Nearshore or artisanal Fish Aggregating Devices (FADs) are an increasingly popular fisheries management tool in tropical marine environments. They have the potential to increase catches of pelagic fish thereby enhancing fishers’ incomes and food security, and they are expected to move fishing effort away from vulnerable coral reef ecosystems so improving sustainable fisheries management. However, very little research has been done on the social aspects of these management tools, particularly in the Western Indian Ocean. This study examined the different perspectives and experiences about the use of FADs as an effective technology in local fisheries in coastal Tanzania and their implications for ecosystem-based management of small-scale fisheries (SSF). Using a participatory and qualitative approach, we document the experiences of local artisanal/small-scale fishers and map their engagement with locally-designed FADs. We also analysed views from the private sector, fisheries management staff and marine biology/science researchers. Our findings show that FADs are indeed a strategic tool for enhanced livelihoods for SSF, and have the potential to transform traditional/cultural fisheries management patterns. However, current deployment of locally-designed or adapted FADs, which include discarded scrap metal and other items, can be vastly different from that imagined by the scientific community or fisheries managers with important implications for reef ecosystems and fishers’ livelihoods. Our study suggests that the utilization and management of FADs in Tanzania requires a multi-stakeholder approach with an emphasis on local knowledge and a multi-disciplinary scientific assessment. The relevance of the ecosystem approach in this regard is further interrogated and critiqued.