Indian Science in Indian Media

Highlights of India Science Wire (ISW) stories

September 2018

India Science Wire - highlighting Indian science in Indian media

The coverage of science and technology particularly relating to research done in Indian research institutions, is generally very poor in Indian media. There are several reasons for this situation, one of them being the lack of credible and relevant science content. In order to bridge this gap, Vigyan Prasar launched a unique initiative - India **Science Wire (ISW)** – in January 2017.

The news service is dedicated to developments in Indian research laboratories, universities and academic institutions. Almost all news stories released by this service are based on research papers by Indian scientists published in leading Indian and foreign journals. All news stories and features are written and edited by a team of professional science journalists with decades of experience in science journalism.

News stories based on happenings in Indian research labs are released to media houses on a daily basis. These stories are also uploaded on ISW website and are simultaneously promoted though social media – Twitter and Facebook. At present, the service is available in English and Hindi.

Reach out ISW Editor with story ideas, comments and suggestions at indiasciencewire@gmail.com

ISW website: http://vigyanprasar.gov.in/isw/isw.htm

ISW stories released and published in Sepetember 2018

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ThePrint

New migrant pest found in Karnataka can cause losses to dozens of crops

KOLLEGALA SHARMA 5 September, 2018

File image of Spodoptera frugiperda | India Science Wire

The migrant insect can feed on most important crops in India like maize, rice, sugarcane, soybean, onion, potato and cotton, among others.

Mysuru: A new migrant insect that can potentially cause losses to dozens of crops has been found in Karnataka. The pest has been damaging maize plants in certain parts of the state, and is not a native and known species in India, scientists from the University of Agricultural Sciences, Bengaluru have reported.

The pest, Spodoptera frugiperda, is a species of armyworm hitherto not found in India. It was first observed during May-June period in maize crops near Gowribidnur in Chikkaballapur district of Karnataka when scientists were investigating crop loss due to caterpillars. It caused extensive damage in the maize crops there.

“It took some time for rearing the larvae collected from the field,” says Prabhu Ganiger, a researcher at the Department of Entomology of the University. The larvae collected from fields were reared in the laboratory for authentic identification. “We found it is difficult to rear them in the lab because they turn cannibalistic eating each other in captivity,” he

explains. Finally, after a month or so we could get the adult and based on their appearance the insect was identified as Spodoptera frugiperda

Spodoptera frugiperda is a known pest in parts of North America from Canada to Chile and Argentina. It has also been reported to have spread to Africa in 2017, causing widespread crop damage. However, so far nobody had reported its presence in Asia.

University of Agricultural Sciences, Bengaluru, team in the field | India Science Wire

The finding is significant since its larvae have been found to feed on almost every important crop grown in India including maize, rice, sorghum, sugarcane, cabbage, beet, peanut, soybean, alfalfa, onion, tomato, potato and cotton. If not contained, it has potential to turn into a major pest, researchers have warned. Since such migrant pests do not have natural enemies in the new land, they spread far and wide causing extensive damage. Four years ago a new invasive South American tomato leaf miner moth, Tuta absoluta had caused extensive loss to tomato in India.

“It is very easy to distinguish the larva from similar spodoptera and cut worms. They have black spots on all over the body. And there are four distinctive black spots near the tail. Farmers can easily identify the new migrant with these features,” explains Dr. Ganiger.

However, scientists are not sure how the pest landed in India. “We can only speculate,” says Dr. Ganiger. Some eggs might have been carried inadvertently by tourists or their eggs could have been carried by clouds from far off and rained here. Instances of such raining of insect eggs and plant pollens are well known. Meanwhile “creating awareness through every medium is essential to prevent its spread,” he says.

The research study, published in journal Current Science, has been authored by Dr. Ganiger along with his colleagues – M. Yeshwanth, K. Muralimohan, N. Vinay, A. R. V. Kumar and Head of Entomology Department Dr. K. Chandrashekara.

THE HINDU BusinessLine

Study finds gaps in publicly funded dialysis programme

SUNDERARAJAN PADMANABHAN **NEW DELHI, SEPT 4**

Incidence of chronic kidney disease is rising rapidly India. It is ranked as the ninth leading cause of death in India as per the estimates made by a global study in 2016. Among the response mounted to address the challenge was the national dialysis programme launched in 2014, envisaging setting up dialysis centres in all the districts.

A new study now has shown that though free treatment under a publicly funded dialysis programme could allow more people access this expensive treatment, it would not be able to address all barriers to ensure long –term success.

The study is based on an analysis of 13,118 beneficiaries who received haemodialysis over a period of four years (2008-12) for end stage kidney disease under the Rajiv Gandhi Aarogyashri Community Health Insurance Scheme (RACHIS) introduced in 2007 by the Government of unified Andhra Pradesh.

It showed that there was steady rise in number of persons accessing treatment, confirming high unmet need for dialysis but survival rates were suboptimal. About 10 percent of all the people who started haemodialysis had died and another 36 per cent had stopped coming to dialysis centres after six months.

The study, done by the George Institute for Global Health India, found that the total cost of dialysis-related care was US dollars 63.2 million, accounting for 3.1 per cent of all claim expenses under the scheme.

Noting that the high drop-out rate had been noticed in smaller studies conducted earlier too, Professor Vivekanand Jha, Executive Director of the George Institute for Global Health, India, said there appeared to be several additional barriers.

“These could include out-of-pocket expenses for travel to dialysis units; management of associated medical conditions the costs of which were not covered by the scheme; loss of income; and caregiver burden. Exploration of these factors requires additional studies”, he said. The study has been published in journal Kidney International.

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अध्ययन

भारतीय वैज्ञानिकों ने अरुणाचल प्रदेश के तवांग जिले में पाई जाने वाली 122 शैवाल प्रजातियों को किया सूचीबद्ध, इनमें से 16 का जैव-संकेतक के रूप में किया जा सकता है प्रयोग

जलवायु परिवर्तन निगरानी में मदद कर सकते हैं शैवाल

नई दिल्ली, आइएसडब्ल्यू : भारतीय वैज्ञानिकों के एक ताजा अध्ययन में अरुणाचल प्रदेश के तवांग जिले में पाई जाने वाली 122 शैवाल प्रजातियों को सूचीबद्ध किया गया है। इनमें से 16 शैवाल प्रजातियों का उपयोग जलवायु परिवर्तन की निगरानी के लिए जैव-संकेतक के रूप में किया जा सकता है।

तवांग की नागुला झील, पीटीएसओ झील और मंगलम गोम्पा के सर्वोच्च शिखर बिंदुओं पर विस्तृत सर्वेक्षण के बाद वैज्ञानिकों ने शैवाल के 250 से अधिक नमूने एकत्रित किए हैं। इन निगरानी क्षेत्रों को शैवालों के वितरण और जैव विविधता के दीर्घकालिक अध्ययन के लिए क्रमशः 3000, 3500 और 4000 मीटर की ऊंचाई पर स्थायी स्थलों के रूप में विकसित किया गया है। इन क्षेत्रों के अलावा तवांग मॉनेस्ट्री और सेला दर्रे के आसपास के इलाकों से भी नमूने इकट्ठे किए गए हैं।

विभिन्न वैज्ञानिक विधियों के उपयोग से शोधकर्ताओं ने पाया कि एकत्रित किए गए नमूनों में 122 शैवाल प्रजातियां शामिल हैं। ये प्रजातियां 47 शैवाल श्रेणियों और 24 शैवाल वर्गों से संबंधित हैं। इन प्रजातियों में परमेलिआचिये कुल की सर्वाधिक 51, क्लैडोनिआचिये कुल की 16, लेकैनोरैचिये कुल की सात, साइकिआचिये कुल की छह और

रैमेलिनाचिये कुल की पांच शैवाल प्रजातियां शामिल हैं। वैज्ञानिकों के मुताबिक, जलवायु और पर्यावरण में होने वाले बदलावों के प्रति संवेदनशील होने के कारण विभिन्न शैवाल प्रजातियों को पारिस्थितिक तंत्र के प्रभावी जैव-संकेतक के रूप में जाना जाता है। शैवालों की निगरानी से पर्वतीय क्षेत्रों में हो रहे पर्यावरणीय बदलावों से संबंधित जानकारियां जुटाई जा सकती हैं और इससे संबंधित आंकड़ों का भविष्य के निगरानी कार्यक्रमों में भी उपयोग किया जा सकता है। इस अध्ययन से जुड़े शोधकर्ता, एनबीआरआई के पूर्व उप-निदेशक डॉ. डीके उप्रेती ने बताया कि किसी क्षेत्र विशेष में जीवित शैवाल समुदाय संरचना से उस क्षेत्र की जलवायु स्थितियों के बारे में पता चल सकता है। शैवाल संरचना में बदलाव से वायु गुणवत्ता, जलवायु और जैविक प्रक्रियाओं में परिवर्तन के बारे में पता लगाया जा सकता है।

यह मिलेगी मदद : इस अध्ययन से जुड़े एक अन्य शोधकर्ता डॉ. राजेश बाजपेयी ने बताया कि, जैव-संकेतक शैवाल उथल-पुथल रहित वनों, हवा की गुणवत्ता, वनों की उम्र एवं उनकी निरंतरता, त्वरित अपरदन रहित उपजाऊ भूमि, पुराने वृक्षों वाले वनों, नम एवं शुष्क क्षेत्रों, प्रदूषण सहन करने की क्षमता और मिट्टी के पारिस्थितिक तंत्र के बारे में जानकारी उपलब्ध कराने का जरिया बन सकते हैं।

इन्होंने किया अध्ययन

लखनऊ स्थित राष्ट्रीय वनस्पति अनुसंधान संस्थान (एनबीआरआइ), अहमदाबाद स्थित इसरो के अंतरिक्ष उपयोग केंद्र और ईटानगर स्थित नॉर्थ ईस्टर्न रीजनल इंस्टीट्यूट ऑफ साइंस ऐंड टेक्नोलॉजी के वैज्ञानिकों द्वारा किया गया यह अध्ययन शोध पत्रिका प्रोसीडिंग्स ऑफ द नेशनल एकेडेमी ऑफ साइंसेज में प्रकाशित किया गया है।

TECH EXPLORIST

Subsidies on irrigation efficiency may have a negative impact on water use

Raghu Murtugudde -September 5, 2018

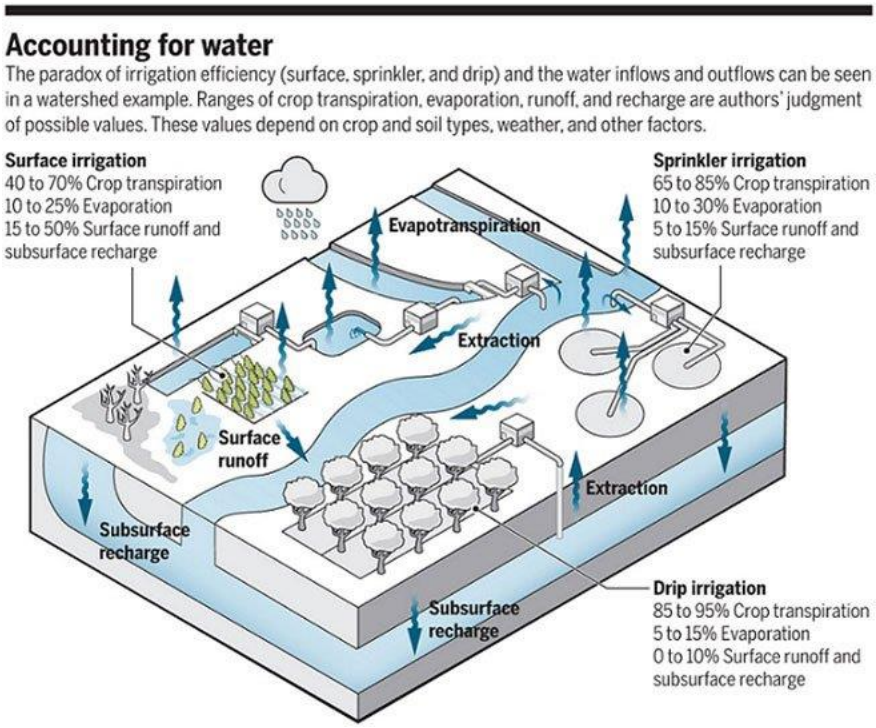
iStock

A new study has pointed out that increased irrigation efficiency does not translate into more water availability for other uses at the watershed level. The subsidies for increasing irrigation efficiency are intended to increase crop production as well as more return flow from irrigated areas that can be allocated to urban, domestic and industrial uses. But this does not seem to be happening.

The study, published in journal Science, by Quentin Grafton of Australia with co-authors from France, UK, and the US underscores what has been observed in recent years. It cites Rajasthan as one of the examples where increased irrigation efficiency due to approaches such as drip irrigation has led to increase in crop yields and agricultural incomes. At the same time, there is also an increase in irrigated area and water withdrawals.

While groundwater management is under the purview of state governments, the central government incentives to the state focus on irrigation efficiency as a step towards climate resilience. A 2017 study by the US geographer Trevor Birkenholtz had reported that farmers adopting drip irrigation are generally commercial-scale farmers who can afford the high costs and are also aware of increasing water demand from drip irrigation. Considering that nearly 80% of water supply for both irrigation and domestic use is from groundwater, dependence on irrigation efficiency for groundwater sustainability may be misplaced.

The increased irrigation efficiency, in fact, reduces the usable return flows despite increased crop transpiration and reduced evaporation which are the intended beneficial use of irrigation water. The water availability at watershed levels decreases because subsidies for irrigation efficiency lead to increases in irrigated areas and water withdrawals as well as driving a choice of more water-intensive crops. This is clearly a critical concern for India considering the monsoon response to global warming.



The paradox of irrigation efficiency (surface, sprinkler, and drip) and the water inflows and outflows can be seen in a watershed example. Ranges of crop transpiration, evaporation, runoff, and recharge are authors' judgment of possible values. These values depend on crop and soil types, weather, and other factors.
GRAPHIC: N. DESAI/SCIENCE

Much has been written about the reduced total monsoon rainfall over India during the 20th century with a striking increase in rainfall extremes, spatial variability and a threefold increase in widespread floods.

Future projections indicate a continued drop in water availability as well crop yields for most major crops. Consistent with the global trends, irrigation in India also accounts for well over 75% of the total water consumption.

In 1960-61, canals and traditional wells contributed nearly 60% of the water supply for irrigation with less than 1% water withdrawals from tubewells. By 2012-13, canals and traditional wells contributed only about 40% but the withdrawals form tubewells is up at 46%. Correspondingly, the total area under cropping systems has increased by about 45% but the area under irrigation has tripled during these decades. This shows up as nearly equal amounts of grain production in both Kharif and Rabi seasons whereas the Kharif used to be the dominant cropping season in the 1960s with twice the annual production compared to Rabi.

Despite impressive increases in agricultural productivity, per capita, food production shows a decline over the recent decades due to the increasing food demand and continued population growth. Electricity use is up for pumping groundwater. The depletion of groundwater tables is alarming in the northwest even though central-western India shows some groundwater recovery. Irrigation water use shows no decrease even during excess monsoon years which is a clear indication that the subsidies are not incentivizing the farmers to produce more crops with less water.

If we want to deal with this dilemma of increased irrigation efficiency leading to increased water withdrawals, we need to establish data networks to track not only crop transpiration but also total inflows and recoverable outflows of irrigation water but also the losses to unrecoverable sinks such as evaporation. Explicit caps on extraction as well irrigated areas are also recommended to ensure effective and real increases in irrigation efficiency.

