



Issue #03 Delta Challenges under Nature-Based Solutions Perspectives

Fall | Winter 2022

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Journal of Delta Urbanism
Delft University of Technology

Delta



The International Space Station was flying 255 miles above the border between Sudan and Egypt near 1 a.m. local time when an Expedition 60 crewmember photographed this oblique view of the Nile River and its delta.. Image by NASA, September, 2019.

Cornelia Redeker

Delta (noun) /'deltə/¹

- the fourth letter of the Greek alphabet
 - a change in a figure or amount
 - an area of low, flat land, sometimes shaped approximately like a triangle, where a river divides into several smaller rivers before flowing into the sea.
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BIBLIOGRAPHY

- 1 Cambridge Dictionary, © Cambridge University Press 2020.

Deltas, in all their variations, are originally dynamic landscapes shaped by natural morphological transformations. They are defined by the transition of tributaries flowing towards the river's main bed to becoming an estuarine landscape with brackish lakes and a myriad of river branchings that eventually discharge into the sea. When we look at deltas, readable in any cartographic depiction as a triangular geometry, we are usually looking from a planar, birds-eye perspective. This fails to depict the slope of the river, but also its geological layers in its transition from land to sea. One of our most complex and vulnerable ecosystems is defined by flows and constantly changing gradient edges in a three-dimensional, rhizomorphous mesh. The salty waters of the sea are held back by the pressure of the current that is in turn produced by the given topography of a gradually declining slope towards the sea that moves the river's freshwater and nutrients to saturate and fertilize the landscape. The brackish zone between the river and the sea can be seen as the delta's highly productive edge expanding to become its own biome. Deltas differ according to the respective climate zone and geology which, along with their degree of urban and industrial development, also define their varying vulnerability to sea level rise and saltwater intrusion.

Deltas are sites for urban and port development, industrialized agri- and aquaculture and, in the case of the Nile, land reclamation of its lakes and into the adjoining desert to extend agricultural land. As low-lying lands, they are also the most vulnerable in terms of sea level rise both in terms of saltwater intrusion and urban exposure consequentially leading to large-scale migration. In their current state, river deltas can be seen as an amalgamation of industrial misconception and a barometer for the state of urgency we are in. Transhemispherically, this shows in our reliance on food imports, expected increase in displacement due to sea level rise, hurricane induced storm surges and our overall incapacity to curb our ecological footprint to mitigate adverse impacts of climate change in time to avoid Armageddon. Beyond the threat from the sea and a decrease in self-sufficiency, deltas are at the end of the line and thus strongly defined by the hinterland and the way the river has been anthropogenically transformed upriver. The way we have engineered different river segments to become industrially productive through large-scale hydrological transformations have turned the softness, unpredictability and autarky of dynamic river landscapes into ones exposed to exterior forces aiming for longitudinal and latitudinal control of velocity, expansion and water level. Channeling riverbeds to accelerate and deepen the water channel for the sake of transshipment, the enablement of urban expansions into the flood plain and the erection of waterpower plants by building dams across the river to produce energy have largely destroyed the river's wetlands and deltaic ecosystem, with its abundant biodiversity reliant on seasonal dynamics to nurture itself and, in that way, us. Before the industrialization of our rivers, silt deposits were producing the most fertile soils. The rivers high water levels covered adjoining flood plains during phases of heavy rains or the melting of snow in the mountainous regions upriver. Ironically, it is exactly this hybris of supposed control that is now backfiring so hard on our river landscapes, and, at the transition to the oceans and seas, their deltas, as their final and most vulnerable segment regarding the adverse impacts this has produced across all sectors.

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Beyond niches, human-centric path dependencies are forcing us to continue with hard engineering to protect economic values of urban, port and industrial development against sea level rise and river floods while producing hydro power. As we carry on compensating a deprived landscape with fertilizers, the degeneration of the delta's inherent capacity to function as an ecosystem that is able to nurture itself and us continues.

JDU is a project by Delta Urbanism Research Group and DIMI Delft Deltas, Infrastructure and Mobility Initiative Delft University of Technology

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Graphic Layout

bruno, Venice (Italy)

Typefaces

Union, Radim Peško, 2006
JJannon, François Rappo, 2019

Publisher

TU Delft OPEN
<https://www.tudelft.nl/library/openpublishing>

Frequency: 1 volume per year

Publication Funding

TU Delft Delta, Infrastructure and Mobility Initiative

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*N.3 | Delta Challenges under Nature-Based Solutions Perspectives / Dictionary | 01
Fall | Winter 2022*

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Citation

Redeker, C., Dictionary, J. Delta Urbanism 3 (2022), doi.org/-

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All published contributions are submitted to a Blind Peer Review process except for the sections Dialogues and Dictionary which are reviewed by the Chief Editors.

ISSN: 2666-7851
p-ISSN 2667-3487