, she argues that protecting women's health and protecting nature are one and the same task. A healthy woman, she writes, builds healthy generations. Dr. Palvinder Kaur and Dr. Balwinder Singh Sooch map biotechnology onto the Sustainable Development Goals, from climate-resilient crops to bioremediation and biofuels. They are honest about the barriers of access, regulation and public trust. The organisms are small, they remind us; the implications are not.

The Bigger Picture

Dr. Wahied Khawar Balwan offers the framework that holds many of these pieces together. Science provides the knowledge, innovation turns it into solutions, and inclusive development ensures those solutions reach small farmers and rural communities, not only large enterprises. Technology alone is never the answer. If it is not affordable and accessible, it is not sustainable.

Roots and Remembering

My own article looks backward in order to look forward. India's stepwells, jaalis, courtyard houses and bamboo homes on stilts were climate-responsive engineering long before sustainability had a certification. Read through the lens of Science Tourism, an idea *Vigyan Setu Foundation* has long championed in India, they are not heritage motifs but a body of tested knowledge. Some of the best answers do not need inventing. They need remembering and then translating into the codes and specifications that shape what we build today.

Closing with a Bridge

Our cover says it better than any of us could. The Umshiang double-decker living root bridge in Meghalaya is grown, not built, by guiding the roots of a rubber tree over roughly 25 years. It gets stronger as the roots grow, can carry the weight of 50 people, and can last for centuries. It exists because generations chose to work with nature rather than against it. No one grows such a bridge alone, and no one grows it quickly. Sustainable futures are much the same: grown patiently, together, and for everyone who needs to cross.

**Sustainability is not a destination we reach.
It is a bridge we grow, together,
one generation at a time.**

We hope this issue leaves you asking more questions than it answers. That, after all, is what science is for.

The views expressed in this editorial are those of the editor. Content contributions are solely the responsibility of respective authors.

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By *Vigyan Setu Foundation*

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Science for a Sustainable Tomorrow

By Mr. Amol Sharma

--- A Future That Demands a New Way of Thinking ---



For many years, progress has often been measured by how much we produce, how fast our cities grow, and how many resources we consume. Bigger factories, wider roads, more buildings, and greater production have traditionally been seen as signs of development. However, as I look at the challenges facing our planet today, I feel that we need to ask ourselves an important question: Can progress continue in the same way forever on a planet with limited resources?

Science offers us an encouraging answer. It tells us that development does not have to mean endless consumption. We can build a better future by using knowledge, innovation, and technology more wisely. This is the idea behind building pathways beyond growth; creating progress that improves human life without damaging the natural systems that support us.

A sustainable tomorrow will not simply appear on its own. It will be created through scientific thinking, responsible choices, and the willingness to imagine new possibilities.

Science Helps Us Understand the Limits of Our Planet

The Earth provides us with air, water, soil, forests, minerals, and energy. Yet these resources are not unlimited. Science helps us understand how ecosystems work and how human activities can disturb their balance.

For example, excessive burning of fossil fuels releases gases that trap heat in the atmosphere. Deforestation reduces the ability of forests to absorb carbon dioxide. Plastic waste enters rivers and oceans, affecting wildlife and ecosystems. Such problems remind us that nature is not an endless storehouse from which we can keep taking without consequences.

Scientific research allows us to study these changes, predict possible risks, and search for practical solutions. Satellites can monitor forests and glaciers, climate models can help scientists understand changing weather patterns, and environmental studies can reveal the impact of pollution. Knowledge gives us the power to recognize problems before they become impossible to manage.

Beyond Growth Means Better, Not Just Bigger

The phrase *beyond growth* does not mean that society should stop improving. Instead, it encourages us to think about the quality of development rather than only its quantity.



For instance, a successful city is not necessarily one with the most buildings and vehicles. A truly successful city may be one with clean air, safe public transport, green spaces, efficient energy use, and healthy citizens. Similarly, progress in agriculture should not be judged only by producing more food. It should also consider soil health, water conservation, biodiversity, and the well-being of farmers.

Science can help us design systems that achieve more while wasting less. Energy-efficient buildings, precision farming, water-saving technologies, and improved public transport are examples of how scientific innovation can make development smarter.

In my view, this is one of the most exciting lessons sciences can teach us: sometimes the best solution is not to use more, but to use better.

Clean Energy: Powering Progress Without Polluting the Future

Energy is essential for modern life. We need it for lighting homes, running schools and hospitals, transporting people, and operating industries. The challenge is to meet these needs without causing unnecessary damage to the environment.

Renewable energy offers an important pathway forward. Solar panels transform sunlight into electricity, wind turbines use moving air to generate power, and flowing water can produce hydropower. Scientists are also developing better batteries and energy-storage systems so that clean energy can be used more effectively.

The shift towards renewable energy is not only about replacing one source of electricity with another. It represents a broader change in the way we think about our relationship with nature. Instead of depending entirely on fuels that take millions of years to form, we can learn to use the energy continuously available around us.

Young people have an important role here. Understanding how energy is produced and used can encourage students to become more responsible consumers and perhaps even future scientists who develop cleaner technologies.

The Circular Economy: Turning Waste into a Resource

For a long time, human society has followed a simple pattern: *take, make, use, and throw away*. This approach creates enormous amounts of waste and places pressure on natural resources.

Science and innovation are helping us move towards a more circular way of living. In a circular economy, materials are reused, repaired, recycled, and redesigned whenever possible. A discarded plastic bottle may become part of a new product. Food waste can be converted into compost or biogas. Old electronic devices can be carefully processed to recover valuable materials.



This approach changes our understanding of waste. What we throw away may still contain useful resources.

However, technology alone cannot solve the problem. Our habits also matter. Carrying reusable bottles, repairing useful items, separating waste, and avoiding unnecessary purchases may seem like small actions, but they reflect an important scientific principle: resources should be used efficiently and thoughtfully.

Science and Innovation Must Include Everyone

A sustainable future cannot be designed only in laboratories or large cities. The benefits of science must reach villages, farmers, workers, students, and communities everywhere.



Inclusive innovation means developing solutions that are affordable, practical, and

suited to local needs. A simple solar lamp can transform life in a place with limited electricity. A low-cost water-purification system can improve health. Scientific methods can help farmers use water and fertilizers more efficiently.

Local knowledge can also work alongside modern science. Communities often possess valuable experience about crops, forests, water, and changing weather conditions. When scientific research respects and learns from such knowledge, solutions can become more effective and meaningful.

A sustainable pathway must therefore be a shared pathway. Progress cannot truly be called successful if it benefits only a few people while leaving others behind.

Role of Students in Building Tomorrow

Sometimes students may feel that problems such as climate change or resource depletion are too large for them to influence. But every major change begins with awareness, curiosity, and learning.



As students, we can develop the habit of asking scientific questions:

Why is this happening? What evidence supports it? What solution could work? How might our actions affect others and the environment?

We can save electricity and water, reduce waste, participate in science projects, and spread awareness in our families and communities. More importantly, we can develop a scientific temper that helps us think critically and creatively.

The scientists, engineers, teachers, planners, and leaders of tomorrow are sitting in today's classrooms. The ideas that solve future problems may begin with a student's observation, experiment, or question.

A Tomorrow Worth Building

The future does not depend only on how much humanity can produce. It depends on how wisely we use what we already have. Science gives us powerful tools, but wisdom must guide the way we use them.

Building pathways beyond growth means choosing cleaner energy, protecting ecosystems, reducing waste, designing

inclusive technologies, and redefining progress. It means understanding that human development and environmental protection are not enemies. With the right knowledge and innovation, they can support each other.

I believe a sustainable tomorrow is not a distant dream. It is a direction we can begin moving towards today. Every solar panel installed, every forest protected, every scientific discovery shared, and every responsible decision made becomes part of that journey.

The real power of science lies not only in explaining the world as it is, but also in helping us imagine the world as it could be. If we combine scientific knowledge with responsibility and compassion, we can build a future that is not merely bigger or faster, *but cleaner, fairer, wiser, and truly sustainable.*

Amol Sharma

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Scientific Temper for Sustainability

By Mr. Kuldeep Gupta



Sustainability is no longer a distant concern reserved for scientists or policymakers. It has become a shared responsibility that touches every aspect of human life, from the way we consume resources to the way we educate our children.

Climate change, pollution, biodiversity loss, and social inequality are not abstract issues;

they are realities shaping our daily existence. To meet these challenges, we must nurture a generation that can think critically, act responsibly, and innovate courageously.

At the heart of this transformation lies scientific temper, which is nothing but the mindset of questioning, observing, analyzing evidence, and seeking rational solutions.

Curiosity as the Spark of Innovation

Every child begins life with curiosity. The simple act of asking “why” or “how”, is the seed of scientific inquiry. Education must harness this natural curiosity and channel it into meaningful innovation. A leaking tap, excessive plastic use, piles of household waste, or the disappearance of local species are not just problems, but in fact, they are opportunities for young learners to investigate and propose solutions.

When schools encourage hands on projects, problem-based learning, and experiments using recycled or locally available materials, students move from memorizing science to living science. These experiences cultivate creativity, resilience, collaboration, and problem solving, which are the very skills needed to build a sustainable future.

Education as a Bridge to Sustainable Development

The *National Education Policy (NEP) 2020* emphasizes experiential, competency based, and multidisciplinary learning. This vision allows classrooms to connect directly with real world sustainability challenges. Students can monitor water quality, document biodiversity, conduct energy audits, or design awareness campaigns.

