

Drivers of coral settlement and recruitment in the Andaman Islands

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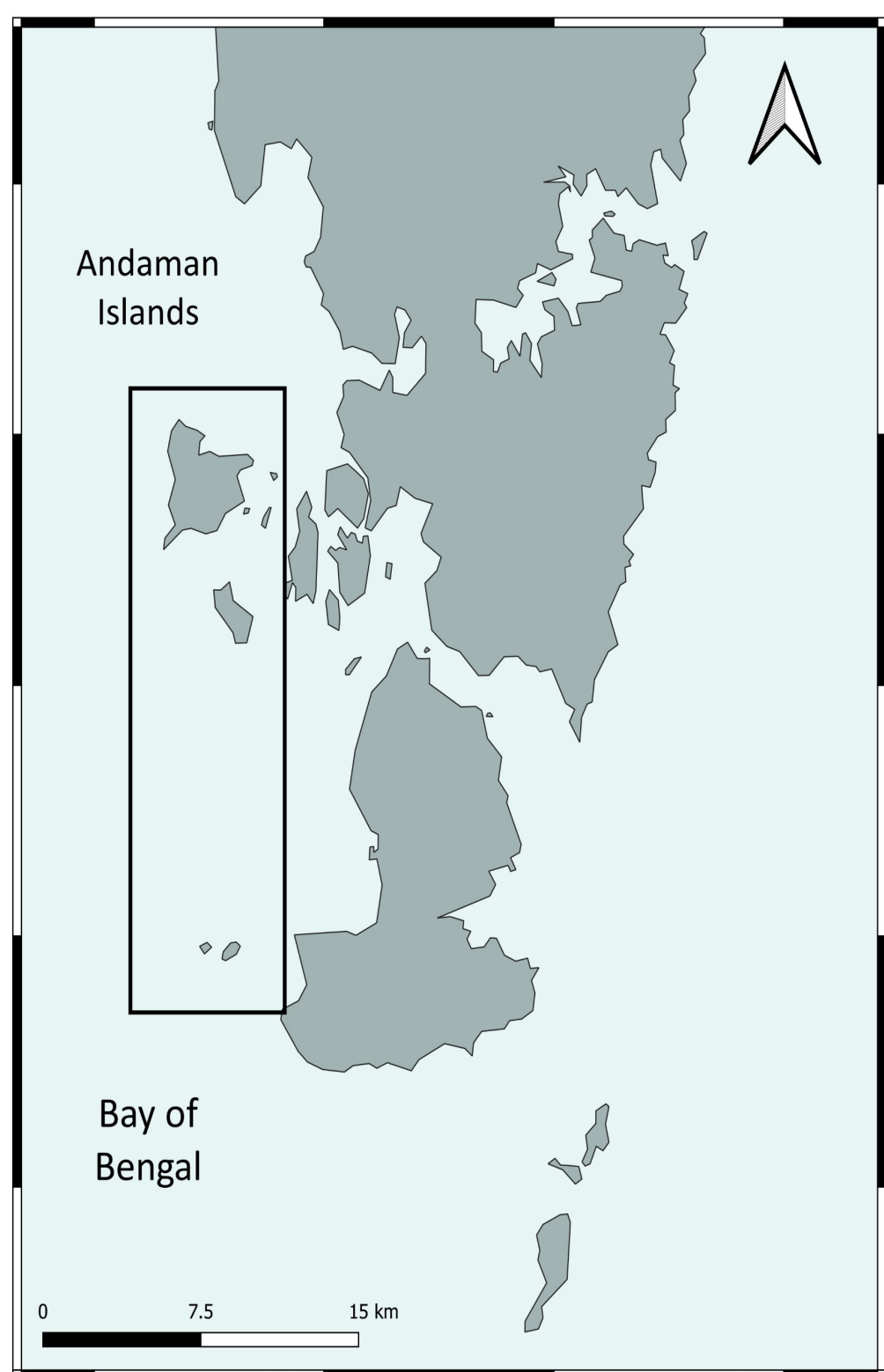
Background

- A reef system is considered “resilient” when it shows successful repair of surviving coral populations, along with an **abundant supply of coral larvae**.¹
- **Settlement and recruitment** are important post-spawning processes which are influenced by environmental drivers.²
- However, how these drivers interact and influence these processes is **relatively understudied**, especially from regions such as the Andaman and Nicobar Islands (ANI), India.
- With the rising frequency and intensity of natural and anthropogenic pressures, understanding these interactions is critical for **improving localised reef management**.³
- This study aims to understand **how key environmental drivers interact to influence early life-history stages** of corals in ANI.