Water withdrawals for irrigation depend on crop selections as well as soil types. Risk perception by farmers based on weather forecasts, access to loans and crop insurance also play a role. The use of subsidies for water withdrawal must be combined with the weather and extended range forecasts as well as seasonal outlooks. This will need trust-building so

that irrigation can be planned based on weather forecasts despite their uncertainties. Behavioral economics and other novel approaches can be brought to bear on maximizing agricultural production with minimal water use instead of focusing on marginal increases in yields with unbounded water use.

Ensuring real increases in irrigation efficiency requires carefully combining subsidies with caps and trade-offs of water withdrawal, irrigated area, electricity use, crop selection, weather, and extended range forecasts as well as seasonal outlooks and other market factors.

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खोज

एक मीटर तक है इन पंचभुजीय स्तंभों का व्यास, एक से 10 मीटर की ऊंचाइयों के अलग-अलग स्थायी स्तंभ भी देखे गए इस क्षेत्र में

कोल्हापुर के गांव में मिले दुर्लभ बेसाल्ट स्तंभ

वास्को द गामा (गोवा), आइएसडब्ल्यू : भारत में स्थित दक्कन ट्रैप को दुनिया भर में इसकी ज्वालामुखीय विशेषताओं के लिए जाना जाता है। इसी क्षेत्र में अब भारतीय वैज्ञानिकों ने पूर्ण रूप से विकसित एक दुर्लभ बेसाल्ट स्तंभ संरचना का पता लगाया है।

बेसाल्ट से बने बहुभुजीय स्तंभों का यह समूह महाराष्ट्र के कोल्हापुर जिले के बांदीवाड़े गांव में मिला है। स्तंभाकार संरचना युक्त यह बेसाल्ट प्रवाह 6.56 करोड़ वर्ष पुराने पन्हाला गठन का हिस्सा है, जो दक्कन ट्रैप की सबसे कम उम्र की संरचनाओं में से एक माना जाता है। यहां पाए गए बेसाल्ट स्तंभ विघटन के विभिन्न चरणों में मौजूद हैं। पूर्व-पश्चिम की ओर उन्मुख ये स्तंभ कम ऊंचाई क्षेत्र (समुद्र तल से लगभग 850 मीटर ऊपर) से ऊपर उठे हुए हैं, जो लैटराइट से ढके दो पठारों को जोड़ते हैं। इन पंचभुजीय स्तंभों का व्यास करीब एक मीटर तक है। इस क्षेत्र में एक से 10 मीटर की ऊंचाइयों के अलग-अलग स्थायी स्तंभ भी देखे गए हैं।

इस कारण हुआ निर्माण : इस अध्ययन से जुड़े प्रमुख शोधकर्ता डॉ. केडी शिर्के ने बताया कि नई खोजी गई यह साइट अद्वितीय और उल्लेखनीय है। इन बहुभुजीय स्तंभों का निर्माण मौसम और स्तंभाकार विशाल बेसाल्ट के क्षरण के कारण हुआ है। इस साइट में भू-विरासत क्षेत्र के रूप में चिह्नित किए जाने के गुण मौजूद हैं और इसे राष्ट्रीय भूवैज्ञानिक स्मारक के रूप में घोषित किया जाना चाहिए।

यह है खासियत

ये स्तंभ पूर्ण विकसित होने के साथ-साथ अन्य क्षेत्रों, जैसे- उत्तरी आयरलैंड के जायंट्स कॉजवे और कर्नाटक के सेंट मैरी द्वीप के मुकाबले मजबूत भी हैं। पन्हाला साइट भूवैज्ञानिक अध्ययनों की दृष्टि से काफी महत्वपूर्ण है। इस क्षेत्र में बेसाल्ट प्रवाह से जुड़ी विशेषताओं को समझने के लिए अधिक अध्ययन किए जाने की आवश्यकता है।

कई ज्वालामुखीय विस्फोट हुए

करीब 30 हजार वर्षों से अधिक समय तक इस क्षेत्र में ज्वालामुखीय विस्फोटों की श्रृंखला हुई है। दक्कन ट्रैप में विशेष रूप से क्षैतिज लावा प्रवाह के निशान, समतल चोटी वाली पहाड़ियां और चरणबद्ध छतों का विकास देखा जा सकता है।

इन्होंने की खोज

यह खोज सावित्रीबाई फुले पुणे विश्वविद्यालय, डॉ. डी.वाई. पाटिल विद्यापीठ, पुणे और कोल्हापुर स्थित डी. वाई. पाटिल कॉलेज ऑफ इंजीनियरिंग एंड टेक्नोलॉजी और गोपाल कृष्ण गोखले कॉलेज के शोधकर्ताओं के एक दल ने की है।

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From hypertension to cancers –alarm bells ringing in India's tribal belts

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Diabetes, hypertension, heart disease and cancers are often dubbed lifestyle diseases and seen largely as problems of city folks. A new investigation into tribal health has revealed that such non-communicable diseases now constitute major health burden across tribal communities as well. In addition, these communities are reporting mental illness too.

Indian tribal women (for representative purpose only; courtesy - Wikimedia Commons)

New Delhi (ISW) - Diabetes, hypertension, heart disease and cancers are often dubbed lifestyle diseases and seen largely as problems of city folks. A new investigation into tribal health has revealed that such non-communicable diseases now constitute major health burden across tribal communities as well. In addition, these communities are reporting mental illness too.

This means tribal people or scheduled tribes – who constitute 8.6 percent of India's total population – are actually facing triple burden of diseases – communicable diseases (malaria, tuberculosis, leprosy etc.), non-communicable diseases (diabetes, cardiovascular and cancers) and mental health problems like stress, substance abuse and so on. Other indicators like maternal and child health, malnutrition and stunting have improved but are still a major health burden.

This scenario has emerged in the report of an expert group set up by the ministries of health and tribal affairs in 2013. The group, headed by Magsaysay awardee and rural health expert Dr Abhay Bang, recently submitted its report to the government. The report, said to be the first such comprehensive effort since the independence, notes that availability of data about tribal health is patchy. So it relied on data from National Family Health Survey, National Sample Survey Organisation, studies done by civil society, and a study by the National Institute of Research in Tribal Health (NIRTH) done at the committee's behest.

Among communicable diseases, malaria continues to be a major health burden in tribal areas. Though tribal communities are just 8 percent of the population, they account for 30 percent of all malaria cases and 60 percent of p falciparum cases and 50 percent of total malaria mortality. "The goal of malaria elimination by 2030 can't be met unless tribal health is prioritized as majority of malaria cases and fatalities are from tribal areas," the report notes.

"Historically it has been believed that tribal populations do not suffer from non-communicable diseases like cancer, diabetes, hypertension and cardiovascular ailments, primarily due to their proximity to nature, healthy food habits and lack of stress. However, there is evidence of early epidemiologic transition in tribal areas and associated increase in the incidence of non-communicable diseases," the report said.

The prevalence of cardiovascular diseases in tribal people is almost same as non-tribal people in seven out of ten states with significant tribal population, and higher than the general population in Maharashtra and Andaman and Nicobar Islands, according to data collected under the District Level Household Survey (DLHS-4). A survey by the National Nutrition Monitoring Bureau (NNMB) in 2009 had found that one out of every four tribal adults suffered from hypertension, which is at par with the national prevalence rate. A survey by NIRTH in Madhya Pradesh revealed that prevalence of hypertension among Baiga tribe was 10.5 percent in Mandla, 20.2 percent in Dindori and 11.2 percent in Balaghat. It was 21.5 percent in Bharia tribe of Patalkot valley in Chindwara district.

"Given the high prevalence of hypertension, stroke rates also will be higher. Although not mentioned in the report I speculate that these will be largely hemorrhagic stroke with catastrophic outcomes," noted Dr D Prabhakaran, Director, Centre for Chronic Disease Control. "The prediabetes mentioned is lower because of the higher non-standard diagnostic threshold. If we use the standard threshold of less than 126 mg/dl it will be even higher. There is no correlation of obesity and diabetes and it is true for all Indians. Given the level of undernutrition and its link to metabolic disorders as adults we can expect diabetes to become a major problem among tribals," he said.

Mental stress is also visible among tribal communities. One of the reasons for this is the fact that most of them live in conflict zones. Forty of the 106 districts affected by left-wing extremism have more than 25 percent tribal population each. Many insurgent groups operate in the Northeast primarily inhabited by tribal communities. "Displacement and migration due to environmental disasters, mining, land acquisition and loss of livelihood are also taking a toll on mental health of tribal people," the report has pointed out.

While the disease burden among tribal populations is high, health infrastructure in tribal areas is inadequate. This, the panel says, is worrying because scheduled tribe populations heavily rely on public health system despite barriers of access. Tribals are now seeking more of modern health care, and the influence of traditional healers is on a decline. Therefore, it is necessary to strengthen the public health system in these areas.

At the same, the traditional healing practices should be studied to distinguish between harmful and beneficial practices. The committee has recommended that tribal medical system should be integrated with modern system to provide the best possible care to tribal communities. A compendium of tribal herbal medicines should be prepared with rigorous testing, and help from CSIR and DBT.

An analysis done by the National Health Systems Resource Centre showed that Jharkhand has the highest percentage shortfall of tribal Primary Health Centres (PHCs), followed by Madhya Pradesh (53%), Rajasthan (52%), Jammu and Kashmir (31%) and Maharashtra (30%). The shortfall of tribal Community Health Centres (CHCs) in Maharashtra, Madhya Pradesh and Rajasthan is 40% and above. In ten major states with tribal populations, the overall deficit of 20% sub-centres, 30% PHCs and 22% CHCs.

The situation is no good when it comes to manpower. In 2017, there was 82% shortfall in specialist doctors, 33 % of lab technicians and 28% of staff nurses in tribal areas. The panel has observed that there is powerful evidence that health worker ASHA is "a very appropriate, feasible and effective way" of bridging the health gap in tribal areas but there was lack of appreciation about it in State Health Missions.

Source: India Science Wire Image courtesy: Wikimedia Commons

जनजातियों में बढ़ रहे हैं जीवनशैली से जुड़े रोग

Fri, 09/07/2018 - 17:12 Author दिनेश सी. शर्मा Source इंडिया साइंस वायर, नई दिल्ली, 07 सितम्बर, 2018

मलेरिया फैलाने वाला एनाफिलिस मच्छर

मलेरिया के खिलाफ वैज्ञानिकों की जंग

अभी तक समझा जाता था कि जनजातीय इलाकों में रहने वाले लोग सिर्फ मलेरिया जैसे संचारी रोगों और कुपोषण से ही जूझ रहे हैं। पर, एक ताजा रिपोर्ट में पता चला है कि उच्च रक्तचाप, हृदय रोग और मधुमेह जैसी गैर-संचारी बीमारियाँ भी अब जनजातीय क्षेत्रों में अपने पैर पसार रही हैं। इसके साथ ही इस अध्ययन में जनजातीय लोगों के मानसिक बीमारियों से ग्रस्त होने के बारे में भी पता चला है।

स्वास्थ्य मंत्रालय और जनजातीय मामलों के मंत्रालय द्वारा वर्ष 2013 में गठित विशेषज्ञ समिति की रिपोर्ट में ये तथ्य सामने आए हैं। इस समिति के अध्यक्ष और ग्रामीण स्वास्थ्य विशेषज्ञ डॉ. अभय बंग ने यह रिपोर्ट हाल में सरकार को सौंपी है।

एक आम धारणा है कि प्रकृति के करीब होने तथा स्वस्थ खानपान के कारण जनजातीय लोग जीवन शैली से जुड़ी बीमारियों के खतरे से बचे हुए हैं। लेकिन, इस रिपोर्ट से स्पष्ट हुआ है कि जनजातीय समुदाय स्वास्थ्य पर तीन तरफ से पड़ने वाली मार झेल रहा है। इनमें संक्रामक रोग (मलेरिया, तपेदिक, कुष्ठ रोग आदि), गैर-संक्रामक रोग (मधुमेह, हृदय रोग एवं उच्च रक्तचाप), मानसिक

तनाव तथा अन्य स्वास्थ्य समस्याएँ शामिल हैं। मातृ एवं शिशु स्वास्थ्य तथा कुपोषण जैसे स्वास्थ्य संकेतकों में सुधार जरूर हुआ है, पर इससे जुड़ी समस्याएँ अभी बनी हुई हैं।

जनजातीय लोग पहले से ही मलेरिया और कुपोषण जैसी स्वास्थ्य समस्याओं से जूझ रहे हैं। भारत की कुल आबादी में जनजातीय समुदाय या अनुसूचित जनजातियों की हिस्सेदारी करीब 8.6 प्रतिशत है। लेकिन, मलेरिया के कुल मामलों में से 30 प्रतिशत मामले जनजातीय क्षेत्रों में पाए जाते हैं और इसके कारण होने वाली 50 प्रतिशत मौतें भी यहीं पर होती हैं। इस रिपोर्ट में कहा गया है कि "वर्ष 2030 तक मलेरिया उन्मूलन का लक्ष्य तब तक पूरा नहीं किया जा सकता जब तक कि आदिवासी स्वास्थ्य को प्राथमिकता नहीं दी जाती"

जनजातीय बहुलता वाले दस में से सात राज्यों में जनजातीय लोगों में हृदय रोगों का प्रसार गैर जनजातीय आबादी के बराबर है। जबकि, महाराष्ट्र और अंडमान निकोबार द्वीप की जनजातीय आबादी में आम जनसंख्या की अपेक्षा हृदय रोगों का प्रसार अधिक पाया गया है। वर्ष 2009 में राष्ट्रीय पोषण निगरानी ब्यूरो (एनएनएमबी) द्वारा किए गए एक सर्वेक्षण में पाया गया था कि प्रत्येक चार जनजातीय वयस्कों में से एक उच्च रक्तचाप से पीड़ित है, जो राष्ट्रीय दर के बराबर है। मध्य प्रदेश में एनआईआरटीएच के एक सर्वेक्षण के अनुसार, बैगा जनजाति में उच्च रक्तचाप का प्रसार मंडला में 10.5 प्रतिशत, डिंडोरी में 20.2 प्रतिशत और बालाघाट में 11.2 प्रतिशत है। छिंदवाड़ा जिले की पातालकोट घाटी के भरिया जनजाति के 21.5 प्रतिशत लोग उच्च रक्तचाप से ग्रस्त पाए गए हैं।

क्रोनिक डिजीज कंट्रोल सेंटर के निदेशक डॉ. डी. प्रभाकरन ने इंडिया साइंस वायर को बताया कि "उच्च रक्तचाप के प्रसार के कारण स्ट्रोक की दर भी अधिक हो सकती है।"

अधिकतर जनजातीय इलाकों में नक्सल हिंसा जैसी समस्याएँ भी हैं। इसके चलते वहाँ रहने वाले लोग तनाव और मानसिक बीमारियों से भी ग्रस्त हो रहे हैं। इस रिपोर्ट के मुताबिक, "पर्यावरणीय आपदाओं, खनन, भूमि अधिग्रहण और आजीविका के संकट के कारण हो रहे विस्थापन एवं पलायन का असर जनजातीय लोगों के मानसिक स्वास्थ्य पर पड़ रहा है।"

एक तरफ स्वास्थ्य समस्याओं का बोझ जनजातीय आबादी पर बढ़ रहा है तो दूसरी स्वास्थ्य सेवाएँ इन इलाकों में लचर बनी हुई हैं। यह स्थिति चिंताजनक है क्योंकि जनजातीय लोग पूरी तरह सार्वजनिक सेवाओं पर निर्भर हैं और पारंपरिक चिकित्सकों पर उनकी निर्भरता कम हो रही है। इसलिए सरकारी स्वास्थ्य तंत्र को जनजातीय क्षेत्रों में मजबूत किया जाना जरूरी है। इसके साथ ही समिति का मानना है कि पारंपरिक उपचार पद्धतियों का वैज्ञानिक रूप से अध्ययन किया जाना चाहिए ताकि जनजातीय चिकित्सा प्रणाली को आधुनिक प्रणाली के साथ एकीकृत किया जा सके।

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THE DAILY Kashmir Convener
Voice of Courage

Heart disease, stroke among top killers in India

By Online Editor On Sep 12, 2018

Dinesh C Sharma

New Delhi, September 12 (India Science Wire): India has witnessed an alarming rise in the occurrence of heart disease, stroke, diabetes and cancers in the past 25 years, a series of new studies published on Wednesday in *The Lancet* and its associated journals have revealed.