By linking these efforts with the *Sustainable Development Goals (SDGs)*, such as clean water, renewable energy, climate action, responsible consumption, the schools can transform into laboratories of sustainable development. In this way, education becomes not just a pathway to knowledge but a bridge to action.

Technology with Purpose

Digital tools from virtual labs to online collaborative platforms have revolutionized science education. They make complex concepts engaging and accessible, bridging geographical and educational gaps. Yet technology must serve a purpose. It should empower learners to investigate, innovate, and collaborate, not simply consume information. A digitally skilled student must also be a socially and environmentally responsible citizen, ensuring that innovation aligns with sustainability.

Inclusion: No One Left Behind

True sustainability is inclusive. Every learner, regardless of background, geography, or ability, deserves the chance to participate in scientific inquiry. Schools can foster inclusivity by valuing diverse perspectives and integrating local knowledge.

When students take their learning into communities through the likes of biodiversity documentation, water conservation drives, or waste management initiatives, they become active partners in development rather than passive recipients of knowledge. This ensures that sustainability is not confined to textbooks but becomes a lived experience.

Local Action, Global Resonance

The most powerful sustainability movements often begin with small steps. A student conserving water at school may inspire change at home. A biodiversity project may spark awareness of local species. A waste management campaign may shift community habits. These local actions, multiplied across

communities, create a ripple effect with global impact.

The lesson is clear: sustainability does not begin in distant conferences or in policy documents. It begins with the questions asked by children, the ideas nurtured in classrooms, and the actions taken in local communities.

Building a Culture of Scientific Temper

Schools and teachers are at the heart of this transformation. Science exhibitions, innovation challenges, field visits, and community projects create spaces where curiosity thrives. Teachers, as facilitators, encourage learners to ask better questions, test ideas, and reflect on outcomes. Learning becomes a journey of discovery rather than rote memorization.

By cultivating scientific temper, schools nurture not just future scientists but responsible innovators and compassionate

citizens who can apply knowledge to real world challenges.

Choices That Shape Our Tomorrow

Sustainability is ultimately about choices; the ones we make today and the world they shape tomorrow. Scientific temper equips young people to question, innovation empowers them to create, and inclusive education ensures everyone participates. Together, these forces can transform local challenges into meaningful solutions and contribute to sustainable global development.

The pathway to a sustainable future does not begin somewhere far away. It begins with a child's curiosity, a teacher's encouragement, and a community's willingness to act. If schools can successfully bring these forces together, they will nurture a generation capable of shaping a better, more inclusive tomorrow.

Kuldeep Gupta

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Sustainability at APS Damana

By Mrs. Anurita Koul



At the [Army Public School Damana](#), sustainability is envisioned not merely as an environmental concept but rather as a strategic approach of developing [responsible, innovative, compassionate and solution-oriented learners](#).

The school aims to create an ecosystem where children learn to understand real-world challenges, experiment with possible solutions and take collective responsibility for building a sustainable future. This vision is closely aligned with the principles of [NEP 2020](#), [experiential learning](#), [competency-based education](#), [inclusion](#) and the [Sustainable Development Goals \(SDGs\)](#).

A significant initiative in this direction is the establishment of the “[Brimming Minds Room](#)”, envisioned as a dynamic experiential

learning and innovation space. The room provides children with opportunities to move beyond textbook-based learning and engage in [hands-on exploration](#), [experimentation](#), [tinkering](#), [creative problem-solving](#) and [collaborative learning](#). Students are encouraged to observe, question, investigate, design, create and reflect, thereby transforming the classroom from a space of instruction into a space of discovery.

The Brimming Minds Room facilitate activities such as [STEM experiments](#), [mathematical puzzles](#), [model-making](#), [coding](#), [tinkering](#), [recycled-material projects](#), [environmental investigations](#) and [simple prototypes](#). Real-life challenges are presented to students, for example, [how can we reduce water wastage?](#) [how can we minimise classroom waste?](#) [how can](#)

renewable energy be used? thereby encouraging children to brainstorm, experiment and develop practical solutions.

A key feature of the initiative is participation of every child. Inclusive development means ensuring that every learner, irrespective of academic ability, learning style or individual need, has a meaningful role. Activities are therefore designed with varied levels of participation, allowing children to contribute as designers, experimenters, artists, researchers, presenters, observers, recorders or team leaders. This build confidence, communication, collaboration and a sense of belonging while ensuring that no child remains a passive learner.

To strengthen environmental responsibility, APS Damana also established a “Green Brigade”, comprising student volunteers who act as young ambassadors of sustainability. The Green Brigade spearhead multiple initiatives such as waste segregation, plastic reduction, water conservation, energy conservation, plantation and biodiversity awareness, cleanliness drives and responsible consumption.

Students do not merely participate in campaigns but also monitor, document and communicate sustainable practices across the school community.

The Green Brigade also collaborate with the Brimming Minds Room to develop “Green

Innovations”, where students transform environmental problems into creative projects and prototypes. Initiatives such as “Waste to Wonder,” “Save Every Drop,” “One Child–One Green Action” and “Energy Watch” make sustainability an everyday practice rather than an occasional activity.

The school’s existing initiatives such as the Sensory Park, BALA, JADUI PITARA, ATL activities, experiential learning practices and SDG-linked projects further complement this vision. Learning can extend beyond classrooms into the school environment, enabling children to observe biodiversity, understand natural resources and connect scientific concepts with everyday life.

Thus, the Brimming Minds Room and Green Brigade together can become powerful sustainability pathways at APS Damana, where one is for nurturing ideas and innovation, whilst the other is cultivating responsibility and action.

The ultimate objective is to create a school culture where science inspires curiosity, innovation creates solutions, inclusion ensures participation and sustainability become a shared way of life.

At APS Damana, the pathway is therefore clear: every child thinks, every mind creates, every hand contributes and every action makes a difference.

Mrs Anurita Koul

Headmistress, Army Public School, Damana, Jammu and Kashmir

महिला स्वास्थ्य देखभाल में हरित नवाचार, आवश्यकता और चुनौतियां (Green innovation in women's healthcare, need and challenges)

By पूनम रौतेला

परिचय:

व्याकरण की रचना करने वालों ने.....

नाजुक "पंखुड़ियों" को स्त्रीलिंग कहा।।

और "नुकीले कांटों" को पुल्लिंग।।

पानी जब मीठा रहा तो "नदी" स्त्रीलिंग...

पानी खारा हो गया तो "समंदर" पुल्लिंग....

युद्ध होता है.... पर शांति आती है ॥

हवा चलती है.... तूफान आता है।।

व्याकरण की रचना करने वालों ने....

हर उस चीज को जिसमें नाजुकता देखी

उसे स्त्रीत्व से जोड़ा....

और फिर

उसके संरक्षण की जिम्मेदारी सौंप दी समाज को....

और फिर उसी समाज ने इसी संरक्षण के लिए आधी आबादी को कैद कर दिया बंधनों में.....



इसी आधी आबादी को अनावश्यक बंधनों में बांधकर विश्व विकास के रथ पर चढ़कर बेलगाम होकर दौड़ना चाहता है। इस दौड़ से दुनिया को कोई मंज़िल हासिल नहीं होगी, यदि आधी आबादी यानी महिलाओं की सहभागिता ना हो।

पूरी दुनिया विज्ञान और तकनीक को जीवन का पर्याय मान चुकी है, मानव सभ्यता परिवर्तन के शिखर पर है, और मानव की नैसर्गिक बुद्धि से उपजी आर्टिफिशियल इंटेलिजेंस यानी "एआई" मानव को ही चुनौती दे रही है। ऐसे में प्रकृति के साथ मानव का संतुलित बंधन कमजोर हो रहा है और प्राकृतिक आपदाएं हमें लगातार चेतावनी दे रही हैं।

इस समस्या के मूल में विकास और तकनीकी क्रांति की वह चाहत है जिसमें दया, करुणा, और सहअस्तित्व की स्त्रीपरक भावनाओं को सिरे से अनदेखा किया गया है। प्रकृति असंतुलित हुई है और इसीलिए संतुलन स्थापित करने के लिए देश की आधी आबादी यानी महिलाओं की स्वस्थ भागीदारी की दिशा में आगे बढ़ने की जरूरत गहराई से महसूस की जा रही है।

महिलाएं वैश्विक पटल पर परिवर्तन के सबसे ताकतवर स्तंभों में से हैं और जब बात प्रकृति के साथ सामंजस्य की हो तो उनकी प्रतिभा और सामर्थ्य का कोई मुकाबला नहीं। इसलिए उनका शारीरिक और मानसिक स्वास्थ्य सुनिश्चित करना वैश्विक जिम्मेदारी है। और इसके लिए उपयोग में लाई जाने वाली सुविधाओं और उत्पादों का पर्यावरण की सुरक्षा के लिए सकारात्मक होना भी जरूरी है।

महिला स्वास्थ्य में हरित नवाचार का आधार यही से जुड़ा है। स्त्री स्वयं प्रकृति का स्वरूप है, वैश्विक जीवनचर्या में पुरुषों के साथ बराबर की भागीदार है और जीवन की उत्पत्ति में स्त्री का जननी के रूप में एकाधिकार है, इसीलिए स्त्री की स्वास्थ्य समस्याओं का निदान प्रकृति के साथ सामंजस्य और संरक्षण पर आधारित होना चाहिए, यही "हरित नवाचार" है!!

