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What is driving conversion of land to aquaculture in the Indian Sundarbans?

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Land in the Indian Sundarbans Biosphere Reserve (SBR) has been extensively (and illegally) converted from agriculture to aquaculture over the last two decades, with implications for Sustainable Development Goals addressing food, poverty, employment, terrestrial and marine ecosystems and inequality. The economic returns from aquaculture are higher than agriculture, but more unequally shared, demand for labour is lower (and often fullfilled by non-local workers) and the expansion of brackish water aquaculture, in particular can contribute to the salinization of land through seepage from ponds, and intentional water management to bring saline water to farms. While remote sensing can demonstrate the conversion, the drivers behind are less clear. Much literature, along with commonly articulated stakeholder perspectives strongly suggest that sea-level rise and cyclone impacts lead to salinization, resulting in reduced agricultural productivity, leading farmers to convert to saline aquaculture as an adaptation. However, this is unclear in the Indian Sundarbans where the highest rates of conversion are not in areas which have suffered saline inundation. SBR-wide factors that affect rates of conversion include international demand for prawns, technology development and transfer, availability of seed, legal frameworks and land tenure. At a more local level, connectivity (for inputs and for marketing product), proximity to water sources, levels of cyclone inundation, salinity and agricultural productivity, existing aquaculture areas, extension services and local government (dis)incentives may explain spatial patterns of differing conversion rates. In this paper we use a two-decade long timeseries of remotely sensed data on land cover and agricultural productivity along with spatially explicit data on connectivity to evaluate which factors were most associated with conversion from agriculture to aquaculture in the past two decades. We then project future possible conversion based on scenarios of how these drivers may change over the the next decade and discuss their implications for Sustainable Development Goals.