Objectives

- To understand the **effect of wave exposure** on community composition and size-class distribution of corals.
- To understand the **effects of substrate composition and stability** on recruit (0-2 cm), juvenile (2-5 cm) and young adult (5-10 cm) corals.

Study site and methods



- 10 sites (5 sheltered and 5 exposed) in Mahatma Gandhi Marine National Park, ANI.
- 3 X 30m line transects at each site. (N = 30)
- 4 X 1m² quadrats on each transect at every 10m. (N = 120)
- 0-2 cm size class estimation using a UV torch in a 50cm² sub-quadrat within the 1m² quadrat.
- Quadrat photos used to analyze 2-5 cm and 5-10 cm using PhotoQuad software.

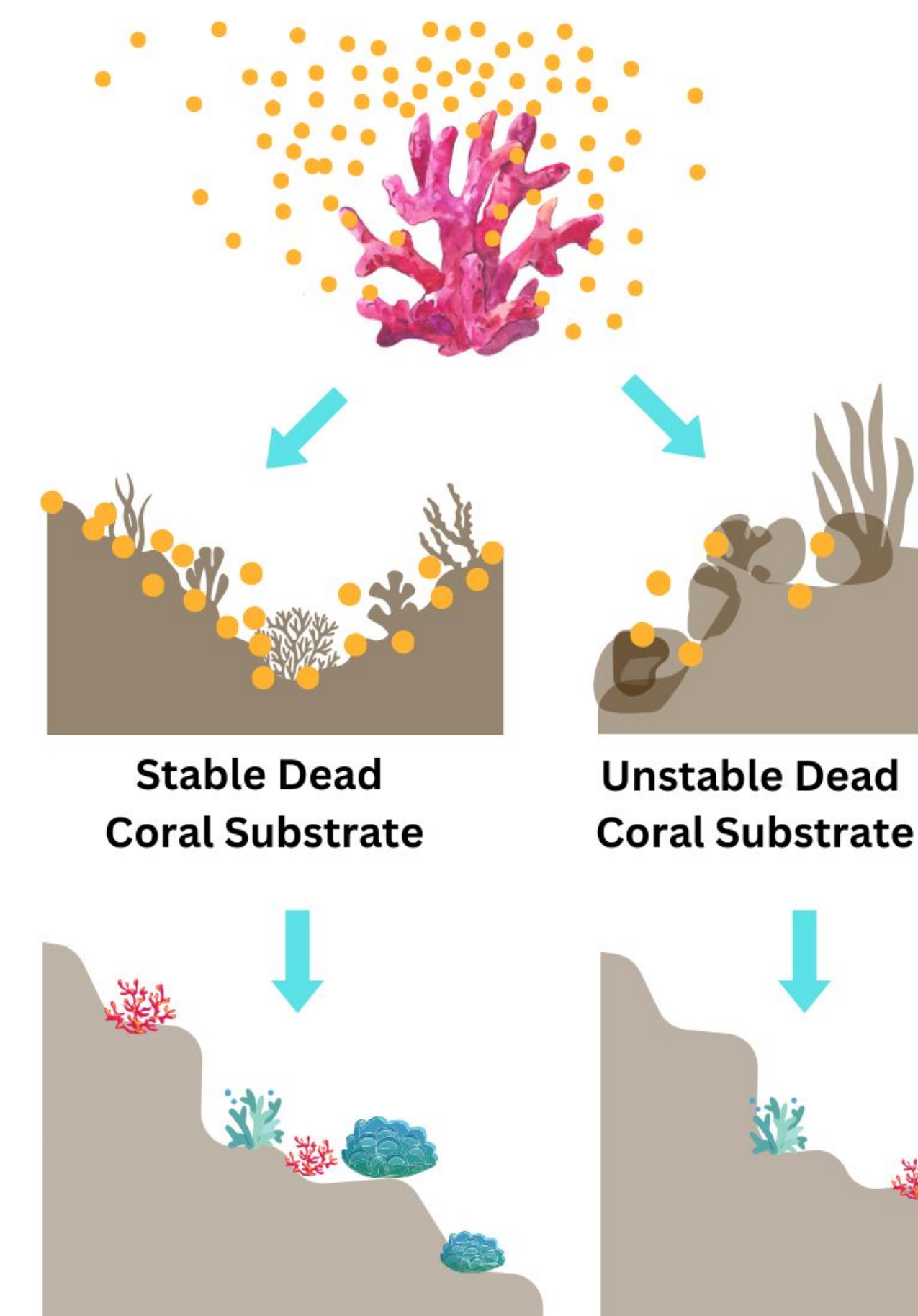
Conclusions:

1. Preliminary evidence highlights the **importance of environmental drivers** in mediating coral settlement and recruitment.
2. Exposed sites support **more colonies of less resilient species and morphotypes** (Branching *Acropora*) as opposed to sheltered sites which support **less colonies of resilient species and morphotypes** (Massive *Porites*).
3. This could be attributed to **wave and current action, suitable settlement substrate** and **low sediment deposition** at exposed sites. However, detailed studies across a larger spatial scale are needed to establish this relationship.
4. **Choice experiments to determine survivorship** post-disturbances, and **long-term monitoring of select species** are key to understand how early life-history processes are influenced by disturbances.

References:

1. McClanahan, T. R., et al. "Diversification of refugia types needed to secure the future of coral reefs subject to climate change." *Con. Bio.* (2023).
2. Yadav, Shreya, et al. "Choice" and destiny: the substrate composition and mechanical stability of settlement structures can mediate coral recruit fate in post-bleached reefs." *Coral Reefs* 35 (2016): 211-222.
3. Steneck, R. S., et al. "Thinking and managing outside the box: coalescing connectivity networks to build region-wide resilience in coral reef ecosystems." *Coral Reefs* 28 (2009): 367-378.

Process of Coral Settlement



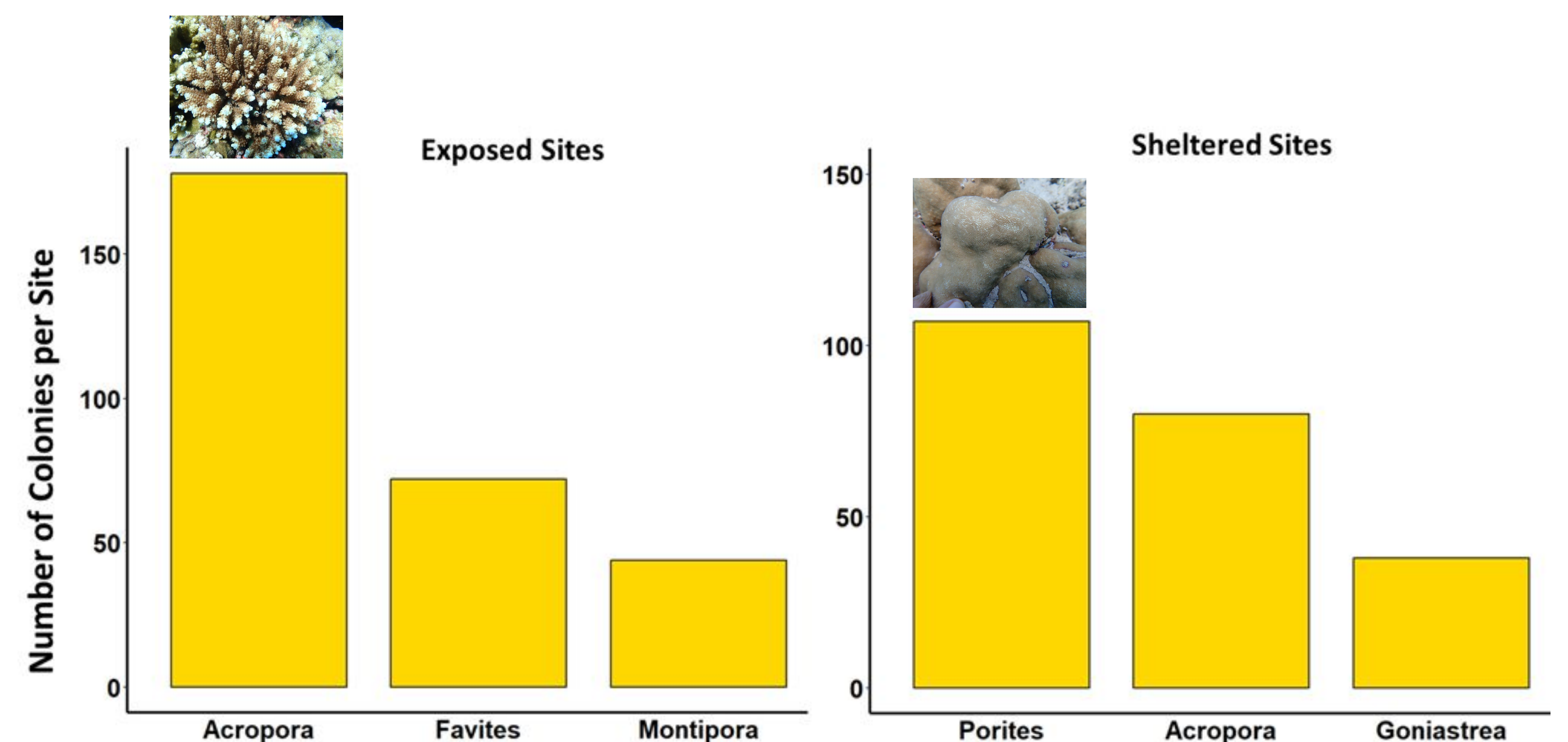
Most corals reproduce by **spawning**, where they simultaneously release eggs and sperm.