विस्तृत समीक्षा:

(१) पारिभाषिक अर्थ: महिला स्वास्थ्य में हरित नवाचार का अर्थ है ऐसी चिकित्सा के उपाय और समाधानों को विकसित करने पर जोर देना जो महिलाओं के स्वास्थ्य को सुधारने के साथ-साथ पर्यावरण के अनुकूल टिकाऊ और ऊर्जा संरक्षण के अनुरूप हो और पारिस्थितिकी तंत्र की सुरक्षा भी सुनिश्चित करते हों।

(२) उद्देश्य और आवश्यकता: महिलाएं मानव सभ्यता में जननी होने के नाते सबसे सम्मानित और महत्वपूर्ण पद पर सृष्टि के प्रारंभ से ही प्रतिष्ठित हैं। एक मां के रूप में वे न सिर्फ शिशु को जन्म देती हैं, बल्कि उसे पालित-पोषित कर योग्य नागरिक भी बनाती हैं। इसके अतिरिक्त, वे कामकाजी महिलाओं के रूप में घर, समाज, और देश के आर्थिक विकास में सहभागी बनती हैं, घरेलू जिम्मेदारियां का निर्वहन भी लगातार करती हैं। इन कर्तव्यों के अनवरत निर्वहन में उनका स्वास्थ्य भारी कीमत चुकाता है और अक्सर लापरवाही के कारण वे गंभीर स्वास्थ्य चुनौतियों का सामना भी करती हैं।

ऐसे में उनके स्वास्थ्य की समय पर देखभाल और उपचार जरूरी है और वह भी प्रकृति सम्मत, क्योंकि कई परंपरागत स्वास्थ्य सुविधाएं और बुनियादी सुविधाएं उनके लिए हानिकारक सिद्ध हो चुकी हैं:

मासिक धर्म: पारंपरिक सेनेटरी पैड में प्लास्टिक और हानिकारक रसायन होने के कारण वे त्वचा में संक्रमण, त्वचा पर चकत्ते और एलर्जी पैदा करते हैं, साथ ही इन्हें उपयोग के बाद विघटित होने में वर्षों लगते हैं, जो गंभीर पर्यावरण प्रदूषण का कारक है।

घर के भीतर वायु प्रदूषण: विश्व के कई भागों में आज भी महिलाएं खाना पकाने के लिए लकड़ी, कोयला या उपलों का उपयोग करती हैं जिनका धुआं फेफड़ों की बीमारियां, दमा और नेत्र समस्याओं को जन्म देता है।

पेयजल: ग्रामीण क्षेत्रों में परिवार के लिए जलापूर्ति अक्सर महिलाओं के हिस्से में आती है और सबसे पहले प्रदूषित पेयजल से होने वाली बीमारियां भी उन्हीं को प्रभावित करती हैं, जिसमें अतिसार या दस्त, अथवा टाइफाइड या मोतीझरा मुख्य हैं।

रसायन आधारित कृषि: खेती, किसानों और मजदूरी से जुड़ी महिलाएं सीधे कीटनाशक और रसायनों के संपर्क में आती हैं और हार्मोन असंतुलन के कारण उनकी गर्भावस्था में जटिलताएं तक पैदा हो जाती हैं।

जलवायु परिवर्तन: जलवायु परिवर्तन के कारण आने वाली प्राकृतिक आपदाओं और अत्यधिक गर्मी का सबसे बड़ा असर गर्भवती महिलाओं और शिशुओं के स्वास्थ्य पर पड़ता है, जो गंभीर समस्या है।

उपरोक्त कारणों से महिलाओं के स्वास्थ्य पर न सिर्फ ध्यान देना जरूरी है बल्कि ऐसे उपाय भी आवश्यक हैं जो प्रकृति के साथ समन्वय कर उन्हें सुरक्षित रख सकें।

(३) प्रमुख हरित नवाचार और परिवर्तन की दिशा:

रीसायकल होने योग्य उत्पाद: पारंपरिक सेनेटरी पैड के स्थान पर बायोडिग्रेडेबल पैड्स, मासिक धर्म कप और पुनः प्रयोज्य अधोवस्त्र, पर्यावरण प्रदूषण को कम करते हैं और महिला स्वास्थ्य के लिए बेहद लाभदायक हैं।

सुरक्षित पेयजल: सौर ऊर्जा से चलने वाले जल शोधन संयंत्र और इको फ्रेंडली शौचालय, महिलाओं को जल जनित बीमारियों से बचाने की दिशा में सफल हरित नवाचार हैं।

जैविक खेती: हरित कीटनाशकों और प्राकृतिक खाद के उपयोग से महिलाओं का स्वास्थ्य खतरनाक रसायनों से सुरक्षित रहता है।

ई-हेल्थ सेवाएं और टेली-मेडिसिन: घर बैठे डिजिटल परामर्श और दवाइयों की उपलब्धता होने से महिलाओं को बार-बार अस्पताल जाने की जरूरत नहीं होती, जिससे कार्बन उत्सर्जन में कमी आती है और समय पर स्वास्थ्य सुविधाएं उपलब्ध होती हैं।

ग्रीन इंफ्रास्ट्रक्चर: आधुनिक तकनीक का उपयोग कर बनाए जाने वाले ग्रीन इंफ्रास्ट्रक्चर पर्यावरण को संतुलित रखकर तापमान नियंत्रित करते हैं और महिलाओं के मानसिक और शारीरिक स्वास्थ्य पर पड़ने वाले कुप्रभाव को समाप्त करते हैं।

उपरोक्त हरित नवाचारों से वैश्विक स्तर पर महिलाओं के बिगड़ते स्वास्थ्य और मृत्यु दर के आंकड़ों में सकारात्मक परिवर्तन की दिशा तय की जा सकती है, जो हरित नवाचार का सबसे बड़ा लाभ है।

(४) विश्व स्तरीय प्रयास: महिला स्वास्थ्य और हरित नवाचार का मेल आज के समय में एक बड़ा वैश्विक ट्रेंड बन चुका है और कई विश्व स्तरीय प्रतिष्ठित कंपनियां इस दिशा में बेहतरीन कार्य कर रही हैं:

नेचुरल साइकिल्स: यह कंपनी बिना किसी हार्मोनल दवा या प्लास्टिक आधारित उपकरण के केवल शरीर के तापमान को ट्रैक कर प्राकृतिक रूप से गर्भधारण को नियंत्रित करने में मदद करती है जो पर्यावरण अनुकूल गर्मी रोधी विकल्प है और महिलाओं के लिए श्रेष्ठ है।

बायोमिल्क: यह कंपनी पारंपरिक शिशु मिल्क फार्मूला बनाने के लिए मानव स्तन कोशिकाओं से असली दूध तैयार करने पर कार्य कर रही है ताकि स्तनपान न करवा पाने वाली महिलाओं को लाभ मिल सके।

दिवाकप/मून कप: इन कंपनियों ने मेडिकल ग्रेड सिलिकॉन से बने रीयूजेबल मेंस्ट्रुअल कप और मासिक धर्म के लिए धोने योग्य कपड़े बनाए हैं जो कई साल तक चलते हैं और अरबों टन प्लास्टिक कचरा बचाते हैं।

गेट्स फाउंडेशन: बिल गेट्स और मेलिंडा गेट्स की साझा फाउंडेशन ने हरित नवाचार की दिशा में सबसे अधिक आधारभूत कार्य किए हैं। यह फाउंडेशन वैश्विक स्तर पर जलवायु परिवर्तन से महिलाओं के स्वास्थ्य की रक्षा पर नवाचारों में निवेश करती है, स्वयं सहायता समूह से महिलाओं के आर्थिक सशक्तिकरण को फंड देती है, एशिया और अफ्रीका की महिला किसानों के लिए हरित कृषि उपकरणों और प्राकृतिक खेती के विकास में भी पैसा लगाती है। फाउंडेशन ने इस दिशा में २.५ अरब डॉलर देने की घोषणा की है, जो हरित नवाचार की दिशा में क्रांतिकारी कदम है।

(५) भारत में पहल:

क्रिस्टीन कागेतसु के साथी पैड्स: क्रिस्टीन ने भारत में, केले के रेशे से १००% बायोडिग्रेडेबल सैनिटरी पैड्स बनाने की पहल की है जो महिला स्वास्थ्य के लिए बेहतरीन पहल है।

सुजाता सावंत का अवनी वैलनेस: सुजाता ने मासिक धर्म को स्वच्छ और सुरक्षित बनाने के लिए ऑर्गेनिक कॉटन और पुनः उपयोग किए जाने वाले कपड़ा पैड बनाने शुरू किए हैं।

तन्वी जोहरी का कार्मेशी: तन्वी के मकई के स्टार्च और बांस के रेशों से तैयार सैनिटरी पैड त्वचा के अनुकूल हैं और बायोडिग्रेडेबल होने से पर्यावरण के लिए सुरक्षित भी हैं।

इकोफेन: अरुंधति मुरलीधरन और उनकी टीम ने ग्रामीण महिलाओं को कम कीमत पर कपड़ों के सैनिटरी पैड्स उपलब्ध कराने और स्वच्छता के प्रति जागरूक रहने का हरित आंदोलन चलाया है।

