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Pineapples could play key role in global superbug battle

Pineapples are the latest-and strangest-weapon to emerge in the global battle against superbugs which are predicted to kill up to 10 million people a year by 2050. Australian scientists have discovered that a collection of enzymes found in the stems and roots of the tropical fruit can cure diarrhoea in piglets, reducing the reliance on antibiotics. Enzymes found in pineapple stems and roots could prove key to developing alternatives to antibiotics. Being able to treat farmed piglets with a natural remedy for diarrhoea also takes antibiotics out of the human food chain.

La Trobe University biochemist Rob Pike said the collection of enzymes found to treat diarrhoea in piglets would likely provide an alternative treatment for the condition in humans as well, given the similarities in physiology and anatomy between the two species.

Indiscriminate use of antibiotics has resulted in resistant bacteria and this contributes to the rise of superbugs. Multi-drug resistant bacteria, known as superbugs, are predicted to kill more people than cancer if left unchecked - about 10 million people a year by 2050. About 500 superbug cases are detected in Australia each year. Developing a natural alternative to treating diarrhoea in humans would significantly add to scientists' arsenal when tackling the global superbug problem. Unlike antibiotics which target the bacteria, the three enzymes found in the pineapples work with the cells in the pig's gut, making it difficult for the bacteria to attach to the cells. This means diarrhoea doesn't take hold.

This is a whole new way of going about the treatment of diarrhoea; It means that the pig cells are no longer vulnerable to bacteria. Pig farmers rely heavily on antibiotics to treat scour, pre-weaning diarrhoea in piglets. Scour is a common cause of death in piglets, which costs the Australian pig industry more than \$7 million a year.

Targeting the gut cells is key because it denies the bacteria the chance to evolve and become resistant. It is resistance which researchers and health professionals fear could eventually render antibiotics useless. The three enzymes found in the pineapple stem and root are called bromelain, a collection of enzymes which were discovered in the 1930s. However it was only 30 years ago that their antibiotic qualities were discovered. The momentum to develop alternatives to antibiotics is there now because people believe antibiotics are on the way out and we need something to replace them.

Source : Sunday Morning Herald

LETTERS

The latest international tiger census data has revealed that the population of the majestic predator has appreciably increased across all their habitats with the exception of some countries where the tiger is almost extinct in the wild (China, Vietnam, Laos PDR). The species has been declared extinct in the wild in Cambodia. Other SE Asian nations like Myanmar, Thailand, Malaysia and Indonesia represent the last few foot holds of different other sub species of this majestic cat. However, South Asian nations (India, Nepal, Bhutan and Bangladesh) jointly constitute the highest number of wild tigers in the entire planet with the report that India is the home for 70% of the global tiger population. Why is this report important from an Indian perspective? Because, a growing and healthy population of top predator species like tiger indirectly reflects the quality of the tiger habitats; and that signifies the Indian forests that are in urgent need of more comprehensive conservation efforts. India has been opening up to other countries for strategic, diplomatic, economic and cultural cooperation and collaboration; and the

recent Look East Policy has further consolidated Indian presence in both eastern part of South Asia as well as the ASEAN member nations of SE Asia.

I humbly suggest that a formal agreement for cooperation in the field of wildlife and forest conservation between China, South Asia (through the SAARC platform) and SE Asia (through the ASEAN network) could work out effectively in protecting the vulnerable wildlife and forests in this vast region. A Joint Conservation Initiative (JCI) operative between these three vast economic zones (China+ SAARC+ ASEAN) can efficiently prevent poaching; curb/close wildlife trade, control the intra- and inter-country trafficking of live wildlife (feeding the illegal global pet industries, private zoos) and wildlife products (such as ivory, animal skin and fur, tiger and bear body parts, rhino horns etc); cut off illegal wildlife markets operating across Hong Kong, China, Vietnam, Cambodia; Indonesia and other SE Asian nations. The JCI approach can also successfully prevent the indiscriminate exploitation of major and minor forest products and produces such as illegal timber

harvesting, collection of rare and critically endangered, endemic wild plants with huge financial value for ornamental and horticultural purposes for the underground plant nursery units for private collectors, medicinal plants and herbs for pharmaceutical, nutraceutical and functional food industries operating unethically procuring biological resources via illegal networks, illegal harvest of honey, plant leaves, medicinal mushrooms and several other forest products for various related industries via smuggling and trafficking. Joint monitoring of the porous international border areas in close coordination with the forest guards and border security forces of adjoining countries can efficiently track cross border trafficking and smuggling of forest and wildlife products more easily. The whole approach has huge potential in protecting endangered species of flora and fauna with five megabiodiverse countries included in this region; China, India, Indonesia, Malaysia and the Philippines.

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NEWS FLASH

Mr. O.P. Srivastava, Life Member of International Society of Environmental Botanists has been conferred National Award for making Documentary Film on "Life in a Metaphors – A portrait of Girish Kasarvalli". This award was presented to him by the President of India on 3rd May 2016 at Ashoka Hall of Rashtrapati Bhawan.

'**Green Ambience**' an NGO has been established by a group of young research scholars, scientists and dedicated environmentalists in Lucknow recently. 'Green Ambience' is the vision for harmonious nature and human interface, which has been lost in the recent past due to materialistic growth. These environmental enthusiasts feel that it is right to live in 'Green Ambience' (natural environment) and moral duty to save the environment. Their 'Green Ambience' deals with Environment Awareness, Health, Employment and Poverty. Green environment is possible through awareness about the proper management of different waste and plantation strategies. It will make a way of clean environment and better health. It is hoped that execution of cleaning, plantation and awareness will generate employment and reduce the poverty. Under its ongoing programmes volunteers of 'Green Ambience' organized a cleanliness and tree plantation drive on Madan Mohan Malviya Marg in lucknow in collaboration with Lucknow Nagar Nigam with the support of Mayor Dr. Dinesh Sharma. Another programme was organized on the occasion of Labour Day in suburban rural areas of Lucknow in Nizampur-Malhore area with the active support of Gram Pradhan of the area.