Fertilised eggs (planulae) remain in the water column before they find **suitable substrates** based on **chemical cues** and **favourable conditions**.

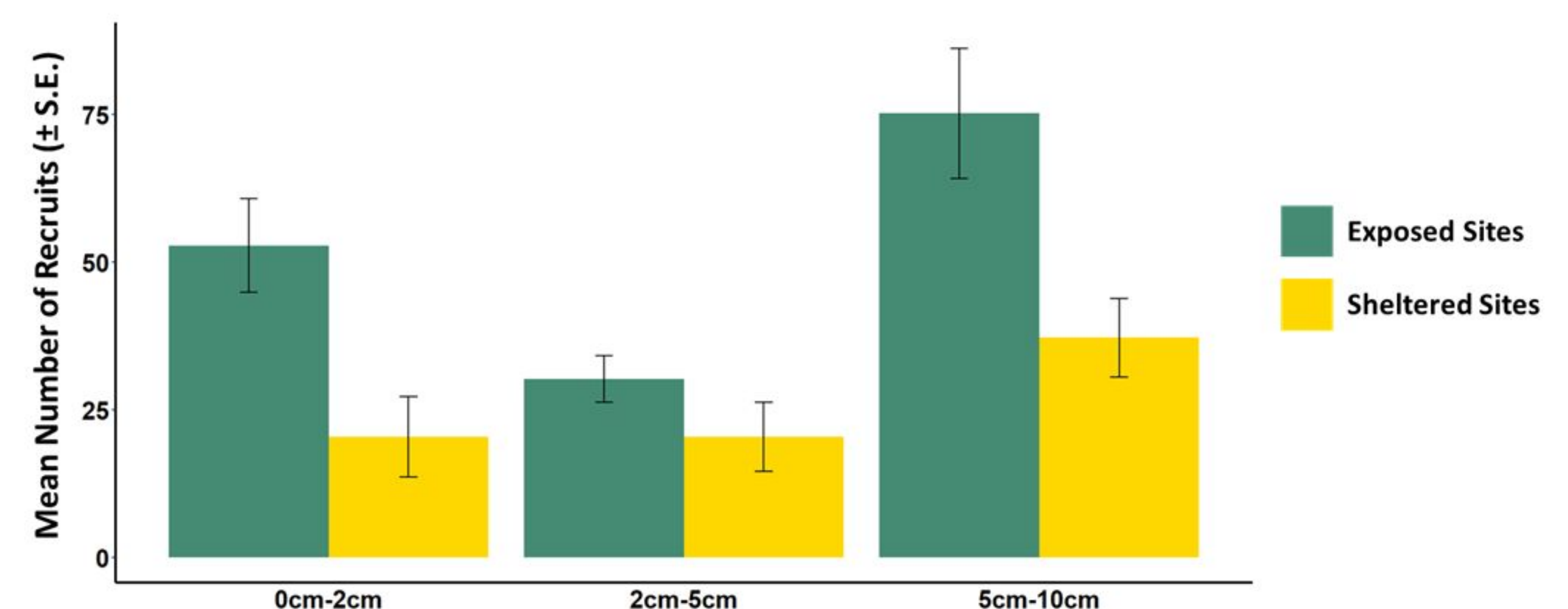
Planulae are successfully recruited in the coral colony when they **adhere to a substratum**, and begin to **form** the **calcium carbonate exoskeleton**