हेल्थफैब: वर्ष २०२० में स्थापित इस अग्रणी भारतीय कंपनी ने भारत में ७३०० करोड़ रुपये मूल्य के भारतीय महिला स्वच्छता बाजार में प्रवेश किया और इन्ट्रोवेटिव पीरियड पैटीज बनाकर हरित नवाचार के क्षेत्र में क्रांति ला दी है जो महिला स्वास्थ्य की दिशा में अभूतपूर्व है।

(६) चुनौतियां: हरित नवाचार महिलाओं के स्वास्थ्य को बेहतर बनाने की दिशा में सबसे सराहनीय पहल है लेकिन इसकी राह में चुनौतियां भी कम नहीं हैं:

जागरूकता की कमी: ग्रामीण और विकासशील क्षेत्रों में आज भी पर्यावरण अनुकूल उत्पादों की पहुंच सीमित है क्योंकि वहां इसकी जानकारी और इस विषय में जागरूकता का अत्यधिक आभाव है।

हरित उत्पादों की कीमत और पहुंच: पारंपरिक उत्पादों से थोड़ा महंगा होने के कारण हर वर्ग की महिलाएं इन्हें नहीं खरीद पाती साथ ही ग्रामीण इलाकों में दुकानों पर इनकी उपलब्धता न होने से महिलाओं की पहुंच न होना सबसे बड़ी चुनौती है।

क्लिनिकल ट्रायल में महिलाओं की कम भागीदारी: महिलाओं से संबंधित नवाचारों की सफलता के लिए उन पर रिसर्च और प्रयोग की बेहद आवश्यकता होती है जिसमें महिलाओं की भागीदारी आवश्यक है, लेकिन पूर्वाग्रह के चलते महिलाएं इस में सहयोग नहीं देती और गंभीर बीमारियों में ठोस परिणाम प्राप्त नहीं हो पाते।

सामाजिक एवं सांस्कृतिक बाधाएं: विकासशील देशों में सामाजिक पर सांस्कृतिक बंधनों के कारण, महिला स्वास्थ्य और मासिक धर्म पर खुलकर बात नहीं होना, इस दिशा में हरित नवाचारों की राह में बहुत बड़ी बाधा है।

अनुसंधान में निवेश की कमी: महिला स्वास्थ्य से जुड़े इको फ्रेंडली उत्पादों के रिसर्च के लिए पर्याप्त स्टार्टअप निवेश और सरकारी प्रोत्साहन की कमी होना हरित नवाचार में प्रगति के कार्य में बाधा बनता है।

(७) भविष्य की आशाएं: वर्तमान युग महिला सशक्तिकरण की दिशा में सबसे आशाजनक युग कहा जा सकता है। इस सशक्तिकरण का सबसे मजबूत आधार महिलाओं का स्वास्थ्य ही है, क्योंकि अस्वस्थ महिला कभी भी परिवार, समाज और देश के विकास में सार्थक योगदान नहीं दे सकती। इस तथ्य को विश्व स्तर पर समझा गया है और महिला स्वास्थ्य में हरित नवाचार पर न सिर्फ भारत में बल्कि विश्व के सभी विकसित देशों ने निवेश करना शुरू कर दिया है।

यह निवेश वास्तव में विश्व के सुरक्षित भविष्य में निवेश है क्योंकि स्वस्थ महिला ही स्वस्थ पीढ़ियों का निर्माण कर भविष्य को सुरक्षित करती है। इस दिशा में आधारभूत कार्य शुरू हो गया है। महिलाओं को केंद्र में रखकर स्वास्थ्य नीतियां बन रही हैं, उनकी विशेष स्वास्थ्य आवश्यकताओं पर अनुसंधान में बड़ी कंपनियां निवेश कर रही हैं, महिला स्वास्थ्य में हरित नवाचारों के लिए युवा वैज्ञानिक, जिनमें अधिकतर महिलाएं हैं, स्टार्टअप शुरू कर रहे हैं.... और सबसे आशाजनक तथ्य यह है कि विकासशील और ग्रामीण क्षेत्र की महिलाओं तक जैविक उत्पादों की पहुंच बढ़ाने के लिए उनकी कीमतों को निचले स्तर तक लाने पर सहमति व्यक्त की जा रही है। महिला अस्पतालों के बुनियादी ढांचे को भी अब ग्रीन बनाया जा रहा है और महिलाओं को नई तकनीक से जोड़ने और डिजिटल स्वास्थ्य के लाभ दिलाने के लिए सरकारी और गैर सरकारी संगठन मिलकर जागरूकता अभियान चला रहे हैं।

नवीनतम आंकड़ों के अनुसार महिला स्वास्थ्य में हरित नवाचार की दृष्टि से वर्ष २०२६ आदर्श वर्ष साबित होने जा रहा है, क्योंकि इस दिशा में सबसे अधिक निवेश इसी वर्ष में देखा गया है। यह कहना अतिशयोक्ति पूर्ण नहीं है कि महिला स्वास्थ्य में हरित नवाचार का भविष्य उज्ज्वल है।

महिलाओं के स्वास्थ्य की सुरक्षा सीधे-सीधे प्रकृति की सुरक्षा से जुड़ी है और इस पुनीत कार्य में हम सबको मिलकर भागीदारी निभानी चाहिए। जन सामान्य, सरकार और गैर सरकारी संगठन मिलकर महिलाओं के स्वास्थ्य को बेहतर बनाने के लिए किए जाने वाले नवाचारों में भागीदारी निभा सकते हैं। महिलाओं के प्रति संवेदनशीलता और उनकी सुरक्षा का भाव हम सब की जिम्मेदारी है, और यह भाव हम सभी में जागृत होना चाहिए, तभी हरित नवाचार महिलाओं के स्वास्थ्य को बेहतर बनाने की दिशा में सार्थक कार्य कर पाएंगे।

पूनम रौतेला

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Biotechnology for Sustainable Development

Engineering a Sustainability Pathway through Biotechnology

By Dr. Palvinder Kaur and Dr Balwinder Singh Sooch

Biotechnology: Charting a Sustainable Pathway for Food, Energy, Health and the Environment

Biotechnology is a field of applied science where living systems are exploited to develop or make useful products. From gene-edited crops to microbes, biotechnology has quietly become one of the most powerful tools for humanity for meeting the demands of a growing population.

Biotechnology's principal strength lies in its capacity to address complex, cross-sectoral challenges through the direct manipulation and application of biological systems. Its solutions are more precise, resource-efficient and adaptable than conventional technological alternatives.

Its interdisciplinary foundation is based on molecular biology, genetics, bioinformatics and process engineering. This multisubject knowledge reserve enables innovations in diverse fields such as agriculture, medicine, energy and environmental management.

As we understand, the global population is projected to approach 9.7 billion by 2050 but arable land per person is shrinking and freshwater resources are depleting. Conventional approaches to farming, manufacturing and medicine cannot scale fast enough on their own to fulfil the demands of rising population. Here,

biotechnology offers a unique alternative by reprogramming biological processes such as photosynthesis, fermentation, cellular repair, microbial metabolism, so that nature itself does more with a fraction of the resource footprint of traditional industrial methods.

Industrial biotechnology is reshaping rapidly. Fermentation platforms once used mainly for beer and yoghurt are now engineered to produce bioplastics, specific chemicals and alternative proteins by displacing petroleum-derived inputs.

Now, this field is no longer confined to the laboratory benches, it acts at the intersection of biology, engineering and data science. Its outcomes now touch nearly every sector of the economy including the food on our plates, the fuel in our tanks, the medicines in our clinics, the materials in our factories and many more.

As the world is heading towards 2030 Agenda for Sustainable Development, biotechnology has emerged as a cross-cutting enabler rather than a niche discipline.

TRANSFORMING OUR WORLD:



THE 2030 AGENDA FOR
SUSTAINABLE DEVELOPMENT

Branches of Biotechnology and the Sustainability Payoff.

Branch	Core Focus	Sustainability Payoff
Agricultural Biotechnology	Gene editing, Precision breeding, Soil microbiome engineering, Biofertilizers, Biopesticides, Green catalyst technologies	Feeding more people on less land, Higher yields, Less water and agrochemical use
Industrial Biotechnology	Fermentation, Engineered enzymes, Bioplastics, Biochemicals, Bionanomaterials	Displaces petroleum-based chemicals and materials
Environmental Biotechnology	Bioremediation, Biosensors, Waste-to-resource platforms	Cleans polluted sites; Turns waste into raw material
Health Biotechnology	Gene therapy, Stem cells, mRNA platforms, Genome and metagenomic sequencing	Faster diagnosis and root-cause treatment of diseases

Mapping Biotechnology onto the United Nation's Sustainable Development Goals

Industry analysts, including joint reporting from global biotechnology trade bodies, have mapped biotech's contributions against the following UN's 17 Sustainable Development Goals (SDGs). This mapping reframes biotechnology not as a single industry in isolation but as an infrastructure layer that other sectors such as agriculture, energy, health, manufacturing, build upon.

• Sustainable Development Goal 2 (Zero Hunger):

The stabilisation of crop yields under increasingly variable climatic conditions represents a central application of modern genomic technologies in agriculture. Precision breeding methods, including CRISPR-CAS mediated gene editing and marker-assisted selection, enable the targeted modification of genes associated with drought tolerance, pest resistance, and abiotic stress response. The conventional

crossbreeding programmes might take a decade of trial and error to nudge a crop toward hardiness, but gene editing can achieve similar results in much lesser time with far greater precision. As rainfall patterns shift and growing seasons become less predictable, these climate-resilient and pest-tolerant varieties are quietly becoming one of agriculture's best adaptive strategies for maintaining agricultural productivity and food security under adverse climatic scenarios.

