An underwater photograph of a coral reef. The scene is filled with various types of coral, including branching corals in shades of brown and orange, and some blue and purple corals. Small orange fish are visible swimming around the coral. The water is clear and blue, and the overall scene depicts a healthy marine ecosystem.

Monitoring growth and mortality of coral transplants and coral-assemblage structure along a water quality gradient

Y. Golbuu, K. Fabricius, R.H. Richmond R. van Woesik

An underwater photograph of a coral reef. The water is murky and greenish, indicating sedimentation. Large, dark, and heavily encrusted rocks dominate the foreground and middle ground. In the background, some white coral structures are visible. A small, striped fish is seen near the top center.

**Sedimentation is one of the major issues
facing coral reefs**

Palau and many Pacific Islands

steep topography

highly erodable soil

high rainfall

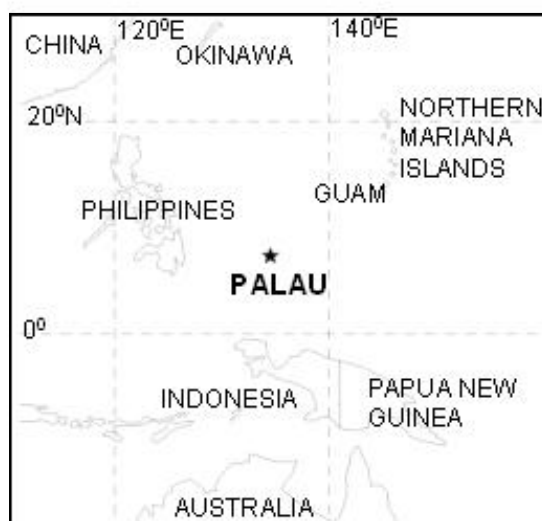
increasing land-use change

Rationale

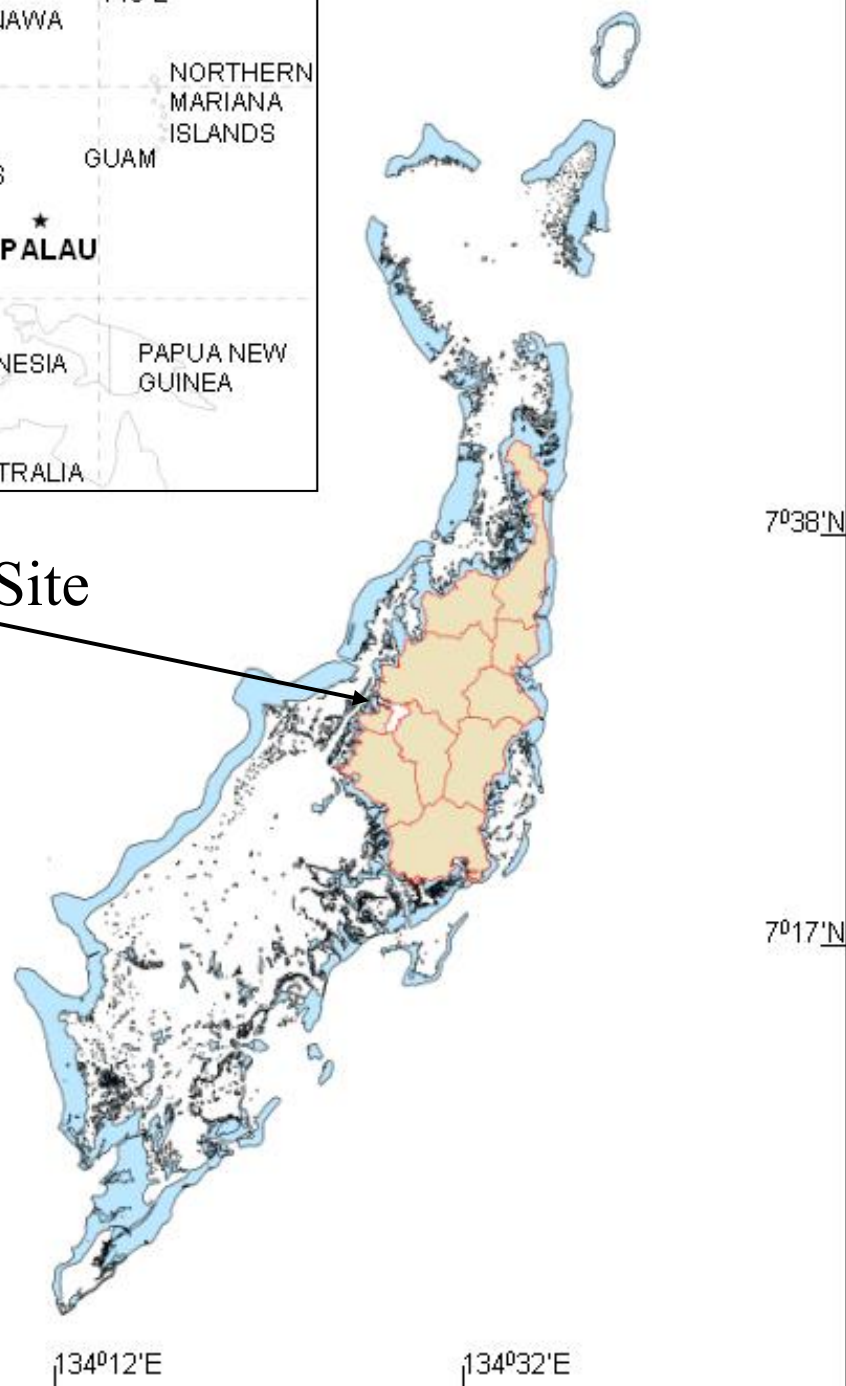
To better understand key processes that influence coral reef community structure under sedimentation stress.

