

The coral reef is the most important and threatened marine ecosystem globally, and there is a considerable deterioration of this component in Qatar. This project aims to improve technologies for Coral Reef restorations and represents an ideal strategy for preserving and mitigating coral reefs in the entire Arabian Gulf. We are also setting an example of a systemic collaboration strategy among stakeholders to accelerate the effort in restoring this valuable resource. As a primary stakeholder and leading global energy producer, Qatargas has provided essential industry collaboration, stewardship, funding, and technical support for this pioneering project as part of the Company's Coral Management Program (CMP).

Qatargas is committed to sustaining and preserving Qatar's marine biodiversity, in line with the Company's Long-Term Environmental Strategy (2021-2030) and Qatar National Vision 2030. The Ministry of Environment and Climate Change, as the governmental authority, encourages companies to finance applied research, approves the needed permits for experiments, and provides their aquaculture facility for the nursery experiments. Scientists of the Environmental Science Center at Qatar University, as the academic stakeholders, are using innovative research and R&D (Research and Development) to improve and create products and methods to accelerate this restoration.

The marine scientists of the Environmental Science Center have been studying the experiences of other researchers worldwide, with their failure and success in restoration of threatened coral reefs. They have also noticed that in Qatar, few coral

species survive in threatened marine areas (mostly in coastal areas), and they are considered "resilient" corals. Furthermore, coral reefs in deeper sites and those isolated from anthropogenic impact remain to house the "fragile" coral species and the associated abundant fishing stock. Knowing the technologies required, the biodiversity composition, and the local marine ecosystem, they managed to identify the need for technologies that improve practical "coral gardening" in the Qatar Marine zone.

The selected strategy is improving Qatar's "Coral Fragmentation" technology. By understanding how to produce "baby corals" or "coral-saplings" from a local "mother colony" they can create the needed resources for actively gardening coral species in new marine sites. In this improved technology, the aquaculture facility has been used to evaluate the ideal light and food to accelerate the growth of resilient species. The marine scientists also achieved a better understanding of the ideal sites for planting the "baby-corals" and the perfect strategy for fixing them on natural marine rock.

Another approach is to create new "houses for corals" in deeper sites with good water conditions. With this aim, a new patent has been granted for an innovative Qatari artificial reef (the mushroom forest), which is resistant to water currents, and designed precisely for creating ideal new houses for corals in deeper sites where there are no natural rock formations. This represents a perfect technology for farming corals in deeper locations. With these two main technologies, new methods and tools were provided for the Qatari society for restoring the economic functionality and ecological beauty of this unique marine ecosystem.



The husbandry experiments with mother corals (entire colonies), and baby corals (fragments), in the aquariums at the Aquaculture Facility in the Aquatic & Fisheries Research Center at Ras Matbakh.