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April 2025 – June 2025

Vigyan Setu e-magazine

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A quarterly, bilingual e-magazine of Vigyan Setu Foundation®

Contents

Vigyan Setu e-magazine is 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

THE BOWSTRING GLASS BRIDGE, KANYAKUMARI

The Bowstring Glass Bridge in Kanyakumari connects the Vivekananda memorial to the Thiruvalluvar statue. The bridge enhances tourist access and is designed to withstand harsh coastal conditions.

The glass bridge spans 77 metres in length and 10 metres in width, making it a substantial addition to Kanyakumari's landscape. This covered bridge will provide visitors with a unique vantage point of the sea while facilitating easy access between the two iconic monuments. Built using state-of-the-art technology, the glass bridge is designed to withstand harsh marine conditions, including corrosion and strong sea winds. This ensures not only its durability but also the safety of those who traverse it, making it a reliable pathway for future generations.

***Photo credit*: Google images**

From the Editor's Desk

Dr. Neha Sharma

"For I was rich, if not in money, in sunny hours and summer days, and spent them lavishly; nor do I regret that I did not waste more of them in the workshop or the teacher's desk. But since I left those shores…" – Henry David Thoreau

From atop this hidden gem, I came across this impactful quote from Thoreau, and a wave of nostalgia rushed in, reminding me of the summertime richness I'd left behind. On this happy note, let us deep dive into the 2nd Issue of VIGYAN SETU e-magazine, VSF's (Vigyan Setu Foundation®) quarterly, bilingual e-magazine carrying articles, write-ups, and news around the globe, anecdotes, poems, puzzles and much more to sensitize you, amuse you, and make you aware of how Science is a Way of Life.

This issue introduces a trending health topic on the importance of omega-3 from fish oil by Dr Balwan. Our Hindi subject expert, Mr. Gaurishankar, then elaborates on the employment opportunities in the field of Meteorological Sciences. We then proceed to expand our awareness of Light pollution and its issues through the vivid perspective of astronomer and scientist, Dr Sharma.

An interesting write-up on the impact of science on our everyday lives has been shared by Ms Koul. On a similar theme, Dr Punit Kumar has enlightened us with the Science of the Common Indian, reminding us of everyday innovations and our rich traditional knowledge.

We received a unique case study-based article from a research group on the Organic initiative of Vermicomposting.

This was developed by a departmental endeavour for tackling sustainable waste management. The approach is a must read!

In this e-magazine, for the science driven organization, we introduce Tulsi Gaushala, based in Jaisalmer and their initiatives, covered by the chairperson, Mr. Vyas.

Lastly, this issue concludes with an event report on the Oral Health and Anti-Tobacco Awareness Camp that was organized by Vigyan Setu Foundation in collaboration with Dr G. D. Pol Foundation's Y.M.T. Dental College and Hospital, Kharghar. The camp was held on 31st May this year, arranged for the residents of Navi Mumbai

We are very grateful to our contributors for sharing a piece of their expertise and the overall efforts and support of the editorial team, without whom none of this would be worth the quality time of our readers.

Editorial Team

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Dr Neha Sharma is an experienced acoustic engineer specialising in building and environmental acoustics. She has undertaken post graduate research in physical and material acoustics. Her doctoral studies focused on exploring the acoustic capability of sustainable materials by effective characterisation, modelling, and experimental approaches. Along with her interest in scientific endeavours, she also carries competence in Innovation, Management and Leadership.

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Fish Oil and Human Health

Dr Wahied Khawar Balwan

In recent times, seafood is getting more focus on account of its richness in omega-3 fatty acid. Numerous investigations carried out reveal the health benefits of omega-3 fatty acids as a nutritional supplement against various life-threatening diseases like cardiovascular diseases, cancers, skin diseases and many inflammatory diseases etc. They also play a significant role for the proper growth and development of the foetus. National and International health authorities have set up recommendation of daily fish oil intake due to the immense health potential it carries, and it is necessary to create an awareness in the society on its importance, as the modern world has become a hub of various lifestyle diseases.

Fish is considered as a cheap source of many essential nutrients especially fat and protein and hence is of value in human diet. It is highly recommended in the human diet due to its richness in two main fatty acids, eicosapentaenoic acid (EPA) and decosahexaenoic acid (DHA). These two fatty acids are polyunsaturated fatty acids. The main sources of these omega-3 PUFA rich oils are the meat of fatty fish such as sardine, herring, mackerel, menhaden, salmon, the liver of cod and the blubber of marine mammals such as seals and whales.

Fish lipids / oil consists of triglycerides, phospholipids, fatty acids, wax esters, sterols, other minor compounds like glyceryl esters, glycolipids, hydrocarbons like squalene, sulpholipids etc. Phospholipids and sterols are structural components in cell membrane while other lipids act as energy stores and are important for maintaining buoyancy. The fatty acids compositions of fish lipids are more complex with mainly monounsaturated fatty acids (MUFA) along with polyunsaturated fatty acids (PUFA) and some saturated fatty acids in different proportions. PUFAs are mainly contributed by omega-5 and omega-3 fatty acids with former being high in freshwater fishes and the latter being the major contributors in marine fishes. The omega-3 fatty acids which are important in human nutrition are α-linolenic acid, Eicosapentaenoic acid and Docosahexaenoic acid.

FISH OIL FOR HEALTH

Omega-3 fatty acids are dietary fibres having an array of health benefits. They are essential for various metabolic processes, form structural component to the cell membrane, essential for foetal development and is found abundant in brain and retina. Recent investigations conducted on omega-

3 fatty acids has gained more recognition to seafood on account of the health benefit they provide, and this is regarded to be one of the most promising developments in human nutrition. EPA and DHA are precursors for several metabolites which are potential mediators beneficial for the prevention and treatment of numerous diseases. Studies revealed the role of long chain omega-3 PUFAs in the treatment of cardiovascular diseases, hypertension, diabetes, arthritis, depression, migraines, skin diseases like psoriasis, eczema and other inflammatory and autoimmune disorders as well as cancer.

Omega-3 Fatty acids and cardiovascular disease

Cardiovascular disease (CVD) refers to the health disorder associated with heart and related circulatory system. It is a prominent disease in the modern world and is mainly associated with the intake of fat rich in saturated and Trans components. Chronic inflammation is thought to be the cause of many chronic diseases including CVDs. CVDs are associated with the narrowing of large arteries with atheromatous plaques, or the total occlusion of coronary arteries (thrombosis) caused by atheromatous blockages leading to myocardial tissue necrosis. Both conditions reduce the heart's ability to pump blood and can result in either chronic or sudden heart failure. It is becoming apparent that regular consumption of fatty fish or fish oil lowers the rate of incidence and deaths from cardiovascular disease.

The cardioprotective effects of n-3 fatty acids in the combined effect of increased heart rate variability, reduced atheroma development and decreases platelet aggregation. In simple terms, omega-3 fatty acids decrease the platelet aggregation leading to a modest prolongation of bleeding time. Apart from these benefits, omega-3 fatty acid intake results in changes in blood lipid levels. It was observed to reduce the serum triglyceride concentration by 30% with associated increase in HDL (Good Cholesterol). This HDL increase reduces the risk of heart diseases.

Omega-3 Fatty acids and cancer

Cancer is one of the most threatening lifestyle diseases having widespread occurrence irrespective of the generation. Several studies have reported possible anticancer effect of omega-3 fatty acids

particularly in breasts, colon and prostate cancer. Omega-3 fatty acids were found to reduce the tumour growth as well as slowed histopathological progression. Experimental and epidemiological studies suggested anti-tumour effects of n-3 fatty acids during the initiation and post initiation stages of colon carcinoma. Studies carried out in Sweden showed an inverse association between fatty fish consumption and prostate cancer. Similarly, studies conducted in America population also revealed that long term consumption of fish meat and omega-3 fatty acids slowed down the progression of prostate cancer. Few epidemiological studies assessed on the effect of dietary n-3 fatty acids and breast cancer showed their protective effects against breast cancer risk by inhibition breast carcinoma development by influencing the biochemical events that follow tumour initiation.

Omega-3 Fatty acids and inflammatory diseases

EPA and DHA have anti-inflammatory effect and a role in oxidative stress and to improve cellular function through changes in gene expression. Inflammatory Bowel Disease (IBD) is a general term for chronic inflammatory disease of the GI tract which includes ulcerative colitis and Crohn disease. Crohn's disease can affect the small intestine and large intestine, mouth, oesophagus, stomach and the anus whereas ulcerative colitis primarily affects the colon and the rectum. Studies using animal models provide strong evidence for the protective effects of omega-3 fatty acids against induced IBD. Similarly, individuals having lower intake of omega-6/omega-3 ratios were 21% less likely to suffer from Crohn disease.

