Carbon Bomb: Indonesia's Failed Mega Rice Project

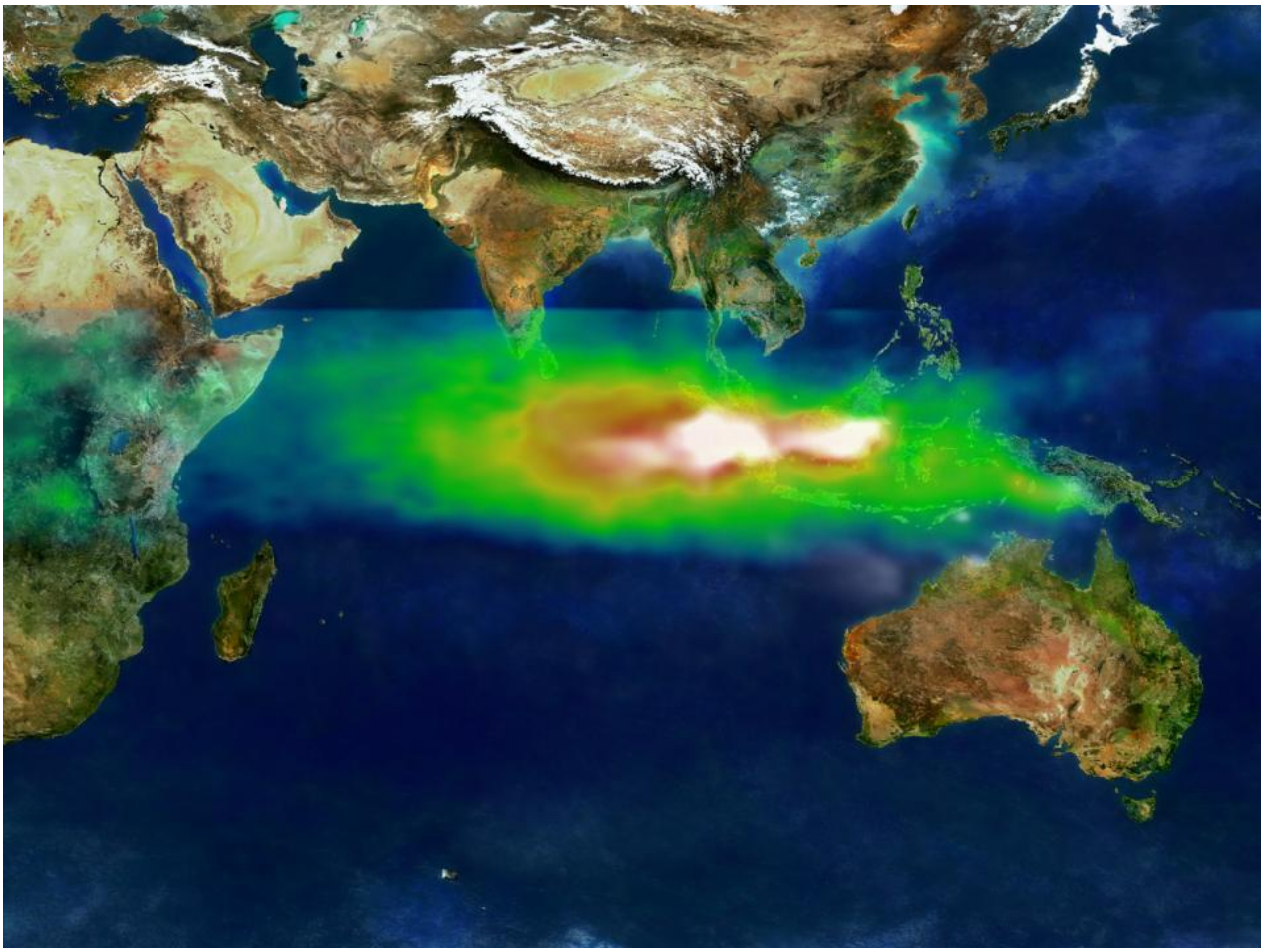
Jenny Goldstein

Summary

In 1997 and 1998, the Indonesian government's Mega Rice Project to use the Central Kalimantan province's peat swamps for intensive, Javanese-style wet rice production failed. The government did not foresee that the peat soils were poor in nutrients and unsuitable for wet rice cultivation. An ENSO-induced drought in 1997 drained the tropical peatlands, which caused the soil to undergo rapid biogeochemical oxidation and erupt in flames. The flames emitted vast quantities of carbon dioxide into the atmosphere; the amount was equivalent to somewhere between 13 and 40 percent of global annual carbon emissions from fossil fuels.

