



### Limited resources and unlimited usage. How can we save it?

## Conserve the energy, Save our climate!

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Newsletter

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#### Why ???

We the people on the earth are gifted with wonderful energy sources by the nature, which has made our routine much more smother & easier... However, this gift of the nature is ' limited '. What we have done is, with the growth of science & technology, we have started using it extremely, because of which the energy resources are going to finish in near future. Hence, let us take the pledge to conserve the energy - save the energy!!!



#### Tips of the Month

#### Article - 1 : Land ecosystems are becoming less efficient at absorbing CO2

Land ecosystems currently play a key role in mitigating climate change. The more carbon dioxide (CO2) plants and trees absorb during photosynthesis, the process they use to make food, the less CO2 remains trapped in the atmosphere where it can cause temperatures to rise. But scientists have identified an unsettling trend - as levels of CO2 in the atmosphere increase, 86 percent of land ecosystems globally are becoming progressively less efficient at absorbing it. Because CO2 is a main 'ingredient' that plants need to grow, elevated concentrations of it cause an increase in photosynthesis, and consequently, plant growth - a phenomenon aptly referred to as the CO2 fertilization effect, or CFE. CFE is considered a key factor in the response of vegetation to rising atmospheric CO2 as well as an important mechanism for removing this potent greenhouse gas from our atmosphere - but that may be changing.For a new study published Dec. 10 in Science, researchers analyzed multiple field, satellite-derived and model-based datasets to better understand what effect increasing levels of CO2 may be having on CFE. Their findings have important implications for the role plants can be expected to play in offsetting climate change in the years to come."In this study, by analyzing the best available long-term data from remote sensing and state-of-the-art land-surface models, we have found that since 1982, the global average CFE has decreased steadily from 21 percent to 12 percent per 100 ppm of CO2 in the atmosphere," said Ben Poulter, study co-author and scientist at NASA's Goddard Space Flight Center. "In other words, terrestrial ecosystems are becoming less reliable as a temporary climate change mitigator."

#### What's Causing It?

Without this feedback between photosynthesis and elevated atmospheric CO2, Poulter said we would have seen climate change occurring at a much more rapid rate. But scientists have been concerned about how long the CO2 Fertilization Effect could be sustained before other limitations on plant growth kick in.For instance, while an abundance of CO2 won't limit growth, a lack of water, nutrients, or sunlight - the other necessary components of photosynthesis -- will. To determine why the CFE has been decreasing, the study team took the availability of these other elements into account."According to our data, what appears to be happening is that there's both a moisture limitation as well as a nutrient limitation coming into play," Poulter said. "In the tropics, there's often just not enough nitrogen or phosphorus, to sustain photosynthesis, and in the high-latitude temperate and boreal regions, soil moisture is now more limiting than air temperature because of recent warming."In effect, climate change is weakening plants' ability to mitigate further climate change over large areas of the planet.



\*Image Source: https://www.tribuneindia.com/news/science-technology/land-ecosystemsbecoming-less-efficient-at-absorbing-co2-study-187101

#### Next Steps

The international science team found that when remote-sensing observations were taken into account - including vegetation index data from NASA's Advanced Very High Resolution Radiometer (AVHRR) and the Moderate Resolution Imaging Spectroradiometer (MODIS) instruments - the decline in CFE is more substantial than current land-surface models have shown. \*Source: https://www.sciencedaily.com/releases/2020/12/201218131902.htm

#### Article - 2 : Identifying where to reforest after wildfire

In the aftermath of megafires that devastated forests of the western United States, attention turns to whether forests will regenerate on their own or not. Forest managers can now look to a newly enhanced, predictive mapping tool to learn where forests are likely to regenerate on their own and where replanting efforts may be beneficial.

The tool is described in a study published in the journal Ecological Applications by researchers from the University of California, Davis; U.S. Geological Survey (USGS), Cal Fire and the U.S. Forest Service."Huge fires are converting forested areas to landscapes devoid of living trees," said lead author Joseph Stewart, a postdoctoral researcher at UC Davis and with USGS. "Managers need timely and accurate information on where reforestation efforts are needed most."The tool, also known as the Post-fire Spatial Conifer Regeneration Prediction Tool (POSCRPT), helps forest managers identify within weeks after a fire where sufficient natural tree regeneration is likely and where artificial planting of seedlings may be necessary to restore the most vulnerable areas of the forest.

#### NOT SO EVERGREEN

Conifers, or plants with cones such as pine trees, dominate many forests in western North America. The study found that conifers are less likely to regenerate after fires when seedlings face drier climate conditions, especially in low-elevation forests that already experience frequent drought stress. Overall, fewer conifers are expected to grow in California's lower elevations following wildfire due to climate and drought conditions."We found that when forest fires are followed by drought, tree seedlings have a harder time, and the forest is less likely to come back," said Stewart.A UC Davis team collected post-fire recovery data from more than 1,200 study plots in 19 wildfires that burned between 2004 and 2012, as well as 18 years of forest seed production data. Ecologists at USGS collected and identified over 170,000 seeds from hundreds of seed traps. The scientists combined these data with multispectral satellite imagery, forest structure maps, climate and other environmental data to create spatial models of seed availability and regeneration probability for different groups of conifers, including pines and firs.



\*Image Source: https://phys.org/news/2020-12-reforest-wildfire.html

Forest managers have used a prototype of the tool in recent years to better understand where to focus regeneration efforts. The new upgrade incorporates information on post-fire climate and seed production and includes an easy-to-use web interface expected to increase the tool's accuracy and use.