In vitro and human studies suggest that omega-3 fatty acids serve as effective therapeutic agents for the management of inflammatory arthritic diseases.

Omega-3 fatty acids in mental health and neural function

Human nervous system has the highest lipid content compared to all other tissues excluding adipose tissue. 50-60% of the total dry weight of adult human is lipid and one third being omega-3 PUFAs mostly DHA. Incorporation of DHA into graving neurons is a prerequisite for synaptogenesis. The Canadian Government has reported that DHA have a biological role supporting the normal development of brain, eyes and nerves. Omega-3 PUFAs are known to have membrane-enhancing capabilities in brain cells which are explained to be due to the major role played by them in fortification of the myelin sheaths and are also found beneficial in repairing brain damage by promoting neuronal growth.

Omega-3 fatty acids for foetal development

Supplementing with EPA and DHA in the diet during pregnancy is associated with multiple benefits for the foetal development. Deficiency of DHA during prenatal development increases likelihood of diminished visual activity, cerebellar dysfunction, cognitive impairment and neurological disorders. As per US Department of Health and Human Service Dietary Guidelines (2010) it is recommended that pregnant and breastfeeding mothers should consume about 8-12 ounces of seafood per week from a variety of seafood sources which accounts to nearly 300-900 mg EPA and DHA per day. This is found to be essential for the growth and development of the foetus. Omega-3 supplementation during pregnancy is also associated with longer gestation period and increase in concentration of EPA and DHA in foetal

tissue. This is very important as prematurity is the cause of various infant diseases and can even lead to death.

Omega-3 fatty acids and skin care

Dietary consumption of fish oils rich in omega-3 fatty acids are known to adjust the balance of lipid inflammatory mediators thereby important in the treatment of inflammatory skin disorders. Excessive exposure to UV light is associated with many undesirable skin alterations. Increased exposure to sunlight also increases the likelihood of non-melanoma skin cancer. Studies have shown that dietary supplementation with omega-3 PUFAs provides photo protection by being effective against UV-irradiation induced damage.

Psoriasis is a common skin disorder characterized by epidermal hyperproliferation and cutaneous inflammation. Researchers carried out suggested that an increase in the dietary intake of fish oil and a reduction in the intake of food rich in arachidonic acid (omega-6 fatty acid) would be beneficial treatment to counteract the exaggerated inflammation in psoriasis.

CONCLUSION

Present lifestyle demands more attention towards health foods on account of the aggravating health problems being generated. The ill effects of chronic diseases like cardiovascular diseases, inflammatory conditions etc. can be reduced by regular consumption of seafoods which are rich sources of omega-3 fatty acids like EPA and DHA. Hence more awareness on the importance of this healthy diet needs to be created for the betterment of the society.

'Any error in this manuscript is silent testimony of the fact that it was a human effort'

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मौसम विज्ञान में रोजगार के अपार अवसर

गौरीशंकर वैश्य विनम्र

भारतीय ज्ञान परम्परा में प्राचीनकाल से खेती, अर्थव्यवस्था, मौसम और दैनिक जीवन से जुड़ी अनेक जानकारियाँ बादलों के रंग, हवा की गति, पशु - पक्षियों की गतिविधियों, अनुमान, गहन अनुभव, ज्योतिषीय गणना आदि संकेतों पर आधारित होती थीं। पहले ग्रामीणजन छोटी - बड़ी समस्याओं एवं प्राकृतिक आपदाओं का निदान सूझबूझ से बड़ी सरलता से कर लेते थे, क्योंकि पर्यावरण में आज के जैसी अचानक उथल-पुथल नहीं थी और प्रकृति में चारों ओर घने वृक्ष और हरियाली थी। मौसम में परिवर्तन प्रायः ऋतुओं के अनुसार ही होता था और इसके लिए अधिक चिंतित होने की आवश्यकता नहीं थी। लोग प्राकृतिक आपदा को दैवी प्रकोप मानकर सहन कर लेते थे। मौसम के पूर्वानुमान के विज्ञान आधारित विकसित संसाधन भी नहीं थे।

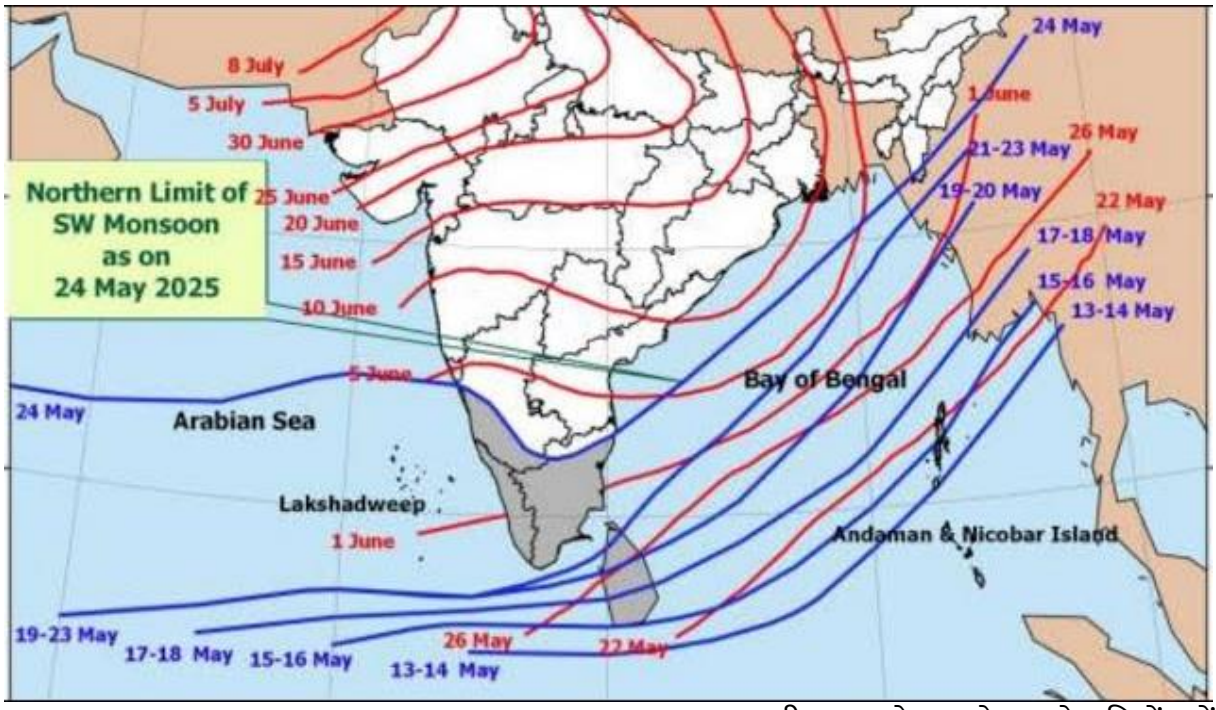
आज मौसम विज्ञान की सार्थकता बढ़ी है। यह वायुमण्डलीय विज्ञान (एटमास्फेरिक साइंस) की एक शाखा है, जिसमें मौसम,जलवायु और उनके विभिन्न घटकों का अध्ययन किया जाता है। मौसम विज्ञानी मुख्य रूप से वायुमण्डलीय स्थितियों के बारे में जानकारी एकत्र करके उसका विश्लेषण करने का कार्य करते हैं।

आगामी २४ घंटे या पूरे सप्ताह मौसम अच्छा रहेगा या खराब, वर्षा होगी या भीषण गर्मी, ग्रीष्म लहर, शीत लहर कब तक रहेगी, इस तरह के मौसम संबंधी अनुमान जानने के लिए हर कोई उत्सुक रहता है। पहले मौसम की भविष्यवाणियाँ या पूर्वानुमान केवल किसानों के लिए ही लाभदायक माने जाते थे, लेकिन अब सामान्यजन भी मौसम संबंधी पूर्वानुमान लेकर लाभ उठाना चाहते हैं। वे उसी के आधार पर अपने कार्यक्रम या यात्राओं की योजना बनाते हैं। यहाँ तक कि शादी के आयोजन जैसे निर्णय भी अब लोग मौसम का पूर्वानुमान को ध्यान में रखकर ले रहे हैं। आज यह उन्नत सैटेलाइट, एआई (आर्टिफिशियल इंटेलिजेंस) और मशीन लर्निंग जैसी तकनीकों से संभव हो रहा है। यह तकनीक का ही कमाल है कि अब कई वर्षों से भारतीय मौसम विज्ञान विभाग (आइएमडी) के पूर्वानुमान अधिकांशतः सटीक होने लगे हैं, इसलिए लोगों का भरोसा इस पर बढ़ता जा रहा है। उन्नत तकनीकों की मदद से मौसम विभाग अपने पूर्वानुमानों से बाढ़, तूफान आदि प्राकृतिक आपदाओं का पूर्वानुमान हो जाने से पहले जैसा नुकसान नहीं होता।

