

Coral Reproduction and Gas developments in the Quirimbas Archipelagos

Reconciliation of Natural Processes and Human Activities

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1 Background

Reproduction is the process through which coral population can grow, maintain and renew themselves in the event of disturbances, meaning it is essential for the persistence and resilience of coral reefs [1]. Therefore, from a conservation perspective, it is crucial to understand fully the nature of this critical process to manage the natural resilience of these valuable ecosystems. Sexual reproduction of scleractinian corals is subject to periodicity, controlled by internal processes and external factors. Depending on species and location, reproductive strategy range from patterns of temporal isolation and protracted breeding seasons to short event of highly synchronized breeding [2]. Reproductive strategy influence reproductive success and have implications for the ecology and management of coral reefs. Longer, asynchronous breeding results in average reproductive output over most of the year. Short burst of simultaneous breeding leads to large reproductive output over a narrow window of time yearly. A more concentrated breeding season means a higher risk of losing an annual cohort of offspring if disturbance coincides with this critical window [3]. This document is not meant to be an exhaustive report of the situation nor to provide all solutions to address the issue of the impact of gas offshore mining on coral reef habitat. Rather, it is an introduction to this problematic and provides general guidelines and recommendations that should be considered in planning certain activities.

2 Problematic

In Vamizi Island and in adjacent islands, very diverse and pristine coral reefs thrive [4,5]. Recent research as shown that coral reproduction in Vamizi is highly seasonal and synchronous, with many species spawning simultaneously over only a few days annually (Sola et al. in prep). This results in a peak of larval recruitment coinciding with this period. The astronomical increase in larval production is thus essential for the long-term health of Vamizi coral reefs, but since coral larvae are often dispersed over considerable distance, the spawning event of Vamizi is highly likely to also benefit coral reefs downstream from the island. The development of offshore natural gas industry and the Palma LNG will revolutionise the socio-economics of the region with great benefits to local populations and national economy. It can also deeply impact the ecology of corals in the area. A number of man-made disturbances can have negative effects on several of stages of the coral reproductive ecology, but measures can be adopted to remove or mitigate the risk of disrupting this critical process.

3 Potential negative factors

3.1 Cutting of reef

The physical removal of corals from reef structure, such as in the context of the construction of an underwater pipe-line would have the main effect of reducing the breeding population and diminishing the source of larval supply. It would also damaged or reduce the availability of habitat for associated species.

3.2 Sedimentation

The increase of suspended particles in the water column due to operation such as dredging affects negatively larval production and recruitment. Increased sedimentation has been shown to reduce fertilization success, increase larval mortality in the water, reduce their ability to settle successfully and increase mortality of newly settled coral recruits [6–8].

3.3 Water pollution

Various types of contaminants, from heavy metal to organic compounds are known to affect the reproductive success of corals [9–13].

3.4 Ship traffic

Intensive ship traffic following spawning events could affect the dispersal of surface spawn-slicks, hindering the supply of larvae to certain reefs.

4 Recommendations

The construction and operation phase of the LNG and the exploitation phase of offshore wells are likely to generate some or all of the above described effects. Mitigation measure should be taken to prevent these activities to result in the disruption of this critical reproductive process compromising the resilience and long-term health of these valuable coral reef ecosystems.

4.1 Monitoring programs

The date of spawning events in Vamizi Island is not as predictable as in some other regions. Thus, monitoring programmes as described in [14] should be undertaken starting June every year. Research in Vamizi as proven that such monitoring allows to detect upcoming spawning events accurately.

4.2 Halt of operations during spawning events

Similarly to Australia, where dredging and dredge spoil disposal is required to cease 5 days prior to the predicted commencement of mass coral spawning, potentially harmful operations should be ceased or reduced during the annual spawning window

4.3 Reef rehabilitation

Where a pipeline will be placed across a barrier reef, important breeding population of corals maybe lost. Therefore, well-established coral culturing technics can be used to safeguard coral individual from the affected area to be fragmented and replanted after the construction of the pipeline to allow for the recolonisation of the affected area. Monitoring should also be undertaken to monitor the recovery of this area in comparison to unaffected areas.

4.4 Silt curtain

Mainly during the construction phase of the LNG, silt curtains should be used to prevent the dispersal of sedimentation plumes that could drift toward reefs structures and smother corals.

5 References

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