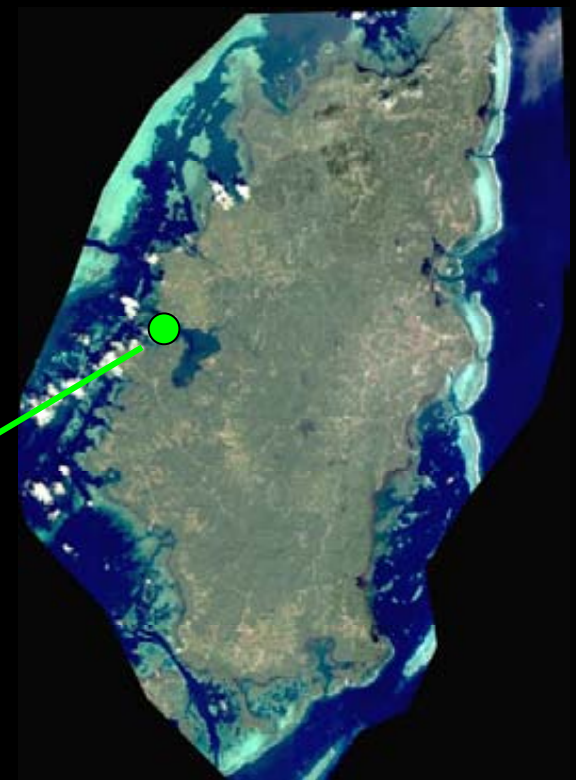
Objectives

- (1) Determine changes in coral reef communities along a terrestrial discharge gradients
- (2) Assess the effects of sedimentation, SSC, and salinity on reef coral growth, survival, and community structure