• Sustainable Development Goal 3 (Good Health and Well-being):

Advances in gene-editing and molecular diagnostic technologies have substantially expanded the therapeutic and diagnostic landscape for both inherited and infectious diseases. Gene therapies are now reaching directly into the source of the problem, correcting or replacing the faulty instructions written into a patient's DNA. Hence, there is a shift from symptomatic management toward aetiological intervention through this

approach. Concurrently, rapid molecular diagnostic platforms including next-generation sequencing-based assays have markedly reduced pathogen identification times, a capability of particular significance in the context of outbreak-prone or antimicrobial-resistant organisms. The biotechnology contribution was witnessed during COVID times with the development of rapid diagnostic tools and vaccines in a short time. The mRNA vaccine platforms proven during the COVID-19 pandemic continue to be adapted for other infectious diseases and for personalised cancer vaccines, illustrating how a single biotechnological breakthrough can generate years of downstream innovation across completely different disease areas. Collectively, these developments illustrate the dual role of biotechnology in modern healthcare systems, where one side these are enabling curative intervention at the genomic level while simultaneously strengthening epidemiological preparedness and response capacity. In addition, recent platform technologies that simplify complex biologic drug development are also shortening research and development timelines by many months, indirectly reducing the resource cost of bringing new therapies to market.

• Sustainable Development Goal 6 (Clean Water and Sanitation):

The application of biological systems to water treatment and contaminant monitoring has emerged as a key strategy for addressing global water security challenges. Bioremediation, using selected or engineered microbial consortia facilitates the degradation of organic pollutants in soil and water, is being deployed at contaminated industrial sites and in oil-spill recovery, often

at lower cost and disruption than conventional mechanical or physicochemical treatment methods. In parallel, biosensor platforms incorporating enzymatic or whole-cell reporter systems permit the real-time, high-sensitivity detection of trace contaminants, enabling early intervention prior to large-scale contamination events. Beyond municipal water treatment infrastructure, industrial adoption of biotechnological water-recycling processes has contributed to measurable reductions in water intensity across manufacturing sectors, aligning industrial practice with broader water-resource conservation objectives.

• Sustainable Development Goal 7 (Affordable and Clean Energy):

Biologically derived energy sources constitute an increasingly significant component of the global transition toward low-carbon energy systems. Biofuel production, utilising lignocellulosic, algal and microbial feedstocks, has achieved substantial commercial scale. This growth reflects continued advances in fermentation efficiency, feedstock diversification, and enzymatic conversion processes. Meanwhile, microbial fuel cells are opening an entirely different frontier, a source of clean power, harnessing bacteria that generate electricity as a byproduct of their metabolism. These developments will reduce world's dependence on fossil fuels. Biotechnological interventions can demonstrate that some of the cleanest energy solutions on the horizon might come not from mining the earth, but from cultivating life itself. These technologies highlight the expanding role of biological systems in diversifying the global renewable energy portfolio.

• Sustainable Development Goal 8 (Decent Work and Economic Growth):

The biotechnology sector constitutes a substantial driver of economic growth and high-skill employment in addition to its scientific and environmental contributions. Behind every breakthrough therapy, engineered crops, or industrial enzymes are a vast and growing economic engine. Valued in hundreds of billions of dollars globally, the sector encompasses a broad employment base spanning research and development, bioprocess engineering, regulatory affairs, and advanced manufacturing. The capital-intensive nature of biomanufacturing infrastructure further positions biotechnology as a catalyst for regional economic development, attracting sustained investment in both established and emerging biotechnology hubs. This growth isn't confined to a handful of wealthy nations, but biotechnology hubs are emerging worldwide, creating high-skill jobs and drawing manufacturing investment into regions eager to diversify their economies. This dual capacity to generate scientific innovations while simultaneously fostering knowledge-based economic growth, situates the biotechnology sector as a significant contributor to the broader objective of inclusive and sustainable economic development. Large bio-manufacturing and contract-development organisations are also formalising sustainability as a core performance metric rather than a side commitment.

Strengths and Challenges for Biotech Developments

Biotechnological processes frequently operate with lower energy and material inputs than their industrial counterparts, as biological catalysts and organisms can perform complex synthesis, degradation, or remediation tasks under mild conditions that would otherwise require intensive chemical or mechanical processing. Furthermore, its rapid pace of methodological innovation exemplified by advances in genome editing, synthetic biology, and high-throughput sequencing has substantially shortened development timelines, enabling faster translation from discovery to real-world application. This combination of precision, efficiency, and adaptability positions biotechnology as a uniquely versatile tool for addressing pressing global challenges, from food security and disease burden to climate change and resource scarcity, while continuing to generate substantial economic and scientific value.

Biotechnology's promise is real, but so are its complications. Public trust in gene-edited food remains uneven across regions, and regulatory frameworks vary widely, creating uncertainty for researchers and companies alike. Equitable access is another concern because advanced gene therapies and precision diagnostics remain expensive, and without deliberate policy attention, the benefits of biotechnology risk concentrating in wealthier countries and populations. Intellectual property regimes, biosafety oversight, and the environmental risks of releasing engineered organisms into open ecosystems all require careful, ongoing

governance. The biosafety and dual use concerns remain a policy question. International coordination on biosafety standards, transparent research practices and public engagement will all be needed to keep pace with science. There is also a data and standardisation gap. Researchers reviewing the sustainable biotechnology literature have called for standardised performance metrics and stronger integration with circular economy models. It is commonly argued that without common ways of measuring "sustainability," it becomes difficult to compare technologies fairly or to hold industry claims accountable. Hence, standardised metrics, biosafety oversight and public trust remain the biggest bottlenecks to scaling these technologies responsibly.

Biotechnology: The Road Ahead for Achieving Sustainability

Biotechnology now touches food, energy, health, water and manufacturing and making it a cross-cutting enabler of nearly every UN Sustainable Development Goal. Waste-to-resource platforms and green biomanufacturing show sustainability being built into industrial processes, not bolted on afterward. While much of the commercial spotlight falls on well-funded biotech hubs in North America, Europe and East Asia, some of biotechnology's most consequential sustainability applications are unfolding in low and middle-income countries. Locally adapted crops, vaccines and diagnostics are extending biotechnology's benefits beyond wealthy research hubs. Drought and flood

tolerant rice varieties, developed through marker-assisted and gene-editing techniques, are being trialed and adopted across South and Southeast Asia, where smallholder farmers are especially exposed to erratic monsoons. Locally produced vaccines and diagnostics, built on biotechnology platforms transferred or licensed from global manufacturers, are reducing the lag between when a health threat is identified and when a country can respond to it domestically rather than waiting on imports. Biotechnology based water purification systems and low-cost biosensors are also being deployed in regions without reliable, centralised water infrastructure, offering point-of-use testing for contaminants at a fraction of the cost of laboratory analysis.

The next decade of biotechnology is likely to be defined less by single breakthrough discoveries and more by integration of gene editing with data-driven breeding, industrial fermentation with circular-economy waste streams, of genomics with everyday clinical practice. Interdisciplinary collaboration between biologists, engineers, policymakers and communities will determine how quickly, and how equitably, these biotech-based tools reach the people and ecosystems that need them most. Biotechnology is no longer a peripheral solution to sustainability challenges; in fact, it is becoming a part of the operating system of a more resource efficient and resilient global economy. Finally, we can say, although the organisms driving biotechnology innovations are small, the implications are not.

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Creating Sustainable Futures

By *Dr. Wahied Khawar Balwan*

Introduction

Sustainability pathways refer to strategies and approaches that enable societies to achieve economic and social progress while protecting the environment and ensuring that natural resources remain available for future generations. Sustainability requires a balance between economic growth, environmental protection, social justice and human well-being.

Three major pillars of sustainable development are Science, Innovation and Inclusive Development. Science provides knowledge about environmental and social challenges, innovation converts knowledge into practical solutions, and inclusive development ensures that the benefits of progress reach all sections of society.

Science and Sustainability

Science plays a fundamental role in understanding the causes and consequences of environmental and social problems.

The major contributions of science are:

Understanding climate change: Scientific research explains global warming, greenhouse gases and changing climate patterns.

Biodiversity conservation: Ecology and genetics help identify threatened species and develop conservation strategies.

Sustainable agriculture: Agricultural science promotes improved crops, efficient irrigation and soil conservation.

Renewable energy: Physics and engineering support the development of solar, wind, hydro and other clean-energy technologies.

Water management: Hydrology and environmental science help in groundwater conservation, wastewater treatment and efficient water use.

Public health: Biomedical and environmental sciences contribute to disease prevention, sanitation and healthier communities.

Pollution control: Chemistry and environmental science help identify pollutants and develop methods for reducing them.

Scientific evidence allows governments and communities to make informed decisions rather than relying on assumptions. It also helps predict environmental changes and assess the long-term consequences of development activities.

Innovation for Sustainability

Innovation means developing and applying new ideas, technologies, processes or methods to solve problems more effectively.

Innovation can make economic activities more efficient while reducing environmental damage.

