

# Comparison of coral benthic cover between the sites of Sakouli and N'gouja, and an assessment of generic coral diversity



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## 1 Introduction

### 1.1 Importance of studying coral reefs



**Biodiversity hotspot!**  
Supports 25% of all marine life despite covering a small area<sup>1</sup>

### 1.2 Mayotte's coral reefs



- Coral reefs in Mayotte : 342 km<sup>2</sup>
- One of the largest lagoons in the region<sup>3</sup>
- Double barrier reef!<sup>3</sup>
- High anthropogenic pressure<sup>4</sup>

### 1.4 Sites of Sakouli and N'gouja



Both sites : Natural shoreline with vegetation<sup>8</sup>  
N'gouja protected area where fishing is prohibited<sup>3</sup>

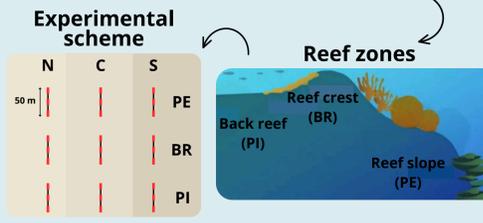
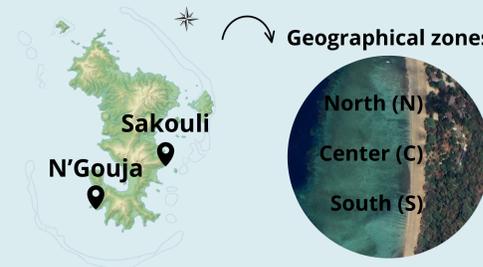
### 1.3 Why focus on benthic cover and genus diversity?

High species richness and functional diversity = Stability and less sensitive to perturbations<sup>5,6,7</sup>

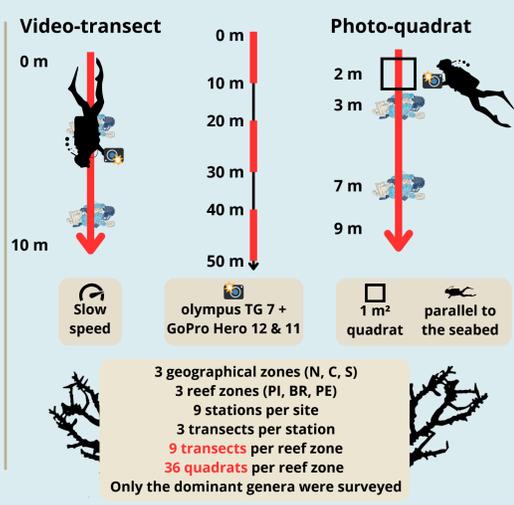


## 2 Materials & Methods

### Study sites and reef zones :



### Protocol :



## 3 Results & discussion

### Comparison of coral cover

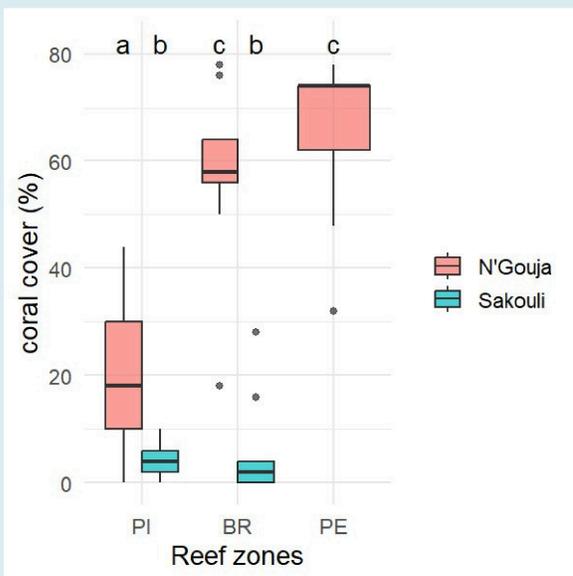


Fig 1. Coral cover in the three reef zones (PI, BR and PE) of the two study sites

Coral cover differs significantly between the reef zones and study sites (ANOVA, df = 4, F = 42.19, P = 7.65e<sup>-14</sup>)

#### N'Gouja coral cover is greater than the cover of Sakouli for all reef zones

**Natural perturbations :** bleaching episodes (1998, 2010, 2024) + cyclone Chido (2025) + Storm Dikeledi (2025)<sup>10</sup>

**Dominance of stress-tolerant genera :** Massive and encrusting growth coral forms<sup>11,15</sup>

**Sakouli site :** More severely affected by Chido<sup>10</sup>

#### Coral cover of N'Gouja reef crest (BR) and reef slope (PE) is greater than the coral cover of N'Gouja back reef (PI)

**PI :** Loose sediment deposits and naturally less populated<sup>13</sup>

**PE :** Reef zone with the highest coral diversity → partially due to low hydrodynamism<sup>13</sup>

#### Really low coral cover on Sakouli and no differences between the back reef (PI) and reef crest (BR)

**Physical destruction + structural loss :** More important in the East (Sakouli) and North sectors

**2024 coral bleaching** → heterogeneous across sectors :

East = average coral mortality of 50%<sup>10</sup>

Maximum mortality of corals at sites in the North and East of Mayotte<sup>14</sup>