Results

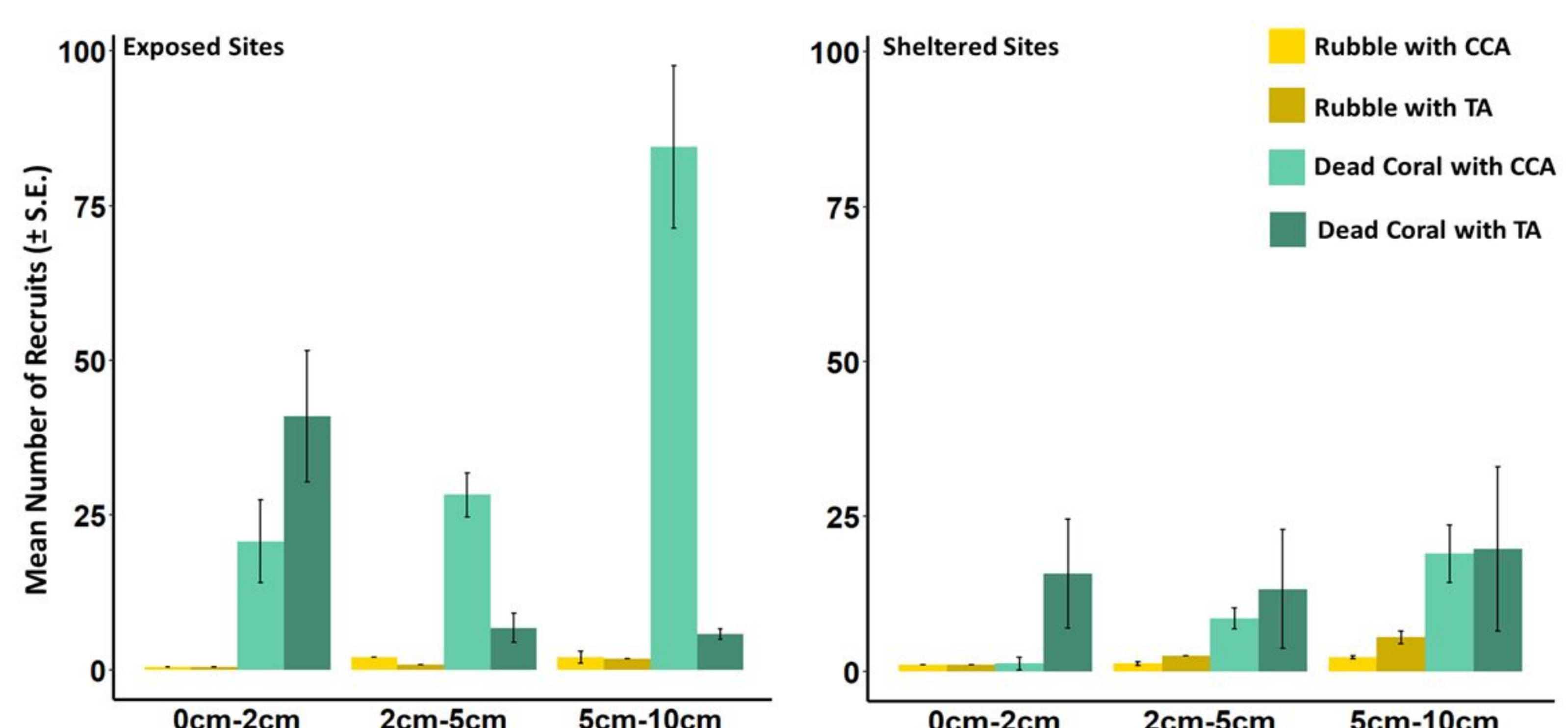
1. Branching *Acropora* is the most abundant genus in exposed sites while in sheltered sites, Massive *Porites* is the most abundant genus.



2. Exposed sites have higher number of coral colonies as compared to sheltered sites



3. Dead coral is the most suitable substrate for all corals. However, the effect of substrate composition is variable



Acknowledgements:

