

Pressemitteilung

U Bremen Research Alliance e.V.

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Forest inventory using drones and AI

In the battle against climate change, mangroves are important allies – they store up to five times more carbon dioxide than other trees. A recently developed method from researchers in the member institutes of the U Bremen Research Alliance now provides more detailed information about the population of mangrove forests, which can help to protect these.

Dr. Arjun Chennu views mangroves as “super trees” because they thrive in an extremely saline environment, are acclimated to tropical heat and tidal changes with the accompanying fluctuations in salinity, and because their root systems are able to protect coasts from erosion while serving as a nursery for fish and other marine animals. They are particularly unique due to their ability to sequester large amounts of carbon dioxide from the atmosphere and store this in their biomass and in the sediment for centuries, if not millennia. “This makes them particularly relevant, and we really ought to not be indifferent about what happens to them,” Chennu opines.

Exact details about how much carbon is stored in the various mangrove areas are currently not available. Estimates range from four to twenty million tons, which are bound in the tidal forests. Chennu, head of the “Data Science and Technology” research group at the Leibniz Center for Marine Tropical Research (ZMT), and Daniel Schürholz, doctoral researcher at the Max Planck Institute for Marine Microbiology (MPIMM), both member institutes of the U Bremen Research Alliance, wanted to know more.

“Our goal was to develop a method that identifies every single tree in a forest and measures its biomass by calculating the tree crown, height, and circumference of the trunk. The more precise our information is, the more accurately we can determine the amounts of stored carbon and the better the trees can be monitored and protected,” Schürholz explains.

The duo therefore relies on the most modern technology – on creating an aerial inventory using drones and artificial intelligence (AI). “These technologies open up completely new methods for charting habitats,” Schürholz explains. Schürholz spent weeks identifying more than 4,000 individual trees using the images, and then used the results to train the AI. “I was dreaming about trees,” the 33-year old remembers with a chuckle. The machine learning was effective. In the end, the AI was able to identify mangroves on its own – and able to differentiate between varying species. Tasks that had previously taken months could now be completed within hours: the algorithm identified a total of 34,667 trees of the mangrove species *Pelliciera rhizophorae* in the surveyed area, and also plotted an additional 30 hectares of red mangroves (*Rhizophora mangle*).

“The nice thing about the inventory is that each tree now has its own identity,” Chennu says. “We know its exact location and how much carbon dioxide it stores.” This is made possible by determining the diameter of the tree’s crown and drawing conclusions from this about the height, trunk circumference, and therefore the tree’s above-ground biomass. This can then be used to derive the tree’s carbon storage.

An exciting article on the innovative method developed by researchers from U Bremen Research Alliance member institutions within a cooperative project was recently published in issue 9 of the U Bremen Research Alliance's science

magazine "Impact":

<https://www.bremen-research.de/en/impressions/forest-inventory-using-drones-and-ai>

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About UBRA:

The University of Bremen and twelve federal and state financed non-university research institutes cooperate within the U Bremen Research Alliance. The Alliance includes research institutes of the four major German science organizations, i.e. Fraunhofer Society, Helmholtz Association, Leibniz Association and Max Planck Society, as well as the German Research Center for Artificial Intelligence.

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Impact - The U Bremen Research Alliance science ma-ga-zine

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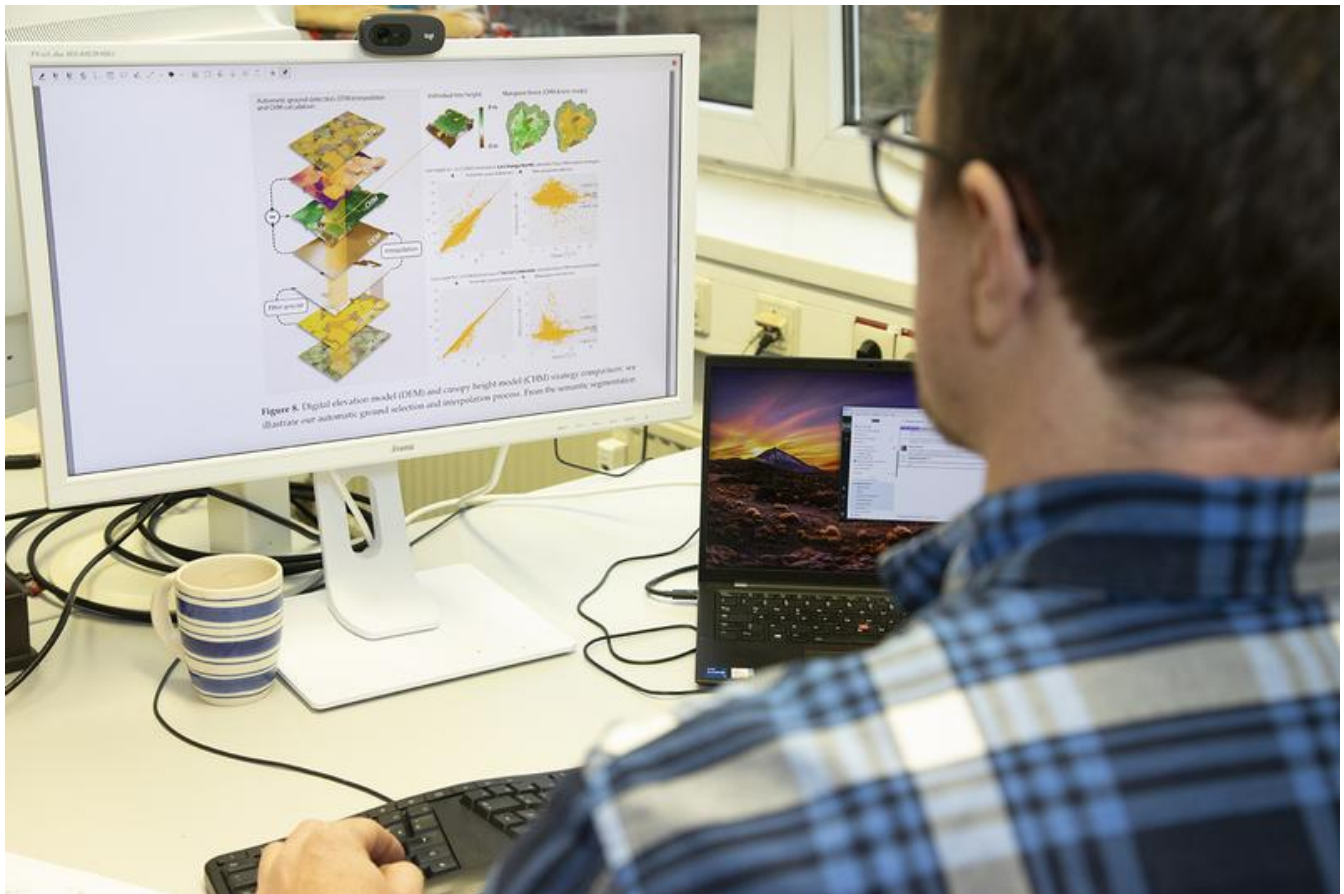
Twice per year, the Impact science magazine provides an exciting insight into the effects of cooperative research in Bremen. "Forest inventory using drones and AI" was published in issue 9 (February 2024).

https://www.bremen-research.de/fileadmin/user_upload/Einblicke/Impact_9/UBRA_Impact_9.pdf

URL zur Pressemitteilung: <https://www.bremen-research.de/en/impressions/forest-inventory-using-drones-and-ai>



Research using consumer-grade drones: Dr. Arjun Chennu (left) and Daniel Schürholz
Jens Lehmkuhler
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