



# Keystone herbivore restoration in the Caribbean: The culture and restocking of *Diadema antillarum*, the long spined sea urchin

PhD total period

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## Motivation

The herbivore sea urchin *Diadema antillarum* (*Diadema* from hereon) plays an crucial role in the dynamics of Caribbean reef ecosystems. This crucial role became very apparent after a mass-mortality event in the 80s, and *Diadema* populations have showed little natural recovery since. Despite this importance, very little is known about the opportunities to culture and rear this species into healthy juveniles to restock suitable reefs. A better fundamental understanding on a stable and optimized culture from gametes to healthy juveniles, can help us to explain the lack of natural recovery and produce juvenile urchins for restocking reefs. A successful approach can help restore *Diadema* populations throughout the Caribbean, and subsequently support recovery and resilience of coral reefs with their ecosystem services they so many people depend on.

## Aim and Objectives

The aim is to develop and validate best practices that can help to effectively restore Caribbean reefs with by restocking with laboratory cultured *Diadema* sea urchins, settled with natural cues resulting in high settlement and post-settlement survival, reared with techniques that minimize the negative effects of culture. Objectives are:

1. Develop and optimize a new larvae culture method for *Diadema* that results in competent larvae and settlers.
2. Identify (bio) chemical cues that induce settlement and metamorphosis for competent *Diadema* larvae with a high juvenile survival rate.

3. Rear juvenile *Diadema* with methods that minimize the negative effects of captivity before release into the wild.
4. Restock reefs around Saba with lab reared *Diadema* restoring populations, reducing macroalgal cover and increasing coral settlement and growth.

## Method

With a novel culture method, developed in Leeuwarden and successfully introduced to conditions on the island of Saba, we succeeded to consistently culture juvenile *Diadema* and answer fundamental developmental questions important for restocking. Competent larvae that are ready to settle will be used to test different cues from their natural environment for the highest settlement success and post settlement survival. Juvenile settlers will subsequently be reared under different conditions and their development compared to wild juveniles of similar size. The reared juveniles in different size classes will be used to study restocking survival on suitable reefs depending on size class.

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