देश में मौसम विज्ञान की सटीक सार्थकता एवं उपयोगिता सिद्ध करने के लिए जगह - जगह नये उन्नत रडार और अवलोकन प्रणाली लगा रहा है। इनसे प्राप्त डाटा के विश्लेषण के लिए डाटा साइंस और एआई जैसी तकनीकों की मदद ले रहा है। भारतीय मौसम विज्ञान विभाग के पूर्वानुमानों की पिछले एक दशक में ५० प्रतिशत सटीकता बढ़ी है।

समुद्र में जाने में सहायता मिलती है। आज कोई भी क्षेत्र हो, हर जगह मौसम की जानकारी आवश्यक है।

आज जैसे - जैसे हम पाँच खरब की अर्थव्यवस्था की ओर बढ़ रहे हैं, उससे आने वाले समय में बहुत से ऐसे सेक्टर भी आएंगे, जो मौसम से प्रत्यक्षतः प्रभावित होंगे। पर्यावरण परिवर्तन के बढ़ते खतरों से भी मौसम की अनदेखी नहीं की



मौसम की सूचनाओं का उपयोग

भारत जैसे विशाल और विविधतापूर्ण देश में भौगोलिक स्थितियाँ एक सी नहीं हैं। यहाँ के कई क्षेत्र समुद्र से लगे हैं। बड़ी जनसंख्या कृषि पर निर्भर है। दूसरी ओर जलवायु परिवर्तन के कारण इधर कई वर्षों में मौसम में अचानक बदलाव आए हैं। दिन - रात के तापमान में असामान्य बढ़ोत्तरी, बाढ़. तूफान, भूकंप जैसी आपदाओं के खतरे बढ़े हैं। पूर्व सूचना मिल जाने से अब तूफान, लू, शीतलहर, भारी वर्षा आदि से नुकसान कम होता है। मौसम की सही जानकारी होने से किसानों के लिए फसल के बारे में निर्णय लेना आसान हो जाता है। उन्हें पहले से पता हो जाता है कि खेत में बीज कब बोना है, खाद - पानी कब - कब देना है आदि। यात्राओं की योजना बनाने और तटवर्ती क्षेत्रों में मछुआरों को

जा सकती। इससे आने वाले दिनों में योजना,विकास या सामाजिक स्तर पर ऐसे बहुत सारे अवसर सृजित होंगे, जहाँ युवाओं के लिए भविष्य में रोजगार पाने की अच्छी संभावनाएँ होंगी।

मौसम विज्ञान में उपलब्ध हैं रोजगार के अनेक अवसर

मौसम विज्ञान एक महत्वपूर्ण और रोचक क्षेत्र है,जिसमें युवाओं के लिए रोजगार की अपार संभावनाएँ हैं। यदि आप मौसम,वातावरण और जलवायु में रुचि रखते हैं,तो यह क्षेत्र आपके लिए उपयुक्त हो सकता है।

ब्यूरो आफ लेबर स्टैटिस्टिक्स के आंकड़ों के अनुसार, अगले वर्ष में वायुमंडलीय वैज्ञानिक विशेषतः मौसम विज्ञानी (मिटिओरोलॉजिस्ट) की मांग में १० प्रतिशत की वृद्धि की संभावना है।

मौसम विज्ञान की जानकारी की मांग आज केवल सरकारी विभागों और मौसम विभागों में ही नहीं है, निजी क्षेत्र में भी अब इस पृष्ठभूमि के लोगों को प्राथमिकता मिल रही है। कई निजी एजेन्सियों में भी पर्याप्त मांग है।

मौसम विज्ञान से पढ़ाई करने के बाद योग्य अभ्यर्थी के पास अवसर प्राप्त करने के तीन प्रकार के विकल्प उपलब्ध हैं - मौसम विज्ञानी बनना, शोध और अनुसंधान क्षेत्र में जाना तथा अध्यापन कार्य करना।

मौसम विज्ञान के जानकारों की मांग निम्नलिखित क्षेत्रों में संभावित है -

भारतीय मौसम विभाग

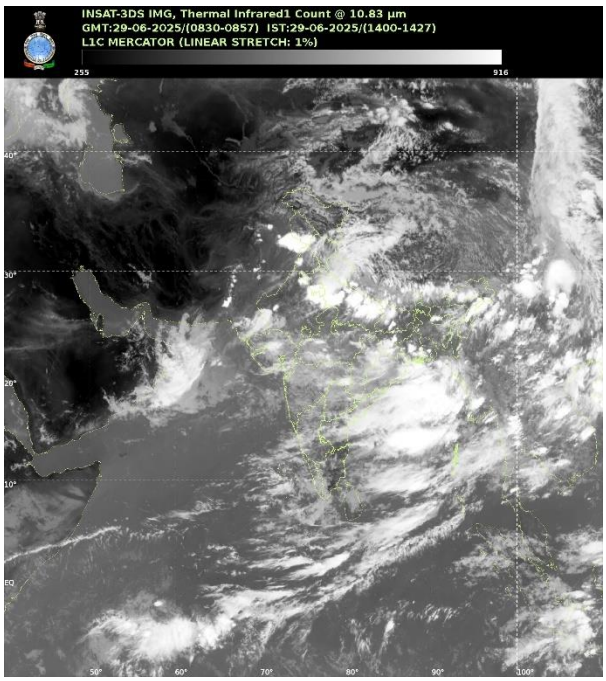
• मौसम पूर्वानुमान कर्ता (वेदर फोरकास्टर)

• मौसम विज्ञानी (मिटिओरोलॉजिस्ट)

• अनुसंधान अधिकारी (रिसर्च आफीसर)

• तकनीकी सहायक (टेक्निकल असिस्टेंट)

• मौसम प्रसारण केन्द्र तथा क्षेत्रीय मौसम विज्ञान केन्द्र में सेवा



अनुसंधान और विश्वविद्यालय

• वैज्ञानिक इसरो, डीआरडीओ, आईआईटी, एनआईटी, आईआईएससी आदि

• शोध सहायक (रिसर्च असिस्टेंट)

• प्रोफेसर. व्याख्याता- मौसम विज्ञान, पर्यावरण विज्ञान, जलवायु परिवर्तन जैसे विषयों में।

निजी कंपनियाँ और मीडिया संस्थान

• मौसम विशेषज्ञ- न्यूज चैनलों और वेबसाइटों के लिए, रेडियो एवं टेलीविजन स्टेशन

• क्लाइमेट कंसल्टेंट - कृषि, निर्माण, ऊर्जा, हवाई, जल यातायात आदि संस्थान

• डाटा एनालिस्ट - मौसम डाटा का विश्लेषण करने हेतु

एविएशन और नेवीगेशन सेक्टर

• एयर ट्रैफिक कंट्रोल और पायलटों के लिए - मौसम रिपोर्टिंग

• भारतीय वायु सेना, नौसेना और थल सेना में मौसम से जुड़े विभागों में नियुक्तियाँ

जलवायु परिवर्तन और आपदा प्रबंधन संस्थान

• क्लाइमेट चेंज एनालिस्ट

• आपदा पूर्व चेतावनी से जुड़ी भूमिकाएँ

अंतरराष्ट्रीय संस्थाएँ

• वर्ल्ड मिटिओरोलॉजिकल आर्गनाइजेशन (डब्ल्यूएमसी)

• यूनाइटेड नेशन्स इन्वायरमेंटल प्रोग्राम (यूएनईपी)

• एनजीओ और पर्यावरण संस्थान

योग्यता

मौसम विज्ञान क्षेत्र में कुशल मौसम विज्ञानियों के लिए सदैव अवसर रहते हैं। इसके लिए अभ्यर्थी को किसी मान्यता प्राप्त विश्वविद्यालय या संस्थान

