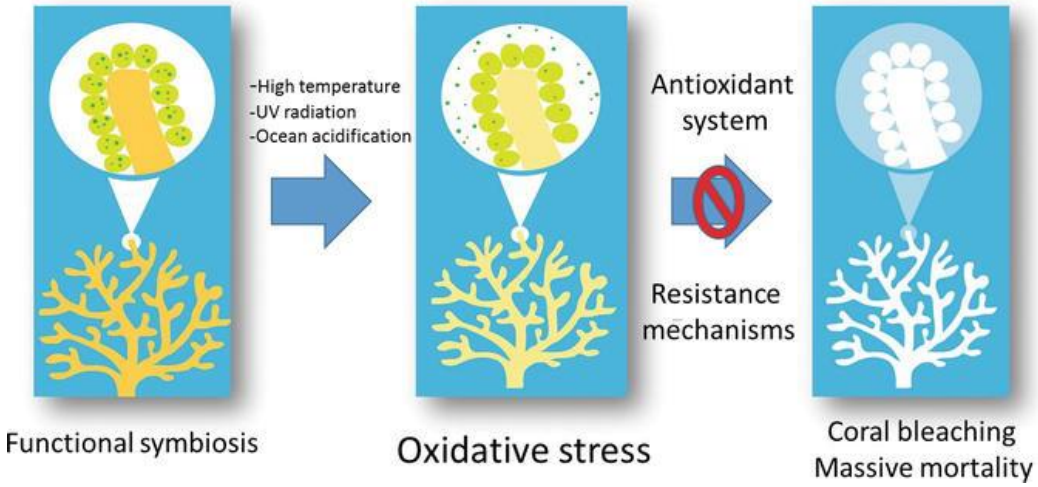
EFFECTS OF THE MARINE PROTECTED AREA SYSTEM ON THE POST BLEACHING RESILIENCE OF NORTH SALARY VILLAGE CORALS

- **Background:** Coral bleaching is a phenomenon of coral dieback, which results in a discoloration of the animal following the expulsion of symbiotic zooxanthellae. Associated with overexploitation of ressources, pollution and hypersedimentation, this phenomenon has led to the loss of 40 to 80% of the coral cover of Madagascar

- **Statistical question:** What is the effect of MPA system on capacity for resilience post bleaching of coral in Salary North coral reef ecosystem?

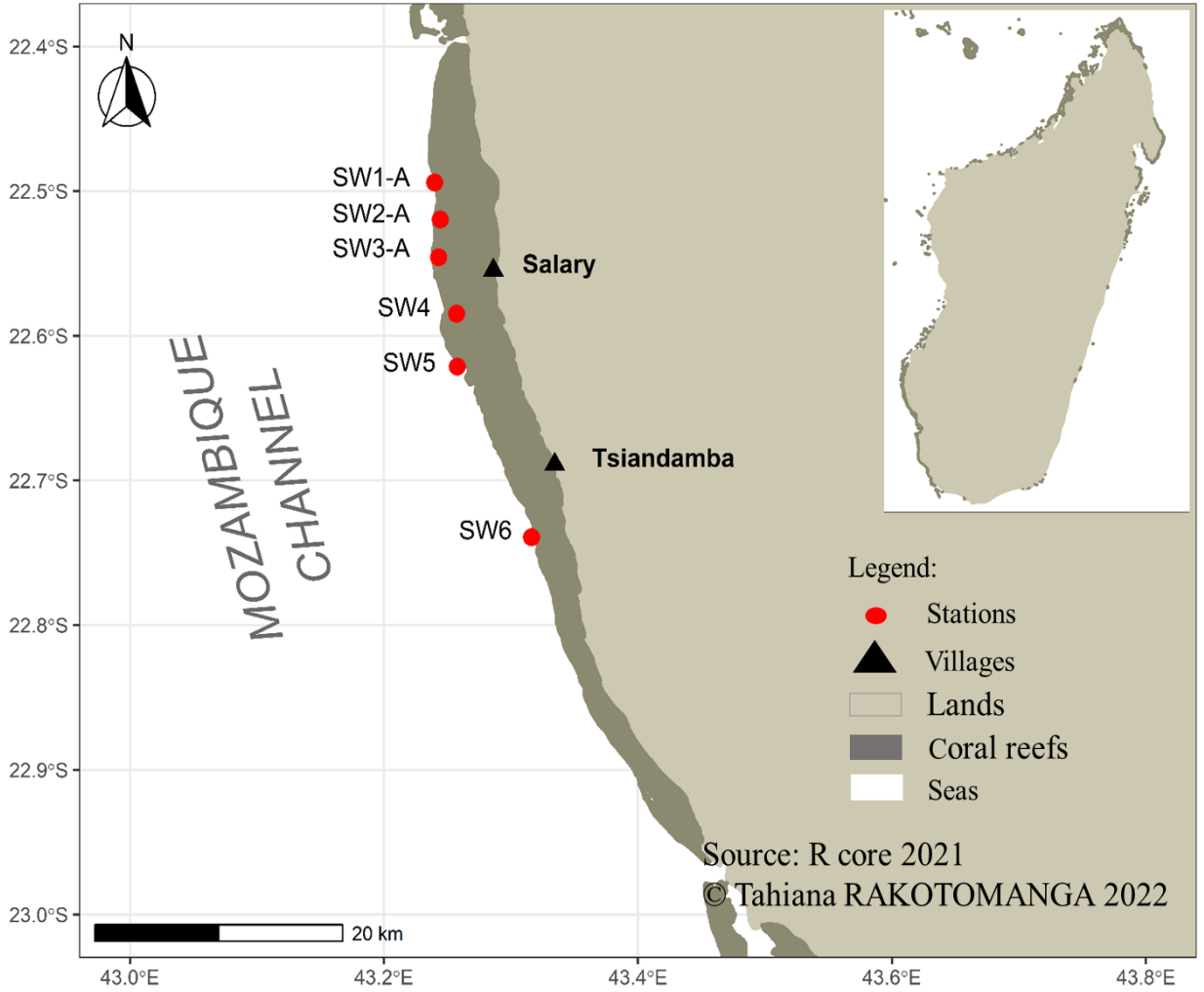
- **Mechanistic question:** How does elevation of temperature influence coral bleaching inside and outside the MPA?



Statistical question

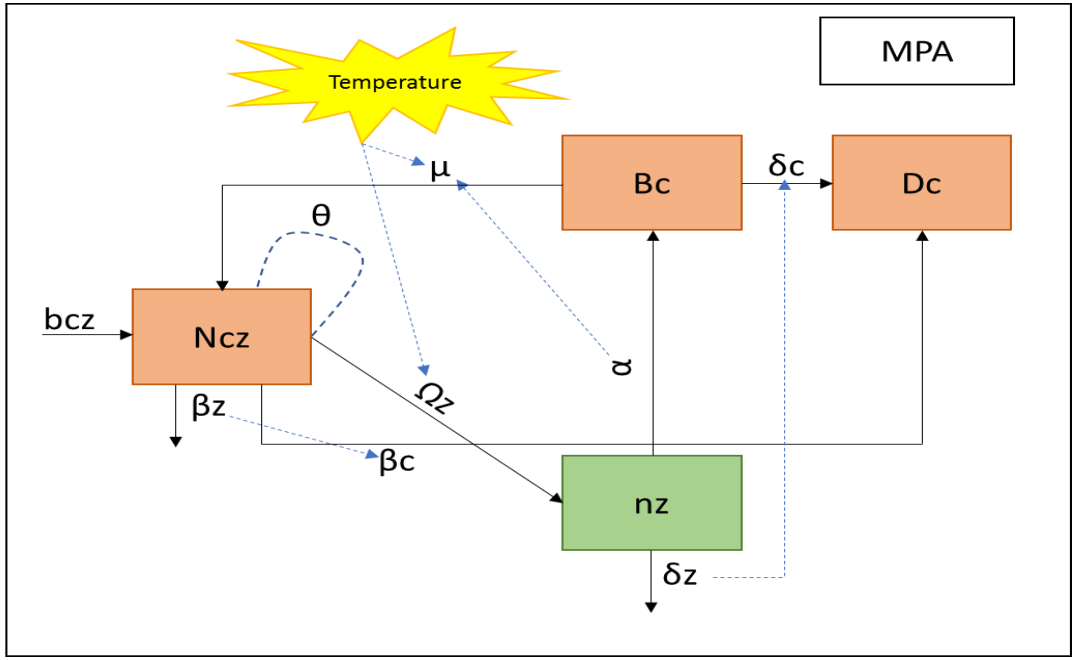
What is the effect of MPA system on capacity for resilience post bleaching of coral in Salary North coral reef ecosystem?

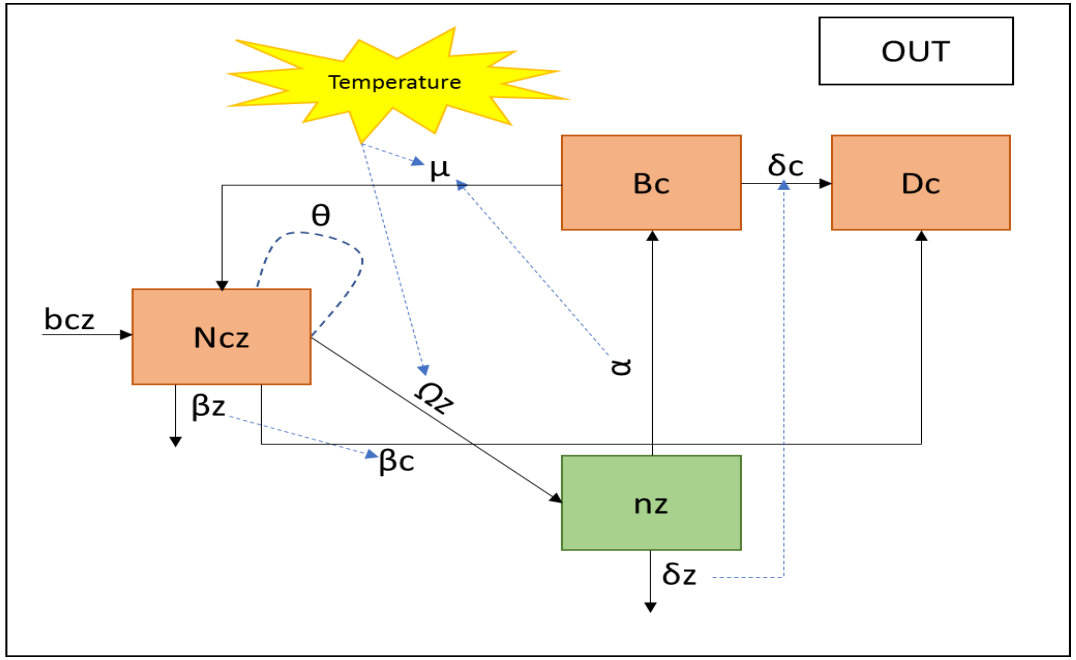
- **Response variable:** Abundance of hard coral
- **Predictor variable**: station, year, zone (MPA, out of MPA), genera, depth, colonie state
- **Family:** Negative binomiale
- **Link:** Log
- **Hypothesis:** MPA system increase coral reef resilience post bleaching
- **R code:** glmer.nb (Abundance of hard coral ~ station + year + zone + genera + depth + colonie state + (1|year), data= coralbleaching)



Mechanistic question

How does elevation of temperature influence coral bleaching inside and outside the MPA?





States

Ncz: Healthy coral in symbiosis with their zooxanthellae
Bc: Bleaching coral
Dc: Dead coral
Nz: Zooxanthellae

Parameters

bcz: Sexual birth of coral; βc: Natural death of coral; βz: Natural death of zooxanthallae; δc: Bleaching death of coral; δz: Bleaching death of zooxanthallae; θ: Assexual birth of coral; α: Process of bleaching; Ωz: expulsion of zooxanthallae; μ: Recovry of coral bleached

NEXT STEP

- To carry out a monitoring of the catches of fishery inside and outside of the MPA as well as a monitoring of the fish and macro invertebrates.
- Conduct the same study at two other sites to compare
- Record temperature anomalies in the study sites since the first major coral bleaching event in 1998 at the NOAA site to compare