The Deltas of the Western Indian Ocean: biophysical constraints, socio-ecological realities and research opportunities
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The African Continent is morphologically asymmetrical with a ridge of high elevations running from the Southern end of the Red Sea through the Ethiopian mountains, along both branches of the Great Rift Valley down to the East coast-hugging mountains of Southern Africa. Thus, the East-flowing rivers tend to be short and steep. In contrast to West Africa, the base rock is dominated by easily erodible volcanic rocks resulting in high sediment loads. Madagascar, surprisingly for its ancient continental origin, has known important volcanic activity as recently as the Miocene. The main West-flowing Rivers originate from the central and southern highlands that are partly volcanic. Thus, even without human-induced land-use change, both the East-flowing rivers of East Africa and the West-flowing rivers of Madagascar have considerable potential for rapid geomorphological change. In addition, the Western Indian Ocean is characterised by high tidal amplitudes through the constraining influence of Madagascar. These factors, in combination with a highly seasonal rainfall pattern, lead to dynamic deltas where population densities are low. The users of these deltas typically have broad livelihood portfolios combining gathering, fisheries, forestry, recession farming and livestock grazing, exercised opportunistically in relation to the flooding pattern. Such livelihoods thread lightly on the resources and have resulted in high biodiversity landscape mosaics. Harbour, irrigation and aquaculture infrastructure are as yet comparatively scarce, at least partly because they are affected by river shifts and extreme floods. Still, major infrastructure projects that can potentially affect these deltas are numerous and their socio-ecological impacts are in general underestimated because reliable information is often lacking as, among other factors, research access to these deltas is similarly constrained by the biophysical realities. Opportunities for comparative research on these deltas are explored.