से इंजीनियरिंग, साइंस स्ट्रीम से स्नातक या परास्नातक होना चाहिए।

मिटिओरोलॉजी या एटमास्फेरिक साइंस से संबंधित कोर्स करने के लिए किसी भी मान्यता प्राप्त संस्थान से (फिजिक्स. केमिस्ट्री, मैथ्स या बायोलाजी) के साथ 12 वीं उत्तीर्ण होना अनिवार्य है। इस तरह के अंडरग्रेजुएट कोर्स में वैश्विक वायुमण्डल, मौसम मापन एवं विश्लेषण, वायुमण्डलीय भौतिकी, मौसम पूर्वानुमान आदि की जानकारी दी जाती है। छात्र आगे चलकर इसी में मास्टर्स एवं पीएचडी भी कर सकते हैं।

आजकल एप मोबाइल, यूट्यूब चैनल और पोर्टल के माध्यम से भी लोगों को मौसम की अद्यतन जानकारी उपलब्ध करायी जाती है, अतः इन क्षेत्रों में भी अच्छी आय प्राप्त की जा सकती है।

प्रमुख संस्थान, जहाँ से मौसम विज्ञान संबंधी कोर्स किए जा सकते हैं -

-भारतीय विज्ञान संस्थान, बेंगलुरु

-आईआईटी, खड़गपुर

-इंडियन इंस्टीट्यूट आफ ट्रापिकल मिटिओरोलॉजी, पुणे

-डिपार्टमेंट आफ एटमास्फेरिक एंड स्पेस साइंसेज, पुणे

गौरीशंकर वैश्य विनम्र
११७ आदिलनगर, विकासनगर,
लखनऊ २२६०२२
दूरभाष ०९९५६०८७५८५

Light POLLUTION – Disturbing the DARK

Dr Amit Kumar Sharma

Can you imagine going out of your apartment or on your rooftop and seeing the magnificent Milky Way and stars glowing above your head?

Unfortunately, it's impossible if you live in a big city or in a Metro city.

. . .and the reason is Light Pollution.

"For my part I know nothing with any certainty, but the sight of the stars makes me dream." – Vincent van Gogh

Dear reader,

when was the last time you experienced a night sky filled with stars? Where was it? How did it make you feel?

While there is growing research supporting the important role night plays in preserving critical wildlife habitats and safeguarding human health, some aspects of the night, such as the awe it inspires, are harder to quantify.

Award-winning science journalist Jo Marchant captures this importance in her book, The Human Cosmos: Civilization and the Stars.

"For most of human history we have led not just an earthly existence but a cosmic one. Our innate relationship with the stars shaped who we are – our religious beliefs, our culture and customs, power structures, scientific advances and even our biology. But over the last few centuries we have separated ourselves from the universe that surrounds us. And that disconnect comes at a cost."

LIGHT POLLUTION???

The issue of light pollution was firstly recognised in the 1970s, when astronomers began to see the impact of the rapid increase in artificial light on their work. At this time, the sky is estimated to have been becoming brighter by between three and six percent every year.

Light pollution is a type of pollution. It is defined as "any adverse (or bad) effect as a result of man-made lights." Usually, this means too much light. Several species, including plants and humans, are badly affected by light pollution. Most people have never heard of light pollution, and those who have usually don't care, or do anything about it. Light pollution costs billions of dollars globally every year.

It is the presence of any unwanted, inappropriate, or excessive artificial lighting. In a descriptive sense, the term light pollution refers to the effects of any poorly implemented lighting sources, during the day or night. Light pollution can be understood not only as a phenomenon resulting from a specific source or kind of pollution, but also as a contributor to the wider, collective impact of various sources of pollution.

Light pollution, or artificial light at night, is the excessive or poor use of artificial outdoor light, and it disrupts the natural patterns of wildlife, contributes to the increase in carbon dioxide (CO2) in the atmosphere, disrupts human sleep, and obscures the stars in the night sky.

It is the human-made alteration of outdoor light levels from those occurring naturally. When we over-light, fail to use timers and sensors, or use the wrong colour of light, we can negatively affect many parts of our world, including migratory birds, pollinators, sea turtles, and mammals, including humans.

Light pollution is the presence of excessive artificial light. It is most common in large cities and Metro Cities where it's produced by streetlights, billboards, shopping malls, and exterior lights on buildings and poles.

Astronomers are specifically concerned about light pollution because it prevents them from observing the night sky. However, environmentalists, health workers, and economists also insist on reducing light pollution.

Types of LIGHT POLLUTION

There are multiple types of light pollution. Let's briefly consider those that can directly affect observational astronomy -

Sky glow – Yellow or orange halo in the night sky.

Glares – Bright light from passing cars or streetlamps.

Light trespass – Streetlight shining into your room.

Satellite glow – Brightening of the sky by artificial satellites.

The first type of light pollution reduces our ability to view celestial objects. The second and third types ruin our night vision. The fourth type has emerged relatively recently. Many experts think that satellite constellations, such as Starlink, pose a real threat to ground-based astronomy. Due to increasing numbers of satellites, our skies might be crawling with bright dots of artificial light in the nearest future.

How to Measure LIGHT POLLUTION?

To measure different types of LIGHT POLLUTION Bortle Scale is used.

Bortle Scale

Astronomers often use the Bortle scale to measure the night sky's brightness. This scale ranges from Class 1 (perfectly dark sky) to Class 9 (most light-polluted city sky).

There are also other scales for measuring light pollution. We can also measure light pollution in our location by determining the faintest stars we can see. Astronomers call this the "Naked Eye Limiting Magnitude" or NELM.

Effects of LIGHT POLLUTION

People who are not interested in observing the night sky usually don't care much about light pollution. But if you think it impacts only astronomy lovers, you're wrong — Light Pollution is harmful to most living creatures and to the environment.

☆ Health effects

Humans are used to a particular day-night cycle, which acts as an internal clock for our bodies. This cycle is controlled by the amount of light around us. Excessive artificial light during the night can disrupt this cycle and cause sleep disorders, depression, and weakening of the immune system.

☆ Effects on animals

Light also controls animals' behaviour, such as reproduction, sleep, and protection from predators. Excessive artificial light negatively affects animals in many ways: migratory birds get disoriented, baby turtles are drawn away from the ocean into the cities, populations of insects' decline, etc.

☆ Energy waste

Unnecessary lighting costs billions of dollars every year and harms the ecology. According to the International Dark-Sky Association, 35% of all outdoor lighting is wasted because of poorly designed light fixtures. The total cost of this waste amounts to around three billion dollars every year in just the United States. Also, millions of tons of carbon dioxide are emitted to power this lighting, which results in immense damage to the environment.

Night Sky Without Light Pollution at Benital – India's First Astro-Village

How to reduce light pollution?

Local authorities can fight light pollution by adjusting street lighting and improving the design of light fixtures. There are three main steps that should be taken:

>Using warm yellow light instead of blue light.

>Dimming all unnecessarily bright light sources.

>Shielding light fixtures so that no light escapes into the sky.

There are also things that you personally can do to minimize light pollution — especially if you live in a house.

Turn off lights when you don't need them.

Use warm-coloured light bulbs

Switch to LEDs — they waste less electricity. Replace outdoor lights with shielded light fixtures. Install motion sensors on outdoor lamps.

"Keep in mind that even small steps in reducing light pollution are worthwhile."

We all must take Oath to reducing Light POLLUTION.

"If we Disturb The DARK, It will Disturb EMBARK"

☆Test Your Knowledge: -

•Which country has the highest light pollution?

•Which country has the least amount of light pollution?

•How much has light pollution increased?

•How many stars can you see with light pollution?

Dr Amit Kumar Sharma *is an Astronomer and a citizen scientist from New Delhi, India and can be reached at amitdixitstar007@gmail.com*

The Impact of Science on Daily Life

Ms Anurita Koul

As Carl Sagan said, **"Science is a way of thinking much more than it is a body of knowledge."** Science plays a fundamental role in shaping our daily lives, influencing everything from the way we communicate to how we understand the universe. Its applications are vast, improving our quality of life and enhancing our knowledge about the natural world. Science affects nearly every aspect of our daily routines. From the alarm clock that wakes us up to the smartphone we use to communicate, technological advancements are the result of scientific discoveries. Modern transportation systems, medical treatments, clean water and electricity all owe their existence to scientific progress.

Science and Health

Medical science has significantly improved human health and life expectancy. Vaccines, antibiotics, diagnostic tools, operations by robots and surgical techniques have transformed healthcare. Additionally, nutritional science helps us make informed decisions about our diet and lifestyle, promoting healthier living.

Science and the Environment

Environmental science helps us understand the impact of human activities on our planet. It also guides us in finding solutions to challenges such as climate change, pollution and biodiversity loss. Renewable energy sources like solar and wind power are direct results of scientific research aimed at promoting sustainability. The more clearly, we can focus our attention on the wonders and realities of the universe about us, the less taste we shall have for destruction.