In late 1997 and into 1998, the peat swamp forests in Central Kalimantan, Indonesia, on the island of Borneo erupted in flames, sending plumes of smoke over Sumatra, Singapore, and Malaysia. Although the fires in the swamps of Central Kalimantan were among the worst, peatlands and forests caught fire across Indonesian Borneo and Sumatra that year. According to some scientists' estimates, the amount of carbon dioxide that Indonesia's fires spewed into the atmosphere in late 1997 was equivalent to somewhere between 13 and 40 percent of global annual carbon emissions from fossil fuels. Coinciding with the overthrow of Indonesian President Suharto, the Asian economic crisis, and an especially dry El Niño year, 1998's perfect storm of environmental and political upheaval thrust Indonesia's peat swamp forests into national and global consciousness.

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NASA imagery of pollution plume over Indian Ocean from Indonesian fires, 22 October 1997

Image courtesy NASA GSFC Scientific Visualization Studio, based on data from TOMS.
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At the center of this environmental crisis was the Mega Rice Project. In the early 1990s, President Suharto envisioned the peat swamps of Central Kalimantan as the ideal landscape for a project establishing intensive, Javanese-style wet rice production, which was aimed to bolster Indonesia's fledging food self-sufficiency and feed the country's 200 million people. While indigenous groups in coastal Kalimantan had long cultivated rice using tidal irrigation, this native farming system was far different from the irrigated paddy rice cultivation found in Java. However, the densely populated island of Java, Indonesia's political center and fertile proverbial breadbasket, was losing rice paddies to industrial development. Suharto's administration looked to offset declining rice production by opening new agricultural land in Indonesia's "outer islands," or all of the islands beyond Java and Bali.

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View of canals excavated in peat forest for Mega Rice Project, Central Kalimantan, 1997

Photo by Patrice Levang.

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Canals and early rice paddy, prior to fires, Mega Rice Project site, 1997

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A Singapore-based agribusiness company, PT Sambu, boasted of success in growing coconuts and pineapples commercially in the peatlands of southeastern Sumatra by relying on an elaborate network of dikes and canals to

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control tidal flooding. Despite the fact that the ecosystems of Sumatra and Central Kalimantan are not analogous, the businessmen talked Suharto into planning intensive wet-rice cultivation in Kalimantan based on the fact that they had successfully cultivated peatlands commercially. They were later appointed as contractors in the Mega Rice Project. Scientists and engineers from several prominent Indonesian universities were commissioned to design pieces of the project's canal-based infrastructure, though Suharto and his advisors sought little input from experts regarding the project's potential for success at the grand scale they imagined it. Some Indonesian and foreign scientists quietly thought that the Mega Rice Project would never work but few dared to speak out against President Suharto, a harsh silencer of critics during his 35-year reign.

Canal construction began abruptly in late January of 1996. During 1996 and through 1997, the Ministry of Public Works, with support from the Ministries of Transmigration, Forestry, and Agriculture, coordinated several thousand Japanese-made excavators and tens of thousands of workers to dig 6,000 kilometers of canals and clear vegetation across one million hectares of peat swamp forest. As part of Indonesia's long-running transmigration program, roughly 40,000 Javanese and Balinese farmers were each given 2.5 hectares of land to transform the deep, acidic peat soil into lush agricultural fields for wet rice cultivation. Few of these transmigrants harvested much rice, however. The nutrient-poor peat soils were ultimately unforgiving, and most Javanese and Balinese farmers were ill-prepared for this peatland ecosystem. Despite the project's reliance on smallholder farmers, the Mega Rice Project was foremost a failed commercial scheme. Government planners had vastly overestimated the extent to which small farmers could manage a complex ecological system.



Aerial view of transmigrant housing and canals in the Mega Rice Project site, Central Kalimantan, 1997

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Javanese transmigrant housing and subsistence gardens, Mega Rice Project site, 1997

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In late 1997, after a year of drought induced by a strong El Niño/Southern Oscillation cycle, fires started burning underground, through the peat soil itself. Tropical peat soil is volatile organic matter composed of decomposing tree trunks, leaves, and roots. Left undisturbed, the soils lie at the bottom of forested, waterlogged swamps throughout the tropics at depths ranging from less than one meter to over 15 meters. Carbon is highly

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concentrated in peat soil and is relatively stable if the soil is saturated with water. But when tropical peatlands are drained across a large hydrological area, as they were in the Mega Rice Project, the soil undergoes rapid biogeochemical oxidation, emitting vast amounts of carbon dioxide into the atmosphere.



Smoldering peat soil in rice paddy, Central Kalimantan, late 1997

Photo by Patrice Levang.

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The project is now referred to as one of the biggest environmental disasters in Indonesia's history, not only because it enabled massive peat fires but also because the project—the objective of which was large-scale irrigated rice cultivation in the peat swamps—produced almost no rice. Following the failure of the Mega Rice Project and the unprecedented peat fires, a coalition of foreign and Indonesian scientists mobilized to conduct extensive research on the greenhouse gas storage and emissions capability of tropical peat soil. This data-based knowledge, reflecting the international priority for climate change research in the twenty-first century, reconceptualized the peatland landscape as a significant carbon source and thus a global environmental risk.

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- http://visibleearth.nasa.gov/view.php?id=1260

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