Study Site







Benthic: Video transects

Coral Recruits: Belt transects .30 X10 m



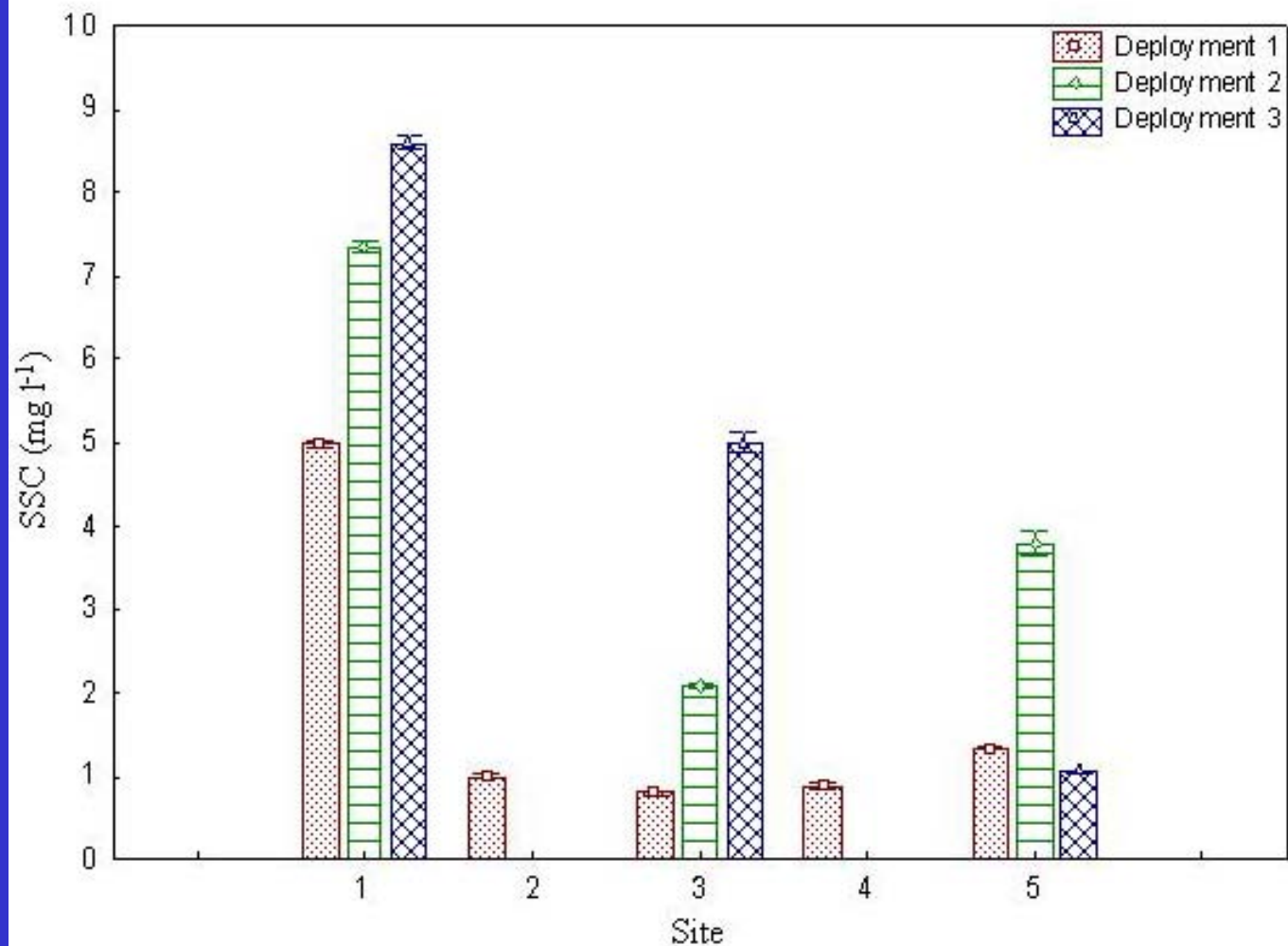
YSI deployable loggers
SSC, salinity, temperature



Sediment trap
Transplant



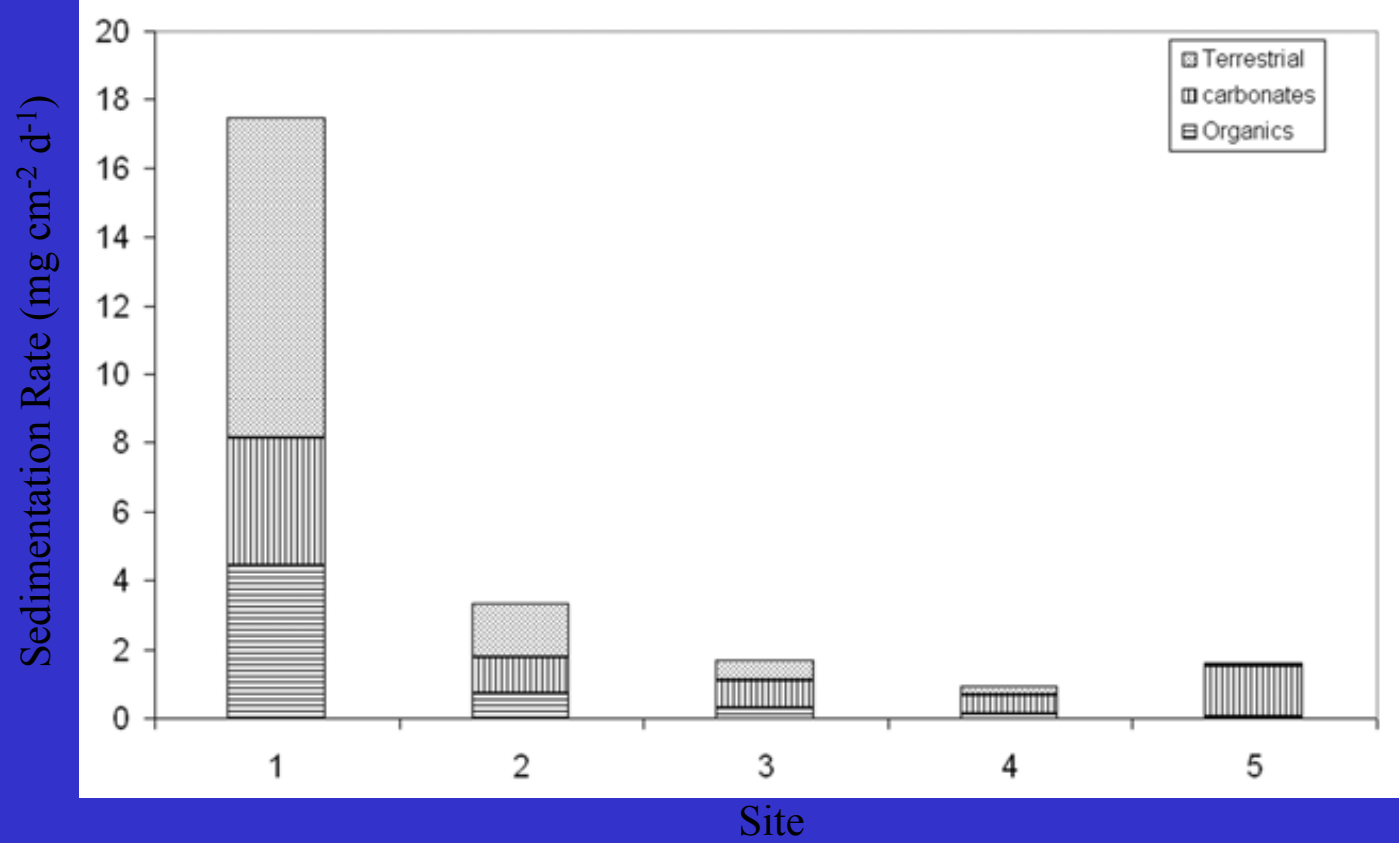
Fabricius (2006) Limnol. Oceanogr. 51: 30-37



SSC decreased from S1-S5 in all deployments

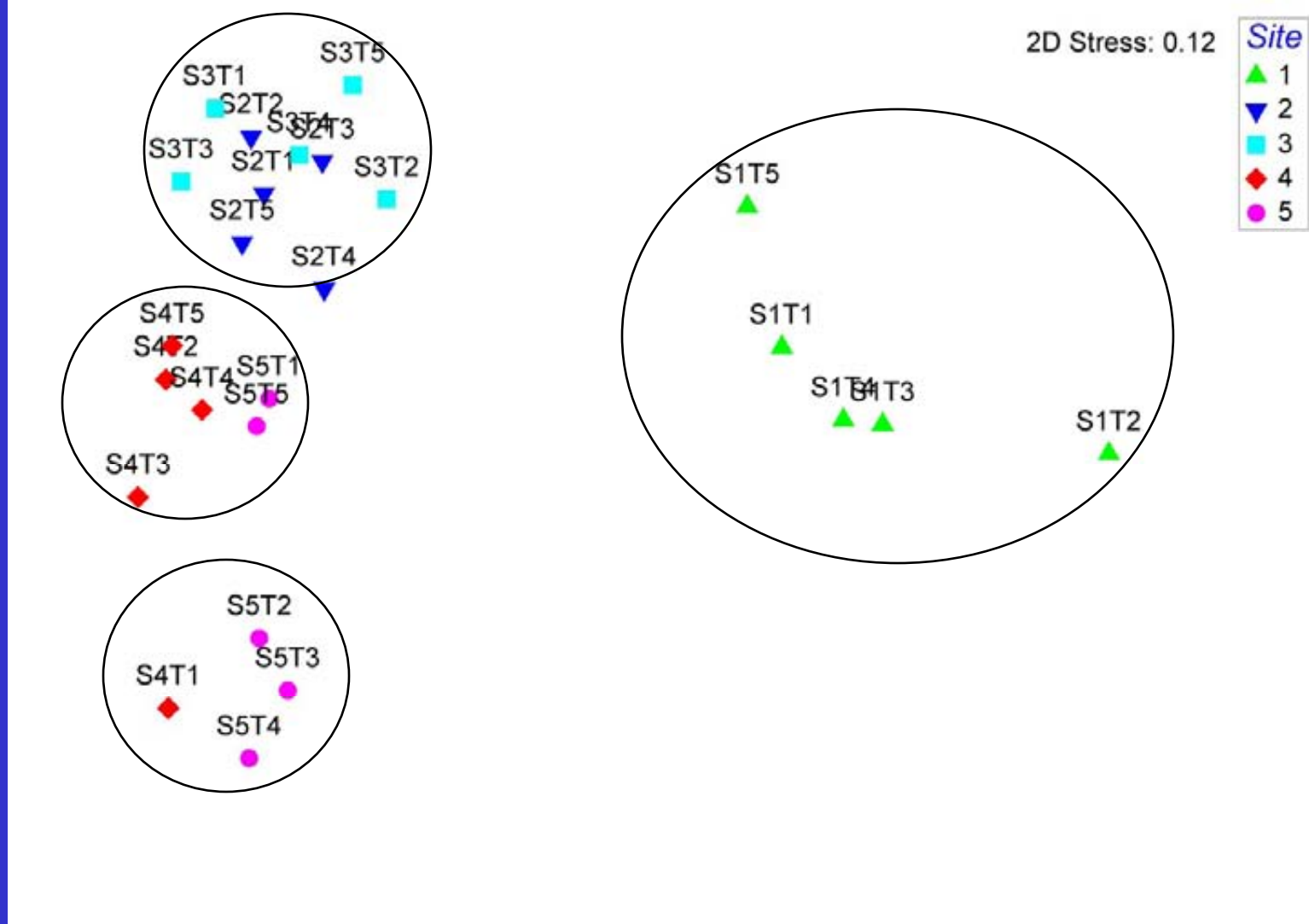
D1 mean SSC decreased by 74% from S1 to S5