Science and Communication

The internet, mobile phones, and other communication technologies are products of scientific innovation. They have revolutionized how we share information, making knowledge accessible to people across the globe. We are all now connected by the Internet, like neurons in a giant brain.

Science and Education

Science education is crucial for fostering critical thinking, problem-solving skills, and creativity. It empowers individuals to contribute to technological advancements and address real-world issues. Neil de Grasse Tyson emphasized the importance of scientific literacy, stating, "Science literacy is the artery through which the solutions of tomorrow's problems flow."

Conclusion

Science continues to be a driving force in improving our lives and understanding the universe. Its applications are everywhere, making life more convenient, healthy, and connected. As we advance, the role of science will only become more significant in addressing the challenges and opportunities of the future. Marie Curie once said, **"One never notices what has been done; one can only see what remains to be done."**

Ms. Anurita Koul *is a Headmistress at the Army Public School, Damana*

The Science of the Common Indian: Everyday Innovations & Traditional Knowledge

Dr Punit Kumar

In the vast landscape of Indian scientific temperament, there exists a lesser celebrated yet profoundly influential pillar, the science practiced and refined by the common Indian. From farmers and weavers to homemakers and street vendors, generations of Indians have drawn upon a deep well of indigenous knowledge, trial-and-error methods, and empirical wisdom to navigate their lives.

The term 'traditional knowledge' often conjures images of the distant past, yet it represents a living repository of time-tested practices. In rural and urban India alike, this knowledge is not static, it adapts, evolves, and responds to challenges with remarkable scientific logic.

Take for example the use of neem leaves for pest control. Long before chemical pesticides entered the market, farmers in India would mix neem leaves into grain storage or extract neem oil for natural insect repellents. Studies today validate this, attributing neem's effectiveness to compounds like azadirachtin, which disrupts insect growth and reproduction. Similarly, turmeric, a kitchen staple, has been revered for its antiseptic properties. Curcumin, the active compound in turmeric, has been shown to possess anti-inflammatory, antibacterial, and antioxidant properties.

These examples underscore that traditional knowledge is scientific, even if it doesn't always emerge from laboratories.

Rural Technologies and Everyday Engineering

Indian villages are fertile grounds for grassroots innovation, where necessity gives rise to ingenuity. The concept of *jugad*, an indigenous term denoting creative, improvised solutions using limited resources, exemplifies how rural populations engineer low-cost technologies tailored to their local environment. These innovations are not accidental; rather, they stem from a practical understanding of physics, mechanics, fluid dynamics, and environmental science acquired through generational experience.

One widely cited example is the pedal-powered washing machine, devised by a villager using parts from a discarded bicycle, a metal drum, and a pulley system. This device not only addresses the issue of erratic electricity supply but also integrates mechanical energy conversion principles to wash clothes efficiently.

Similarly, modified bullock-cart ploughs now enable farmers to sow seeds with uniform spacing, a critical feature for maximizing yield and conserving water. Such modifications often employ simple geometric and mechanical adjustments, like adjustable seed funnels and weight-balanced plough shafts.

In drought-prone regions like Tamil Nadu and Maharashtra, farmers have developed DIY drip irrigation systems using discarded plastic bottles and gravity-based hose arrangements. These systems optimize water delivery directly to the plant roots, reducing evaporation loss—an application of fluid control and capillary action without any formal irrigation training.

Other examples include low-cost solar dryers, grain threshers made from salvaged fan parts, and bamboo wind turbines. Although these inventions often go unrecognized in formal engineering literature, they reflect a community-level R&D ecosystem. Empowering and documenting such knowledge can provide scalable, sustainable technologies for wider application, especially in climate-resilient agriculture and rural development.

Culinary Chemistry in Indian Kitchens

Indian kitchens are not merely spaces for food preparation, they are living laboratories where centuries of observation, experimentation, and empirical refinement have shaped culinary practices that align remarkably with modern scientific understanding. The culinary traditions of India offer deep insights into thermodynamics, microbiology, and organic chemistry, often without formal education, passed down orally through generations.

Take the fermentation of dosa or *idli* batter, this process is a careful balance of microbiological kinetics and environmental variables. Rice and urad dal, when soaked, ground, and left in a warm place, undergo natural fermentation driven by *Leuconostoc* and *Lactobacillus* species. These microbes flourish at specific temperature and humidity levels, breaking down starches and proteins while producing lactic acid, which enhances the batter's nutritional profile and makes it easier to digest.

The use of pressure cookers in Indian households reflects an understanding of physical chemistry. By increasing the pressure inside the sealed vessel, the boiling point of water rises, allowing food to cook at higher temperatures without drying out. This technique not only saves time and fuel but also preserves more nutrients than open vessel boiling.

Acid-base interactions are another subtle area of expertise. Adding tamarind, lemon, or tomatoes to lentils or leafy greens not only enhances flavour but creates an acidic environment that helps in iron absorption, a practice especially valuable in predominantly vegetarian diets.

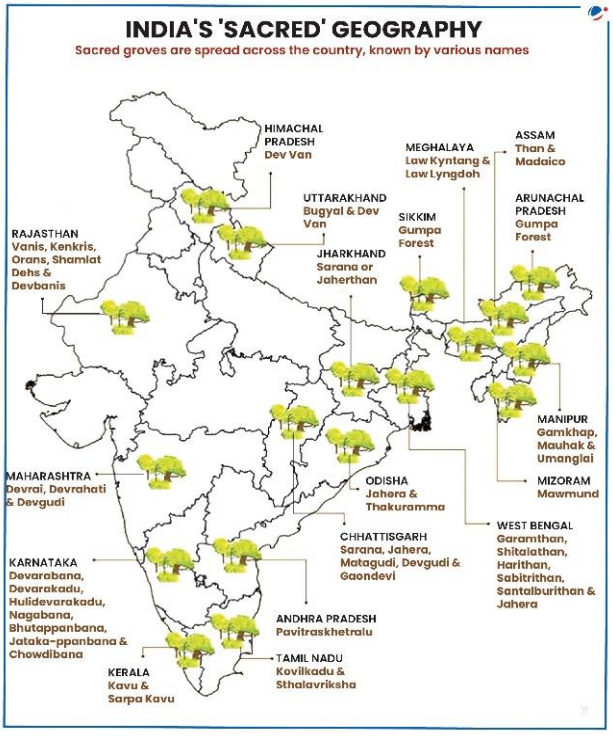
Additionally, the sequencing of spice tempering (*tadka*) demonstrates sophisticated chemical reaction control. Heating mustard seeds, cumin, or fenugreek in oil activates enzymatic reactions and unlocks volatile compounds like aldehydes and terpenes. Adding spices in a precise order ensures the release of fat-soluble components at their optimal temperature, affecting not just flavour but also the

bioavailability of medicinal phytochemicals. Indian cooking, therefore, is not just about taste, it's an intricate symphony of science, culture, and health.

Indigenous Environmental Management

Long before the rise of modern environmental science, Indian communities developed sophisticated ecological management practices rooted in tradition, observation, and reverence for nature. These practices are not relics of the past, they are time-tested strategies that can inform today's sustainability efforts, particularly in the context of climate resilience and biodiversity conservation.

One of the most remarkable examples is the system of sacred groves, known as *devarakaadu* in Karnataka, *kavus* in Kerala, and *sarnas* in Jharkhand. These patches of forest are protected by religious and cultural taboos, often associated with local deities. Though unwritten, these norms ensure strict non-intervention, allowing the flora and fauna within to thrive. Research has demonstrated that sacred groves function as gene banks, preserving endemic plant species, acting as carbon sinks, and regulating the local microclimate.



In arid zones such as Rajasthan, ancient water harvesting systems like *johads*, *baoris*, and *kunds* showcase ingenious applications of hydraulic principles. These structures harness runoff and percolation, recharging aquifers and sustaining communities during prolonged droughts. The spatial design, gradual slopes, percolation channels, and layered masonry ensures minimal evaporation and efficient water storage, a testament to traditional knowledge of fluid dynamics and geology.

Moreover, the deliberate planting of trees like *peepal*, banyan, *neem*, and *tulsi* near water sources, temples, and homes was rooted in both spiritual significance and ecological function. These trees are known for their high transpiration rates, air-purifying qualities, and deep root systems that prevent soil erosion. Such practices reflect a deep understanding of environmental interconnectivity, emphasizing that sustainability was never separate from culture in Indian life.

