

## ***Sand is a saviour against sea-level rise yet we are squandering it***

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Bendixen et al. (Nature 571, 29-31, doi: 10.1038/d41586-019-02042-4 (2019)) commented that sand extracted from fluvial environments is consumed faster than it is being produced. This has deeper implications than the authors imply particularly for managing flood risk in a changing climate.

Sand and water attract people to rivers, estuaries and coasts – whether for basic living needs, livelihoods, energy, industry or tourism. Extracting sand (e.g. mining) or restricting its movement (e.g. river damming) reduces sediment availability, meaning that when large floods do occur, insufficient sediment is deposited on the land for it to raise naturally as a means of flood defence against smaller floods. Man-made levees and embankments also restrict sand deposition, potentially leading to net subsidence. The 'levee effect' also increases the desirability of the flood zone as a place to live as it is perceived as safe. In turn, this increases the demand for infrastructure, much of which is ironically built with sand. Fluvial sediment depletion can also lead to coastal erosion, especially if accompanied by foreshore sand mining, even though the latter is banned in many countries world-wide.

Extracting, restricting and building with sand brings compound maladaptations – increasing flood risk. In estuaries and coasts, sea-level rise will make this worse. Sea-levels are projected to accelerate in the second half of this century, coinciding with a period where Bendixen et al. (2019) indicate sand prices could be exceptionally high. Nourishing beaches with sediment from currently inactive marine sources is an increasingly popular choice to adapt to sea-level rise. However, it could also become a limited option if depleted and priced out of the market.

We are committed to sea-level rise, but we are committing ourselves to sand shortages too. Reinforcing Bendixen et al. (2019), instead of squandering sand, we need to save it.

### **References:**

Bendixen, M., Best, J., Hackney, C. & Lønsmann Iversen, L. (2019). Time is running out for sand. *Nature* **571**, 29-31 (2019) doi: 10.1038/d41586-019-02042-4  
<https://www.nature.com/articles/d41586-019-02042-4>