Examples of sustainable innovation

Area	Sustainable Innovation
Energy	Solar panels, wind turbines, energy-storage systems
Agriculture	Precision farming, drought-resistant crops, drip irrigation
Transport	Electric vehicles, public transport and non-motorized transport
Industry	Energy-efficient machinery and cleaner production
Waste	Recycling, composting and waste-to-energy technologies
Water	Desalination, water recycling and rainwater harvesting
Construction	Green buildings and low-carbon materials
Digital technology	Smart grids, sensors and data-driven resource management

Green and Digital Technologies

Technologies such as artificial intelligence, Internet of Things (IoT), satellite monitoring, biotechnology and advanced materials can contribute to sustainability by improving resource efficiency and monitoring environmental changes.

However, technology alone cannot solve sustainability problems. Innovation must be affordable, accessible, environmentally responsible and socially beneficial.

Inclusive Development

Inclusive development means ensuring that all people including disadvantaged and marginalized communities have the opportunities to participate in and benefit

from economic, technological and social progress.

Sustainable development cannot be achieved if economic growth increases inequality or excludes vulnerable populations. The key dimensions of inclusive development are:

Social inclusion: Equal access to education, healthcare, housing and basic services.

Economic inclusion: Access to financial resources, employment opportunities and entrepreneurship.

Gender inclusion: Equal opportunities and participation of women and girls.

Rural inclusion: Improved infrastructure, connectivity and livelihood opportunities in rural areas.

Digital inclusion: Affordable access to digital technologies and digital literacy.

Educational inclusion: Quality education and scientific opportunities for all.

Participation: Involving local communities in decisions affecting their environment and livelihoods.

Relationship between Science, Innovation and Inclusive Development

These three components are closely interconnected:

Science → Knowledge → Innovation → Practical Solutions → Inclusive Access → Sustainable Development

For example, scientific research may identify water scarcity as a major problem. However, Innovation can produce efficient irrigation

and water-recycling technologies, while Inclusive development ensures that these technologies are affordable and accessible to small farmers and rural communities, not only large commercial enterprises.

Thus, sustainability requires a science–innovation–society connection.

Major Sustainability Pathways

A. Transition to Renewable Energy

Moving from fossil fuels toward renewable energy can reduce greenhouse-gas emissions and improve energy security. Important pathways include:

- Solar and wind energy
- Small-scale decentralized energy systems
- Energy-efficient appliances
- Battery and energy-storage technologies
- Smart electricity grids
- Clean cooking technologies

B. Sustainable Agriculture

Agriculture must produce sufficient food while conserving soil, water and biodiversity. Approaches include:

- Organic and ecological farming
- Precision agriculture
- Drip irrigation
- Crop diversification
- Integrated pest management
- Climate-resilient crops
- Agroforestry

C. Circular Economy

The traditional model is: Take → Make → Use → Dispose

A circular economy aims to: Reduce → Reuse → Repair → Recycle → Recover

This reduces resource consumption and waste generation.

D. Sustainable Cities

Rapid urbanization creates challenges such as pollution, traffic congestion, waste and housing shortages. Sustainable cities require:

- Public transportation
- Green spaces
- Energy-efficient buildings
- Waste segregation and recycling
- Sustainable water management
- Affordable housing
- Smart-city technologies

E. Conservation of Biodiversity

Healthy ecosystems provide food, clean water, pollination, climate regulation and other essential services. Sustainability pathways include:

- Protected areas
- Wildlife conservation
- Habitat restoration
- Sustainable forestry
- Marine conservation
- Community-based conservation
- Control of invasive species

Role of Education

Education is a powerful pathway toward sustainability. It develops:

- Environmental awareness
- Scientific thinking
- Problem-solving skills
- Innovation and entrepreneurship
- Responsible consumption
- Community participation

Education for Sustainable Development (ESD) encourages learners to understand the relationship between environmental, social

and economic systems and to develop solutions for real-world problems.

Challenges

Despite significant scientific and technological progress, several barriers remain:

- Poverty and inequality
- Limited access to technology
- High initial costs of green technologies
- Lack of infrastructure
- Climate change
- Overconsumption of natural resources
- Digital divide
- Weak environmental governance
- Resistance to technological and social change
- Unequal distribution of benefits

Therefore, sustainability strategies must consider both technological feasibility and social realities.

Way Forward

A successful sustainability pathway should focus on:

- Evidence-based policymaking
- Investment in scientific research
- Promotion of green innovation

- Affordable and accessible technology
- Renewable energy transition
- Sustainable agriculture and food systems
- Circular economy principles
- Protection of biodiversity
- Quality education and skill development
- Gender equality and social inclusion
- Community participation
- International cooperation

Conclusion

Science, innovation and inclusive development are complementary pathways toward sustainability. Science provides the necessary knowledge needed to understand complex challenges, innovation transforms knowledge into practical solutions, and inclusive development ensures that these solutions benefit society fairly.

The ultimate goal is not simply technological advancement or economic growth, but the creation of a society in which human well-being, environmental protection and economic prosperity can coexist. Sustainable development therefore requires a transition toward cleaner technologies, responsible resource use, inclusive institutions and active participation of communities.

“Any error in this manuscript is silent testimony of the fact that it was a Human effort.”

Dr. Wahied Khawar Balwan

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From Scientific Inquiry to Sustainable Innovation

By Dr. Dinesh Kumar

Science for a Sustainable Future

Science has never been merely a collection of facts, formulas and theories to be remembered for an examination. At its heart, science is a disciplined way of asking questions, testing ideas and using evidence to understand the world. In the twenty-first century, this way of thinking has acquired even greater significance as humanity confronts challenges that are interconnected, complex and global in scale.

Climate change, water scarcity, food security, public health, biodiversity loss, energy transition and technological inequality cannot be addressed through isolated interventions. They require knowledge, evidence, innovation and collective action. This is where science becomes a pathway to sustainable development.

The United Nations Sustainable Development Goals (SDGs) provide an important global framework for this endeavour. SDG 4: Quality Education, SDG 9: Industry, Innovation and Infrastructure, SDG 10: Reduced Inequalities, and SDG 13: Climate Action are particularly relevant to the relationship between science, education and sustainable development. The wider SDG framework also connects education and innovation with poverty reduction, sustainable resource use, climate action and global partnership (United Nations, n.d.). (Sustainable Development Goals)

For India, therefore, strengthening science is not simply a question of producing more laboratories, researchers or examination achievers. The larger task is to develop a society in which scientific thinking informs decisions, innovation addresses real problems and the benefits of scientific progress reach people across geographical, social and economic boundaries.

This calls for a movement from science education to science for sustainable development.

Scientific Temper: Where the Journey Begins

The foundation of such a transformation is scientific temper. The idea, strongly associated with India's post-independence vision of modernity and development, is rooted in rational enquiry, evidence, openness to questioning and willingness to revise one's understanding when evidence changes.

This disposition is particularly important in an age of misinformation, pseudoscience and rapidly circulating unverified claims. A scientifically informed citizen does not accept a claim merely because it is popular; nor does one reject a new idea simply because it is unfamiliar. Instead, the individual asks: What is the evidence? How was it obtained? Can it be tested? What are its implications?

Scientific temper consequently has a direct connection with sustainable living. Decisions concerning water consumption, energy use, nutrition, public health, waste management and environmental protection increasingly require people to understand evidence and distinguish reliable information from misinformation.

The sustainable future we seek will therefore depend not only on sophisticated technologies but also on citizens capable of using reason responsibly.

Reimagining Science Education

The school is one of the most important places where this culture can be cultivated. Yet science can lose its vitality when learning becomes dominated by memorisation of definitions, diagrams and examination answers.

The real question is not whether students can reproduce a scientific fact, but whether they can use scientific thinking when confronted with a problem.

A lesson on energy, for instance, can move beyond definitions of kinetic and potential energy to an investigation of household energy consumption and the possibilities of conservation or renewable sources. A lesson on water can lead students to examine local water quality, wastage and conservation. Biology can become an entry point for understanding biodiversity, nutrition and public health. Physics can help students investigate energy efficiency, transport and climate-related technologies.

Such approaches make learning experiential and purposeful. They also correspond closely with the educational direction articulated in National Education Policy 2020 (NEP 2020),

which emphasizes experiential learning, critical thinking, multidisciplinary education and deeper conceptual understanding (Ministry of Education, Government of India, 2020). (Education Government of India)

Science education should therefore help students move through a continuum:

Curiosity → Investigation → Understanding
→ Problem-solving → Innovation → Impact

This is a more meaningful measure of scientific learning than the ability to reproduce information under examination conditions.

The Teacher as a Catalyst

No transformation in science education can succeed without empowering teachers. The teacher is not simply the person who delivers scientific information; the teacher creates the intellectual environment in which curiosity either flourishes or fades.

In my view, one of the most important responsibilities of a science teacher is to create a classroom where a student is not afraid to ask an apparently simple question. A question such as “Why does this happen?” or “Can we do this differently?” may be the beginning of scientific thinking.

Teachers can make this possible by connecting textbook concepts with observations from everyday life, encouraging experimentation, allowing students to learn from failure and giving them opportunities to investigate local problems.

A school science laboratory should therefore not be viewed merely as a room containing apparatus. It should become a space for questioning, testing, collaboration and creation.

Even where resources are limited, a culture of experimentation can be developed through locally available materials, low-cost models, digital simulations, field observations and community-based investigations. What matters most is not always the sophistication of the equipment, but the quality of the question being investigated.

Inclusive Science: Ensuring No One Is Left Behind

Scientific progress cannot be called sustainable if access to scientific opportunity remains unequal.

