

Integrating satellite and socioeconomic data to improve climate change policy

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Atul Jain led a study that used a combination of satellite and census data to identify deforestation and expanding saltwater farming as the key physical and socioeconomic drivers of climate change in Bangladesh. Credit: L. Brian Stauffer

Bangladesh is on track to lose all of its forestland in the next 35-40

years, leading to a rise in CO₂ emissions and subsequent climate change, researchers said. However, that is just one of the significant land-use changes that the country is experiencing. A new study uses satellite and census data to quantify and unravel how physical and economic factors drive land-use changes. Understanding this relationship can inform climate policy at the national scale in Bangladesh and beyond.

The study, led by University of Illinois at Urbana-Champaign atmospheric sciences professor Atul Jain and postdoctoral researcher Xiaoming Xu, is published in the journal *Regional Environmental Change*.

"Land usage changes when biophysical factors like temperature and soil quality change, but also when the economic needs of people change," Xu said. The study identifies two key areas where land use and cover have shifted because of biophysical and socioeconomic activities in Bangladesh—and suggests policies to mitigate their influence on climate change.

First, the team found that approximately 11% of the forests in Bangladesh have shifted to shrub land, cropland and [urban land](#) from 2000-10.

"Extreme climate events, such as drought and flood, changes in urban and rural population and [economic conditions](#) are driving the changes from forest to shrub land in the southeast region of Bangladesh," Jain said. "Here, the locals earn their livelihood by using land, lumber and fuel resources from forests. However, deforestation may be controlled by implementing simple policies such as road improvement, which can provide the people with a means to obtain alternative fuels and livelihoods that are not as dependent on forests."

The study also found that from 2000-10, the area of standing water

bodies such as ponds, lakes and reservoirs increased by approximately 9%. This change occurred in the coastal southwest part of the country, where worsening floods during monsoon months have pushed aquaculture expansion at the cost of cropland in recent decades, the researchers said.

"The rapid conversion of traditional rice-farming land to saltwater shrimp ponds is now a well-established practice in the southwest coastal area of Bangladesh," Xu said. "Shrimp farming is 12 times more profitable than [rice cultivation](#) in this country."

The flooding and expansion of saltwater farming have led to increased soil salinity, spoiling the soil for farming purposes, the researchers said. "Policies need to be developed that encourage the development of saltwater aquaculture only in the regions with favorable conditions to prevent further soil degradation," Jain said.

More information: Xiaoming Xu et al. Dynamics and drivers of land use and land cover changes in Bangladesh, *Regional Environmental Change* (2020). [DOI: 10.1007/s10113-020-01650-5](https://doi.org/10.1007/s10113-020-01650-5)

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