Household Innovations by Women

Across India, women particularly in rural and semi-urban areas have functioned as everyday scientists and engineers, innovating not in laboratories but in kitchens, courtyards, and community spaces. Their contributions, often overlooked, are rooted in sustainability, efficiency, and local ecology, making them powerful agents of grassroots science.

One prime example is the optimization of traditional *chulhas* (clay stoves). Faced with the dual challenge of limited fuel availability and smoke inhalation, women have modified chulhas to improve air circulation, reduce wood consumption, and minimize indoor air pollution. These innovations, which often include double-chamber combustion, or metal-lined insulation, are not just environmentally friendly but also health-enhancing, showcasing practical knowledge of thermodynamics and material science.

Natural detergents made from ash, soap nuts (*reetha*), and *shikakai* are other notable examples. These biodegradable cleaners not only reduce chemical waste but also maintain soil and water health in rural wash areas. Soap Nuts, rich in natural saponins, exhibit surfactant properties that have recently drawn the attention of sustainable product researchers.

In menstrual health, many rural women have historically used cloth pads made from old cotton saris washed, dried in sunlight (a natural UV sterilizer), and reused. Today, women-led cooperatives are reviving this practice with upgraded, stitched versions that offer eco-friendly and low-cost alternatives to disposable sanitary pads, drastically reducing plastic waste.

Moreover, home remedies like the turmeric-ginger-honey-*tulsi* mix for respiratory ailments are now scientifically validated for their antimicrobial, anti-inflammatory, and immune-boosting properties. These traditional formulations exemplify women's accumulated ethnomedical wisdom, bridging the gap between ancestral knowledge and modern biochemistry.

Crafts and Material Science

India's rich artisanal heritage is more than cultural; it is a testament to centuries of applied science. Behind every loom, wheel, and chisel lies an intricate understanding of geometry, physics, and material properties, honed through generations of empirical learning.

Consider the Banarasi silk saree, woven with fine silk and *zari* (gold/silver thread). The artisans, or *karigars*, masterfully manage warp and weft tensions, controlling the density, sheen, and durability of the weave. This involves an acute sense of textile physics, as even minor tension imbalances can ruin the pattern or reduce the lifespan of the fabric. Further, patterning often includes mirror symmetry and tessellations, echoing mathematical precision.

In South India, *kolam* and rangoli designs created daily using rice flour or chalk are striking examples of artistic algorithms. These designs often depict fractals, rotational symmetry, and geometric recursion, making them visual tools for teaching mathematical concepts in a culturally grounded way. Studies have shown that such practices improve spatial

reasoning and cognitive development among children exposed to them.

Terracotta pottery, especially the iconic water *matkas* or *surahis*, utilize the principles of evaporative cooling. The porous clay allows water to slowly seep through the surface, where it evaporates, absorbing heat and cooling the remaining contents, a direct application of latent heat transfer and thermodynamics.

Cane and bamboo craftsperson, especially in Assam, Nagaland, and Kerala, intuitively understand mechanical properties like tensile strength, elasticity, and the bending modulus. Their handcrafted items, furniture, baskets, rooftops are lightweight yet sturdy, reflecting an eco-conscious, ergonomic approach to structural engineering. These crafts represent an embedded material science that deserves formal documentation and integration into contemporary design thinking.

Traditional Healing and Ayurvedic Logic

Ayurveda, one of the oldest holistic healing systems in the world, is deeply rooted in the Indian philosophical view of balance and interconnectivity. Far from being a static tradition, Ayurveda represents a dynamic and systemic understanding of health that integrates physiology, herbal pharmacology, nutrition, psychology, and environmental science.

The foundational concept of doshas, *vata* (movement), *pitta* (transformation), and *kapha* (structure) maps the biological processes of the human body onto elemental forces. Though these concepts are metaphorical, modern systems biology draws parallels in its focus on homeostasis, regulatory feedback, and metabolic variation. Ayurvedic diagnostics, which include pulse reading (*nadi pariksha*), tongue analysis, and detailed lifestyle assessments, anticipate contemporary approaches in personalized medicine that consider genetic, environmental, and behavioral factors.

Pharmacologically, many Ayurvedic herbs have undergone scientific scrutiny. Ashwagandha (*Withania somnifera*) is well-documented for its adaptogenic, anti-stress, and neuroprotective properties, influencing cortisol levels and cognitive function. *Triphala*, a blend of *amalaki*, *bibhitaki*, and *haritaki*, has shown antioxidant, laxative, and antimicrobial effects, and is used both as a daily detox and a therapeutic agent in gut health.

Ayurveda's *Ritucharya* (seasonal routines) and *Dinacharya* (daily regimens) also reflect an early understanding of chronobiology, how biological functions follow natural cycles. This foresight in adapting treatments to seasonal changes, age, diet, and mental state aligns with modern epigenetic and lifestyle medicine approaches. Thus, Ayurveda is not merely ethnomedicine, but a sophisticated preventive and therapeutic system, with relevance for addressing chronic diseases, mental health, and lifestyle disorders in today's global health landscape.

Science in Festivals and Rituals

Many Indian festivals embed scientific practices disguised in symbolism. For example, Makar Sankranti, celebrated during the sun's northward movement, includes eating sesame (*til*) and jaggery, a combination rich in healthy fats and iron, crucial during winter.

Fasting during *Navratr* resets digestive cycles, aligns with seasonal detox, and is linked with circadian rhythm research. The lighting of lamps in Diwali is more than symbolic, it disinfects surroundings and improves ambient conditions in colder months.

Even traditional rituals like applying *haldi* before weddings have antimicrobial significance, helping prevent skin infections.

Agricultural Ingenuity and Seed Saving

Indian farmers have for centuries practiced seed selection, rotation cropping, and companion planting. In tribal Odisha, farmers practice mixed cropping of millets, legumes, and vegetables in a way that maximizes soil fertility and reduces pest incidence.

Seed-saving practices, now endangered by genetically modified crops were once decentralized, communal, and diverse. Farmers selected seeds based on resilience, yield, and seasonal behaviour, preserving genetic variety long before modern biotechnology recognized its value. With climate-smart agriculture gaining ground, these traditional models are gaining renewed attention for their resilience and sustainability.

Scientific Literacy Beyond Academia

Scientific understanding among the common Indian does not necessarily stem from formal education. Observation, experimentation, and intergenerational learning have created a knowledge culture that rivals academic science in creativity and practicality.

The street vendor who adjusts spice levels based on ambient humidity, or the cobbler who knows which sole material will last in monsoons all reflect this embodied science. Many practices rely on empirical results, often tested repeatedly in the field of daily life. It is crucial that educational institutions recognize and engage with this knowledge base, not as folklore, but as science in practice.

In post-colonial India, science has often been defined by Western parameters of lab-based inquiry and empirical methods. While this has its merits, it also sidelines the contributions of millions who engage with science informally and practically. The science of the common Indian, deeply embedded in culture and ecology, provides a resilient, low-cost, and sustainable model of knowledge production. Recognizing and validating this can open new frontiers in education, policy, and innovation. By integrating traditional knowledge systems with modern scientific frameworks, India can build a pluralistic and inclusive scientific community, one that truly represents its civilizational ethos and democratic spirit.

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Organic initiative-Vermicomposting A departmental endeavour for sustainable waste management- A Case Study

A.M.Chalkoo, Zahoor A Wani, Peerzada Yasir, Bilal A Wani, Azad H Khan, Yaseen Maqbool, Ubaid Yaqoob, M Sulaiman Dar, Mir Khusrau, Bahar Ahmad Meer

Abstract
The present work is aimed towards developing a sustainable waste management practice and to impart skill-based training to Bonafide students at the institute to achieve Sustainable Development Goals (UN-SDG). Keeping in view rampant use of spurious pesticides and chemical fertilizers prevalent in market, an initiative was taken by the department to sensitize the student community and progressive farmers about already existing tradition of converting farmyard manure (FYM) like cow dung and plant litter into organic manure-Vermicompost. The aim was also to reduce the period of decomposition and to apply established scientific procedure like augmentation with red wiggler worms, layering of plant litter and FYM in Vermibeds and maintenance of optimum moisture and temperature to facilitate rapid conversion of organic waste into ecofriendly biofertilizer-vermicompost. The vermicompost produced was analysed for its quality and the organic carbon content, N, P, and K content was found to be in the desirable range. Further the students were given hands-on training sessions and demonstrations about the vermicompost production process and successful students were awarded certificates as well.

Keywords
Vermicompost, Nutrient, Sustainable development, Plant litter, Red Wiggler.

