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Biomass to Remediate Environment
CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

Kenya warms to the water hyacinth as wonder source of biofuel

The Guardian, 27 August 2019

It is 9am on the shores of Lake Victoria's Winam Gulf in Kenya's Kisumu county. Tourists are arriving on the beach in droves, preparing to spend the day sunbathing and taking boat rides. Behind them, enormous marabou storks on spindly grey legs are pacing the beach, waiting for scraps.

Nearby, a group of women scan the horizon, looking for the fishing boats that will soon arrive with their daily catch.

But there's something else on the horizon too, a sheet of water hyacinth pulled over the surface of the lake. The leaves of the floating plant extending like an oversized green shag carpet, rolling gently in the wind.

"We hope that the boats arrive before the hyacinth covers this area, [because] it will be difficult for [the fishermen] to access the dry land and bring us fish," says Elizabeth Keita, a fishmonger in the village of Dunga, as she eyes the bobbing green sheet in the distance.

Water hyacinth (Eichhornia crassipes), an aquatic plant native to South America, first appeared in countries in Africa in the early 1900s. Scientists there dubbed it the "world's worst aquatic weed", after it spread from the Cape in the early 1900s and started clogging up major dams and rivers.

In east Africa, the nefarious invader arrived with Belgian colonists in Rwanda, who liked the look of its glossy leaves and delicate purple flowers floating in their garden ponds. But by the 1980s, it had slipped out of……

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Combination of Waste Materials and Biomass can Improve the Sustainability of Soils

AZO Cleantech, 05 August 2019

According to a new study, a mixture of waste materials combined with a biomass product can help in the quest for high-quality soils.

Every year, soil degradation is presenting a major threat to global food security. In fact, soil erosion accounts for the loss of about 12 million hectares of cropland.

Now, at the University of Plymouth, researchers have shown that the loss of key nutrients like carbon and nitrogen can be reduced by adding biochar to soil produced from waste materials. Biochar is a solid, carbon-rich material extracted from biomass.

This, according to the researchers, can enhance the sustainability of manufactured soils by improving conditions that are conducive to maintain plant growth and by enhancing carbon storage capacity, nutrient retention, and moisture content. It will also bring down the dependence of soil on the excess use of fertilizers, thus lowering cost as well as the risk of pollution caused by extreme leaching of nitrogen.

Reported in Science of the Total Environment, the study concentrated on a soil made up of waste materials, which has been implemented to support a range of plants within artificial and natural environments over a period of 18 years. Conversely, the soil's success has depended on frequent applications of fertilizers to supply……

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Great Loss of Ecology in Amazon

CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

Deforestation, climate crisis could crash Amazon tree diversity: study

Mongabay News, 18 August 2019

The combined impact of ongoing deforestation and escalating climate change on the Amazon rainforest could radically transform its configuration by 2050, with the biome divided into two distinct blocks — one occupied by still significant but very seriously diminished rainforest, the other dominated by agribusiness and scattered forest inside conserved areas.

That shift, were it to occur, could result in a decline of up to 58 percent of Amazon tree species richness, of which 49 percent would have some degree of risk for extinction (with tree species becoming vulnerable, endangered or critically endangered), according to a new study published in Nature Climate Change.

The authors of the paper — four researchers from Brazil and the Netherlands — determined that both deforestation and climate change had to be examined together, and not separately as is typically done, in order to determine a realistic future scenario.

To the researchers' surprise, when the effects were combined in their models, the tree species loss numbers were very high.

Under the deforestation/climate change scenario, one half of the Amazon (the northern, central and western portions) would be reduced to 53 percent of the original forest, although still with continuous areas. The other half (the eastern, southern and southeastern areas, where agribusiness activities currently take place), would become extremely fragmented,…..

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Amazon fires 'extraordinarily concerning', warns UN biodiversity chief

The Guardian, 30 August 2019

The fires in the Amazon are "extraordinarily concerning" for the planet's natural life support systems, the head of the UN's top biodiversity body has said in a call for countries, companies and consumers to build a new relationship with nature.

Cristiana Paşca Palmer, the executive secretary of the UN Convention on Biological Diversity, said the destruction of the world's biggest rainforest was a grim reminder that a fresh approach was needed to stabilise the climate and prevent ecosystems from declining to a point of no return, with dire consequences for humanity.

"The Amazon fires make the point that we face a very serious crisis," she told the Guardian. "But it is not just the Amazon. We're also concerned with what's happening in other forests and ecosystems, and with the broader and rapid degradation of nature. The risk is we are moving towards the tipping points that scientists talk about that could produce cascading collapses of natural systems."

The world's environmental crises are an increasing concern in international politics. Deforestation of the Amazon was high on the agenda of this week's G7 meeting in Biarritz, France. In September, world leaders will gather in New York for a climate action summit. Next year, they are scheduled to get together again for a nature,…..

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Solution of Plastic Pollution

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Mexico's cactus offers alternative to plastics

The Hindu, 07 August 2019

Mexico's prickly pear cactus, which is emblazoned on the country's flag, could soon play a new and innovative role in the production of biodegradable plastics.

A packaging material that is made from the plant has been developed by a Mexican researcher and is offering a promising solution to one of the world's biggest pollution conundrums.

"The pulp is strained to obtain a juice that I then use," said Sandra Pascoe, who developed the product and works at the Atemajac Valley University in the western city of Guadalajara.

That substance is then mixed with non-toxic additives and stretched to produce sheets that are coloured with pigments and folded to form different types of packaging.

"What we're doing is trying to concentrate on objects that don't have a long life," she said, particularly "single-use" packaging.

Ms. Pascoe is still conducting tests, but hopes to patent her product later this year and look for partners in early 2020, with an eye towards large scale production.

The cacti Ms. Pascoe uses for her experiments come from San Esteban, a small town on the outskirts of Guadalajara, where they grow by the hundreds. San Esteban is located in Jalisco state where, starting next year, single-use non-recyclable plastic bags, straws and other disposable items will be banned..... **Read More...**

SA enters global race to combat plastic pollution and find alternatives

Engineering News, 23 August 2019

The agreement was signed by UNIDO representative in Southern Africa Khaled El Mekwad and Japanese ambassador to South Africa Norio Maruyama, and will be jointly executed by UNIDO and the CSIR. The joint research programme will look at both plastic waste and alternative materials to conventional plastics. The programme will run for three years, paid for by a Japanese grant of $1.8-million.

At the signing ceremony, Maruyama observed that "[t]his project has been mentioned between the two countries' leaders". Japan had agreed to provide the funding after a bilateral meeting between Japanese Prime Minister Shinzo Abe and South African President Cyril Ramaphosa prior to the G20 summit in Osaka, Japan, in June. At that G20 summit, Abe announced that Japan would support the waste management efforts of developing countries, including capacity building and infrastructure development. The ambassador described the signing of the agreement in Pretoria as a "concrete achievement" of that policy.

"UNIDO is a strategic development partner for South Africa and also has a strong and long-standing partnership with the government of Japan," explains El Mekwad. "By implementing this agreement with a national institution, the CSIR, national ownership of the programme will be further..... **Read More...**

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Synthesis and Environmental Protection

CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

How synthetic biology can help the environment

phys.org, 15 August 2019

Most environmental science is focused on how to turn back the clock, not push it forward, says Ben Bostick, a geochemist at Lamont-Doherty Earth Observatory. "We think about how we can roll back our footprint, and not so much about how can we make our footprint bigger in a positive way," he said. "But there are many examples of synthetic biology that I think actually have a lot of potential in the environment. Think of how we can help our environment just by doing things like improving the materials we make using synthetic biology."

Synthetic biology (synbio) is the construction of biological components, such as enzymes and cells, or functions and organisms that don't exist in nature, or their redesign to perform new functions.

Synthetic biologists identify gene sequences that give organisms certain traits, create them chemically in a lab, then insert them into other microorganisms, like E. coli, so that they produce the desired proteins, characteristics or functions.

Since 2011, when I wrote a general introduction to synbio, the field has grown rapidly.

One reason for this is the development of the gene editing tool CRISPR-Cas9, first used in 2013, that locates, cuts and replaces DNA at specific locations.

Another reason is how easy it has become to use the Registry of Standard Biological Parts, which catalogs over 20,000 genetic parts or BioBricks that can be ordered and used to create new synthetic organisms or systems. In 2018, investors poured $3.8 billion and governments..……

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Artificial tree promises to suck up as much air pollution as a small forest

Digital Trends, 16 August 2019

Trees are nature's way of cleaning the air, but they come with the downside of needing time in order to grow. A Mexican startup called Biomitech has a way around this, however. The company has developed an artificial tree that it claims is capable of sucking up the equivalent amount of air pollution as 368 living trees. That's not only a saving on growing time, but also on the space needed to accommodate them.

Called Biourban, the near 14-foot metal tree employs microalgae that pulls carbon dioxide and other contaminants from the air and returns pure oxygen in exchange. Since launching in 2016, the company has installed one tree its home city of Puebla, Mexico, another in Columbia, and a third in Panama. It has additional contracts for two more trees in Mexico, and the possibility of "planting" others in Mexico City and Monterrey.

"What this system does, through technology, is inhale air pollution and use biology to carry out the natural process [of photosynthesis], just like a tree," Jaime Ferrer, a founding partner in Biomitech, told TechXplore.

It's a fascinating idea. Biomitech's goal is to help cities to achieve cleaner air in scenarios where it's not feasible to plant the massive number of trees that would be necessary to achieve this the natural way. That's a worthy ambition since, according..…

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