"This work is a great example of how multiple partners can come together to solve major resource management problems that are arising from California's climate and fire trends," said co-author Hugh Safford, regional ecologist for the USDA Forest Service's Pacific Southwest Region and a member of the research faculty at UC Davis. The study was funded by the USGS' Southwest Climate Adaptation Science Center, Ecosystems Mission Area and Land Change Science Program.

\*Source: https://www.sciencedaily.com/releases/2020/12/201218165101.htm

#### Article - 3 : Roadmap to renewables unites climate and sustainability goals

While the pressures of climate change bring a sense of urgency to renewable energy development, a new study serves as a roadmap toward uniting the goals of a low-carbon future with that of ecological sustainability and conservation.

The study, published in the journal Frontiers in Sustainability from the University of California, Davis, and John Hopkins University, aims to help decision-makers avoid the unintended environmental consequences of renewable energy development."Renewables aren't always sustainable, but they can be if we think proactively," said co-leading author Sarah Jordaan, an assistant professor at John Hopkins University's School of Advanced International Studies. "There is a huge misalignment between United Nations Sustainable Development Goals and climate goals. This is a call to action for leaders to come together to address it."

To develop the roadmap, the authors assessed public and private investments in renewable energy and analyzed the tradeoffs and synergies of clean energy. They also identified research themes drawn from a two-day workshop held by the Electric Power Research Institute in 2019 with 58 leading experts in the fields of renewable energy and sustainability from across academia, industry, government sectors.

#### **MISSING THE FOREST FOR THE GHGs**

Among the key research priorities identified for sustainable solar and wind developments include site selection and understanding interactions with wildlife.For example, Florida's longleaf pine forests have, for centuries, helped store carbon, protect water quality and provide wildlife habitat. Now, only a fraction of the historical range of longleaf pine forests in the state remain. Yet a sliver of that remaining sliver is slated to be replaced by a solar installation.

Meanwhile, in the same state and just a few miles away, water birds squawk, preen their feathers, and hunt for food atop a floating array of solar panels -- a "float voltaic" installation. Here, both wildlife and greenhouse-gas-reduction goals appear to coexist gracefully."We

can't pursue climate change mitigation blindly," said co-leading author Rebecca. R. Hernandez, a UC Davis assistant professor and founding director of the Wild Energy Initiative in the John Muir Institute of the Environment. "We must consider the impacts of renewables on the few ecosystems we have left."



\*Image Source: https://phys.org/news/2020-12-roadmap-renewables-climatesustainability-goals.html

#### **PUSHING FORWARD**

The authors said the work highlights how the field of sustainable renewable energy is in its infancy, with many of the questions and solutions unclear. The roadmap, they emphasize, is a living document, designed to change as the field matures."We're pushing forward into maturation something that is really just being born," Hernandez said of renewable energy. "Across its sectors, everyone is trying to figure things out as quickly as possible. This roadmap points to the fact that we all need to get organized and work together to share knowledge, innovation and results."

\*Source: https://www.sciencedaily.com/releases/2020/12/201218131850.htm

#### Article - 4 : Potentially damaging surface ozone levels rose in lockdown, UK study finds

Less traffic on the roads during the first lockdown led to a reduction in air pollution but may have caused potentially damaging surface ozone levels to rise, a new study has revealed. The study -- led by the University of York -- shows levels of nitrogen dioxide (NO2) down on average across the UK by 42 per cent, but surface ozone (O3) increased by 11 per cent on average.

Surface, or ground-level ozone, can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. Scientists believe our warm and sunny spring weather may have been a contributing factor. The report concludes that if the Covid-19 lockdown is taken as an example of how air quality will respond to future reductions in vehicle emissions -- with more electric vehicles being introduced -- it serves as a warning that the problem of O3 must also be considered. Professor James Lee from the Department of Chemistry and the National Centre for Atmospheric Science said during the first lockdown levels of O3 were the worst in the South of England.

Professor Lee added: "The problem is being created by the change in chemistry between NOx (nitrogen oxide) and O3. The main reason is the change in the nitrogen dioxide levels but the warm sunny weather in April and May also increased the ozone level. As a result, we found UV radiation across the UK was higher in 2020 compared to previous years, with the largest increases in southern England."London, Chilton in Oxfordshire and Camborne in Cambridge shire saw increases of around 50% compared to previous years, with Glasgow and Inverness showing smaller increases of around 30%."These results are a cautionary tale. As well as looking at how we reduce levels of nitrogen dioxide by cutting diesel and petrol emissions, we also need to keep an eye on what is happening with ozone, so we don't create other forms of pollution dangerous to human health."

The report says in China nitrogen oxide reductions have also led to increases in O3 and air quality abatement strategies are being developed in order to offset the problem. This can be achieved by controlling volatile organic compounds (VOCs) -- which are gases emitted into the air from products or processes of industry and other



\*Image Source: https://www.news-medical.net/news/20201220/Despite-reduced-airpollution-damaging-surface-ozone-levels-rose-in-lockdown.aspx

man-made activity.Professor Lee added: "Our research shows it will be vital to control man-made VOCs to avoid any health gains made by the reduction of NO2 being offset by O3 increases."Data was collected from 175 Automatic Urban and Rural Network (AURN) traffic monitoring sites across the UK between 23rd March and 31st May 2020 and compared with figures from the previous five years.

\*Source: https://www.sciencedaily.com/releases/2020/12/201218112509.htm

## Conserve the Energy, Save our Climate!



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