A large number of these environmental NGOs are also members of International Society of Environmental Botanists, which provided them guidance and logistic support in their praiseworthy efforts which will have great societal impact at local level.

Adapt or perish, says the Nature

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Till about half a decade ago, I used to write that the threat of the Global Warming is looming large. But now, the scenario is completely changed and it is no more a threat, rather we are grappling with one of the worst situations of our times. For us this may be something new, because in the past 100 years such a scenario had not occurred; but for the animals and plants it is nothing new. They know that if they have to survive, they have to adapt or they perish.

It was around 55.5 million years ago, our planet was undergoing worst global warming-termed as Paleocene-Eocene Thermal Maxima or PETM in short. That was a period when the climatic vicissitudes were at its zenith. There were periods of extreme heat, extreme droughts and extreme rainfall. The brunt of the climate was faced by all. Fortunately, we were not there! The animals being closer to the nature, know how to survive. Many of the giants like elephants, horses, tigers, rhinoceros etc. managed to reduce their sizes to reduce the surface areas of their bodies exposed to the Sun. They still continue to live in the sizes reduced during the days of the yore. Alas, all were not so lucky, due to changes in the salinity of the oceans many oceanic fauna became extinct. Fortunately, the scenario was not that bad for the flora. It did thrive. Of course the onset of the Ice Age did impact the flora too.

Now once again, the life on the planet is threatened with dire consequences. Many of the living being like cockroaches, with a high sense of adaptability and omnivorous in food habits may wriggle out of the situation. But for the human being it is going to be rather tough.

Man is dependent on crops for

food and if the climate is adverse the food supply is affected. Let us see how the situation has changed in the past five million years.

Since times immemorial, rather say since the day the hunter gatherer man became a cultivator, he began looking towards the skies for the rain or the sunshine. Till then, man was like a predator, killing animals for food. But once he became a cultivator, he began to play with the earth. Many a times he changed the landscape by hacking a forest to create a large farm. The more he began depending on the earth, more he started meddling with the nature and he started getting more rebuttals from the nature.

Researchers on the past climates studied them as they existed five million years ago to the contemporary period. They even created computer simulated models to predict the future climates. Paul Crutzen, a Nobel awardee of 1995, who unraveled the mechanisms that upset our ozone layers, has coined the term Anthropocene era for the present geological era of the Earth.

The reason for this nomenclature is simple as evident from the name Anthropos which means human. This is an era of the earth dominated by us, the humans. But humans have been dominating the earth since quite some time. Hence there is a debate about the starting date of the Anthropocene era. Some say it should coincide with industrialization. But there are evidences of human interference on the ecosystem much before that. The conversion of man from hunter-gatherer to an agriculturist in the Neolithic period is said to be the beginning of the Anthropocene.

It seems ecological dis-balances began some 10,000 years ago. In other

words it coincided with the retreat of the Ice Age. During that period many species of large mammals disappeared. Was it a climatic incident or human hand was there? The scientists do not deny the possibility of killing of those giants by the humans of the yore! It is believed that this mass killing by the humans affected the methane production. The mammoths that were predated were the largest methane producers. The dip in the methane levels in the atmosphere led to a Global chill.

These meat eaters advanced further as agriculturists and burnt acres and acres of forests. These forests were the carbon stores or carbon sinks for the excess atmospheric carbon. Instead, our ancestors converted them into carbon-dioxide producing fields. In a way, it was boon in disguise that the Global chill induced by their forefathers was stalled as the excess carbon-dioxide in the atmosphere generated warmth by creating greenhouse conditions. Bill Ruddiman of Virginia University, an ace climate scientist, on the basis of the study of the Ice Cores from Antarctica worked out the global enhancement of greenhouse gases and said that this increased the global temperatures by 0.8 degree Celsius.

Thomas Stocker, another climatologist produced contradictory evidence to prove that the initial warming by the Neolithic man was not possible. He said it was due to reactions by the carbon containing minerals in the oceans that finally released heavy amounts of carbon-dioxide to raise the levels of green-house gases.

However, this was all before the industrially and technologically evolved biped, the modern man came into existence. Once the smoke belching industries were set up and

hydrocarbon fuel guzzling automobiles came into being, the scenario drastically changed. To compound the problem human beings have multiplied like insects. More numbers means the requirement of more food, more water, more roads, more vehicles...there is no end to this gargantuan list.

Thus, food and water security are at present foremost in the minds of the world leaders, than the territorial

securities and expansions. The climate seems to have gone haywire. Countries like USA are facing fierce storms, vicious floods and heat or cold waves. Developing country like India is facing the crisis of floods and droughts, unprecedented winter rains and storms, humid and torrid summers. All these lead to more consumption of power, which ultimately burdens the atmosphere with more green-house gases.

Will it be lights out for the humans, like the other vanishing species of vertebrates? It seems as of today the extinction of vertebrates is 114 times faster than it used to be in the past 10000 years. We have polluted our world, hacked our forests and now in front of the Nature we are soft targets like the 'walking dead.'

Are we going to survive the war with the Nature is a million dollar question.