### Comparison of benthic relative cover

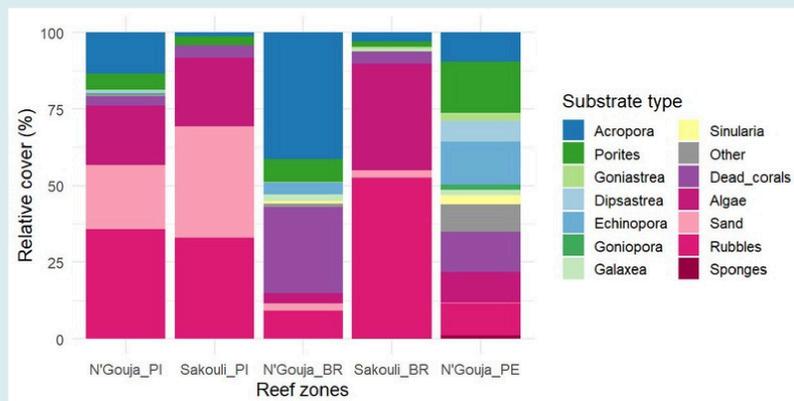
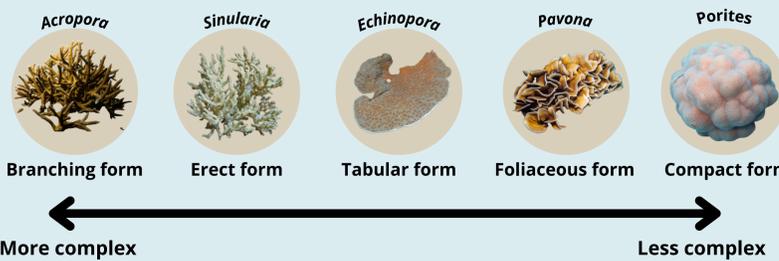


Fig 2. Benthic relative cover in the three reef zones (PI, BR and PE of N'Gouja and PI and BR of Sakouli) of the two study sites (The "other" category refers to non-dominant genera)

Benthic cover significantly different between reef zones and study sites (Chi<sup>2</sup> ; X<sup>2</sup> = 3684.3 ; P = 1e<sup>-6</sup>)



#### Benthic relative cover

##### Global observations :

- PI : Majority of **substrate** other than corals (algae, sand, rubbles) → consistent with characteristics of the area<sup>12</sup>
- N'Gouja coral cover > Sakouli coral cover (majority of *Acropora*, but small proportion compared with cover of unconsolidated substrate + algae)

##### BR :

- N'Gouja : Majority of *Acropora* & **dead corals** → could indicate that this area was previously populated with even more corals (no available literature for N'Gouja reef crest)
- Sakouli : Majority of **rubbles & algae** → absence of dead corals could suggest that this area was initially poor on corals, but hydrodynamics link with Chido cyclone could also have moved the corals out of the area (in the literature, the pre-Chido cyclone baseline condition of coral cover on the Sakouli reef crest has not been investigated)

##### PE :

No dominant substrate observed + **large diversity of corals genera** on N'Gouja reef slope

### Comparison of generic coral diversity

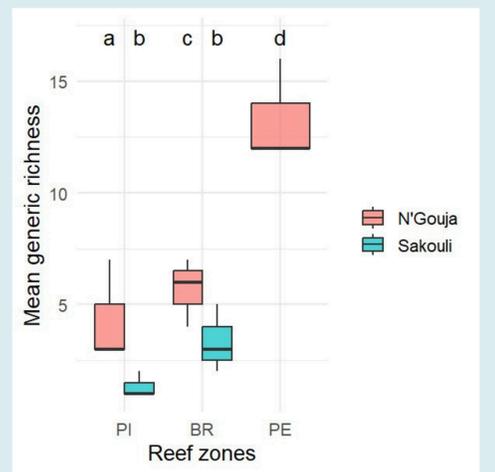


Fig 3. Mean generic richness in the three reef zones (PI, BR and PE of N'Gouja and PI and BR of Sakouli) of the two study sites

Mean generic richness depends significantly on the reef zones and study sites (ANOVA, df = 4, F = 57.36, P = 2e<sup>-16</sup>)

Evaluated on the surface complexity, top heaviness and volume compactness<sup>15</sup>

#### Generic coral diversity

##### Global observations :

- Mean generic richness of corals at N'Gouja > mean generic richness of corals at Sakouli
- Mean generic richness significantly higher in PE than in PI & BR<sup>16</sup>

##### N'Gouja :

- PI & BR : Dominance of the genus *Acropora*
- PE : **increase of coral diversity** → *Acropora* no longer dominant + formerly absent or scarce genera are beginning to appear

##### Link with environmental conditions :

Change in coral communities composition (coral cover + composition of species) could be related to **coral characteristics + environmental conditions**<sup>16</sup> :

- PI & BR : conditions highly variable → may explain the establishment of **competitive coral species** (such as *Acropora*<sup>16,17</sup>)
- PE : conditions relatively constant<sup>18</sup> + allowing the establishment of a diversity of coral genera<sup>16</sup> (no single dominant + competitive coral genus)

The limited mixing of water between PI & PE may partly explain the observed patterns in variability of environmental parameters<sup>18</sup>

## 4 Limitations

1 Identification bias → some genera were very similar



2 Freediving not really adapted to study reef slope

3 Limited knowledge of the environmental conditions

4 Enough replicates?

## 5 Perspectives

Impact of Chido cyclone and Dikeledi storm on coral reef ecosystems

Focusing on other habitats of the barrier reef

Ichthyological studies : complexity of coral communities = more fish diversity and biomass?<sup>19,20</sup>

## 5 Bibliography

Please scan the QR code to access the bibliography