The innovation ecosystem must include girls, rural learners, students from economically disadvantaged families and young people studying in schools where sophisticated facilities may not be readily available. Otherwise, talent may remain invisible simply because opportunity is unevenly distributed.

This is not merely an educational concern. It is a development concern.

A talented student in a remote village may have the same curiosity as a student in a well-equipped urban school but may not have the same access to laboratories, mentors, competitions or digital resources. Mobile science laboratories, virtual laboratories, low-cost experimental kits, online learning resources, mentorship programmes and partnerships between institutions can help narrow this gap.

Gender inclusion is equally important. Encouraging girls to participate confidently in science, technology, engineering and mathematics is not simply about increasing representation; it expands the country's pool

of scientific talent and strengthens the diversity of perspectives within innovation.

The objective should be simple: no child's scientific potential should be limited by geography, gender or economic circumstance.

From Curiosity to Indian Innovation

India's scientific achievements provide powerful evidence that scientific knowledge can be translated into solutions of immense social value.

The work of the Indian Space Research Organisation (ISRO) offers a particularly compelling example. India's Earth-observation capabilities support applications in agriculture, water resources, forestry, biodiversity, weather and climate, rural and urban development, and disaster management (ISRO, n.d.-a). (ISRO)

ISRO's agricultural applications, for example, use satellite remote sensing for crop-area and crop-yield estimation, crop-condition assessment, soil information and other applications relevant to agricultural planning and food security (ISRO, n.d.-b). (ISRO)

Similarly, satellite-based information contributes to the assessment and management of water resources. ISRO notes applications involving surface and groundwater, hydrological modelling and water-resource monitoring (ISRO, n.d.-c). (ISRO)

These examples offer an important lesson for young learners: advanced science becomes most meaningful when it addresses real human and environmental needs.

The same principle applies to research and innovation in areas such as renewable

energy, sustainable agriculture, biotechnology, water management, waste reduction and climate resilience. The Council of Scientific and Industrial Research (CSIR), for instance, maintains technology resources covering areas including water technologies and waste-to-wealth technologies (CSIR, 2026). (CSIR)

The next challenge is to create stronger pathways connecting school-level curiosity with higher education, research institutions, entrepreneurship and industry.

A student who begins by identifying a local problem should be able to progress from observation to investigation, from investigation to prototype and eventually from prototype to a viable solution.

This is where start-ups, green technologies and social innovation become important. Innovation should not be presented to students simply as a means of winning competitions; it should be presented as a means of creating solutions that are useful, responsible and sustainable.

Science for Inclusive Development

Science acquires its deepest social meaning when it moves beyond institutions and becomes part of community problem-solving.

A village facing water-quality concerns, for example, can become a setting for students to investigate water sources, analyse possible causes and discuss conservation measures. Communities dealing with waste can explore segregation, recycling and resource recovery. Local biodiversity can become the focus of citizen-science projects in which students and residents document species and environmental changes.

Such activities transform people from passive recipients of scientific information into participants in scientific enquiry.

This is the significance of citizen science and participatory science. Local knowledge, community observations and scientific methods can complement one another. Schools can act as bridges connecting communities with scientific institutions, local administration and environmental organisations.

The result is a more democratic model of science, one in which people do not merely hear about scientific solutions but participate in identifying problems and developing responses.

Science, Policy and the Sustainability Imperative

A sustainable science ecosystem requires supportive public policy. India's NEP 2020 provides an important educational foundation by encouraging experiential learning, critical thinking, multidisciplinary education and greater flexibility in learning (Ministry of Education, Government of India, 2020). (Education Government of India)

This educational vision needs to be connected with the country's wider sustainability priorities.

Climate education, green skills, responsible technology use and environmental awareness should increasingly become part of the learning experience rather than isolated themes. Young people entering the workforce will encounter expanding opportunities in renewable energy, environmental science, climate technology, sustainable agriculture, biotechnology, data-driven resource management and other emerging fields.

India's Mission LiFE (Lifestyle for Environment) offers another useful example of linking sustainability with everyday choices. The initiative promotes environmentally responsible lifestyles and emphasizes the role of individuals and communities in creating a sustainable future (Ministry of Environment, Forest and Climate Change, Government of India). (MoEFCC)

Such initiatives demonstrate an important principle: technological solutions and behavioural change must work together. Scientific innovation can provide better solutions, but society must also develop the knowledge and habits required to use resources responsibly.

The Challenges We Must Confront

The pathway is promising, but it is not without obstacles. Examination pressure can discourage exploration; unequal access can restrict participation; gender disparities can narrow the talent pool; and inadequate mentorship can prevent promising students from seeing pathways into research and innovation.

There is also a need to strengthen the connection between education, research and employment so that talented young people see meaningful opportunities within India's scientific ecosystem.

These challenges cannot be solved by schools alone. Families, educational institutions, universities, research organisations, industry, policymakers and communities all have a role to play.

The measure of a successful science ecosystem should therefore include not only the number of researchers or patents

produced, but also who gets to participate, which problems are being solved and who benefits from the solutions.

Inspiring the Next Generation

Young people need scientific role models who demonstrate not only achievement but also curiosity, perseverance and service to society. Dr. A. P. J. Abdul Kalam remains a powerful example of how scientific aspiration can relate to national development and the dreams of young people.

But inspiration should not come only from celebrated scientists. A local teacher who develops a low-cost experiment, a student who solves a community problem, a farmer who adopts a scientific innovation or a young entrepreneur developing a sustainable technology can also become a role model.

Stories of unsuccessful experiments and persistent efforts are equally valuable. They teach students that innovation rarely emerges fully formed. It develops through observation, questioning, failure, refinement and perseverance.

The ultimate educational goal should therefore be to nurture young people who are not afraid to ask questions, test possibilities and take responsible action.

Conclusion:

Three Pillars, One Sustainable Future

The future of science should be imagined not as a race for technological advancement alone, but as a journey towards a future that is scientifically informed, innovative, inclusive and sustainable.

- At the centre of this journey are three interconnected pillars.

- Science gives us the evidence and knowledge to understand the challenges before us.
- Innovation transforms knowledge into practical, scalable and responsible solutions.
- Inclusion ensures that opportunities to participate in and benefit from scientific progress are not restricted to a privileged few.

When these three forces converge, they create pathways towards sustainable development.

The challenges of climate change, water and food security, public health, biodiversity loss, energy transition and inequality demand precisely such convergence. No single discipline, institution or technology can address them alone.

The responsibility of education is therefore much larger than preparing students for examinations. It is to prepare them to understand their world, question responsibly, collaborate across disciplines, develop solutions and contribute meaningfully to society.

The science classroom can become the starting point of that transformation.

A question asked by a child today may become an investigation tomorrow, an innovation in the future and, ultimately, a solution that improves lives.

That is why the pathway matters:

Science → Innovation → Inclusion → Sustainability

The real measure of scientific progress will not be only how much humanity discovers, but how wisely that knowledge is used and how widely its benefits are shared.

A sustainable future will be built when scientific curiosity becomes innovation, innovation becomes inclusive opportunity, and inclusive opportunity becomes meaningful change for people and the planet.

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India's Indigenous Blueprint for Sustainable Living

By Dr. Neha Sharma

Long before "Science Tourism" entered mainstream policy conversations in India, the **Vigyan Setu Foundation** had spent more than a decade building its modern Indian framework. The foundation's Managing Trustee, Dr Lalit Sharma, did not simply borrow a global travel category; they reshaped it. Where the term had typically pointed to research laboratories and ecological hotspots, they widened it to include the decoding and protection of our scientific heritage, encouraging visitors to see India's famous historic monuments through the lens of physics, engineering and astronomy.

While Science Tourism is a global concept, it was the **Vigyan Setu Foundation** that anchored it in India, championing it well before 2020 as a vital tool for public science communication and heritage preservation. As this article explores the intersection of travel and discovery under the theme of Sustainability Pathways, we owe the Foundation and Dr Sharma a real debt of gratitude for shifting how we look at our rich scientific heritage. It is in that spirit that this article reads India's built heritage as a body of engineering, and as a guide to building sustainably today.

Much earlier than the rise of "sustainability" as a design framework, India's builders were deeply fluent in its philosophy. Across deserts, coastlines, mountains, and floodplains, vernacular architecture evolved

not from certification checklists but from necessity arising from communities reading their climate, their soil, and their materials with extraordinary precision. As the built environment sector scrambles to decarbonise, there is a quieter, more overlooked opportunity: looking backward before looking abroad.

Water as the First Design Brief

In Rajasthan and Gujarat, water scarcity produced some of the most sophisticated hydrological architecture in the world: the stepwells, or *baolis*. Structures like *Rani ki Vav* or *Chand Baori* are often admired for their geometry, but their real genius is thermal and ecological: descending storeys of stone create a cool microclimate even in punishing heat, while the well itself recharges groundwater and buffers seasonal drought. These weren't just wells; they were community infrastructure, social space, and climate control rolled into one.

Similarly, the *Charbagh* garden systems and stepped tanks across the subcontinent treated water circulation as inseparable from architectural planning, which is a lesson, modern urban design is only now relearning through the language of "blue infrastructure."

Passive Cooling before Air Conditioning

The perforated stone or lattice screens, better known as the *jaalis*, seen in Rajasthani

havelis is a masterclass in passive design. By diffusing sunlight and accelerating air movement through the Venturi effect, *jaalis* cool interiors without mechanical intervention, while also managing privacy and glare. This single architectural element performs simultaneously as climate control, light modulation, and cultural expression.