Silvopastoral Systems and Biodiversity

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The most common threat to biodiversity is the fragmentation of natural habitats. With the increase in human population the demand for food grains and other food items like milk and meat has also increased, which has led to the loss of forests for the expansion of the agricultural frontier and pastures, mainly in the tropics. The

loss of forests is one of the principal negative impacts on biodiversity, due to the expansion of the agricultural frontier, mainly in the tropics. Silvopastoral Systems can become an effective tool to mitigate this problem, because of its multiple benefits and ecosystem services, coupled with increased productivity in livestock

systems production.

Silvopastoral systems (SPS) are an agroforestry systems orientated mainly for livestock production. It also aims at providing environmental and soil benefits, including biodiversity aspects. Biodiversity is a key aspect in the sustainability of the agriculture production systems and hence for

Table 1. Ecosystem services from silvopastoral systems.

Parameter	Benefit
Nutrient Cycling	In an SPS plant nutrients are in a state of continuous, dynamic transfer. Plants take up nutrients from the soil and use them for metabolic processes. In turn, plants return nutrients to the soil either naturally as litter, or through root senescence.
Carbon sequestration	SPS represent an important alternative to the recovery of degraded areas and have high potential for carbon (C) sequestration. Net carbon flux and primary productivity increases significantly due to integration of different woody species with grasses.
Biological N Fixation	A long-term, more sustainable and cost-effective solution to pasture degradation is the addition of vigorous forage legumes to the pasture to boost soil N levels by biological N fixation. Leguminous nitrogen fixing-fodder species can fix > 150 kg N/ha/yr (equivalent to 320 kg urea/ha/yr), some of which is cycled to the pasture via animal dung and urine during grazing.
Greenhouse gas mitigation	Methane emission from ruminants is one of the sector's largest greenhouse gas emissions. SPS is one of the most important approaches to offsetting agricultural emission through improving animal diet quality and using forage rich tannin species.
Microclimatic conditions	The shade within silvopastoral systems reduces temperature and ameliorates environment and is beneficial for better animal performance. Shade has been useful in increasing milk yields of dairy cattle and liveweight gains of feed cattle in hot climates,
Recovering degraded land	SPS with fast-growing leguminous nitrogen-fixing trees can, in a short to medium time, recuperate degraded land. The litter stocks and soil C and N stocks in SPS indicate that the use of leguminous trees can increase efficiency in re-establishing the nutrient cycling processes of the systems. These results also show that recovering degraded land with this technique is effective in sequestering carbon dioxide from the atmosphere at high rates.
Biological diversity	SPS with a diversity of multipurpose species growth generate a rich habitat that increases the number and variability of living organisms (below and above the soil). In the above-ground level, diversity of insects and birds increases which is beneficial for the productivity of SPS, while in the belowground layer worm and beetle species thrive due to increase in the soil humidity created by the trees and shrubs grown in the SPS.

maintaining a SPS work in an integral way. Although, biodiversity depends on the structural heterogeneity of the land vegetation, SPS, is composed of a multistrata vegetation with a diversity of herbaceous and woody species that create heterogeneity for increased

below- and above-ground biodiversity. Trees and shrubs provide habitat and food for diverse types of birds and bees, and, at the same time, birds and bees play a fundamental role in natural reforestation and vegetation restoration through seed dispersal.

Silvopastoral Systems provide a number of ecosystem services including carbon sequestration, biodiversity conservation, soil enrichment, air and water quality maintenance, and regulation of microclimate (Table 1).

Cutting meat and dairy intake is beneficial for health, the environment and climate

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A new research report quantifies how much reducing meat and dairy in our diets would cut agricultural pollution of the air and water. It also considers the health benefits of lowered meat and dairy consumption.

Livestock production in the EU is the cause of around 80 per cent of the nitrogen losses from agriculture – losses that cause a number of environmental problems, including eutrophication of ecosystems from excess nutrient nitrogen, health damage from air pollution, and enhanced global warming. The high consumption of meat, dairy products and eggs in the current European diet leads to an intake of saturated fat and red meat that exceeds health recommendations.

Halving the current consumption of meat and dairy in the EU would not only have considerable direct health benefits through changes in food consumption patterns, but would also reduce agricultural nitrogen losses by more than 40 per cent and greenhouse gas emissions from agriculture by 25–40 per cent.

These are some of the conclusions of the report “Nitrogen on the table”, which was presented at an event in the European Parliament in mid-January. The study was prepared by an international group of researchers engaged in the Task Force on Reactive Nitrogen of the Convention on Long-range Transboundary Air Pollution.

According to the report, around 80 per cent of the total emissions of ammonia, nitrates and nitrous oxide from EU

agriculture are related to livestock production, including the emissions from feed production (e.g. cereal and fodder crops). The study investigates the effects of a 25 to 50 per cent reduction in the intake of meat and dairy on human health and the European environment.

Reducing the consumption of meat and dairy would result in food consumption patterns that are better aligned with international dietary recommendations and lower the prevalence of cardiovascular diseases and colorectal cancer. However only the most radical change investigated – a 50 per cent reduction in all meat and dairy consumption – brings the average intake of saturated fats within a range recommended by the World Health Organization (WHO). This scenario is also the only one in which the average intake of red meat is reduced to only slightly above the maximum recommended by the World Cancer Research Fund (WCRF).

Lower consumption of meat and dairy products, accompanied by a proportional reduction in livestock production in the EU, would reduce nitrogen losses and greenhouse gas emissions as well as the area of land use per EU citizen. In the case of a 50 per cent reduction in all meat and dairy, nitrogen losses would come down by around 40 per cent. In particular, ammonia emissions would be reduced, as these are highly related to livestock production, whereas both livestock and arable field-based activities contribute large amounts of nitrous oxide and nitrate emissions.

Greenhouse gas emissions from agriculture would be cut by 25–40 per cent.