Introduction
Often one would feel what our role is towards the sustainable development initiative of our government at the ground level. What do we owe to our society for being students of plant sciences. Small initiatives, interventions and outreach activities could make a huge difference. Having said that we need to think globally but act at a local level.
The rampant use of chemical fertilizers and chemical pesticides are posing a threat to our biosphere including hydrosphere, lithosphere and atmosphere. The water resources along with soil are getting extremely polluted due to the excessive use of spurious chemicals. It is in the backdrop of this concern that the Department of Botany thought it prudent to undertake a sustainable waste management initiative at the institutional level.
Further it was also observed that almost all students enrolled in the college hail from agricultural background and remain associated with agricultural activities. The waste matter like cow-dung (FYM) and agricultural straw is dumped on to the roadside and in open fields which give a shabby look and poses a threat of infection to the local community.

To address this open environmental challenge, a need was felt to develop a sustainable waste management practice. The Department of Botany initiated vermicompost production based on scientific procedures to convert waste like cow dung and farmyard litter into organic manure Vermicompost. Apart from converting waste to resources, Bonafide students at the college were given demonstrations, hands-on training sessions, and certificates in vermicomposting. This integrated approach of the *Waste to Resource (Garbage to Gold)* and *Earn while Learn* concept was adapted for sustainable waste management within the college premises.

Methodology

The Vermiculture (Cultivation of worms) unit was constructed for Vermicompost production and multiplication of worms in the Botanical Garden of the college. The size of the Vermiculture unit was 15×30 feet in which two worm bins (Vermibed) with dimensions of 3×3×12 feet with proper provision of ventilation and drainage system were set up. GI sheets were used to cover the top of the house, and the sides of the house were covered by light weighed tin sheets to protect from direct sunlight and rain, and to avoid the entrance of flying predators and rodents.

The semi decomposed cow dung (around 30 days old) was procured from neighbouring villages and kept in an open area to eliminate the gas before shifting to Vemibeds. A layer of chopped lawn grass was placed at the bottom (Bedding material) followed by a layer of semi decomposed cow dung. This was again followed by a layer of dry grass and the process continued. The layered pattern of cow-dung and straw was followed in other beds also. Around 3 kgs of red wiggler (*Eisenia fetida*) worms were placed in each Vermibed. The moisture content of Vermibeds was maintained by keeping gunny bags on the top and sprinkling of water was ensured in a regulated manner. The whole set up was monitored daily. The final product was properly sun dried and sieved to obtain dark black coloured granular and nutritionally rich Vermicompost, which was packed in bags for sale.

Quality Analysis and Chemical composition

Around 1 kg of semi dried vermicompost was subjected to quality analysis through Mountain Research Centre for Field Crops (SKUAST-K) Khudwani, Kulgam. The chemical analysis report along with the reference standard is detailed below in a tabulated form.

S.No.	*Analyte*	*Vermicompost produced in experimental set up in college*	*Reference Range (Desirable)*
1.	Colour	Dark brown	Dark brown
2.	Odor	Foul Odour absent	Absent
3.	Solids	78%	
4.	Moisture	22%	22.6%
5.	pH	8.4	5-8.5
6.	EC	1.7dSm¹	3.42
7.	Organic Matter	46.4%	50-60%
8.	Carbon	27.3%	28.15%
9.	Total Nitrogen	2.1%	1.42%

10.	C:N Ratio	13	12
11.	Phosphorus (P)	0.82%	0.81%
12.	Potassium (K)	1.96%	1.1%
13.	Man Made Foreign Matter (Glass,Plastic,Metal) <2mm fraction	<1%	
14.	Stones %dry weight	<5%	

Results and Discussion

Vermicompost is a well stabilized, finely divided peat-like material produced through a non-thermophilic process involving the biodegradation and stabilization of organic materials by interactions between earthworms and microorganisms. Vermicompost, which is obtained by decomposition of organic wastes by red wiggler earthworms, is an eco-friendly organic product with high economic and nutritive value (Garg and Gupta, 2009). Many organic wastes (plant litter, animal waste, food wastes, urban solid waste, wastepaper, sawdust, etc.) can be used as raw material in vermicompost production (Karmakar *et al*., 2012).

Earthworms are regarded as friends of farmers, soil managers and nature's ploughmen. They utilize organic matter, promote soil porosity and aeration, bring about fragmentation and mixing of mineral particles. Some species of earthworms have the capability of consuming different organic wastes including animal manure, green manure, industrial waste, sewage sludge and crop residues. Red worms (*Eisenia fetida*) are the most widely used species used in vermicomposting.

The decomposition rate of vermicompost is comparatively faster than traditional compost because in vermicomposting the conversion of organic materials takes place through the gut of earth worm where the end materials contain high microbial activities and rich in nutrient contents.

The analysed result showed that the organic carbon content to be 27.3%, which is in the range of optimum value of organic carbon in most of the already reported studies. This is in conformity with the findings that the worm castings (vermicompost) contain a higher percentage of organic carbon as compared to conventional compost and garden soil. The C:N ratio in the sample was recorded to be 13 and low C:N ratio indicates higher rate of mineralization and thus the vermicompost prepared from the substrates contains a high percentage of total nitrogen (2.1%). Several other studies have also confirmed the low C: N ratio from vermicompost with different substrate composition. Frankenberger and Abdelmagid (1985) state that organic matter with a C/N ratio lower than 20 includes high quality of organic matter and will undergo mineralization in the soil. Majlessi *et al* (2012) stated that the vermicompost with low C/N ratio (14-30) indicates a mature and stable Vermicompost. During the decomposition process, soil microorganisms burn carbon as a source of energy, but not all the carbon remains in its body; a certain amount is lost as carbon dioxide during respiration. Therefore, the low C/N ratio of vermicompost indicates good quality vermicompost.

Total Nitrogen, Available Phosphorus and Potassium (NPK)

The analysed result showed that relatively the highest (0.82%) available phosphorous was recorded from the vermicompost. The enhanced P level in vermicomposting suggests phosphorous mineralization during the process. The worms during vermicomposting converted the insoluble P into soluble forms with the help of P-solubilizing microorganisms through phosphatases present in the gut, making it more available to plants. The study is in conformity with the result of Nagavallemma *et al* (2004) who found that the worm casting contains the highest available phosphorus contents with the values ranging from 1900 to 10,200mg/kg.

Conclusion

Vermicompost is nutritionally rich natural organic manure, which releases nutrients in the soil and improves the quality of the plants with renewed physical and biological properties of soil. The Vermicompost prepared from locally available materials such as cow dung and mixture of all straws were analysed for their nutrient evaluation. According to the results of this study, the nutrient content of Vermicompost prepared from all substrates showed the highest values for all macro and micro plant nutrients. Thus, the vermicompost made from all materials could correct the plant nutrient imbalance if applied to the nutrient deficient soil and could be used for Vermicompost preparation based on the accessibility of materials.

If the practice of converting waste to resource (Garbage to Gold) is followed in the institution or in the countryside or in other institutions, the dependency on chemical fertilizers could be largely minimized and physical, biological, and chemical composition would increase. Further the damage to different components of the environment would be reduced. This way we could make our students ambassadors and messengers of the vermicomposting method.

Acknowledgements

The authors acknowledge financial and logistic support extended by Principal Government Degree College, Anantnag, Prof. Muzaffer Ahmad Bhat in establishment of the Vermicompost unit within college premises, all the staff members of the Department of Botany and Seed Technology and former colleagues who devoted their time, energy, and expertise in successful establishment of Vermiculture and vermicompost production. The authors extend sincere gratitude to Dr. Zahoor Ahmad Baba from SKUAST-K Wadoora for his expert guidance and scientific Officer at MRCFC Khudwani, Kulgam centre for quality analysis of Vermicompost.

References are available upon request.

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Tulsi Gaushala: An Oasis of Animal Welfare in the Desert of Jaisalmer

Mr Manav Vyas

Established in 2001, Tulsi Gaushala in Jaisalmer operates under the aegis of the Tulsi Govardhan Nidhi Sansthan, a registered trust under the Society Registration Act of 1958. The Gaushala is also officially recognized by the Government of Rajasthan and holds registrations under Section 12AA and 80G of the Income Tax Act, providing donors with tax exemption benefits. Additionally, it is registered with the Animal Welfare Board of India and NITI Aayog. Efforts are currently underway to obtain CSR registration.

The Gaushala began on a small piece of privately owned land before receiving an official land allotment from the government in the latter half of 2001. In the early years, growth was modest, with the cattle population reaching around 100 by 2009. A significant transformation occurred with a change in the trust's management. A dedicated team of professionals and volunteers, unified by a shared commitment to animal welfare, took charge and began shaping the Gaushala into a model institution.

