Environment News Futures

Waste Less at Home

Methods for reducing household food waste

Cornell Food & Brand Lab—January 5, 2016

Consumer food waste carries the highest environmental impact compared to losses earlier in the food chain, and it is no longer a problem concentrated only in higher income countries. How can household food waste be reduced? The proper answer might come from more research to identify which communication and marketing initiatives work better to decrease waste. In a new paper published in the *Journal of the Association for Consumer Research*, researcher Gustavo Porpino, from the Brazilian Agricultural Research Corporation (Embrapa) provides some solutions and a framework for conducting future research on this global issue of remarkable social and environmental relevance.

Worldwide Electricity Production Vulnerable to Climate and Water Resource Change

International Institute for Applied Systems Analysis—January 4, 2016

Climate change impacts on rivers and streams may substantially reduce electricity production capacity around the world. A new study calls for a greater focus on adaptation efforts in order to maintain future energy security.

Climate change impacts and associated changes in water resources could lead to reductions in electricity production capacity for more than 60% of the power plants worldwide from 2040-2069, according to a new study published in the journal *Nature Climate Change*. Yet adaptation measures focused on making power plants more efficient and flexible could mitigate much of the decline.

"Hydropower plants and thermoelectric power plants—which are nuclear, fossil-, and biomass-fuelled plants converting heat to electricity—both rely on freshwater from rivers and streams," explains Michelle Van Vliet, a researcher at the International Institute for Applied Systems Analysis (IIASA) in Austria and Wageningen University in the Netherlands, who led the study. "These power-generating technologies strongly depend on water availability, and water temperature for cooling plays in addition a critical role for thermoelectric power generation."

Together, hydropower and thermoelectric power currently contribute to 98% of electricity production worldwide. Model projections show that climate change will impact water resources availability and will increase water temperatures in many regions of the world. A previous study by the researchers showed that reduced summer water availability and higher water temperatures associated with climate change could result in significant reductions in thermoelectric power supply in Europe and the United States.

This new study expands the research to a global level, using data from 24,515 hydropower and 1,427 thermoelectric power plants worldwide. "This is the first study of its kind to examine the linkages between climate change, water resources, and electricity production on a global scale. We clearly show that power plants are not only causing climate change, but they might also be affected in major ways by climate," says IIASA Energy Program Director, Keywan Riahi, a study co-author.

"In particular the United States, southern South America, southern Africa, central and southern Europe, Southeast Asia and southern Australia are vulnerable regions, because declines in mean annual streamflow are projected combined with strong increases in water temperature under changing climate. This reduces the potential for both hydropower and thermoelectric power generation in these regions," says Van Vliet.

The study also explored the potential impact of adaptation measures such as technological developments that increase power plant efficiency, switching from coal to more efficient gas-fired plants, or switching from freshwater cooling to air cooling or to seawater cooling systems for power plants on the coasts.

"We show that technological developments with increases in power plant efficiencies and changes in cooling system types would reduce the vulnerability to water constraints in most regions. Improved cross-sectoral water management during drought periods is of course also important," says Van Vliet. "In order to sustain water and energy security in the next decades, the electricity focus will need to increase their focus on climate change adaptation in addition to mitigation."

Philippine Coastal Zone Research Reveals Tropical Cyclone Disruption of Nutrient Cycling

How cycads weather the storms

University of Guam—December 23, 2015

The influence of Typhoon Haiyan damage on leaf nutrient traits in coastal habitats is explored by researchers in a new study. Their publication illuminates several ways in which a tropical cyclone disrupts nutrient flow through the ecosystem.

Living on beachfront property on a tropical island is an idyllic life goal for many people. Those people may be envious of a number of native Philippine plant species that restrict their population distribution to coastal zones. But that idyllic life comes with a price, as revealed in an article that appears in issue 2 of the 2015 volume of the *Journal of Geography & Natural Disasters.*

Cool Roofs in China Offer Enhanced Benefits during Heat Waves

Study uses regional climate model to compare heat waves to normal summer conditions

DOE/Lawrence Berkeley National Laboratory— December 22, 2015

It is well established that white roofs can mitigate the urban heat island effect, reflecting the sun's energy back into space and reducing a city's temperature. In a new study of Guangzhou, China, researchers found that during a heat wave, the effect is significantly more pronounced. Reflective roofs, also called cool roofs, save energy by keeping buildings cooler, thus reducing the need for air conditioning.

Enhanced Rock Weathering could Counter Fossil-fuel Emissions and Protect Our Oceans

University of Sheffield— December 14, 2015

Scientists have discovered enhanced weathering of rock could counter human-made fossil fuel CO_2 emissions and help to protect our oceans.

An international team, led by researchers from the University of Sheffield, found that speeding up the naturally occurring process of the weathering of rock to draw CO_2 out of the atmosphere could help to significantly stabilise the climate and avert ocean acidification caused by humans burning fossil fuels.