Reductions in meat and dairy production would also free up large areas of farmland for other purposes such as food export or bioenergy crops. The authors conclude that reductions in reactive nitrogen emissions will have benefits not only within the EU but at continental and global scales, because both atmospheric ammonia and nitrates in water-bodies cross national frontiers and contribute to international pollution. The reduced emissions of the greenhouse gases methane, nitrous oxide and carbon dioxide are relevant both at EU level and globally.

It is noted that the EU Common Agricultural Policy could help to transform the current agricultural system into one that sustains healthier dietary choices and has lower environmental impacts. If livestock farmers were rewarded by retailers and consumers for higher environmental and animal welfare standards, the economic impact on the livestock sector could, to some extent, be mitigated.

The report “Nitrogen on the Table: The influence of food choices on nitrogen emissions and the European environment” is published by the Centre for Ecology & Hydrology, Edinburgh, UK, as a special report of the European Nitrogen Assessment.

Courtesy: Acid News No. 1, March 2016; Published by Air Pollution & Climate Secretariat, Goteborg, Sweden

WELCOME NEW LIFE MEMBERS

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NEWS AND VIEWS

FIVE AMAZING PLANTS NEW TO SCIENCE

If you think everything's already been discovered, maybe you should ask a botanist. Each year, these scientists describe about 2000 new plants, according to a new report on the *State of the World's Plants*, released recently by the Royal Botanic Gardens, Kew, in the United Kingdom. Last year 2034 plants from around the world were unveiled as new species—the top countries for discovery (over the last 10 years) were Brazil, Australia, and China. Among the more interesting finds are *Drosera magnifica*, a carnivorous sundew that grows as tall as 1.5 meters in Brazil, and *Oberholzeria etendekensis*, a low-growing desert shrub from Namibia that represents an entirely new genus. But a grim finding in the report confirms that one in five plants are at risk of extinction. One of those is *Gilbertiodendron maximum*, a newly discovered 45-meter-tall rainforest tree in Gabon. Another new species on the brink is *Sartidia isoalensis*, a grass discovered in Madagascar's Isalo National Park. *Sartidia* was likely outcompeted by other species when humans arrived about 2000 years ago and started burning the island's vast grasslands. The report, which takes a broad look at the plant world, estimates that there are 390,900 vascular plants known to science.

Source: Erik Stokstad
(In: *Science*)

INCREASING GRASSLAND SPECIES IMPROVES POLLINATION AND MAY IMPACT ON CROP YIELDS

Grasslands cover 30–40% of European agricultural areas. Agrienvironmental schemes leading to even small changes in grassland biodiversity could elicit extensive benefits. A new study on working farms

in southwest England highlights the contribution of the plant diversity of the grassland to the abundance and diversity of insect pollinators and their potential to increase crop yields. The researchers make recommendations for which species to include in seed mixes.

Practical management options for grasslands are critical if the Common Agricultural Policy's priority to promote sustainable farming is to be realized. This study aimed to investigate how the number (and type) of plant species in a pasture and how a pasture is managed affects the diversity and function of insect pollinators over time. The study also sought to identify grassland species that show the greatest effects on insect pollinator abundance and diversity. Finally, the impact of plant species richness to pollination of crop and wildflower species was investigated.

Based on their studies the researchers made some recommendations. For example, chicory (*Cichorium intybus*) is identified as a target species to include in seed mixes, because it acts as a pollinator resource and has high agronomic value (it causes increased weight gain in lambs and captures fertilizers). In the field experiment, dandelions (*Taraxacum* sp.) attracted 35% of all pollinator visits by 33% of all species, and in the farm surveys, creeping thistle (*Cirsium arvense*) attracted 17% of all visits by 18% of all pollinator species. Although well visited by pollinators, these species have little agronomic value.

Pasture plant species richness was significantly and positively associated with: strawberry fruit weight and quality; seed count per individual flower of red Campion; pollinator functional diversity. However, broad bean showed no significant relationship, which the researchers say is potentially because pollination of this species is principally by large bees who forage at a scale beyond individual

pastures. Although the use of these botanical measures do not directly relate to estimates of farm-scale crop production, maximizing fruit weight and quality through natural processes — such as increasing the richness of plant species — may provide an incentive to farmers looking to achieve higher market prices due to improved crop pollination.

Source: *Science for Environment Policy*

AIR POLLUTION CLAIMS 5.5 MILLION LIVES ANNUALLY, MAINLY IN CHINA AND INDIA

Taking a deadly toll on us, poor air quality claims 5.5 million lives worldwide annually, with more than half of the deaths occurring in two of the world's fastest growing economies, China and India. Power plants, industrial manufacturing, vehicle exhaust and burning coal and wood all release small particles into the air that are dangerous to a person's health.

The University of British Columbia research found that despite efforts to limit future emissions, the number of premature deaths linked to air pollution will climb over the next two decades unless more aggressive targets are set. The researchers said that air pollution is the fourth highest risk factor for death globally and by far the leading environmental risk factor for disease, adding that reducing air pollution is an incredibly efficient way to improve the health of a population.

Researchers from Canada, the United States, China and India assembled estimates of air pollution levels in China and India and calculated the impact on health. Their analysis shows that the two countries account for 55% of the deaths caused by air pollution worldwide. About 1.6 million people died of air pollution in China and 1.4 million died in India in 2013.

In China, burning coal is the biggest contributor to poor air quality. Researcher Qiao Ma, who found that outdoor air pollution from coal alone caused an estimated 366,000 deaths in China in 2013, said that the study highlights the urgent need for even more aggressive strategies to reduce emissions from coal and from other sectors.