Detailed estimates of cardiovascular diseases, diabetes, chronic respiratory diseases, cancer, and suicide show that their prevalence has gone up in every Indian state between 1990 and 2016, but there is vast variation among states.

The prevalence of heart disease and stroke has increased by over 50% from 1990 to 2016 in India, with an increase observed in every state. The contribution of these diseases to total deaths and disease burden in the country has almost doubled in the past 25 years. Heart disease now is the leading individual cause of disease burden in India, and stroke is the fifth leading cause.

Heart disease and stroke together contributed to 28·1% of total deaths in India in 2016 — compared with 15·2% in 1990. Heart disease contributed 17·8% of total deaths and stroke contributed 7·1% of total deaths. The proportion of deaths and disability from heart disease

was significantly higher in men than in women, but was similar among men and women for stroke. Deaths due to cardiovascular diseases rose from 13 lakh in 1990 to 28 lakh in 2016.

The number of prevalent cases of cardiovascular diseases has increased from 2.57 crore in 1990 to 5.45 crore in 2016. The prevalence was the highest in Kerala, Punjab and Tamil Nadu, followed by Andhra Pradesh, Himachal Pradesh, Maharashtra, Goa, and West Bengal.

More than half of the total cardiovascular disease deaths in India in 2016 were in people younger than 70 years. “This proportion was the highest in less developed states, which is a major cause for concern with respect to the challenges posed to the health systems. Reducing premature deaths from cardiovascular diseases in the economically productive age groups requires urgent action across all states of India,” the researchers have observed.

“The study shows that the response has to be appropriate to the context of each state. By shining the torchlight on specific disease burdens that each state must prioritise, this study will help direct health system resources to maximise impact through early prevention and effective treatment,” explained Professor K Srinath Reddy, President, Public Health Foundation of India, and one of the joint senior authors of the series. Other joint senior authors are Dr Soumya Swaminathan and Dr Lalit Dandona.

“While it is known that non-communicable diseases have been increasing in India, a major finding of concern is that the highest rate of increase in heart disease and diabetes is in less developed states. These states already have high burden from chronic obstructive lung disease and range of infectious and childhood diseases,” said ICMR director general Professor Balram Bhargava.

The increase in health loss due to diabetes since 1990 is the highest among major non-communicable diseases. The increase has been observed in every state of the country, and the relative rate of increase is the highest in several less developed states. “Policy action must take these state-level differences into account to control this potentially explosive public health situation,” the researchers have suggested.

The number of persons with diabetes in India has increased from 2.6 crore in 1990 to 6.5 crore in 2016. Among the risk factors contributing to diabetes in India in 2016, high body mass index (BMI) had the highest impact. The other risk factors included dietary risks, tobacco use, occupational exposure to second-hand smoke, low physical activity, and alcohol use.

The proportional contribution of cancers to the total health loss in India has also doubled from 1990 to 2016, but the incidence of different types of cancers varies widely between the states, according to thestudy. Over8% of the total deaths in India in 2016 were due to cancer, which is double the number in 1990. The estimated number of cancer cases increased from 5.48 lakh in 1990 to 10.6 lakh in 2016. The leading types of cancer in 2016 were stomach

(9%), breast (8·2%), lung (7·5%), lip and oral cavity (7·2%), pharynx cancer other than nasopharynx (6·8%), colon and rectum (5·8%), leukaemia (5·2%), and cervix (5·2%).

Another area pf concern is the rise in suicides, which is presently the leading cause of death in the 15-39 year age group in India. Almost 37% of the total global suicide deaths among women occur in India, and suicide death rate among the elderly has also increased over the past quarter century.

The studies have been done as a part of the India State-level Disease Burden Initiative, a joint project of the Indian Council of Medical Research (ICMR), Public Health Foundation of India (PHFI), and Institute for Health Metrics and Evaluation (IHME). Experts from over 100 Indian institutions participated in the exercise.

(India Science Wire)

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अध्ययन

महिलाओं की तुलना में पुरुषों में हृदय रोग के कारण मृत्यु का अनुपात काफी अधिक, बीते 25 वर्षों के डाटा के विश्लेषण से आया सामने

हर राज्य में तेजी से बढ़ी हृदय रोगियों की संख्या

नई दिल्ली, आइएसडब्ल्यू : भारत में पिछले 25 वर्षों में हृदय रोग, पक्षाघात, मधुमेह और कैंसर जैसी बीमारियां बहुत तेजी से बढ़ी हैं। प्रतिष्ठित जर्नल द लैंसेट और इससे संबद्ध जर्नलों में प्रकाशित हुए नए अध्ययनों से यह बात सामने आई है। भारत के हर राज्य में हृदय तथा रक्तवाहिकाओं संबंधी बीमारियों, मधुमेह, सांस संबंधी बीमारियों और कैंसर के 1990 से 2016 तक के विस्तृत आकलन दर्शाते हैं कि ये बीमारियां बढ़ी हैं, लेकिन अलग-अलग राज्यों में इनके प्रसार में काफी भिन्नता है।

भारत में हुई कुल मौतों में से हृदय संबंधी बीमारियों और पक्षाघात के कारण हुई मृत्यु के आंकड़े 1990 में 15.2 प्रतिशत थे, जो 2016 में बढ़कर 28.1 प्रतिशत आंके गए हैं। कुल मौतों में से 17.8 प्रतिशत हृदयरोग और 7.1 प्रतिशत पक्षाघात के कारण हुईं। महिलाओं की तुलना में पुरुषों में हृदय रोग के कारण मृत्यु और अक्षमता का अनुपात काफी अधिक है, लेकिन पुरुषों और महिलाओं में पक्षाघात समान रूप से पाया गया। वहीं, देश में कार्डियोवेस्कुलर बीमारियों के कारण होने वाली मौतों की संख्या 1990 में 13 लाख से बढ़कर 2016 में 28 लाख पाई गई। इन बीमारियों के मरीजों की संख्या 1990 में 2.57 करोड़ से बढ़कर 2016 में 5.45 करोड़ हो गई है। केरल, पंजाब और तमिलनाडु

में इनका प्रसार सबसे अधिक था। इसके बाद आंध्र प्रदेश, हिमाचल प्रदेश, महाराष्ट्र, गोवा, और पश्चिम बंगाल में भी इसके मामले अधिक पाए गए हैं। 2016 में भारत में कार्डियोवेस्कुलर बीमारियों के कारण हुईं कुल मौतों में से आधे से ज्यादा लोग 70 साल से कम उम्र के थे। पब्लिक हेल्थ फाउंडेशन ऑफ इंडिया के अध्यक्ष और शोध से जुड़े वरिष्ठ वैज्ञानिक प्रोफेसर के श्रीनाथ रेड्डी के मुताबिक, अध्ययन दर्शाते हैं कि प्रत्येक राज्य में इस संदर्भ में उचित प्रबंधन होना चाहिए।

भारतीय चिकित्सा अनुसंधान परिषद के महानिदेशक प्रोफेसर बलराम भार्गव का कहना है कि हालांकि यह ज्ञात है कि भारत में असंक्रामक रोग बढ़ रहे हैं, लेकिन मूल चिंता का विषय यह है कि खून की कमी संबंधी हृदय रोग और मधुमेह में वृद्धि की उच्चतम दर कम विकसित राज्यों में है।

मधुमेह से ग्रसित लोगों में भी इजाफा

भारत में मधुमेह से ग्रस्त लोगों की संख्या 1990 में 2.6 करोड़ से बढ़कर 2016 में 6.5 करोड़ हो गई है। 2016 में भारत में मधुमेह के लिए उत्तरदायी संकट कारकों में से उच्च शारिरिक भार इंडेक्स (बीएमआइ) सबसे अधिक प्रभावी है।

कैंसर की स्थिति

भारत में कुल स्वास्थ्य गिरावट के लिए कैंसर का आनुपातिक योगदान 1990 से 2016 तक दोगुना हो गया है। भारत में कैंसर के मामलों की अनुमानित संख्या 1990 में 5.48 लाख से बढ़कर 2016 में 10.6 लाख हो गई।

संयुक्त परियोजना के तहत अध्ययन

भारतीय चिकित्सा अनुसंधान परिषद (आइसीएमआर), पब्लिक हेल्थ फाउंडेशन ऑफ इंडिया (पीएचएफआइ) और इंस्टीट्यूट फॉर हेल्थ मैट्रिक्स एंड इवेल्युएशन (आइएचएमइ) की भारतीय राज्य स्तरीय रोग संबंधी पहल नामक एक संयुक्त परियोजना के एक हिस्से के रूप में ये अध्ययन किए गए हैं।

EASTERN MIRROR

Avalanche forecasting, public awareness can save lives

Srinagar, Sep. 13 (India Science Wire): The majestic mountains in the Himalayas, besides being abode of ice, snow and freshwater, are also hotbeds of natural calamities and disasters like earthquakes, flash floods, landslides and snow avalanches.
The roads that crisscross high mountainous regions are prone to heavy snow avalanches, which at times result in loss of life and property. Geologists, geographers, sedimentologists and environmental experts are studying snow avalanches in order to be able to predict their formation and occurrence with accuracy and precision.

A scientific investigation into the avalanche that occurred on January 5, 2018 on Chowkibal-Tangdhar road in Kupwara district of Jammu & Kashmir has revealed important insights into such disasters.

The study by scientists from Snow and Avalanche Study Establishment (SASE), Chandigarh, involved running computer simulations to get insights into its various aspects including the characteristic features of snow mass as well as probable cause behind the formation and occurrence of the avalanche.

In the accident, a vehicle was swept away in the snow cloud and got buried under avalanche debris resulting in death of ten passengers. The Chowkibal-Tangdhar road is among the most vulnerable ones in the region where snow avalanches occur at a high frequency especially during winters.

The researchers simulated formation and movement of snow avalanche and then studied its various characteristic features including mass, speed and pressure. It was observed that most of the area of this avalanche zone is facing south and south-east with an average slope of 42% and 37% respectively. Computer simulations revealed various parameters like velocity, flow and pressure of the avalanche.

The region has scanty tree cover which in turn contributes to the avalanche formation as well as their frequent occurrence. It seems the vehicle which got swept away was parked wrongly

in the avalanche path, due to road blockade. It was also found that there was such an intense pressure and momentum accompanying the snow cloud, that the vehicle simply got swept away with the moving mass.

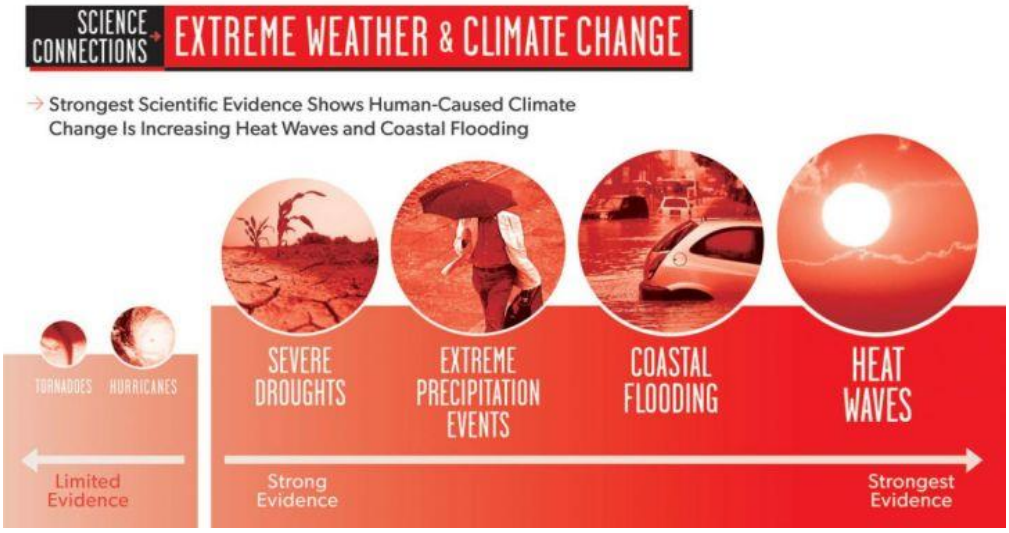
The driver and passengers were unaware about the standard operating procedures to be followed while travelling in avalanche-prone areas. The study points to the fact that there is lack of awareness among the people especially those who live in avalanche prone regions. Thus general awareness and rigorous scientific forecasting of snow avalanches are key to efficient avalanche risk management.

According to Dr H.S. Gusain, lead researcher of the study, “accidents related to snow avalanches can be avoided if travelers know Standard Operating Procedure and for that there should be mass awareness campaigns to make people aware about this information and educate them about do’s and don’ts of travelling on vulnerable roads.”

Jammu & Kashmir, Himachal Pradesh and Uttarakhand are among the most avalanche vulnerable regions in India. In Kashmir valley, every year snow avalanches occur in Drass, Gurez, Keran, Machhil, Pahalgam, Gulmarg, Naugam and Banihal. Avalanches are triggered due to specific topographical and snow pack conditions, with formation zones generally sloppy accompanied by barren hills with scanty tree cover.

The research team included Hemendra S. Gusain, V.D. Mishra and D.K. Singh from Snow and Avalanche Study Establishment, Chandigarh. The study has been published in journal Current Science.

Linking Weather Extremes With Climate Change In Real-Time



Every time an extreme weather event like the Kerala floods occurs, there is a great demand for information on its causes. The question uppermost in public discourse is if such events can be attributed to climate change and global warming.

Detection and attribution are the foundations of climate change science. Climate change can be detected either as long term or low-frequency changes such as warming, sea level rise or mean precipitation changes. Climate or weather extremes are not uniformly definable but the magnitude of events and their frequency or return period are typically used as indicators.

Attribution means either quantifying the change in risk or probability of an extreme event that can be attributed to human influence on climate or quantifying specific thermodynamic and dynamic patterns that contributed to the extreme. Thermodynamics in this context is conceived in the warming, humidity increase or sea level rise. Dynamics corresponds to changes in winds and circulation patterns which can be decomposed into natural variability and changes due to human activities.

The monsoon and El Niño represent natural variability in climate. Separating the ‘forced’ component due to human impact can be like finding the needle in a haystack but with rising greenhouse gas emissions and the associate temperature, humidity and sea level rise, human impact has clearly emerged beyond natural variability.

The human impact on climate can be captured in the changing radiation balance at the top of the atmosphere. Increased greenhouse gases warm the planet and perturb the balance between

incoming solar energy or the shortwave radiation and the outgoing longwave or infrared energy from the planet. This radiation balance is the net forcing of the climate including the extremes while the earth's natural variability acts as the noise separating the human impact on extremes.

While the increase in temperature and humidity due to increased radiative forcing of greenhouse gases can be easily computed and understood, deciphering the response in precipitation is a serious challenge. Warmer temperatures and increased humidity provide favorable conditions for building atmospheric instabilities which should lead to more rainfall. However, the heat and humidity also alter winds and circulation of the atmosphere and hence the oceans. This leads to changes in the location and amount of evaporation and the total amount, intensity and frequency of rainfall.

For example, the total amount of monsoon rainfall may be reduced but at the same time the frequency of the number of rainy days can be reduced much more. This means, when it rains it pours. Clearly, it cannot pour everywhere since the moisture supply is finite. Thus it rains cats and dogs in one place while another place will lose its rain. For instance, if it floods in Kerala, then there can be a reduction in rainfall over Maharashtra.

Model simulations of the real world scenario are needed to separate thermodynamic and dynamic contributions. But this separation is only possible by comparing to a world where human influence does not exist – so-called 'counterfactual' world. Simulating the counter-factual world requires running a coupled ocean-atmosphere model in the absence of greenhouse gas emissions due to human activity. Such coupled climate model simulations require massive computing facilities.

When the real world and the counter-factual world are simulated with enormous computing resources, the natural variability needs to be subtracted to extract the human-contribution to the observed extreme event. Model shortcomings in capturing natural variability (monsoon and El Niño) can affect the differences in the actual and counterfactual worlds simulated by the models. That's why attribution studies have to rely on multiple models to increase our confidence in their conclusions.

The posing of the question about human contribution can also lead to counter-intuitive attributions. For example, the heatwaves of Russia in 2010 and Texas in 2011 were not altered in their magnitude because of global warming, leading to a conclusion that they were not a result of human activity. However, their return period or the probability of occurrence was found to be clearly influenced by global warming.

Attribution studies of Kerala floods or other extreme weather events in India will have to ask similar questions. Were the rainfall amounts over parts of Kerala during August enhanced by global warming or were their probability increased or both? Such attribution studies typically take months to complete. The Bulletin of American Meteorological Society publishes the State of the Climate each July tabulating the previous year's climate anomalies and extreme events including some attribution studies.

The growing demand for attribution information has now led to efforts towards developing 'Operational Attributions'. In this approach, the highest percentiles or thresholds (e.g., rainfall rates of more than 150 mm per day) and the associated circulation patterns are kept ready based on past events for a given location. For example, an impending El Niño and the

expected droughts, floods or winter storms can be pre-computed along with the contributions from local warming and/or circulation changes due to global warming.

If an extreme event does occur, then these pre-computations allow for rapid attributions in near-real time. Another approach is to generate extremes based on model forecasts of sea surface temperatures. These allow for near real-time attributions which are now in more and more demand from communities, governments and businesses such as insurers.

A few attribution studies are available on the Indian monsoon and streamflows, increase in widespread floods, heatwaves, and hydro-climatology of major river basins. Attribution of climate extremes is an essential and effective tool for India, given its high vulnerability to natural disasters and regional disparities in these vulnerabilities.

The money invested in weather and climate prediction is clearly yielding results as seen in the accurate forecasts of many heavy rainfall events in the last several years. Climate scientists also need to have pre-computed thresholds and circulation patterns to issue wise guesses in the immediate aftermath of extreme events to satisfy the demand for information. Such information, once confirmed from operation attributions, will also guide policy and disaster mitigation efforts.

INDIANSKNOW

Better Lithium Ion Batteries On The Cards

September 17, 2018 By Sunderarajan Padmanabhan Twitter: @ndpsr

New Delhi, September 14 (India Science Wire): A team of scientists at India Institute of Technology (IIT), Hyderabad, has developed a set of new electrodes that promise to help produce lithium ion batteries with higher energy densities.

Battery cells consist of cathode, anode and the electrolyte that conducts ions between two electrodes. The energy density of a battery depends on voltage and specific capacity (the capacity to store amount of charge in the material per unit mass) of electrode material.

The cathodes are usually made of mixed transition metal oxides and metal phosphates and have specific capacities in the range of 140-210 milliampere hour per gram. The anodes are

made of graphite and have specific capacities of 350 milliampere hour per gram. The energy density of the overall cells range from 100 to 265 Watt hour per kilogram.

Team of researchers at IIT Hyderabad

The team at IIT Hyderabad has developed two new cathode materials and one anode material. For the first type of cathode, they synthesized mixtures of transition metal oxide and carbon-coated lithium manganese phosphate, to form a “blended cathode”. It has been found to show good stability under repeated cycling. The electrodes made with this blend had a specific capacity of 225 milliampere hour per gram. The second cathode is based on doping of transition metal oxide cathode material with fluorine and magnesium. It has capacity of nearly 280 milliampere hour per gram.

The anode material, developed in collaboration with Oak Ridge National Laboratory (USA), is an organic binder-less, additive-free 3D electrode architecture made of silicon and nano carbon. It was coated on a current collector made up of carbon fibre, instead of copper foil. The new anodes had capacities of over 2,000 milliampere hour per gram.

Leader of the study team, Dr. Surendra K. Martha, said that silicon was used for the anode material because its outstanding specific capacity. One silicon atom can bond with more than four lithium ions, while six carbon atoms are needed to bind to a single ion of lithium. “The material developed by retains the advantage of silicon in terms of higher capacity and at the same time overcome disadvantages like poor physical integrity as it provides enough space between silicon and the surrounding carbon coating, which allows for volume expansion and contraction without pulverisation of the silicon”, he said.

The research team has demonstrated the viability of its development, by combining the new cathode and anode materials in a coin-type lithium ion cell. It generated energy densities of 500 Watthour per kilogram.

Research Stash

New Approach Can Make Better Titanium Alloy for Implants

Researchers at the Indian Institute of Science (IISc) in Bengaluru have proposed a new approach for developing orthopedic implants with better ability to bond with the bone.

Currently, orthopedic implants for knee and hip arthroplasty are made of metallic alloys that contain potentially toxic elements like aluminum, vanadium, and nickel. They are also much stiffer than human bone and don't bond well with the bone.

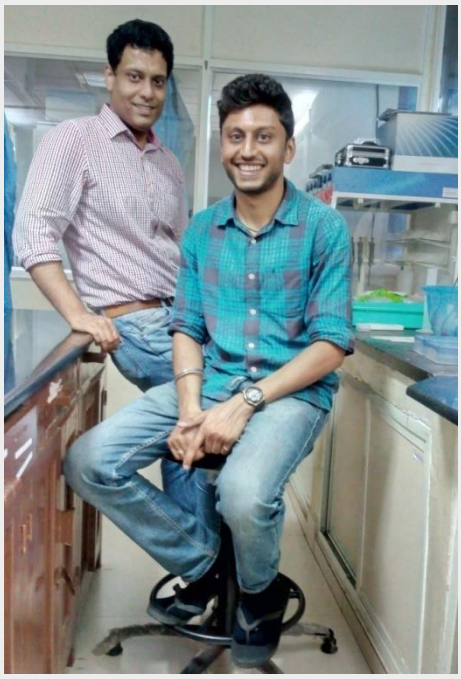


Image: Kaushik Chatterjee and Sumit Bahl (Left to Right)

The research team at IISc has developed a strategy to increase the bioactivity of titanium alloy consisting of non-toxic elements – titanium, niobium, and tin, through surface severe

plastic deformation (metalworking techniques). This approach could help produce new titanium alloys that are less stiff compared to currently used. The researchers have published a report on their work in the journal '*ACS Biomaterials Science & Engineering.*'

The researchers used a technique known as surface mechanical attrition treatment (SMAT) to boost bioactivity of alloy's surface. In this technique, the metal alloy sheet is placed inside a chamber containing hard steel balls typically used in ball bearings. The chamber is vibrated using electromechanical means because of which the balls start to move randomly at high speed inside the chamber.

"The SMAT treatment deforms the surface of the metal sheet, which leads to an increase in surface hardness, modification in surface roughness and surface wettability and its chemistry. These modifications are responsible for increasing biological activity of the metal," explained Dr. Kaushik Chatterjee, who led the research, while speaking to *India Science Wire*.

SMAT can improve biomechanical properties like fatigue and wear resistance, added Dr. Sumit Bahl, lead author of the study. The equipment used for the experiment was developed in collaboration with a Bengaluru company.

"The study has shown that traditional metal processing techniques can be still used to improve the cell-material interaction of new class of titanium alloys," commented Dr. T.S. Sampath Kumar of Indian Institute of Technology, Madras, who was not connected with the study.

The research team included Sai Rama Krishna Meka, Sumit Bahl, Satyam Suwas, and Kaushik Chatterjee. The study was supported by the Science and Engineering Research Board (SERB). (India Science Wire)

By Ratneshwar Thakur
Journal Article

TECH EXPLORIST

Modifications in school bag can reduce load for children

By **Jyoti Singh** -September 19, 2018

Heavy school bags are always a problem for school children. A group of Indian researchers has now redesigned school bag pack so that it can reduce the load on spine and shoulders of children.

In the modified design, heavier books can be placed closer to the spine and lighter one away from it. Shoulder straps of the bag pack have been adjusted to the extent where the tip of the backpack is positioned at two centimeters above the waistline of the bag holder.

“We have incorporated an internal frame to reduce the load from spine and shoulders and distribute it to the pelvic region. The new design will also distribute the load evenly to torso,” said Ishant Gupta, lead researcher from the Center of Excellence in Industrial and Product Design at the PEC University of Technology, while speaking with India Science Wire.

Earlier studies have proved that there is a direct relationship between energy expenditure and trunk forward lean. Traditional school bags place the backpack load closer to the body's center of mass, resulting in changes in gait as well as energy expenditure. While carrying such backpacks the body leans in an anterior forward direction where it has to balance upper body, head, skull and weight of the bag. In the new design, the spine doesn't have to balance upper body weight which means less energy is needed.

The new study examined gait parameters, posture, trunk angle and energy expenditure differences between modified backpack and existing backpacks in school children aged between 11 and 13 years. The new and existing backpacks were tested in 26 children under three loading conditions of 10%, 20% and 30% of their body weight.

The gain in energy expenditure was the highest when children carried loads of 30 percent of their body weight. Students carrying modified backpacks with 30 percent bodyweight loads were found to have reduced energy expenditure that was 6.7 calories per minute whereas it was 8.4 calories per minute with the existing bags. The trunk angle was also found to reduce from 8.7 degrees with existing backpacks with 30 percent bodyweight loads to 6.2 degrees with the modified backpacks.

"The researchers have considered several parameters while studying the backpack weight. It is important to ensure that users know how to pack their bags in a correct manner. Normally the bag weight should never exceed 15% of body weight in children. Heavier bags can lead to postural problems," commented Dr. Davinder Singh, professor of orthopedics at Safdargunj Hospital, New Delhi.

The erect posture, natural gait patterns and reduction in energy consumption supported by the modified backpacks may thus reduce the causes of back pain and fatigue among school children, researchers said. The study has been published in journal Current Science. The research team included Ishant Gupta and Parveen Kalra (PEC University of Technology) and Rauf Iqbal (National Institute of Industrial Engineering, Mumbai).

Down To Earth
FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH
25 years

Experiments in rats show some bad memories can be forgotten

Indian scientists found that exaggerated response and difficulty to get rid of bad memories could depend on whether the bad memory was formed before or after a stressful event

By Ratneshwar Thakur Last Updated: Wednesday 19 September 2018

More studies in animals and humans will be required to further explore how this research can be used for treating stress disorders. Credit: Sodanie Chea/Flickr

It is believed that exaggerated response to bad memories is similar for all negative memories. Now, a team of Indian scientists have shown that exaggerated response and difficulty to get rid of bad memories could depend on whether the bad memory was formed before or after a stressful event.

The finding is based on experiments done in rats using a technique called fear conditioning. When a rat is presented with a sound tone along with an aversive cue, it forms a memory that the tone is bad. The rat freezes in fear whenever the tone is played. But when the tone is repeated without the aversive cue, the animal learns to forget aversive memory and realises that the tone is not bad.

When rats underwent stressful experience before fear conditioning, they showed increased fear response and inability to forget aversive memory. In contrast, when they underwent the stressful experience afterwards, they did not show any enhanced response fear or inability to extinguish the fear memory.

Researchers also recorded brain activity of the rats as they underwent fear conditioning and stressful experience. It was found that although amygdala (emotional hub of the brain) remained hyperactive in stressed animals, it did not affect expression of fear memory. The prefrontal cortex which remained relatively unaffected in stressed animals seemed to control the normal fear response.

Earlier studies had shown that amygdala and prefrontal cortex play important role in fear-related behaviour. While amygdalais involved in formation of fear memories, prefrontal cortex (involved in making executive decisions) helps in their regulation and finally extinction. Stress has been found to elicit opposite effects on the two brain structures.

“When fear-enhancing effects of prior exposure to stress are not in play, the expression of fear reflects normal regulation of prefrontal activity, not stress-induced hyperactivity in the amygdala,” explained Sumantra Chattarji, leader of the research team.

Stress-induced strengthening of fear memories and impaired fear extinction are generally believed to be behavioural manifestation of these contrasting effects on amygdala and prefrontal cortex. This has given rise to the view that stress impairs the ability to extinguish fear memories. “Our study questions this view”, researchers said. However, more studies in animals and humans will be required to further explore how this research can be used for treating stress disorders.

The study done by Bangalore-based National Centre for Biological Sciences (NCBS) and Institute for Stem Cell Biology and Regenerative Medicine (inSTEM) has been published in journal *eLife*. The research team included Mohammed Mostafizur Rahman, Ashutosh Shukla and Sumantra Chattarji. This work was supported by Department of Atomic Energy and Department of Biotechnology.

(India Science Wire)

BioVoice Get Heard!
www.biovoicenews.com

Early sowing can increase cotton yield: study

A new study by Indian scientists has predicted that the yield of cotton can be maximized if the crop is sown early (by mid-May) and irrigated during ball formation and maturity stages in case of drought conditions

By **BioVoice Correspondent** - September 21, 2018

By Dr Aditi Jain

New Delhi: Crop forecasting—prediction of crop production under different weather conditions through computer simulations— can guide decisions to maximise production under a particular weather condition. Such predictions have become important under the emerging climate change scenario where knowledge about impact of changing weather patterns on crop productivity can help in minimizing yield loss.

A team of Indian scientists, in their study published in journal Current Science, have predicted that the yield of cotton can be maximized if the crop is sown early (by mid-May) and irrigated during ball formation and maturity stages in case of drought conditions. They identified the stages of cotton plant sensitive to water availability by simulation techniques.

The study involved analyzing rainfall patterns during June to September from 2002 to 2014, which included two drought years (2002, 2014) and two excess rainfall years (2010, 2013). Researchers then collected yield data of three Bt cotton varieties – Pancham-541, RCH-791 and SP-7007, which were cultivated in Hisar district of Haryana, during the Kharif season of these four years.

It was found, through simulations, that early sowing (Mid- May) always yielded better cotton production as compared to late sowing (June). Further, it emerged that irrespective of sowing time, irrigation at ball formation stage (66 to 101 days after sowing) and again at ball maturation stage (101-135 days) can increase the yield in case of drought condition.

"With changing climate, cotton crop production is affected which has corresponding socio-economic impacts. This can be alleviated with help of improved irrigation support and pest control management", explained Dr. A. P Dimri, *author of the study and Professor at Jawaharlal Nehru University.*

Water availability is one of the prime factors that determines crop production. However, it is not economical to go for irrigation throughout the season. Consequently, such studies which help in understanding critical stages of water requirement for a particular crop are essential to make better decisions in times of water scarcity.

The research team included A. Shikha (Jawaharlal Nehru University), P. Maharana (University of Delhi), K. K. Singh (India Meteorological Department) and R. Niwas (Chaudhary Charan Singh Haryana Agricultural University), besides Dr. Dimri.

(India Science Wire)

KASHMIR
READER

New gamma ray telescope coming up in Ladakh

By reader on September 22, 2018

NEW DELHI: Indian astronomers would soon be able to observe and monitor spectacular celestial events like explosion of stars, falling of matter into black holes and collision of extraterrestrial objects better. Researchers at Tata Institute of Fundamental Research (TIFR) and Bhabha Atomic Research Centre (BARC) are developing a new gamma ray telescope.

The four-metre telescope will be able to operate in bright environment like twilight hours and moon-lit nights, unlike traditional ones that operate only in dark hours of the night. It will be the second such telescope to be available globally. The first one is in La Palma in Canary Islands set up jointly by Switzerland and Germany in 2011.

Speaking to India Science Wire, Dr. Varsha Chitnis of Department of High Energy Physics at TIFR, said the imaging camera to be used in the telescope is different from convention ones. It used pixels made of what are called Geiger-mode avalanche photo-diodes (G-APDs), while conventional telescope cameras are based on photomultiplier tubes (PMTs).

“G-APDs need a much lower operation voltage, are more robust and have higher photon detection efficiency. They can be operated during strong moon light and are ideal for a gamma ray telescope,” she added.

The new telescope will be located near the High Altitude Gamma Ray (HAGAR) array at Hanle in Ladakh which houses the Indian Astronomical Observatory operated by Indian Institute of Astrophysics, Bengaluru.

It will work in tandem with MACE (Major Atmospheric Cerenkov Experiment) – a 21-metre diameter gamma ray imaging telescope which is also under installation at Hanle. While MACE will operate in discovery mode looking at candidate sources of gamma ray or very faint objects, the new telescope will keep an eye on blazars. Whenever there is any flaring activity in any of them, it will alert MACE which will then shift its focus to the active blazer.

Gamma rays provide the best window to study what are called the non-thermal universe. Cosmic rays form an important component of the non-thermal universe. It is thought that remnants of supernova explosions accelerate cosmic rays with energies at the lower end of the cosmic ray spectrum and that higher energy cosmic rays could be accelerated in active galactic nuclei.

Gamma rays are also produced when charged particles are accelerated to such high energies through different processes. Thus the study of the gamma ray emissions from various celestial objects is expected to give a clue regarding the origin of cosmic rays and insights into the emission regions and emission processes in these sources. The details of the new telescope have been discussed in a recent paper published in Journal of Astrophysics and Astronomy. —Agencies

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बच्चों का बोझ कम करेगा स्कूल बैग का नया डिजाइन

दूर होगी समस्या

पंजाब इंजीनियरिंग कॉलेज (पीईसी) यूनिवर्सिटी ऑफ टेक्नोलॉजी के शोधकर्ता ईशांत गुप्ता का कहना है कि यह बैग धड़ पर भी भार को समान रूप से वितरित करने में मददगार होगा।

नई दिल्ली, आइएसडब्ल्यू : स्कूल बैग का भारी वजन बच्चों के लिए हमेशा एक समस्या रही है। भारतीय शोधकर्ताओं ने अब स्कूल बैग का ऐसा डिजाइन तैयार किया है जो बच्चों के कंधे और रीढ़ की हड्डी पर पड़ने वाले बोझ को कम करने में मददगार हो सकता है।

इस बैग को कुछ इस तरह डिजाइन किया गया है कि इसमें भारी किताबों को रीढ़ के करीब और हल्की पुस्तकों को रीढ़ से दूर रखा जा सकता है। बैग की पट्टियों को इस तरह लगाया गया है जिससे बैग का निचला सिरा कमर से दो सेंटीमीटर ऊपर रहता है।

पंजाब इंजीनियरिंग कॉलेज (पीईसी) यूनिवर्सिटी ऑफ टेक्नोलॉजी में औद्योगिक और उत्पाद डिजाइन में उत्कृष्टता केंद्र के शोधकर्ता ईशांत गुप्ता ने बताया कि हमने रीढ़ और कंधों से भार को कम करने के लिए एक आंतरिक फ्रेम बैग में शामिल किया है। नया डिजाइन धड़ पर भी भार को समान रूप से वितरित करने में मददगार होगा। पहले के अध्ययनों में मनुष्यों में ऊर्जा खपत का संबंध धड़ के आगे की ओर झुकाव से पाया गया है। पारंपरिक स्कूल बैग बैकपैक लोड को शरीर के भार के केंद्र के करीब रखते हैं, जिसके परिणामस्वरूप चाल के साथ-साथ ऊर्जा व्यय में परिवर्तन होता है। इस तरह के बैग

उठाते समय शरीर आगे की ओर झुक जाता है, जहां शरीर के ऊपरी हिस्से, सिर, खोपड़ी और बैग के वजन को संतुलित करना होता है। नए डिजाइन में रीढ़ की हड्डी को ऊपरी शरीर के वजन को संतुलित करने की जरूरत नहीं होती है।

इस अध्ययन में 11 से 13 साल के आयु वर्ग के स्कूली बच्चों में नए बैग और मौजूदा बैग के बीच चाल संबंधी मापदंडों, शरीर की मुद्रा, धड़ के कोण और ऊर्जा व्यय अंतर की जांच की गई है। शरीर के 10 फीसद, 20 फीसद और 30 फीसद की लोडिंग स्थितियों के तहत नए और मौजूदा बैग का 26 बच्चों में परीक्षण किया गया है। अपने शरीर के 30 फीसद वजन के बराबर भारी मौजूदा बैग उठाने वाले बच्चों में ऊर्जा व्यय सबसे ज्यादा होता है। जबकि, अपने शरीर के 30 फीसद वजन के बराबर के नए बैग उठाने पर ऊर्जा व्यय कम पाया गया है। अध्ययनकर्ताओं के अनुसार, नए बैग के उपयोग से 6.7 कैलोरी प्रति मिनट ऊर्जा की खपत होती है, जबकि मौजूदा बैग के साथ 8.4 कैलोरी प्रति मिनट ऊर्जा खर्च होती है।

नई दिल्ली के सफदरगंज अस्पताल में ऑर्थोपेडिक्स के प्रोफेसर डॉ. दविंदर सिंह के अनुसार, 'शोधकर्ताओं ने बैकपैक वजन का अध्ययन करते समय कई मानकों पर विचार किया है। यह सुनिश्चित करना महत्वपूर्ण है कि उपयोगकर्ता को यह पता हो कि अपने बैग को सही ढंग से कैसे पैक किया जाना चाहिए। आमतौर पर बच्चों के बैग का वजन उनके शरीर के वजन के 15 फीसद से अधिक नहीं होना चाहिए। भारी बैग पॉस्चर संबंधी समस्याओं का कारण बन सकता है।'

शोधकर्ताओं के अनुसार, नया बैकपैक सीधे खड़े होने की मुद्रा, सामान्य चाल और ऊर्जा खपत में कमी को सुनिश्चित कर सकता है, जिससे स्कूली बच्चों में पीठ दर्द और थकान के कारणों को कम किया जा सकता है। यह अध्ययन शोध पत्रिका करंट साइंस में प्रकाशित किया गया है। **इंडिया साइंस वायर**

सिक्किम को मिला पहला भूस्खलन निगरानी तंत्र

Author उमाशंकर मिश्र Source इंडिया साइंस वायर, 24 सितम्बर, 2018

गंगटोक। सिक्किम में भूस्खलन की रियल टाइम निगरानी के लिये पहली बार चेतावनी तंत्र स्थापित किया गया है। भूस्खलन के लिये संवेदनशील माने जाने वाले उत्तर-पूर्वी हिमालय क्षेत्र में स्थापित यह प्रणाली समय रहते भूस्खलन के खतरे की जानकारी दे सकती है, जिससे जान-माल के नुकसान को काफी हद तक कम किया जा सकता है।

उत्तर-पूर्वी हिमालय क्षेत्र की सिक्किम-दार्जिलिंग पट्टी में स्थापित इस चेतावनी प्रणाली में 200 से अधिक सेंसर लगाए गए हैं। ये सेंसर वर्षा, भूमि की सतह के भीतर छिद्र दबाव और भूकम्पीय गतिविधियों समेत विभिन्न भूगर्भीय एवं हाइड्रोलॉजिकल मापदंडों की निगरानी करते हैं। यह प्रणाली भूस्खलन से पहले ही सचेत कर देती है, जिससे स्थानीय लोगों को आपदा से पहले उस स्थान से सुरक्षित हटाया जा सकता है।

सिक्किम की राजधानी गंगटोक के चांदमरी गाँव में यह प्रणाली 150 एकड़ में स्थापित की गई है जो आस-पास के 10 किलोमीटर के दायरे में भूस्खलन की निगरानी कर सकती है। चांदमरी के आस-पास का क्षेत्र जमीन खिसकने के प्रति काफी संवेदनशील है और पहले भी यहाँ भूस्खलन की घटनाएँ हो चुकी हैं। हिमालय के भू-विज्ञान को केन्द्र में रखकर विकसित की गई यह चेतावनी प्रणाली इंटरनेट ऑफ थिंग्स (आईओटी) पर आधारित है। सिक्किम आपदा प्रबन्धन प्राधिकरण की पहल पर केरल के अमृता विश्वविद्यापीठम के शोधकर्ताओं द्वारा इस प्रणाली को विकसित किया गया है।

इस चेतावनी प्रणाली के अन्तर्गत वास्तविक समय में निरन्तर आँकड़े एकत्रित किए जा सकते हैं। इन आँकड़ों का स्थानीय नियंत्रण केन्द्र में बुनियादी विश्लेषण किया जाता है और फिर उन्हें केरल के कोल्लम जिले में स्थित अमृता विश्वविद्यापीठम की भूस्खलन प्रयोगशाला के डाटा प्रबन्धन केन्द्र में भेज दिया जाता है।

इस प्रणाली से प्राप्त आँकड़ों का उपयोग विश्वविद्यालय के शोधकर्ताओं द्वारा भूगर्भीय एवं जल विज्ञान की प्रकृति और पहाड़ी क्षेत्र की प्रतिक्रिया का अध्ययन करने के लिये किया जा रहा है ताकि भूस्खलन के प्रति संवेदनशील क्षेत्र के लिये प्रारम्भिक चेतावनी मॉडल विकसित किया जा सके।

इस परियोजना से जुड़ी प्रमुख शोधकर्ता डॉ. मनीषा सुधीर ने बताया कि **"यह नई चेतावनी प्रणाली भूस्खलन से 24 घंटे पूर्व चेतावनी जारी कर सकती है। स्थानीय स्तर पर स्थापित की जाने वाली यह प्रणाली विभिन्न प्रकार के सेंसरों पर आधारित है। इन सेंसरों को ड्रिल करके जमीन के भीतर पाइप की मदद से स्थापित किया जाता है। यह प्रणाली सौर ऊर्जा से संचालित होती है और सौर ऊर्जा के भंडारण के लिये परियोजना स्थल पर बैटरियाँ लगायी गई हैं।"**

शोधकर्ताओं के अनुसार, वर्षा सीमा पर आधारित मॉडल, इन-सीटू सेंसर आधारित निगरानी प्रौद्योगिकी, इंटरफेरोमेट्रिक सिंथेटिक एपर्चर रडार आधारित तकनीक, जमीन आधारित रडार प्रौद्योगिकी, इलेक्ट्रिकल रेजिस्टिविटी टोमोग्राफी और उपग्रह छवियों के जरिये भूस्खलन का अनुमान लगाया जा सकता है। यह बहुस्तरीय चेतावनी प्रणाली है जो आपदा प्रबन्धन अधिकारियों को सम्भावित भूस्खलन के खतरों को कम करने और उसके प्रबन्धन करने के लिये प्रभावी कदम उठाने में मददगार हो सकती है। यह प्रणाली दुनियाभर में भूस्खलन की निगरानी के लिये आमतौर पर उपयोग होने वाले रेनफॉल थ्रेसाल्ड मॉडल से अधिक प्रभावी पायी गई है।

सिक्किम का 4,895 वर्ग किलोमीटर क्षेत्र भूस्खलन के प्रति संवेदनशील है, जिसमें से 3,638 वर्ग किलोमीटर क्षेत्र मानव आबादी, सड़क और अन्य बुनियादी ढाँचे से घिरा हुआ है। शोधकर्ताओं के अनुसार, यह प्रणाली आर्टिफिशियल इंटेलिजेंस पर आधारित है जिसे विभिन्न क्षेत्रों में स्थापित करके विस्तृत भूक्षेत्र में भूस्खलन की निगरानी की जा सकती है।

डॉ सुधीर के मुताबिक, **"भारत में घातक भूस्खलन की घटनाएँ अन्य देशों की अपेक्षा अधिक होती हैं। पश्चिमी घाट और कोंकण हिल्स, पूर्वी घाट, उत्तर-पूर्वी हिमालय और उत्तर-पश्चिमी हिमालय जैसे क्षेत्रों में भारत की 15 प्रतिशत भूमि भूस्खलन के खतरे के प्रति संवेदनशील है। उत्तर-पूर्व हिमालय क्षेत्र में, सिक्किम-दार्जिलिंग पट्टी में भूस्खलन का सबसे अधिक खतरा है। यही कारण है कि हमने हमारी भूस्खलन पहचान प्रणाली स्थापित करने के लिये इस क्षेत्र को चुना है।"**

वैज्ञानिकों के अनुसार, भूकम्पीय कम्पन, लम्बे समय तक बारिश और पानी का रिसाव भूस्खलन का कारण हो सकते हैं। ढलानों से पेड़-पौधों की कटाई, प्राकृतिक जल निकासी में हस्तक्षेप, पानी या सीवर पाइप के लीकेज, निर्माण कार्यों और यातायात से होने वाले कम्पन जैसे मानवीय कारण भी भूस्खलन के लिये जिम्मेदार माने जाते हैं।

डॉ सुधीर के अनुसार, **"लोगों को भूस्खलन और जोखिमों के बारे में शिक्षित करना जरूरी है। आम लोगों और सरकारी**

संगठनों से भूस्खलन की सम्भावना के बारे में डाटा इकट्ठा करने के लिये सोशल मीडिया और मोबाइल फोन एप्स भी विकसित किए जा सकते हैं।"

सिक्किम के चांदमरी गाँव में पूर्व चेतावनी तंत्र स्थापित करते हुए शोधकर्ता अमृता विश्व विद्यापीठम के उप कुलपति डॉ. वेंकट रंगन ने बताया, **"अमृता विश्वविद्यापीठम द्वारा सिक्किम में लगाई गई यह प्रणाली भारत में ऐसी दूसरी प्रणाली है। इससे पूर्व केरल के मुन्नार जिले में इस तरह की प्रणाली लगाई जा चुकी है, जो कई सफल चेतावनियाँ जारी कर चुकी है। इस चेतावनी तंत्र को स्थापित करने के लिये पृथ्वी विज्ञान मंत्रालय और अमृता विश्वविद्यापीठम द्वारा वित्तीय मदद दी गई है।"**

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New device developed to tackle pollution in high traffic zones

BioTech Times Desk September 25, 2018

By Sunderarajan Padmanabhan

New Delhi, September 25: The National Environmental Engineering Research Institute (NEERI), Nagpur-based laboratory of the Council of Scientific and Industrial Research (CSIR), has developed a device to address air pollution at high traffic zones like traffic intersections and parking areas.

The device, which brings together developments in chemistry, physics and micro-meteorology on a single platform, consists of two stages. In the first stage, a fan sucks air around the device and pollutants like dust and particulate matter are separate using three filters of different dimensions.

After this, the air is led into a specially designed chamber where carbon monoxide and hydrocarbons content in the air are oxidized into less harmful carbon dioxide using activated carbon coated with titanium dioxide. The oxidation is supported by two ultraviolet lamps. The purified air is then ejected with force into the atmosphere so as to help dilute pollutant content in the outside air.