In the hot-humid south, the courtyard house (*nalukettu* in Kerala, *chettinad* homes in Tamil Nadu) uses a central open-to-sky courtyard to drive stack ventilation, where the hot air rises and escapes, pulling cooler air through shaded verandas below. Deep eaves and sloped tiled roofs manage monsoon rainfall while shading walls from direct heat gain. None of these required imported HVAC thinking; it required attentive observation of airflow and sun path.

Material Intelligence

Perhaps the most quietly radical aspect of Indian vernacular building is its material restraint. Mud, lime, bamboo, thatch, laterite, and cow-dung plaster were not "low-tech" compromises. They were high-performing, locally sourced, biodegradable, and thermally intelligent choices. Laterite stone in coastal Kerala breathes with humidity. Lime plaster, unlike cement, allows walls to regulate moisture rather than trap it, reducing damp and extending building life. Bamboo, now being re-engineered in labs as a "future material," was already load-bearing architecture in the Northeast and Western Ghats centuries ago.

Even agricultural residues including jute, coir, husk and the likes, found their way into construction and insulation, an early form of

circular economy where waste from one system became input for another. This resonates strongly with today's push toward bio-based acoustic and thermal materials, an area where the built environment is still catching up to what artisanal knowledge encoded generations ago.

Built to Survive

High-Altitude Passive Solar Design

In Ladakh, traditional homes flip the passive strategy entirely: thick rammed-earth or mud-brick walls store heat, small deep-set windows minimise loss, and south-facing orientation with sun-trapping courtyards captures maximum solar gain in a high-altitude desert. This is passive solar design, executed without a single simulation software, refined instead through generations of trial, error, and inherited memory.

Engineering for Earthquakes

Vernacular builders were not only responding to heat and water; they were also engineering for survival. In Kutch, the circular *bhunga* houses, with their mud walls, lightweight conical thatched roofs and a round plan that leaves no vulnerable corners, became well known for how many of them stood through the devastating 2001 earthquake while rigid masonry around them failed. In Kashmir, *dhajji dewari* construction laces a timber frame through masonry infill, so the walls can flex and dissipate seismic energy rather than resist it until they crack. Both systems accept movement instead of fighting it, which is a principle modern seismic codes arrived at through very different means.

Adapting to Floods and Slopes

In the flood-prone plains and hills of the Northeast, the answer is lightweight bamboo architecture raised on stilts. Lifting the living floor above rising water lets floods pass beneath the house, while bamboo's flexibility and low weight make the structure forgiving under stress. The same stilted typology also adapts to sloping ground with minimal excavation, which is useful in landslide-prone terrain. If a house is damaged, it can be repaired or rebuilt from locally grown material.

Resilience as Sustainability

There is a sustainability argument here that is easy to overlook: resilience is itself a form of low-carbon design. A building that survives a hazard does not need to be rebuilt, and one made of light, natural, repairable materials does far less harm when it is stressed to its limits.

Reviving Indigenous Architecture

The risk in "reviving" indigenous architecture is treating it as a nostalgic aesthetic rather than functional system. The real opportunity lies in extracting the underlying principles such as passive thermal regulation, water-sensitive design, hazard-resilient construction, hyper-local material sourcing, adaptable community-scale infrastructure,

and re-embedding them into contemporary practice, codes, and specification culture, rather than merely referencing them as heritage motifs.

This also means taking indigenous knowledge seriously as engineering, not folklore. Many of these systems were never formally documented in journals or standards, but they were empirically tested over centuries, at scale, under real climatic stress. That is arguably a more rigorous dataset than most modern products can claim.

As the built environment searches for its sustainable future, some of the most useful answers may not need inventing. They need remembering and then translating into the specifications, certifications, and building codes that shape what gets built today.

Whether you are seeking to explore the depths of Science Tourism or looking for the right tools to communicate it to your audience, I strongly encourage you to reach out to **Vigyan Setu Foundation**, the pioneers driving Science Tourism in India. They frequently organise online presentations and short courses on this topic

Do contact us directly via a quick email:
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Vigyan Setu Foundation Awards 2026

Call for Nominations

Vigyan Setu Foundation Awards 2026

Connecting Science with Society for a Healthier, Informed and Sustainable Future

The Vigyan Setu Foundation Awards 2026 celebrate individuals and institutions whose sustained efforts are helping make scientific knowledge more accessible, relevant and useful to society. The Awards recognize meaningful contributions towards promoting scientific temper, addressing important health concerns, communicating scientific heritage, and strengthening public understanding of issues affecting people, animals and the environment.

The Vigyan Setu Foundation Awards 2026 cover **four important areas** of societal engagement with science:

Popularization of Science Recognizing impactful science communication, public engagement, lectures, exhibitions, demonstrations, workshops, school and community outreach, and innovative use of print, digital and social media to make science understandable and connected with everyday life.

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Promotion of Science Tourism Celebrating innovative use of tourism as a medium for science communication and experiential learning, including scientific museums and institutions, heritage sites, biodiversity, astronomy, geology, technology and industrial heritage. The Award particularly recognizes initiatives where tourism becomes a meaningful tool for **learning, interpretation and public engagement with science.**

Public Health Advocacy Recognizing science-based initiatives addressing public health, particularly through the **One Health perspective** linking human, animal and environmental health. Areas include zoonotic diseases, rabies prevention, emerging and re-emerging infections, antimicrobial resistance, veterinary public health, food safety, vector-borne diseases and community health education.

The Awards are open to **individuals with at least three years of meaningful contribution** and to institutions with a demonstrated track record of at least three years in the relevant field. Both ongoing and completed initiatives are eligible. Contributions are assessed with attention to **originality and innovation, social impact and outreach, sustainability and scalability, and relevance to the selected category.**

The nomination window will remain open from **1 October to 15 November 2026**. Self-nominations as well as nominations by others, with the nominee's consent, may be submitted. Only one nomination per individual or institution will be accepted for the award year.

Recipients will receive a **Citation and Memento**, along with recognition on the Vigyan Setu Foundation's website, public and social-media announcement, and a feature in the Vigyan Setu e-magazine. The Awardees will be announced on **12 December 2026**, the Foundation Day of Vigyan Setu Foundation.

Vigyan Setu Foundation Awards 2026 seek to acknowledge those who go beyond communicating science to **connecting science with society** building awareness, encouraging informed action and creating meaningful bridges between scientific knowledge and everyday life.

For nomination details and guidelines, visit the page [Vigyan Setu Foundation Awards 2026](#)

Vigyan Setu e-magazine 2027

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All contributions will undergo a standard editorial screening for relevance, quality, and adherence to guidelines.

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विज्ञान सेतु ई-पत्रिका

वार्षिक सदस्यता

विज्ञान सेतु ई-पत्रिका, एक त्रैमासिक, द्विभाषी (अंग्रेजी-हिंदी) डिजिटल प्रकाशन है, जिसका पंजीकरण नंबर ISSN: 3107-9822 (ऑनलाइन) है, वैज्ञानिक जागरूकता, वैज्ञानिक दृष्टिकोण और विज्ञान-समाज सहभागिता को बढ़ावा देने के लिए समर्पित है। वर्ष २०२७ के लिए पाठकों, शिक्षकों, शोधकर्ताओं और विज्ञान संचारकों को वार्षिक सदस्य के रूप में जुड़ने के लिए आमंत्रित किया जाता है।

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यह सदस्यता शुल्क चार अंकों, जनवरी-मार्च २०२७, अप्रैल-जून २०२७, जुलाई-सितंबर २०२७ (थीम / विषय-वस्तु आधारित), और अक्टूबर-दिसंबर २०२७ के लिए मान्य होगा।

सदस्यों के लाभ

- १ चार डिजिटल अंक: सदस्यता अवधि के दौरान प्रकाशित सभी चार त्रैमासिक अंकों तक पहुँचा
- २ साहित्यिक योगदान का अवसर: सदस्य, वर्ष २०२७ के लिए अधिकतम चार लेख या लेखन भेज सकते हैं—एक कृति प्रति अंक।
- ३ साहित्यिक योगदान का प्रमाणपत्र: जिन सदस्यों के लेख/लेखन प्रकाशित होंगे, उन्हें ई-प्रमाणपत्र ईमेल के माध्यम से भेजा जाएगा।

प्रेषण दिशानिर्देश (Submission Guidelines)

- १ नैतिक एवं बौद्धिक संपदा अनुपालन
सभी प्रस्तुतियाँ नैतिक मानकों और बौद्धिक संपदा अधिकारों का सम्मान करें।
योगदान मौलिक एवं साहित्यिक चोरी (Plagiarism) से मुक्त होना चाहिए।
उद्धृत सामग्री का उचित संदर्भ देना आवश्यक है।
- २ संपादकीय समीक्षा
सभी लेख/लेखन की प्रासंगिकता, गुणवत्ता और दिशानिर्देशों के अनुपालन हेतु संपादकीय समीक्षा की जाएगी।
प्रकाशन हेतु स्वीकृति पूरी तरह संपादकीय निर्णय पर निर्भर करेगी।
- ३ भाषा
लेख/लेखन अंग्रेजी या हिंदी, किसी भी भाषा में भेजे जा सकते हैं।
- ४ प्रारूप

विस्तृत प्रारूप दिशानिर्देश वेबसाइट (<https://vigyansetufoundation.in/>) पर ई-मैगजीन अनुभाग में उपलब्ध हैं।

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