In India, a major contributor to poor air quality is the practice of burning wood, dung and similar sources of biomass for cooking and heating. Millions of families, among the poorest in India, are regularly exposed to high levels of particulate matter in their own homes.

India needs a three-pronged mitigation approach to address industrial coal burning, open burning for agriculture, and household air pollution sources.

Source: *The Financial Express*
ANI

HEALTH IMPACTS OF CLIMATE CHANGE IN THE INDOOR ENVIRONMENT: A UK REVIEW REPORT

The health risks associated with climate-induced changes to indoor environments are explored in a new study. UK-based researchers synthesized findings of how climate change — and mitigation and adaptation measures — might affect the inside of buildings, through overheating, air quality, allergies and infections, flood risk and other exposure risks.

In addition to its well-reported effects on the external environment, changes to the climate will also change conditions inside of buildings. The resultant risks to human health include overheating, flood damage, indoor air pollution, extremes of temperature and biological contamination (e.g. potential increases in pest infestations and airborne infectious diseases).

Given that people in high income countries typically spend over 90% of

their time indoors, the threat may be significant. Vulnerable persons may spend even more time at home. To protect public health, it is important to consider the climate-change-mediated effects on dwellings, and the opportunities and risks adaptation and mitigation strategies can bring.

The researchers focused on housing-related health effects in the UK likely to arise through climate change, as well as mitigation measures in the built environment. They explored four key consequences of climate change on the indoor environment: overheating, reduced ventilation and indoor air quality (which may lead to the growth of pathogens), allergens and infections, and mould and water damage through damp and flooding.

The researchers say climate change could exacerbate the health risks already present in these four categories. They say the population groups at highest risk are the elderly, those with pre-existing health conditions, and those who live in crowded accommodation or are economically deprived. Researchers also discuss the unintended harmful effects of certain climate change mitigation policies. For example, making buildings increasingly airtight to increase energy efficiency could also increase concentrations of air pollutants, such as fine particulate matter (PM_{2.5}) and carbon monoxide. However, these effects can be mitigated by properly implemented ventilation systems, such as mechanical ventilation systems with heat recovery and air filtration.

According to these researchers, measures designed to reduce greenhouse gas emissions could also reap health benefits, by reducing extreme temperatures and indoor exposure to air pollution, for instance. Changes to building design are particularly important for health protection. New buildings should be designed to address the health challenges of climate change while also reducing fossil fuel use. Existing buildings should be adapted using

measures such as external shading devices and shutters, which can maintain comfortable indoor temperatures and minimize the need for air conditioning (which also has an environmental cost).

Climate change will amplify existing health risks in the indoor environment, such as high temperatures, air pollution and damp due to flooding and heavy rainfall. Properly targeted and cost-effective adaptation/mitigation measures could minimize these risks. Policies should promote long-term energy-efficient building interventions, accompanied by proper ventilation and shading, and removal of indoor pollution sources such as tobacco smoke.

Source: *Science for Environment Policy*

WILD PLANT CONSERVATION EFFORTS COULD BENEFIT FARMING AND FOOD SECURITY

Conservation of wild plants related to important crops requires more concerted efforts, according to a new study conducted in Scotland. The study makes recommendations for improving conservation not only within Scotland, but it could help other countries to prioritize their wild plants.

Crop wild relatives (CWR) are wild plants relatively closely related to cultivated crops. They are important because their genes encode traits that have been useful for agricultural breeding programmes, for example, to produce more resilient crops able to withstand the adverse impacts of environmental change. One wild relative of barley (*Hordeum bulbosum* L.), for instance, has genes that help it to resist diseases such as leaf rust, a fungal disease which can cause leaves to die.

Working from a checklist of 1259 taxa (biological classification groups), the researchers identified Scottish CWR plants that should be prioritized for conservation. Native species, those that were more closely related to widely cultivated crops with a high economic

value, and those considered under threat were prioritized.

According to the researchers, their studies reveal a lack of focus on conserving the genetic diversity of CWR. They recommend that priority species be incorporated into conservation plans within existing protected areas and the link between protected area conservation and food security be made to highlight the value of conserving these vital species to the general public. Outside these areas, conservation will require land owners and managers to work together to resolve potential conflicts over land management strategies. Further recommendations include: continued efforts, potentially using citizen science, to monitor existing populations of priority species; promotion of their value among crop breeders; and conservation of at least five different populations of each CWR *in situ* — with complementary seed collections stored in gene banks elsewhere.

Efforts to conserve Scottish CWR will contribute to agricultural diversity and food security. The hotspot and mapping analyses used in the Scottish process could be useful to other countries attempting to develop priority lists, complementary national conservation strategies and CWR conservation areas. The researchers suggest that the process for prioritizing CWR conservation should address global policy targets as well as the concerns of national stakeholders.

Source: *Science for Environment Policy*

CLIMATE CHANGE WILL CAUSE AT LEAST 130,000 DEATHS IN INDIA BY 2050

Climate change could kill more than 130,000 people in India in 2050 due to changes in diet and bodyweight from reduced crop productivity, according to new estimates published in the British medical journal *The Lancet*. The study predicts that these

changes could lead to nearly 529,000 extra deaths globally in 2050, as opposed to a future without climate change in which adequate food availability and consumption could prevent 1.9 million deaths.

The modeling study, carried out by researchers from University of Oxford, UK, evaluates the impact of climate change on diet composition and bodyweight, and estimates the number of deaths caused by this in 155 countries in 2050.

Changes in food availability and intake also affect dietary and weight-related risk factors such as low fruit and vegetable intake, high red meat consumption, and high bodyweight. These all increase the incidence of non-communicable diseases such as heart disease, stroke, and cancer, as well as death from those diseases.