Between 2009 and 2025, Tulsi Gaushala achieved several important milestones in the field of animal welfare. Today, it is home to over 1,200 cattle, along with a few injured camels. The Gaushala also has a history of rescuing wild animals and transferring them to the Forest Department for further care.

Core Areas of Focus

Tulsi Gaushala works across four major areas of animal welfare:

1. Rescue and Care of Stray Cattle: We provide shelter and care to abandoned cattle, often left by owners due to their inability to provide economic benefits.

2. Breed Improvement: We focus particularly on the indigenous Tharparkar breed, aiming to restore the dignity and profitability of traditional cattle rearing for local communities.

3. Veterinary Services: A team of three veterinary professionals offers round-the-clock medical care to all animals brought to the Gaushala. An automatic-lifting animal ambulance ensures timely transportation and treatment. Our fully stocked medical facility treats injured, sick, and accident-affected animals.

4. Sustainable Biomass Utilization: We operate an 85 cubic meter biogas plant, established under the Government of India's Godhan Pariyojana, for clean energy generation. The biogas powers an electric generator and produces organic manure. We also produce Gokasht—eco-friendly cow dung logs used for cremation and in traditional kilns, thereby reducing deforestation and supporting environmental conservation.

Environment and Community Initiatives

In a region characterized by rocky terrain, the Gaushala has successfully planted over 100 trees. These trees were planted by digging pits with machinery, filling them with fertile lakebed soil, and nurturing them—providing crucial habitat for local birds like the endangered sparrow.

Looking ahead, the Gaushala is working towards establishing a state-of-the-art Super Speciality Veterinary Hospital to serve animals in need with the best possible care.

We are also expanding our shelter facilities to include abandoned bulls and oxen—often the most neglected animals on the streets. The State Government has allotted

25 bighas of land near the Oran Forest area for this initiative, where we plan to develop a Nandi Shala. This site will also feature an artificial lake for wildlife and the plantation of around 5,000 trees to help create a thriving natural ecosystem.

Join Us in Making a Difference

Tulsi Gaushala operates on the core principle of compassion—providing relief, shelter, and dignity to voiceless animals. Our work is supported primarily by government aid and the generous contributions of animal lovers and activists. We are also working towards building a self-sustaining ecosystem for long-term impact.

If you happen to visit Jaisalmer, we warmly invite you to visit Tulsi Gaushala and support our efforts in creating a kinder world for animals.


जैसलमेर-पोकरण भास्कर

बेसहारा छोड़े गए घायल व बीमार गोवंश को तुलसी गौशाला में मिलती है पनाह


धर्म . समाज . संस्था

अनूठी पहल • गौ काष्ट के जलने पर निकलने वाला धुआं वातावरण को साफ कर ऑक्सीजन में करता है बढ़ोतरी

गौ काष्ट से कीजिए होलिका दहन, तुलसी गौशाला में 20 क्विंटल गौ काष्ट तैयार,प्रदूषण रोकने हवन सामग्री डाली

हवन में भी गोबर के कंडों का उपयोग, अब होलिका दहन के लिए गौ काष्ट तैयार


संगीत ने बदला गोवंश का व्यवहार

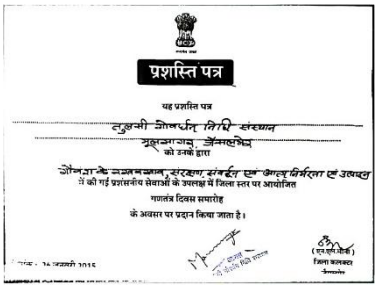
Our Team:

Permanent Veterinary Staff:
Mr Prem Singh Bhati (Retired) Senior LSA
Mr Yogesh Kumar Verma LSA
Mr Gaurav Solanki LSA

Visiting Veterinarians:
Dr Vasudev Garg, SVO, Govt Vet. Hospital
Dr Hethudan, SVO, Govt Vet. Hospital
Dr Joginder Singh, VO, Govt Vet. Hospital

Managing Committee:
Mr Pawan Bhatia - Vice Chairperson
Mr P S Rajawat – Vice Chairperson
Mr Mehtab Singh Bhati – Secretary
Mr Anil R Bhatia – Treasurer

Manav Vyas *is the Chairperson of Tulsi Goverdhan Nidhi Sansthan, Jaisalmer*



प्रशस्ति पत्र

यह प्रशस्ति पत्र

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को उनके द्वारा

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में की गई प्रशंसनीय सेवाओं के उपलक्ष में जिला स्तर पर आयोजित

गणतंत्र दिवस समारोह

के अवसर पर प्रदान किया जाता है।

Event Report: Oral Health and Anti-Tobacco Awareness Camp

Dr Lalit Sharma

To mark **World No Tobacco Day 2025**, **Vigyan Setu Foundation**, in collaboration with Dr G. D. Pol Foundation's Y.M.T. Dental College and Hospital, Kharghar, Navi Mumbai, organized a comprehensive Oral Health Education, Promotion, and Outreach Camp, coupled with an Anti-Tobacco Awareness and Referral Programme on May 31, 2025, at Himgiri Cooperative Housing Society Limited, Sector 3, Sanpada, Navi Mumbai.

The camp aimed to raise awareness about the harmful effects of tobacco use and the importance of maintaining good oral hygiene. The event witnessed enthusiastic participation from residents across the societies of Sanpada, with over 50 individuals, from 3 to 90-years old, availing themselves of the services and information offered.

Key Highlights

Oral Health Screening:

Dental professionals conducted thorough check-ups, identifying oral health issues, and offering expert advice.

Tobacco Cessation Counselling:

Focused sessions were held to educate visitors on the impact of tobacco consumption, with an emphasis on early signs of oral cancer and gum diseases.

Educational Material:

Posters and props were utilized to reinforce key messages on oral hygiene and the dangers of tobacco.

Referral Services:

Attendees requiring follow-up care were referred to YMT Dental College and Hospital for further evaluation and treatment.

The camp served not only as a health check-up initiative but also as a strong educational intervention, emphasizing preventive healthcare and lifestyle modification. The collaborative effort showcased the commitment of both institutions toward building a healthier, tobacco-free society.

Vigyan Setu Foundation extends heartfelt thanks to the Dean, Faculty and interns of Y.M.T. Dental College and Hospital for their voluntary services, Managing Committee of Himgiri CHSL for logistics, Mr Datta Agre for hospitality, and to the residents of Sanpada for their participation and support.


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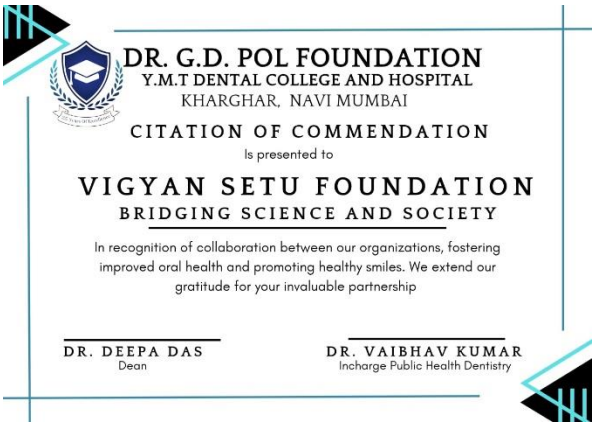
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In recognition of collaboration between our organizations, fostering improved oral health and promoting healthy smiles. We extend our gratitude for your invaluable partnership
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Organizes
Dental Checkup Camp


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Bridging Science and Society
Organizes
Dental Checkup Camp
Conducted by
Y.M.T Dental College & Hospital, Kharghar
HIMGIRI CHSL, Sector 3, Sanpada
31 May 2025
10 am - 03 pm


Vigyan Setu Foundation
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Dental Checkup Camp
HIMGIRI CHSL, Sector 3, Sanpada
31 May 2025
10 am - 03 pm
DR. G. D. POL FOUNDATION'S
Y.M.T. DENTAL COLLEGE
& HOSPITAL
FREE DENTAL
CHECKUP CAMP
DEPARTMENT OF PUBLIC HEALTH DENTISTRY


HIMGIRI CHSL, Sector 3, Sanpada
31 May 2025
10 am - 03 pm
T. DENTAL COLLEGE
& HOSPITAL


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Organizes
FREE!
Dental Checkup Camp
Conducted by
Y.M.T Dental College & Hospital, Kharghar
HIMGIRI CHSL, Sector 3, Sanpada
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