This is the first time the large-scale effects of weathering by vegetation, roots and symbiotic microbes have been investigated using a complex modelling approach to find out how to accelerate the Earth's natural CO_2 removal system to counter-act anthropogenic CO_2 emissions and ocean acidification. Weathering occurs when rainwater comes into contact with rocks under warm conditions causing the rock to breakdown chemically. This process converts CO_2 to bicarbonate, a natural neutraliser, which eventually drains away via rivers to the oceans. Plants enhance this further by acidifying the soil particles around their roots. It helps if the surface of the rock particles is large such as in silicate rock like volcanic rock basalt.

Dr Lyla Taylor, from the University of Sheffield's Department of Animal and Plant Sciences, said: "Phasing down fossil fuel emissions remains a top priority but we also need to better understand potential strategies for safely removing atmospheric CO_2 to avert dangerous climate change. We have shown that, in principle, rock weathering could indeed draw down atmospheric CO_2 and could benefit coral reefs in the ocean."

"The simulations we ran were idealised as they covered some of the world's most ecologically sensitive terrestrial environments, however our evidence shows that the enhanced weathering strategy is definitely worth investigating further as it could play a significant role in offsetting the damage we are doing to the environment."

Ocean acidification is caused by the uptake of CO_2 from the atmosphere which leads to an ongoing decrease in the pH of the Earth's oceans and has a range of possible harmful consequences including coral bleaching which leaves the organism vulnerable to disease. The United Nations estimate ocean acidification could cost the global economy one trillion US dollars a year by 2100. Lead author of the study, Professor David Beerling, also from the Department of Animal and Plant Sciences, said: "This study is important because deploying strategies for removing CO_2 from the atmosphere are strongly embedded in climate stabilisation policies but don't yet exist.

"With the UN Climate Change Conference still at the forefront of everyone's mind it is vital that we investigate the safety, effectiveness and benefits of methods such as enhanced weathering so we know what our options are. Detailed theoretical modelling like this is a good place to start." The study, which was published on 14 December 2015 in *Nature Climate Change*, was conducted by researchers at the University of Sheffield in collaboration with the University of Bristol, University of California, Columbia University, and the Goddard Institute for Space Studies.

This research is part of the University of Sheffield's revolutionary approaches to tackling climate change. Last month saw the launch of its £10 million Leverhulme Centre for Climate Change Mitigation led by Professor David Beerling, which will develop the science to safely remove CO_2 from the atmosphere to cool the planet.

Norway to Help India Manage Construction Waste

IANS—Dec 30, 2015

India will sign an MoU with Norway for training of human resource to handle construction and demolition waste, in tune with the Clean India Campaign launched by Prime Minister Narendra Modi.

A Memorandum of Understanding (MoU) will be signed between SINTEF, Norway and Central Public Works Department (CPWD) for cooperation in the development of human resource capacity-building and scientific research in the field of Recycling of Construction and Demolition (C&D) Waste in India. The proposal in this regard was cleared by the union cabinet on Wednesday.

India's construction industry generates about 10-12 million tonnes of waste annually. There is a huge demand of aggregates in the housing and road sectors but there is a significant gap in demand and supply, which can be reduced to a certain extent by recycling construction and demolition waste.

While some of the items like bricks, tiles, wood and metal are re-used and recycled, concrete and masonry, constituting about 50 percent of the construction and demolition waste, is not currently recycled in the country.

Four 'Super-Heavy' Elements Added to Periodic Table

First to be added since 2011 and the first to be found by scientists working in Asia

Robert Lee Hotz—Jan. 4, 2016

Four recently discovered substances are joining the periodic table of the elements, filling in key blank spots in chemistry's official compendium of the basic building blocks of the universe.

The International Union of Pure and Applied Chemistry, which verified their existence, announced the entry of the four elements, the first since 2011 and the first to be found by scientists working in Asia. These four radioactive "super-heavy" elements are known by temporary names based on the number of protons each contains in its nucleus: ununtrium, ununpentium, ununspetium and ununoctioum. Their discoverers now have the privilege of proposing a permanent name and symbol for each.

Three of the elements—designated with atomic numbers of 115, 117 and 118—were first detected more than a decade ago by researchers at the Joint Institute for Nuclear Research in Russia and the Lawrence Livermore National Laboratory in California. The fourth, with an atomic number of 113, was discovered in 2004 by the Riken research institute in Japan. The researchers have considerable leeway in conceiving names for the new elements. International rules allow them to be based on mythological creatures, a mineral, a scientist, or a place, but the international governing body has the final say in approving them.

The most recent entrant to the periodic table was Element 112, formally named copernicium to honour Polish astronomer Nicolaus Copernicus. The decision to expand the periodic table will be detailed in two reports by experts from the international chemistry group and the International Union of Pure and Applied Physics. The reports, which the IUPAC announced on its website on Dec. 30, will be published later this year in the journal "*Pure and Applied Chemistry*."

"A particular difficulty in establishing these new elements is that they decay into hitherto unknown isotopes of slightly lighter elements that also need to be unequivocally identified," said Paul J. Karol, a nuclear chemist at Carnegie Mellon University and chairman of the group that evaluated the claim, in a statement accompanying the announcement.