According to the study, if the level of global emissions remains unchanged, then the projected improvement in food availability could be reduced by about a third by 2050, and lead to average per-person reductions in food availability of 3.2%, in fruit and vegetable intake of 4.0%, and red meat consumption of 0.7%.

The countries that are likely to be worst affected are low- and middle-income countries, predominantly those in the Western Pacific region and South-East Asia with almost three-quarters of all climate-related deaths expected to occur in China and India. On a per-capita basis, Greece and Italy are expected to be badly affected.

Source: *The Lancet*.

GLOBAL WARMING MAKING RICH RICHER AND POOR POORER!

A new study has warned that global warming will drive vast and unpredictable shift in natural wealth by taking from the poor and giving to the rich.

Many studies have shown that critical natural resources, including fish stocks, are moving pole ward as the

planet warms. The study from Yale, Rutgers, Princeton, and Arizona State universities suggests that these biophysical changes are also reallocating global wealth in unpredictable, and potentially destabilizing, ways.

On its surface, these biophysical movements will shift resources from communities and nations closer to the equator into places closer to the poles. In many cases this would seem to exacerbate inequalities between richer and poorer communities. The researchers suggest that the impacts on net global wealth may not be that straightforward. In fact, they make the case that changes are more likely than not to produce an overall net loss in global wealth.

The reason is the inevitable and unpredictable price impacts in places where the quantities of fish stocks increase depending on the quality of its resource management, existing institutions, and fishing regulations. We tend to think of climate change as just a problem of physics and biology. But people react to climate change as well, and at the moment we don't have a good understanding for the impacts of human behavior on natural resources affected by climate change.

According to their analysis, if fish quantities increase in a northern community, for instance, it will likely cause a devaluation of that resource locally, particularly if that community is not equipped to manage the resource efficiently. If the northern community is not a particularly good steward or manager, they're going to place a low value on that windfall they just inherited, the researchers said. So the aggregate could go down.

To be clear, the 'gainers' here are clearly better off. They are just not more better off than the losers are worse off. The losers are losing much more than the gainers are gaining. And when that happens, it is not an efficient reallocation of wealth. The analysis suggests that policy discussions around climate change should address how the

physical changes will affect wealth reallocation, rather than allowing nature to redistribute this wealth in an unpredictable, “willy-nilly” manner.

Source: ANI

NIGHTTIME LIGHT POLLUTION COVERS NEARLY 80% OF THE GLOBE

Now, one-third of people cannot see Earth's galaxy at night because of artificial lighting, which affects nearly 80% of the globe. The findings, part of a new atlas of worldwide light pollution, suggest that the problem is poised to get worse without regulatory action.

Light pollution has intensified in the past half-century, increasing about 6% each year in North America and Europe, according to research published using a previous atlas created 15 years ago by the same researchers. That atlas, and the new study, define “light-polluted skies” as having a luminance of 14 or more microcandelas per square meter—about 10% higher than normal night sky brightness levels.

The new atlas shows that now, more than 80% of the world experiences light-polluted night skies, which includes roughly 83% of Earth's population, and more than 99% of Europeans and Americans. By population, Singapore has the world's most light-polluted skies, followed by Kuwait, Qatar, and the United Arab Emirates—all densely populated countries. Africa has the dimmest skies; the top 10 least polluted countries are on the continent.

Such pollution affects more than just our view of the Milky Way. Strong artificial lighting at night can cause birds to migrate at the wrong time of season, deter nighttime pollinators like bats, disrupt underwater ecosystems, and even increase melatonin production in humans, leading to disrupted sleep cycles and increased risk of some cancers. And these detrimental effects can persist even

after the lights have been dimmed or removed.

We can surely lower the levels of light pollution by turning off the lights, but we cannot reverse the damage we have already done.

The atlas also projects what would happen if all outdoor lighting in Europe switched from common high-pressure sodium lights to energy efficient 4000-K white light-emitting diode (LED) lights. LED lights release more light in the blue part of the spectrum than sodium lights. Those blue wavelengths are more easily scattered by Earth's atmosphere than other colors, which would considerably increase the light pollution they ultimately contribute, bulb for bulb. Blue light is also more easily picked up by the human eye, which means that people would perceive even brighter skies. The atlas team predicts a doubling in worldwide light pollution if they continue to be adopted globally.

This atlas is also a “first step” toward understanding light pollution's impacts on wildlife. Light pollution comes from more than just lightbulbs. The key for many ecological researchers will be developing tools to calculate “horizontal illuminance,” the glare and reflection of artificial lighting from clouds and ground surfaces under different types of weather conditions. However, there is a great potential in the atlas's ability to raise awareness of a relatively underappreciated issue—and the dangers to both humans and wildlife from putting Earth into a state of “permanent twilight.”

Source: Ben PankoJun
(In: *Science*)

START THINKING ABOUT POLLUTION INSIDE HOMES, WARNS NEW STUDY

Air inside our homes may be as polluted as outside and there is need to monitor its quality to take remedial measures, says a new study. Cooking residues, chemicals and various

microbes and fungal spores are usually found existing in homes and may cause chronic health problems, the study said. A collaborative effort of European, Australian and UK researchers, led by the University of Surrey, it is published in the journal *Science of the Total Environment*.

When we think of the term 'air pollution' we tend to think of car exhausts or factory fumes expelling grey smoke. However, there are actually various sources of pollution that have a negative effect on air quality, many of which are found inside our homes and offices. From cooking residue to paints, varnishes and fungal spores the air we breathe indoors is often more polluted than that outside.

In 2012 indoor air pollution was linked to 4.3 million deaths globally, compared with 3.7 million for outdoor air pollution. Urban dwellers typically spend 90% of their time indoors, and this has been linked to 'Sick Building Syndrome' where dwellers exhibit a range of ill health effects related to breathing indoor air. Whether the use of coal and wood for cooking, to microbial contaminants including bacteria and viruses these effects include respiratory disease and reduced cognitive function.

It is essential that we are able to effectively monitor indoor air pollution so that we can better understand when and where levels are worst, and in turn offer solutions to make our air healthier. Our work looks at the use of small, low-energy monitoring sensors that would be able to gather real-time data and tell families or workers when levels of pollutants are too high.

Sometimes the solution to this will be as simple as opening a window, but without knowledge at the right time these simple steps are often skipped. With this research we are calling for greater importance to be placed on ensuring buildings are built with indoor pollution monitoring in mind. As we enter the age of smart cities this is one way in which technology will

actively benefit health.

Source: TNN

THE DANGERS OF USING PLASTIC WATER BOTTLES

There are many reports out now that refilling and reusing the same bottle repeatedly, if not washed properly, can make one sick. Researchers have now examined that plastic that holds the water, and they have found some chemicals in certain types of plastic contain, like phthalates and bisphenol A, may seep into the water. These toxins can disrupt the endocrine system, messing with our hormone balance.

Plastic bottles are manufactured with styrene, which is made from refined crude oil, and through a very toxic process forms the small, thin bottles which will slowly leach out proven neuro-toxins into the water. Independent tests have been made on water in plastic bottles that show significant levels of these chemicals and phthalates, which are estrogen like compounds that act in our body just like estrogen. Natural water sources where grey water is deposited consistently have fish with hormonal abnormalities due to phthalates from plastic and other sources being poured back into our streams and lakes. Bottles exposed to heat or sun, like those left in the car or out in flats on a loading dock, have much higher levels of these chemicals.

The larger, thicker plastic bottles, like those for water coolers are even worse. This type of plastic is proven to leach Bisphenol-A (BPA) into the water. The FDA maintains that low doses of this chemical is not toxic, but they base that on two studies carried out by the industry that manufactures BPA! Conflict of interest anyone? Meanwhile, over 200 other independent studies have scientists very alarmed about the effects on our bodies.

At low doses, BPA interferes with natural estrogen getting into cells, and

with increased exposure, can completely shut-off male reproductive systems. At high doses, it can shut down body's production of thyroid hormone, one of the most toxic chemicals known to man". When we choose water stored in plastic bottles, we are in fact ingesting these chemicals into our bodies- BPA or bisphenol is an estrogen mimicking chemical. It brings about health disorders like learning and behavioral problems, altered immune system function, fertility problems, and brings on early onset of puberty in girls, decreased sperm count, prostatic and breast cancer, diabetes and obesity are other disorders. Bottled drinking water is even more harmful when left strapped to your bike or car, or left exposed to hot sun. Ultra violet rays from the sun speeds up leaching of the plastic chemicals into the bottled water. Yet another toxin by the name dioxin is also released to the water when left in the sun. This dioxin accelerates breast cancer.

About 40 percent of bottled water is tap water. This means we are not only exposed to dangerous BPA from the bottle, we may also be exposed to a variety of water contaminants such as fluoride, chlorine, arsenic, aluminum, disinfection byproducts and prescription drugs.

As we struggle to minimize consumption of fossil fuels, bottled water increases this trend. Since virgin petroleum is used to make these plastic bottles, the more bottles we use, the more of virgin petroleum is needed to crate fresh bottles. As a result, more fossil fuel is burned to fill bottles and distribute them. A study reveals the following astounding facts- it requires 273 billion liters of water to make empty bottles. Treating and filtering tap water for bottling paves way for even more waste. For every liter of water, it takes two liters of water to make it. And only half of the bottles are ever recycled and they end up as waste, clogging the earth.

We should stop buying plastic bottled water and start carrying our

own filtered water in a glass or stainless steel bottle. There are many of these new, stainless steel water bottles popping up all over the place now.

Source: *Alternative Health*

THIS DESERT MOSS CAN WATER ITSELF WITH FOG

To tap into scarce water supplies, most desert plants have extensive root systems that burrow deep or spread wide. But one desert moss has a different trick up its sleeve: a thirst-quenching structure called an awn. Awns are tiny, hair-like structures that project from the end of each leaf to capture water. For the first time, scientists have examined in detail how this moss (*Syntrichia caninervis*) pulls water right from the air using its awns. At the smallest scale, the awns are covered with grooves about 100 nanometers deep and 200 nanometers wide, the perfect size for dew to condense within them when conditions are right. Those nanogrooves lie within larger troughs that measure about 1.5 micrometers deep and 3 micrometers wide, a good size to snag fog droplets from the air. Once enough moisture collects in the microgrooves, capillary action caused by surface tension in the water pulls the droplets toward the thicker end of the awn, which lies toward the plant. The plant waters itself. And on the rare occasions when rain falls, any droplets trapped between two awns are likewise pulled toward the plant's leaves, the researchers reported in *Nature Plants*. These tricks may one day help engineers design better equipment to collect water in arid locales, the researchers suggest.

Source: Sid Perkins

(In: *Science*).

