Are Deltas Human Constructs?

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Productive and biologically diverse, deltaic lowlands attracted humans since prehistory and may have spurred the emergence of the first urban civilizations. Deltas continued to be an important nexus for economic development across the world and are currently home for over half a billion people. But recently, under the double whammy of sea level rise and inland sediment capture behind dams, they have become the most threatened coastal landscape.

Large dams are relatively recent phenomena, but human alteration of landscapes has been ongoing ever since the advent and expansion of agriculture. Combining field data and modeling, I discuss how human activities have significantly influenced the formation of the deltas including the Danube and Ebro deltas in Europe and the Indus, Krishna, and Godavari deltas in Asia and Mississippi in North America. Can rates of growth of these deltas be attributed to climate change, land-use impacts, or both?

Understanding the historic morphologic change in deltas has become increasingly important as sea levels rise and sediment loads feeding deltas continue to be sequestered behind dams in the hinterland. Traditionally deltas have been densely populated while providing disproportionately high ecosystem services and resources to society. In regions that have been affected by humans, deltas can serve as a regional record of climate and land-use changes across large watersheds.

If human activities are in some degree responsible for the development of the world's deltas, this would provide an important context for understanding how humankind will manage these resources over the coming centuries, particularly as climate changes and humans continue to alter these landforms.