Prototypes of the device, named WAYU, have been installed at the ITO Junction in central Delhi and Mukarba Chowk in north Delhi. Minister for Science and Technology Dr. Harsh Vardhan unveiled the prototypes on Tuesday. Over the next one month, 54 more units would be installed in other parts of the city, the minister said. The cost of the purifier is Rs 60,000 each.

Dr. Harsh Vardhan inaugurates device to tackle pollution at high traffic zones.

NEERI Director Dr. Rakesh Kumar said filters were made of non-woven fabric and their removal efficiency for particulate matter was 80 to 90 percent and of the poisonous gases 40 to 50 percent. It is 5.5 feet tall and one foot wide. It can bring down the PM 10 values from 600 micrograms per cubic metre to 100 micrograms per cubic meter and PM 2.5 values from 300 micrograms per cubic metre to 60 micrograms per cubic metre in half an hour. The device consumes half a unit of electricity for every 10-hour operation. It is capable of providing purified air for an area of about 500 sq. m around it.

The institute, he said, was working on scaling up the device so that it can cater to an area of 10,000 sq. m. over the next three months. In addition, efforts were underway to add on capabilities to treat other atmospheric pollutants including nitrous and sulphur oxides. The National Institute of Designs, Ahmedabad, will work on aesthetic designs for the purifier. The current prototype has been designed with the help of Industrial Design Centre at IIT, Mumbai.

Most high traffic density zones have lot of buildings in the neighbourhood leading to restricted flow of air or what is technically called “Street Canyon” effect. Consequently, emissions coming from vehicle tail pipes do not get diluted and road dust remains suspended in the air. (India Science Wire)

THE MORUNG EXPRESS

Sikkim gets real-time landslide warning system

September 25, 2018

Sensors at Chandmari Village in Sikkim's Gangtok District

India Science Wire

A real-time landslide warning system has been set up in the Sikkim-Darjeeling belt of north-eastern Himalayas which is highly vulnerable to landslides. This system can help save lives and loss to property by issuing advance alerts.

The warning system consists of over 200 sensors that can measure geophysical and hydrological parameters like rainfall, pore pressure and seismic activities. It has been set up on slopes spread over 150 acre at Chandmari village in Gangtok. It will monitor a densely populated area which has seen landslides in the past. The system is capable of warning about 24 hours in advance. People could be safely evacuated in this period.

This landslide warning system has been deployed by the researchers of Kerala based Amrita University in collaboration with the Sikkim State Disaster Management Authority. The project has been partly funded by the Ministry of Earth Sciences.

The system collects real-time, continuous data from the sensors and performs basic analysis at the locally established control center and relays the same to the Data Management Center

at Amrita Vishwa Vidyapeetham in Kerala's Kollam district. The researchers use this data to characterize geological and hydrological factors and response of the hill with respect to dynamic and real-time meteorological variations to develop a warning.

Dr. Manisha Sudheer, the lead researcher associated with this project, said "this is an in-situ system which has been deployed with the help of various sensors. These sensors are installed within land surface by drilling a pipe. The system is solar powered."

Sikkim's 4,895 square kilometer area is sensitive to landslides, of which 3,638 sq km area is surrounded by human population, roads and other infrastructure.

"This multi-level warning system will help disaster management authorities to take steps to mitigate and manage potential landslide threats in a proactive and effective manner. We have performed several community engagement programs to disseminate knowledge regarding the impact of landslides, the working of the warning system and its capability to warn about imminent landslides", said researchers.

Landslides are triggered by natural causes like vibrations from earthquakes and the build-up of water pressure between soil layers due to prolonged rainfall or seepage. In recent decades, manmade causes have become significant in triggering landslides, including removal of vegetation from the slopes, interference with natural drainage, leaking water or sewer pipes, modification of slopes by construction of roads, railways, buildings etc. Landslides can be detected at different accuracy levels using models, sensors or satellite images.Rainfall threshold based models are most commonly used but may lead to false-positives predictions.

"More accurate landslide databases need to be maintained and regional as well as site-specific rainfall threshold models developed. Low-cost in-situ monitoring technologies have to be deployed in landslide prone terrains. People have to be educated regarding landslides and the risks involved. Social media and mobile phone apps can be developed to collect data about the chances or precursors for landslides from the people and other governmental organizations," said Dr. Sudheer.

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चिंताजनक

दार्जिलिंग स्थित यूनिवर्सिटी ऑफ नॉर्थ बंगाल के प्राणी विज्ञान के वैज्ञानिक पश्चिम बंगाल के डेंगू प्रभावित क्षेत्रों में कीटनाशकों के प्रति मच्छरों की प्रतिरोधक क्षमता का अध्ययन करने के बाद इस नतीजे पर पहुंचे हैं।

डेंगू के मच्छरों पर बेअसर साबित हो रहे हैं कीटनाशक

वास्को-द-गामा (गोवा), आइएसडब्ल्यू : डेंगू से निपटने के लिए न तो प्रभावी दवाएं हैं और न ही अभी इसे नियंत्रित करने के लिए टीकाकरण उपलब्ध है। डेंगू का नियंत्रण संक्रमण फैलाने वाले मच्छरों की रोकथाम पर निर्भर करता है। इसके लिए मच्छरों को मारने वाले कई तरह के सिंथेटिक कीटनाशकों का प्रयोग किया जाता है। भारतीय वैज्ञानिकों के एक ताजा अध्ययन में पता चला है कि इन कीटनाशकों के प्रति मच्छरों में प्रतिरोधक क्षमता विकसित होने के कारण अब वे बेअसर साबित हो रहे हैं।

दार्जिलिंग स्थित यूनिवर्सिटी ऑफ नॉर्थ बंगाल के प्राणी विज्ञान के वैज्ञानिक पश्चिम बंगाल के डेंगू प्रभावित क्षेत्रों में कीटनाशकों के प्रति मच्छरों की प्रतिरोधक क्षमता का अध्ययन करने के बाद इस नतीजे पर पहुंचे हैं। डेंगू मच्छर मुख्य रूप से डीडीटी, मैलाथिओन परमेथ्रिन और प्रोपोक्सर नामक कीटनाशकों के प्रति प्रतिरोधी पाए गए हैं। शोधकर्ताओं के अनुसार, विभिन्न प्रकार के कीटनाशकों के खिलाफ मच्छरों में प्रतिरोधी तंत्र विकसित होने कारण इन कीटनाशकों का कोई खास असर मच्छरों पर नहीं पड़ता है। वैज्ञानिकों ने मच्छरों में प्रतिरोध पैदा करने वाली जैव-रासायनिक प्रक्रियाओं का पता लगाया है। उनका कहना है कि

मच्छरों में मौजूद एंजाइम कार्बोक्सीलेस्टेरेसेस, ग्लूटाथिओन एस-ट्रांसफेरेसेस और साइटोक्रोम पी450 या संयुक्त रूप से काम करने वाले ऑक्सीडेसेस के माध्यम से उत्पन्न डिटॉक्सीफिकेशन द्वारा प्रतिरोधक क्षमता उत्पन्न हुई है।

इस तरह हुआ अध्ययन : इस शोध के दौरान पश्चिम बंगाल के अलीपुरद्वार, कूचबिहार, जलपाईगुड़ी, दार्जिलिंग और उत्तरी दीनाजपुर समेत पांच जिलों से मच्छरों के लार्वा, प्यूपा और वयस्कों को मानसून से पहले, मानसून के समय और मानसून के बाद की अवधि में एकत्रित किया गया। इन मच्छरों पर डेल्टामेथ्रिन, लैम्बडेसीहेलोथ्रिन, मैलेथिओन, प्रोपोक्सर, परमेथ्रिन और डीडीटी के प्रभाव का अध्ययन किया गया है। पृथक रूप से और मिलाकर उपयोग किए गए इन कीटनाशकों के प्रभाव से प्रति दस मिनट में मरकर गिरने वाले मच्छरों की संख्या का आकलन करते हुए उनकी मृत्यु दर की गणना की गई है।

डीडीटी के प्रति सबसे ज्यादा प्रतिरोधक क्षमता : शोधकर्ताओं ने मच्छरों की मृत्यु दर के आधार पर उनकी कीटनाशकों को ग्रहण करने की क्षमता के बीच संबंध स्थापित किया है। इससे पता चला है कि पिछले 70 वर्षों से दुनियाभर में कृषि और सार्वजनिक स्वास्थ्य क्षेत्र दोनों में व्यापक रूप से उपयोग किए जाने वाले कीटनाशक डीडीटी के प्रति मच्छरों की कीटनाशकों के प्रति प्रतिरोधक क्षमता सबसे ज्यादा है क्योंकि इसके उपयोग से सिर्फ 46 से 70.2 फीसद मच्छर ही नष्ट हो पाते हैं। इस अध्ययन से जुड़े वरिष्ठ वैज्ञानिक डॉ. धीरज साहा ने बताया, 'कीटनाशकों के अंधाधुंध उपयोग के कारण मच्छरों ने अपने शरीर में कीटनाशकों के नियोजित कार्यों का प्रतिरोध करने के लिए रणनीतियों का विकास कर किया है। इसी प्रक्रिया को कीटनाशकों के प्रति प्रतिरोधी क्षमता के विकास रूप में जाना जाता है।'

गौरतलब है कि एडीस एजिप्टि और एडीस अल्बोपिक्टस डेंगू के रोगवाहक मच्छरों की प्रजातियां हैं, जो पूरे भारतीय उपमहाद्वीप में फैली हैं।

इंडिया साइंस वायर

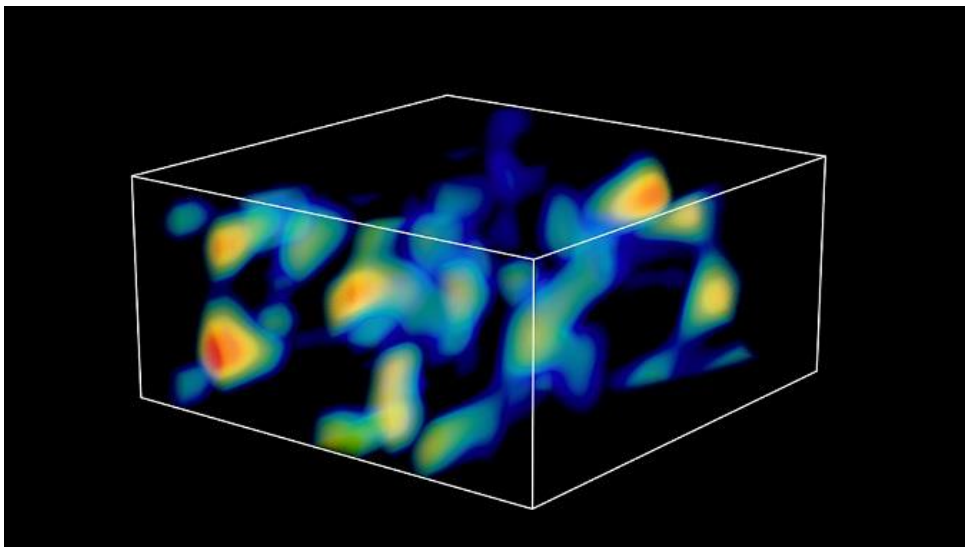
TECH2

TV VENKATESWARAN 26 SEPTEMBER, 2018 19:27 IST

RESEARCHERS SAY THAT OUR UNIVERSE IS LESS LUMPY THAN EARLIER ESTIMATES

Dark matter interacts gravitationally with ordinary matter in the universe forming lumps such as stars.

An international group of researchers has released the most in-depth wide-field map of three-dimensional distribution of matter in the universe ever made. The study suggests that the clumping of matter in the universe has happened more slowly than suggested in earlier estimates.



The results were obtained by studying images of 10 million distant galaxies captured by the Hyper Suprime-Cam Survey (HSC) of Japan located in Hawaii. The team includes Surhud More, an Associate Professor at the Inter-University Center for Astronomy and Astrophysics (IUCAA), Pune.

From the Earth to superclusters of galaxies, the distribution of matter is not even but it is clumped with a vast void in between. The study has revealed for the first time much sharper picture of the distribution of matter and void.

“If the universe had too much of mysterious dark matter or too little of enigmatic dark energy, it would be more clumpy than today. Conversely if the dark energy is more and dark matter is less we would not have the lumpy structures we see today,” explained Aniket Sule, Chairperson of the Public Outreach and Education Committee of Astronomical Society of India, while speaking to *India Science Wire*.

Dark matter interacts gravitationally with ordinary matter forming lumps such as stars, galaxies and superclusters while dark energy accounts for the observed accelerated expansion of the universe. There is no direct way to detect or study both dark matter and dark energy except by examining the imprint they leave in the largescale structure and evolution of the Universe.

Just at the nick of Big Bang 13.8 billion years ago, all the matter and energy of the universe was concentrated in a single point. Once the universe commenced expanding, the distribution of mass and energy should have been even, except for teeny-weeny effect of gravity and quantum fluctuations. Hence, at any given moment and location, the distribution of matter and energy will exhibit an incredibly tiny, sub-microscopic volatility, which then becomes 'seed' for lumps. The relentless pull of the gravity then takes over, and even a tiny mass fluctuation snowball into runaway clumping of matter.

About 400,000 years after the Big Bang, just a blink of an eye in the cosmic timescale, a colossal flash occurred all over the universe, whose relic is still observable as the cosmic microwave background radiation, or CMB. Primordial clumps of matter and energy that was present in the new-born universe left an imprint in the CMB. Very high precision images of CMB obtained by the European Space Agency's Planck mission revealed the pattern of the primordial lumps in the baby universe.

What about today? The earth is a lump of matter surrounded by empty space. With 99% of the mass of the solar system concentrated in the Sun, it is an example of local unevenness. Even at a larger scale, galaxies and dark matter are not spread uniformly across the Universe. Under the pull of gravity and dark matter, they are concentrated into a web like structure of clusters and filaments, with enormous voids in between. "Just as we expect facial anatomical features found in baby photographs to match with the adult, one would expect the lumpiness seen in the baby universe imprinted in the CMB obtained by the Planck mission must match the lumpiness we see today," said Sule.

"Fluctuations measured by Planck are like a precise arrow shot from the early universe, and we have measured where the arrow landed with Hyper Suprime-Cam instrument of the Subaru Telescope," says Surhud More.

"From the CMB data on primordial lumps, one can compute what should be the lumpiness today. Surprisingly, the lumpiness is less than the expected. This implies that the universe is accelerating little less than assumed, which in turn implies that the amount of dark energy in the universe is little less than theorized" said Aniket Sule. If confirmed by further studies, this can have huge implications for new physics that goes beyond the Standard Model.

Astronomers estimate that together dark matter and dark energy make up 95 per cent of our Universe. Yet we know very little about it. Like a galaxy or a distant astronomical object, dark matter cannot be seen directly. We can only infer its presence from the gravitational effect it has on the fabric of space-time. According to Albert Einstein's general theory of relativity, mass, including dark matter warps space. As light travels from distant galaxies towards the earth, if it encounters dark matter in its way, then the light bends in the warped space. As a result, the images of galaxies telescopes capture are slightly distorted, a phenomenon called weak gravitation lensing.

By analysing minute distortions caused by gravitational lensing, researchers have reconstructed a highly precise 3D distribution of dark matter in the universe. The data

collected in this study showed how fluctuations of dark matter across the sky have changed over billions of years, and how dark energy has influenced this growth of structure.

HSC is 820-megapixel camera attached to the 8.2 meter Subaru telescope at the summit of Maunakea, Hawaii. Since 2014, researchers from Japan, Taiwan and the US led by Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU) Project Assistant Professor Chiaki Hikage and a collaboration group co-chaired by Surhud More, have been engaged in the survey.

"This is just a first step, and the completed data of HSC survey promises to advance our understanding of dark matter and dark energy," said Kavli IPMU Principal Investigator, Masahiro Takada. HSC is still taking images, and the current results are based on only 11 per cent of the full survey which is expected to be completed by 2020.

IUCAA is also involved in the Large Synoptic Survey telescope which will survey about 100 times more area within the next decade with about a 100 times more galaxies to map out the unseen dark matter and the properties of dark energy. All these are expected to shed more light on dark matter and dark energy.

THE HINDU BusinessLine

Glacial lake flood keeps disaster managers on toes in Sikkim

JYOTI SINGH

GANGTOK, SEPTEMBER 26

Disasters managers and scientists in Sikkim are keeping a close watch on a lake formed due to melting of glaciers to see how successful is an experiment they began two years back to siphon off excess water from the lake to prevent it from bursting.

Floods caused due to outbursts of such lakes, known as Glacial Lakes Outburst Floods (GLOFs), are a subject of concern in the Sikkim Himalayan region as several lakes have been formed due to melting of scores of glaciers in the region. In order to prevent any disasters due to outbursts from such lake, a project was started in the South Lhonak lake where in high density polyethylene (HDPE) pipes have been installed to siphon off water from the glacial lake.

The disaster mitigation initiative is important as many glacier lakes have been formed due to melting of glaciers. Retreat of glaciers in the wake of global warming is expected to increase the number of glacier lakes and also expand the size of the existing ones.

“Three pipelines have been installed and they are discharging water at the rate of 50 to 60 litres per second each,” Dhiren G. Shrestha, additional director in the Remote Sensing Division of Sikkim State Council of Science and Technology, explained while speaking to India Science Wire. Each pipe has a diameter of eight inches.

However, he said, transporting the pipes to high altitudes poses serious challenges. Yaks were used to carry the pipes and other materials to the lake situated at 17,000 ft. “The way to the lake is full of steep and narrow passages. Only Yaks could manoeuvre them and take the pipes safely to the destination,” he said.

The Sikkim State Climate Change Cell under Sikkim State Council of Science and Technology, carried out the work in collaboration with the Land Revenue and Disaster Management Department. Sonam Wangchuk of Ladakh-based NGO, Students' Educational and Cultural

Movement of Ladakh (SECMOL), was also involved in the project.

During a recent expedition, a team managed to survey the outer areas of the area and found that huge amounts of water are flowing from the North Lhonak glacier. The inflow is almost

same as what South Lhonak Lake is discharging. “It would be difficult to assess how water level decreased by how much. We see the discharge as is purely a disaster mitigation effort,” Shrestha added.

The size of the South Lhonak lake was small during 1960s and it has since grown many folds. It is one of the fast growing lakes out of 14 potentially dangerous lakes susceptible to Glacial Lakes Outburst Floods (GLOFs) in the Sikkim Himalaya region. It has a history of bursting, as evident in remnants of huge flood plains formed few meters downstream of the outlet area.

(India Science Wire)

Twitter: @ashajyoti11

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प्रभा साक्षी

ट्रैफिक वाले क्षेत्रों में प्रदूषित हवा को साफ करने के लिए नया प्यूरीफायर

By सुंदरराजन पद्मनाभन | Publish Date: Sep 27 2018 12:10PM

नई दिल्ली। (इंडिया साइंस वायर) : अधिक ट्रैफिक वाले क्षेत्रों में वायु प्रदूषण के कारण दूषित हवा को शुद्ध करने के लिए भारतीय शोधकर्ताओं ने एक नया प्यूरीफायर विकसित किया है। ऐसे दो उपकरण दिल्ली में दो स्थानों पर लगाए गए हैं। इसे विकसित करने वाले वैज्ञानिकों के अनुसार इस प्यूरीफायर को चौराहों और पार्किंग स्थलों जैसे क्षेत्रों में लगाकर प्रदूषित हवा को साफ किया जा सकता है।

यह उपकरण दो चरणों में कार्य करता है। पहले चरण में डिवाइस में लगा पंखा अपने आसपास की हवा को सोख लेता है और विभिन्न आयामों में लगे तीन फिल्टर धूल एवं सूक्ष्म कणों जैसे प्रदूषकों को अलग कर देते हैं। इसके बाद हवा को विशेष रूप से डिजाइन किए गए कक्ष में भेजा जाता है जहां टाइटेनियम लेपित सक्रिय कार्बन के उपयोग से हवा में मौजूद कार्बन मोनोऑक्साइड और हाइड्रोकार्बन्स तत्वों को कम हानिकारक कार्बन डाईऑक्साड में ऑक्सीकृत कर दिया जाता है। दो पराबैंगनी लैंपों के जरिये यह ऑक्सीकरण किया जाता है। अंततः तेज दबाव के साथ शुद्ध हवा को वायुमंडल में दोबारा प्रवाहित कर दिया जाता है ताकि बाहरी हवा में प्रदूषकों को कम किया जा सके।

वायु नाम इस प्यूरीफायर को वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (सीएसआईआर) की नागपुर स्थित प्रयोगशाला राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसंधान संस्थान (नीरी) ने विकसित किया है। वायु नामक इस उपकरण का प्रोटोटाइप मध्य दिल्ली में आईटीओ और उत्तरी दिल्ली में मुकरबा चौक में स्थापित किया गया है। विज्ञान और प्रौद्योगिकी मंत्री डॉ. हर्ष वर्धन ने इस प्रोटोटाइप का अनावरण किया है। इस मौके पर उन्होंने कहा कि "अगले एक महीने में शहर के अन्य हिस्सों में 54 और ऐसी इकाइयां स्थापित की जाएंगी। इनमें से प्रत्येक प्यूरीफायर की लागत 60,000 रुपये है।"

नीरी के निदेशक डॉ. राकेश कुमार के अनुसार, "इस उपकरण में लगे फिल्टर गैर बुने हुए कपड़े से बने हैं जो सूक्ष्म कणों को 80-90 प्रतिशत और जहरीली गैसों को 40-50 प्रतिशत तक हटाने की क्षमता रखते हैं। यह उपकरण 5.5 फीट लंबा और एक फुट चौड़ा है जो पीएम-10 की मात्रा को 600 माइक्रोग्राम प्रति घन मीटर से 100 माइक्रोग्राम प्रति घन मीटर तक कम कर सकता है। इसी तरह आधे घंटे में इस उपकरण की मदद से पीएम-2.5 की मात्रा को 300 माइक्रोग्राम प्रति घन मीटर से 60 माइक्रोग्राम प्रति घन मीटर तक कम किया जा सकता है। इसकी एक खास बात यह है कि इस उपकरण को 10 घंटे तक संचालित करने में सिर्फ आधा यूनिट बिजली की खपत होती है। यह उपकरण अपने आसपास के लगभग 500 वर्ग मीटर क्षेत्र में शुद्ध हवा उपलब्ध कराने में सक्षम है।"

डॉ. कुमार ने बताया कि "अगले तीन महीनों में हमारी कोशिश इस उपकरण को बेहतर बनाने की है ताकि दस हजार वर्ग मीटर के दायरे में हवा को शुद्ध किया जा सके। इसके अलावा, नाइट्रस और सल्फर ऑक्साइड समेत अन्य वायुमंडलीय प्रदूषकों की शोधन क्षमता को इस उपकरण में शामिल करने के प्रयास भी किये जा रहे हैं। इस प्यूरीफायर उपकरण का डिजाइन अहमदाबाद स्थित राष्ट्रीय डिजाइन संस्थान द्वारा किया जाएगा। हालांकि, इस उपकरण का मौजूदा प्रोटोटाइप भारतीय प्रौद्योगिकी संस्थान (आईआईटी), मुंबई के औद्योगिक डिजाइन सेंटर की मदद से डिजाइन किया गया है।"

THE WIRE

As Gutkha Stands Banned, Use of Dohra Rises in Uttar Pradesh

Dohra is a mixture of areca nut, catechu, edible lime, peppermint, cardamom and flavouring agents and its use is growing as people perceive it to be safer than gutkha which stands banned in the state.

Dinesh C. Sharma 28/SEP/2018

New Delhi: Oncologists have red-flagged a smokeless tobacco product prevalent in parts of eastern Uttar Pradesh as a possible carcinogen.

The product – called *dohra* – is a mixture of areca nut (s*upari*), catechu (*kattha*), edible lime, peppermint, cardamom and flavouring agents. It is mainly consumed in parts of eastern Uttar Pradesh and its use is growing as people perceive it to be safer than gutkha which stands banned in the state, a new study has observed.

"The dohra does not contain any statutory warning label in the form of any sign or picture or written warnings and hence, consumers are unaware of the health hazards it brings along, leading to higher consumption," pointed out the study published in the *Indian Journal of Medical Research* (IJMR).

Dohra is used with and without tobacco and sold without any brand name. There is evidence that chronic use of this product is a major risk factor of oral submucous fibrosis

in the younger age groupwhich might later progress to oral cancer, researchers said. “People prefer consuming dohra to consuming gutkha considering it to be harmless since there are no warnings,” the study said.

The information on dohra was collected from Jaunpur, Allahabad and Pratapgarh through group discussions with vendors and community members. It was found that dohra is prepared either by users themselves or by small scale units. It is available in betel shops and other roadside kiosks. The shelf life of wet dohra is just a few days while the dry one can last for months. The packets are priced from Rs 5 to Rs 50 depending on the weight. It is available for Rs 500 per kilo in Jaunpur, Rs 1200 per kilo in Allahabad and for Rs 800 per kilo in Pratapgarh.

“Dohra contains areca nut (betelnut or supari) leading to oral submucous fibrosis which is a potentially malignant condition. It decreases salivary secretions, causes dental problems, digestive system problems as well as may cause cancer,” explained Prof Ravi Mehrotra, director ICMR-National Institute of Cancer Prevention and Research, and co-author of the study. “Around 80% to 90% of consuming dohra do so with tobacco. Its continuous consumption tends to make people addicted to it and difficult to quit.”

Professor Mehrotra said urgent steps were needed to make people aware of the dangers of dohra. Otherwise, it could go the same way as gutkha and *khaini*, which were first sold as unbranded and home-made products but eventually became branded products manufactured at industrial scale.

Smokeless tobacco products are hazardous to human health but are largely unregulated and underreported, observed an editorial in the same issue of IJMR. “Limited data are available on the properties, production, ingredients and health hazards of these preparations. Many of these products are consumed with areca nut (a Group I human carcinogen) and are culturally acceptable,” the editorial said. In fact, it said, tobacco manufacturers regularly try to introduce newer smokeless tobacco products, increasing consumer appeal by adding flavouring, new delivery methods and brand mimicking.

The study team included Vishwas Sharma (Department of Health Research), Amrita Nandan (Society for Life Science and Human Health, Allahabad), Ajay Kumar Shukla (Ganpat Sahay P.G. College, Sultanpur), Anshika Chandra (WHO FCTC Global Knowledge Hub on Smokeless Tobacco, NICPR), Ravi Kaushik (DHR), Dhirendra Narain Sinha (School of Preventive Oncology, Patna), besides Prof Ravi Mehrotra. (India Science Wire)

Dinesh C. Sharma writes at India Science Wire and tweets @dineshcsharma.

THE HINDU BusinessLine

Thirteen young scientists get Shanti Swarup Bhatnagar Prize

SUNDERARAJAN PADMANABHAN

NEW DELHI, SEPTEMBER 27

A total of 13 scientists from different institutions across the country have been chosen for the prestigious Shanti Swarup Bhatnagar prize for 2018.

The award winners include Dr. Ganesh Nagaraju and Dr. Ambarish Ghosh (Indian Institute of Science, Bengaluru); Dr. Amit Agarwal and Dr. Ashwin Anil Gumaste (IIT, Bombay), Dr.Rahul Banerjee and Dr. Swadhin Kumar Mandal (IISER, Kolkatta); Dr. Nitin Saxena (IIT, Kanpur); Dr. Amit Kumar (IIT, Delhi); Dr. Thomas Pucadyil (IISER, Pune); Dr. Parthasarathi Chakraborty (National Institute of Oceanography, Goa); Dr. Madineni Venkat Ratnam (National Atmospheric Research Laboratory, Tirupathi); Dr. Ganesan Venkatasubramanian (National Institute of Mental Health and Neurosciences, Bengaluru) and Dr. Aditi Sen De (Harish Chandra Research, Allahabad).

The names were announced by Prof Ashutosh Sharma, secretary, Department of Science and Technology and Director General of Council of Scientific and Industrial Research (CSIR) on the occasion of CSIR Foundation Day on Wednesday.

The prize carries a cash component of Rs. 5 lakh each. It is awarded annually for outstanding research, both fundamental and applied, in the areas of chemical sciences, biological sciences, earth, atmosphere, ocean and planetary sciences, engineering sciences, mathematical sciences and physical sciences. It is named after the founder Director of CSIR, Dr. Shanti Swarup Bhatnagar.

On the occasion, Minister for Science and Technology Dr. Harsh Vardhan presented CSIR Technology Awards for 2018 to under different categories to Institute of Microbial Technology, Chandigarh (CSIR-IMTECH); Central Glass & Ceramic Research Institute, Kolkata (CSIR-CGCRI); Indian Institute of Chemical Technology, Hyderabad (CSIR-IICT); Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad and Indian Institute of Petroleum (CSIR-IIP), Dehradun.

IMTECH has won the award for development of clot buster drugs for thrombolytic therapy, while CGCRI got the award for an innovative technology for manufacturing of specialty material for immobilization of high level radioactive waste. IICT has been chosen for the award for transfer of

technology for production of two chemicals. CIMFR and IIP have jointly won the award for their efforts for effective marketing of their knowledge bases.

(India Science Wire)

Twitter handle: @ndpsr

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चमड़ी का कालाजार बन रहा है नई चुनौती – शुभ्रता मिश्रा

27th September 2018 Deoghar samachar Bureau 0 Comments black fever, kala-azar, Leishmaniasis, sandflies, vector born disease, visceral leishmaniasis

मरीज को देखते डॉ. बिप्लव पॉल

वास्को-द-गामा (गोवा)। भारतीय शोधकर्ताओं के एक ताजा अध्ययन में उन कारकों का पता चला है जो त्वचा संबंधी कालाजार को खत्म करने में बाधा बने हुए हैं। शोधकर्ताओं के अनुसार, स्वास्थ्य के प्रति लापरवाह रवैया, रोग के बारे में अज्ञानता, त्वचा रोग के कारण शरीर पर पड़ने वाले धब्बों को कथित कलंक माना जाने, इलाज में देरी और प्राथमिक स्वास्थ्य केंद्रों से दूरी जैसे कारणों की वजह से कालाजार उन्मूलन कार्यक्रम प्रभावित हो रहा है।

बिहार के हाजीपुर में स्थित राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान और पटना के राजेन्द्र स्मारक चिकित्सा विज्ञान अनुसंधान संस्थान के शोधकर्ताओं द्वारा किये गए सर्वेक्षण में ये बातें उभरकर आयी हैं।

कालाजार के बाद होने वाले त्वचा संबंधी लीश्मेनियेसिस रोग के शिकार 18-70 साल के 120 लोगों को इस अध्ययन में शामिल किया गया है। इसमें 63.3 प्रतिशत पुरुष और 36.7 प्रतिशत महिलाएं शामिल थीं। प्रतिभागियों में अधिकतर मजदूर वर्ग के निरक्षर और कुछ प्राइमरी स्कूल तक पढ़े लोग शामिल थे।

कालाजार के बाद त्वचा संबंधी लीश्मेनियेसिस रोग होने की संभावना रहती है। इसे चमड़ी का कालाजार भी कहा जाता है। यह एक ऐसी स्थिति है जब लीशमैनिया डोनोवानी नामक परजीवी त्वचा कोशिकाओं पर आक्रमण कर उन्हें संक्रमित कर देता है और वहीं रहते हुए विकसित होकर त्वचा पर घाव के रूप में उभरने लगता है। इस स्थिति में कालाजार से ग्रसित कुछ रोगियों में इस बीमारी के ठीक होने के बाद त्वचा पर सफेद धब्बे या छोटी-छोटी गांठें बन जाती हैं।

त्वचा संबंधी लीश्मेनियेसिस रोग एक संक्रामक बीमारी है, जो मादा फ्लेबोटोमिन सैंडफ्लाइज प्रजाति की बालू मक्खी के काटने से फैलती है। बालू मक्खी कम रोशनी और नमी वाले स्थानों जगहों जैसे कि मिट्टी की दीवारों की दरारों, चूहे के बिलों तथा नम मिट्टी में रहती है।

इस अध्ययन से जुड़े प्रमुख शोधकर्ता डॉ बिप्लव पॉल के मुताबिक "कालाजार के बाद मरीज में त्वचा संबंधी लीश्मेनियेसिस रोग के लक्षण उभरने में 15 दिन से 15 साल तक लग सकते हैं। पुरुषों की तुलना में महिलाओं में इस रोग के प्रति जागरूकता अधिक पायी गई है। ज्यादातर महिलाएं बीमारी के लक्षण उभरने पर इलाज के लिए स्वयं अथवा परिजनों की मदद से स्वास्थ्य केंद्र पहुंच जाती हैं। इसके विपरीत पुरुष इलाज के लिए देर से पहुंचते हैं।"

इस अध्ययन में पाया गया है कि 72.5 प्रतिशत लोगों को कालाजार की जानकारी तो है, पर इस बीमारी के बाद होने वाले त्वचा के लीश्मेनियेसिस रोग के बारे में जानकारी कम लोगों को ही है। अध्ययनकर्ताओं के अनुसार, सिर्फ 31.7 प्रतिशत लोग इस रोग के बारे में जानते हैं। बीमारी के लक्षणों के प्रति भी 62.5 प्रतिशत लोग जागरूक नहीं हैं। इसी तरह 42.5 प्रतिशत लोगों को इस रोग के प्रसार के लिए जिम्मेदार बालू मक्खी के बारे में कोई जानकारी नहीं है।

डॉ पॉल के अनुसार, "गंदगी वाली बस्तियों में गरीबी रेखा के नीचे जीवन बिताने वाले लोग इस रोग के शिकार अधिक होते हैं। इनमें से 75 प्रतिशत लोगों को यह तक मालूम नहीं होता कि उनको कोई मक्खी भी काट रही है।"

चमड़ी का कालाजार होने पर 8.4 प्रतिशत लोग घरेलू उपचार और 25.8 प्रतिशत लोग आयुर्वेदिक या होम्योपैथिक उपचार कराते हैं। इससे जाहिर होता है कि इस रोग को गंभीरता से लेने वाले लोगों की संख्या कम है। लगभग 15.8 प्रतिशत लोग सामाजिक उपेक्षा के डर से इस बीमारी को छिपाते हैं। इस रोग से पीड़ित कम उम्र के मरीजों, अविवाहित रोगियों और त्वचा पर अधिक घावों से ग्रस्त लोगों में हीन भावना भी देखी गई है। इस कारण कई बार लोग संकोच के चलते भी इलाज के लिए देर से पहुंचते हैं।

इस अध्ययन से जुड़े दो वरिष्ठ वैज्ञानिकों डॉ नियामत अली सिद्दिकी और डॉ कृष्णामूर्ति के अनुसार, चमड़ी के कालाजार के प्रति लोगों को जागरूक करना जरूरी है। मरीजों का इलाज के लिए देर से पहुंचना कम करने के लिए सार्वजनिक-निजी सहयोग आधारित प्रणाली विकसित करने से फायदा हो सकता है। कालाजार के मरीजों अथवा उनके परिजनों को त्वचा संबंधी लीश्मेनियेसिस रोग के बारे में समझाना भी आवश्यक है। इसके अलावा, कालाजार और चमड़ी के कालाजार के निदान और उपचार के लिए मुफ्त सेवाओं को बढ़ावा देना चाहिए।"

शोधकर्ताओं की टीम में डॉ बिप्लव पॉल, डॉ नियामत अली सिद्दिकी और डॉ कृष्णामूर्ति के अलावा पवन गणपति, संजीवा बिमल, प्रदीप दास और कृष्णा पाण्डेय शामिल थे। यह शोध हाल ही में प्लॉस वन शोध पत्रिका में प्रकाशित किया गया है।

इनपुट – इंडिया साइंस वायर

THE WIRE

Pakistan's Nuclear Arsenal May Have Plateaued: Study

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Dinesh C. Sharma 29/SEP/2018

New Delhi: A new study has estimated the size of Pakistan's nuclear stockpile to be lower than present estimates, attributing it to a shortage of uranium.

The study indicates that Pakistan could at best have between 112 and 156 nuclear weapons. Of them, 78 to 104 would be highly enriched uranium (HEU)-based weapons and 34 to 52 would be plutonium weapons.

A 2016 study by American researchers had estimated the size of Pakistan's nuclear stockpile to be in the range of 204 to 306 in 2014. According to the International Panel for Fissile Materials, Pakistan had 120 to 130 warheads made up of both types at the end 2010.

"We believe that because of uranium shortage, Pakistan's nuclear arsenal has reached a plateau and can only grow very slowly. Any alternative explanation for an increased arsenal size should provide a satisfactory and consistent explanation for uranium sourcing

by Pakistan," the researchers have said in their study, published in the September 25 issue of *Current Science*.

In the absence of any direct information about weapon production capacities of different countries, the amount of fissile material that a country possesses is used to determine the number of nuclear weapons it can make. The new study does the same, but researchers say they looked at the demand and supply situations in Pakistan in an integrated way. The estimate is based on publicly available information about nuclear facilities of Pakistan and on certain assumptions, such as quality of uranium ore and burn-up of reactors.

The analysis also takes into account the demand for domestically produced yellowcake, or uranium concentrate, in three major facilities: the Karachi Nuclear Power Plant, the Kahuta enrichment facility and the plutonium production reactors at Khushab.

If it is assumed that the Karachi plant operates for 150 days on average and the capacity of the Kahuta is taken to be 11,000 separative work units (SWUs), along with low burn-up of the Khushab reactors, the total (cumulative) demand for yellowcake to feed all three facilities comes to 1,884 tonnes. Against this, Pakistan would have produced 1,584 tonnes of yellowcake cumulatively till 2014. The Karachi power reactors would have needed 805 tonnes of yellowcake for continuing operations till the end of 2014, leaving the rest for production of HEU and plutonium to be used in its weapons programme, the study argues.

Given the information available about the working of enrichment and plutonium production facilities till 2010, Pakistan would have accumulated 1,482 kg of HEU and 154 kg of weapon grade plutonium. "The non-availability of yellowcake after 2010 makes it imperative that these estimates of nuclear weapons are valid as of 2014," the paper says. For making one HEU weapon, the estimate is that it requires 12-18 kg of HEU, while it is 4-6 kg of plutonium per weapon for the second type.

"Pakistan does not have high grade uranium ore in the country. It is well known that Pakistan is not a major uranium producing country. Its potential uranium reserves are also not very large, though many of the areas are still unexplored," Lalitha Sundaresan, of the National Institute of Advanced Studies, Bengaluru, explained. She coauthored the paper with Kaveri Ashok of the Centre for Science, Technology and Policy, Bengaluru.

Security experts, however, remain skeptical of the new estimate. "I am not sure of the assessments since there are always so many assumptions made when calculating the fissile material available – the burn in power reactors, the quality of uranium ore and so on," Manoj Joshi, distinguished fellow at the Observer Research Foundation, New Delhi, said. "All external estimates put Pakistan as having more nuclear weapons. The point is: does it matter? I would imagine [one just requires] 50 or even 10 weapons [to] deter an adversary."

Dinesh C. Sharma writes at India Science Wire and tweets @dineshcsharma.

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Scientists take a cue from lotus leaf to make protein measuring device

Researchers at the mechanical engineering division of the Indian Institute of Technology, Mumbai, have used lotus leaf to design a device that can help fill microwells with desired biological molecules quite efficiently

By **BioVoice News Desk** - October 1, 2018

By Kollegala Sharma

Mysuru: *Scientists are looking for cues from nature to solve complex research problems such as filling up microwells with biological molecules or microorganisms.*

Researchers at the mechanical engineering division of the Indian Institute of Technology, Mumbai, have used lotus leaf to design a device that can help fill microwells with desired biological molecules quite efficiently.

Microwell devices are useful in single-cell studies and protein measurements because they require very little sample, provide rapid results and are cost effective. However, existing mechanisms to manipulate samples and fabrication of microwell-based microfluidic devices are complex and need an external power source.

For fabricating the new microwell device, the inspiration came from the lotus leaf. Lotus leaves are coated with rough surface containing a mat of hairs. These are so narrow and short that any water drop falling on them will roll out rather than sticking on to them. Researchers coated the leaf with a polymer and let it set for some time. Peeling off the thin layer, the team hardened it by heating. Thus a mould which was a mirror image of the lotus leaf surface was made.

A similar coating, peeling and hardening of the mould gave a thin polymer with features identical to the lotus leaf's surface. Each film was stuck on a thin glass of about a square centimeter in size. "The top and bottom plates are arranged in such a way that the microwells and micropillars face each other inside the chamber of the microdevice," explained Prof Amit Agrawal, who led the research team. A thin separator stuck at the borders separates the two plates.

"The average thickness of the micro-patterned surfaces of the device is around 2 mm. Since undulations of micro-patterned surface only amount to about 0.1 mm, the variations in different lotus leaves does not affect the fabrication," said Prof Agrawal, who this week was named winner of the prestigious S S Bhatnagar Prize for engineering sciences.

The team then used magnetic liquid drops – drops of water or other fluid coated with fine iron oxide dust or nanoparticles. This liquid was used to fill the microwells with either proteins like bovine serum albumin, microbeads or E.coli *bacteria. To fill microwells, all that one had to do is to add magnetic fluid drops filled with the desired substance into the device and roll a magnet underneath. Caught between the pull of the magnet and the water repellent nature of micropillars, the drops break spilling their content into the wells. Although placed in an inverted condition, microwells hold on to the substance due to their micro dimensions. At the end of five back-and-forth roll of the magnet almost 80% of microwells were occupied by microbeads with an increase in concentration.*

"Our microdevice is useful to capture a variety of biological entities such as cells, bacteria, proteins and microparticles. It will be most beneficial in measurement of proteins through antibody-coated microparticles because of the ease of counting captured microparticles in the microwell array through available detection methods," said Prof Agrawal. Various improvements are being planned to the microdevice to make it easily usable and aesthetically appealing.

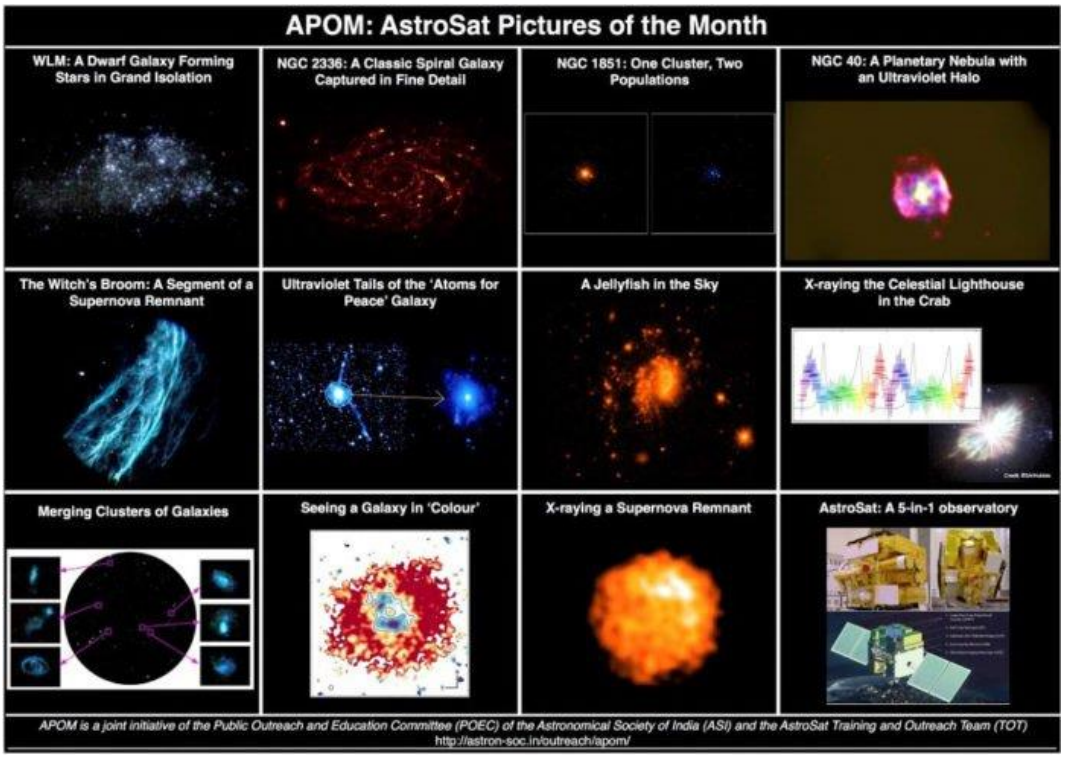
The research team included Prof Amit Agrawal, Professor Himani Sharma, Anvesh Gaddam, Kimberley John, Ambuja Navalkar and Samir K. Maji. The results of the study have been published in journal Scientific Reports.

(India Science Wire)

TECH EXPLORIST

A new effort to bring astronomy and people closer

By **Sunderarajan Padmanabhan** - September 28, 2018



Public Outreach and Education Committee (POEC) of the Astronomical Society of India (ASI), and the AstroSat Training and Outreach Team is all set to add a new feature to its one-year-old campaign to bring ISRO's Astrosat space observatory closer to the general public.

The two organizations have now decided to come out with layman-friendly reports every month on research papers published by scientists on their work using instruments onboard the observatory. This will be in addition to the monthly release of Astrosat images under the`AstroSat Picture of the Month (APOM)' programme which started a year ago.

Speaking to India Science Wire, Dr. Niruj Mohan Ramanujam of ASI POEC, said students from across the country have been following the images with curiosity and interest. With the

new feature to be introduced from next month, they would also get a closer view of the research work that is going on with the help of the satellite.

AstroSat is India's first dedicated multi-wavelength space observatory launched by ISRO on 28 September 2015. It has five telescopes – four of which can look at the same part of the sky simultaneously. These give it unique capability of observing in the ultraviolet, X-rays as well as gamma rays.

Astronomers have been using the instruments to study diverse celestial phenomena in galaxies, exploding stars, neutron stars, and black holes. These studies have enabled them to investigate the nature of matter at extremely high temperatures, under very high magnetic fields, and sometimes in very violent environments.

Each APOM features a picture, accompanied by a short text explaining why the image is interesting. Readers are encouraged to go further and learn more about the concepts mentioned, through various web-links, which are provided.

Over the past year, APOM has featured ultraviolet images of star clusters and remnants of supernova explosions in the Milky Way, as well as nearby galaxies. It has covered galaxies that are interacting with each other, including those that are merging together. It has brought out clusters of galaxies, including gas ripped away from galaxies falling into these gigantic clusters.

All the images in APOM have been taken from research papers published in astronomy journals. The accompanying text is at a level aimed at school and college students. This month's APOM features a photograph of the observatory itself, taken after its assembly to mark the third anniversary of AstroSat and its first anniversary.