EVEN YOUNG RAINFORESTS CAN HELP SAVE THE CLIMATE

The logging of old-growth rainforest in the tropics—often to create cattle pastures—is a major blow to the

climate. Cutting down the forests releases lots of carbon dioxide into the atmosphere—and of course, the trees aren't absorbing it anymore. But that's not the end of the story. When pastures are abandoned (often after a few years), trees start to come back, forming second-growth forests. These forests might lack the massive trees and rich biodiversity of an old-growth forest, but they can still play an important role in helping regulate climate. An ecologist at the University of Connecticut, and the International Institute of Sustainability in Rio de Janeiro, Brazil, and a team of 60 researchers first estimated the extent of second-growth forests across 43 regions of Latin America, and then built a model to estimate their ability to store carbon. It turned out that second-growth forests made up a sizeable fraction: In 2008, 17% of forest was 20 years old or younger, and another 11% was between 20 and 60 years old. If all this forest continues to grow for the next 4 decades, their model showed, it would store 8.5 petagrams of carbon, 71% of that in Brazil alone, as team reports today in *Science Advances*. That's equivalent to the carbon emissions from all fossil fuels throughout Latin America and the Caribbean from 1993 to 2014. The results suggest that second growth forests—along with halting deforestation—can provide major help for meeting climate goals.

Source: Erik Stokstad,
(In: *Science*)

UNDERGROUND INJECTIONS TURN CARBON DIOXIDE TO STONE

Researchers working in Iceland say they have discovered a new way to trap the greenhouse gas carbon dioxide (CO₂) deep underground: by changing it into rock. Results published recently in *Science* show that injecting CO₂ into volcanic rocks triggers a reaction that rapidly forms new carbonate minerals—potentially locking up the gas forever. It offers a ray of hope for

beleaguered efforts to fight climate change by capturing and storing CO₂ from power plants.

Dozens of pilot projects around the world have sought to test carbon capture and storage (CCS) as a way of curbing CO₂ emissions from power plants. Very few have been scaled up, owing to prohibitive cost.

CCS also faces technical hurdles, and one of the largest is where to store the captured gas. Most researchers favor formations of sedimentary rock, often sandstone harboring briny groundwater or depleted oil wells, because industry has long experience in working with them. But scientists fear that fissures in the rock layers that cap the storage aquifers could let CO₂ leak back into the atmosphere.

So Icelandic, U.S., and French scientists proposed a different approach: injecting CO₂ into underground layers of basalt, the dark igneous rock that underlies Earth's oceans and crops up in parts of continents as well. They knew that unlike sandstone, the basalt contains metals that react with CO₂, forming carbonate minerals such as calcite—a process known as carbonation.

The researchers injected 220 tons of CO₂—spiked with heavy carbon for monitoring—into layers of basalt between 400 and 800 meters below the surface. They also added extra water, which reacted with the gas to form a key driver of mineral reactions, carbonic acid. Then they monitored the pH, geochemistry, and other characteristics of the subsurface by taking samples from nearby wells.

What happened next startled the team. After about a year and a half, the pump inside a monitoring well kept breaking down. Frustrated, engineers hauled up the pump and found that it was coated with white and green scale. Tests identified it as calcite, bearing the heavy carbon tracer that marked it as a product of carbonation.

Measurements of dissolved carbon in the groundwater suggested

that more than 95% of the injected carbon had already been converted into calcite and other minerals. It was a huge surprise that the carbonation happened so fast.

The speedy carbonation “means this method could be a viable way to store CO₂ underground—permanently, and without risk of leakage,” Matter says. Unpublished data from a similar project in basalt near the Columbia River near Wallula, Washington, point to a similar conclusion. And there is no lack of basalt formations on land or offshore, which could make CCS possible for power plants “not near sedimentary rocks or depleted oil wells,” Matter adds.

Bigger field tests are needed, says geologist Peter Kelemen of Columbia University, to confirm that such a high fraction of the injected carbon was mineralized. (Columbia is a CarbFix partner, but Kelemen is not on the project.) Scaled-up demonstrations could also make sure that the speed of the reaction won't turn into a drawback, Stanford's Benson says. If carbonation generates minerals that quickly plug the pores in the basalt, she worries, they could trap CO₂ near the injection site instead of letting it spread through the rock.

But even CarbFix's own scientists acknowledge that the biggest obstacle to CCS in basalt is financial: Power companies have little incentive to pursue it. Without a price on carbon emissions, there's no business case, admits Matter, who hopes policymakers will create such an incentive. Otherwise, projects in basalt could suffer the same fate as the dozens of conventional CCS projects around the world that have failed to be commercialized. In the meantime, says Benson, the success in Iceland is a welcome development. “We could all use some positive news in this field,” she says.

Source: Eli Kintisch
(In: *Science*)

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9-14 October 2016, Brisbane, Australia
E-mail: keith.robertson@iwahq.org;
info@iwa-exhibitions.com
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12-14 October 2016; Incheon Korea
Contact: Ms. Ivy Hou
Conference Secretary
E-mail: icebs@cbees.org
Website: <http://www.icebs.org/>

National Seminar on Environment and Sustainability: A Geographical Perspective

18-19 November, 2016; Kolkata
Contact: Organizing Secretary,
National Seminar on Environment and Sustainability: A Geographical Perspective
Prasanta Chandra Mahalanobis
Mahavidyalaya
111/3B.T. Road, Bonhoogly (Opposite to ISI)
Kolkata-700 0108
E-mail: geoconference2016.pcm@gmail.com
Website: www.pcm.in

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23-24 February, 2017, Paris, France
Website:
waset.org/conference/2017/02/paris/ICAPC

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3-4, April, 2017, Barcelona, Spain
Contact: International ASET Inc.
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E-mail: info@icesdp.com

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21-22 April 2017; Anglia Ruskin University,
Cambridge, UK
Website: <http://on-climate.com/2017-conference/call-for-papers>

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25 - 27 April, 2017, Cadiz, Spain
Contact: Irene Moreno Millan
Conference Secretariat
Wessex Institute, Ashurst Lodge, Ashurst
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November 24 - 25, 2017; Havana, Cuba
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