

Restoring marine ecosystems - What's the cost and is it feasible?

Dr Elisa Bayraktarov^{1,2}, Dr Megan Saunders^{1,2}, Dr Sabah Abdullah¹, Dr Morena Mills¹, Jutta Beher¹, Prof Hugh Possingham^{1,2,3}, Prof Peter Mumby¹, Prof Catherine Lovelock¹

¹The University Of Queensland, ²Global Change Institute, ³The Nature Conservancy

Land-use change in the coastal zone has led to worldwide degradation of marine coastal ecosystems. Restoration may assist the recovery of an ecosystem that has been degraded, damaged, or destroyed. Uncertainties about restoration cost and feasibility can impede decisions on whether, what, how, where, and how much to restore. Here, I present a synthesis of 235 studies with 954 observations from restoration projects of coral reefs, seagrass, mangroves, saltmarshes and oyster reefs worldwide, and evaluate cost, survival of restored organisms, project duration, area, and techniques applied. Findings showed that while the median and average reported costs for restoration of one hectare of marine coastal habitat were around 80,000 US\$ (2010) and 1,600,000 US\$ (2010) respectively, the real total costs (median) are likely to be 2-4 times higher. Coral reefs and seagrass were the most expensive to restore while mangrove projects were the largest and the least expensive. Total restoration costs were up to 30 times cheaper in developing countries. Survival was highest for saltmarshes (64.8%) and coral reefs (64.5%) and lowest for seagrass (38.0%). However, success rates reported could be biased towards publishing successes rather than failures. The majority of restoration projects were short-lived (1-2 years) and seldom reported on monitoring costs. Restoration success depended primarily on the ecosystem, site selection, and techniques applied rather than on money spent. We need enhanced investment in both improving restoration practices and large-scale restoration.