D1 max SSC decreased by 87% from S1 to S5



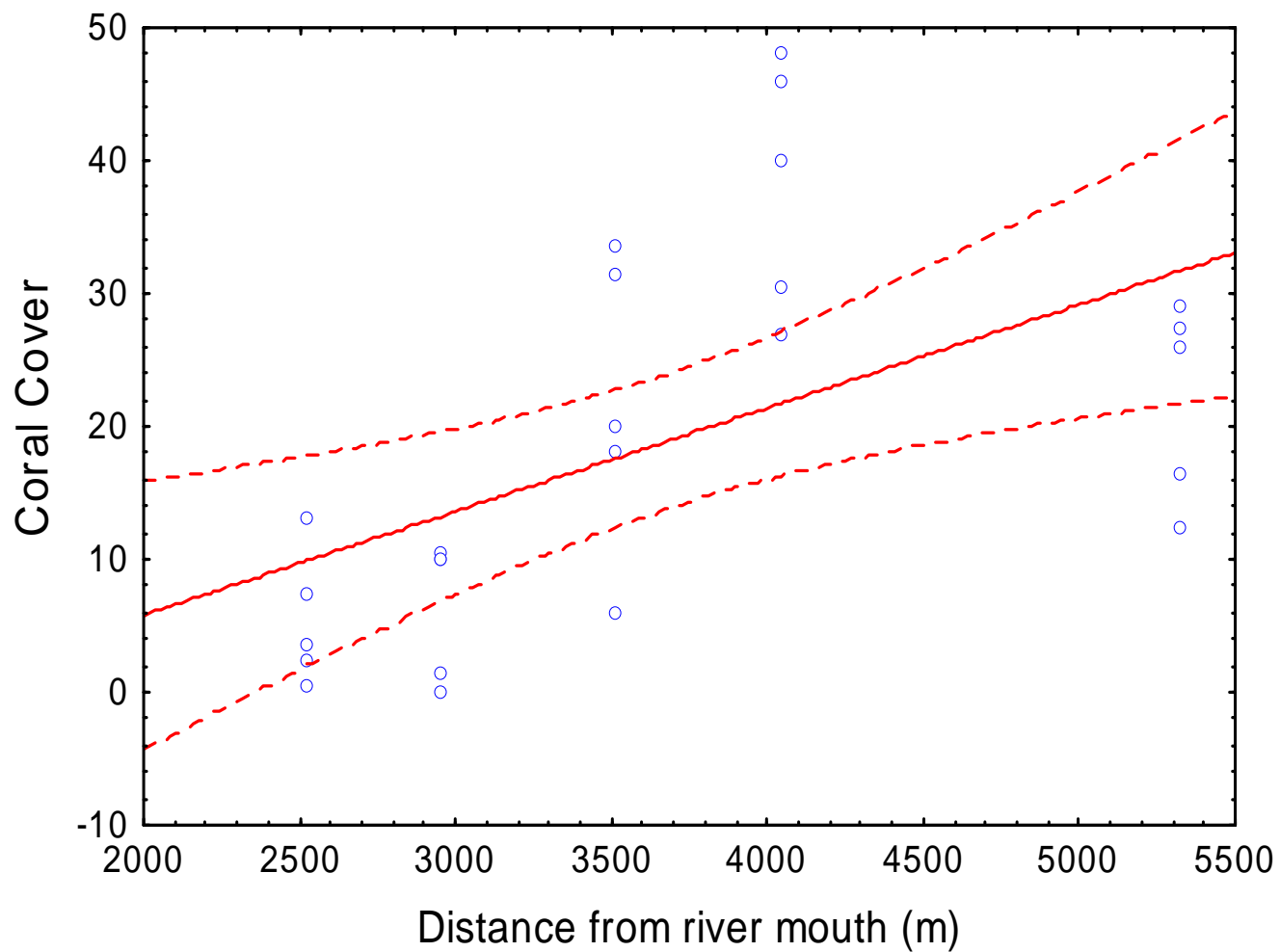
S1-S2 83% decreased

S3-S4 47% decreased



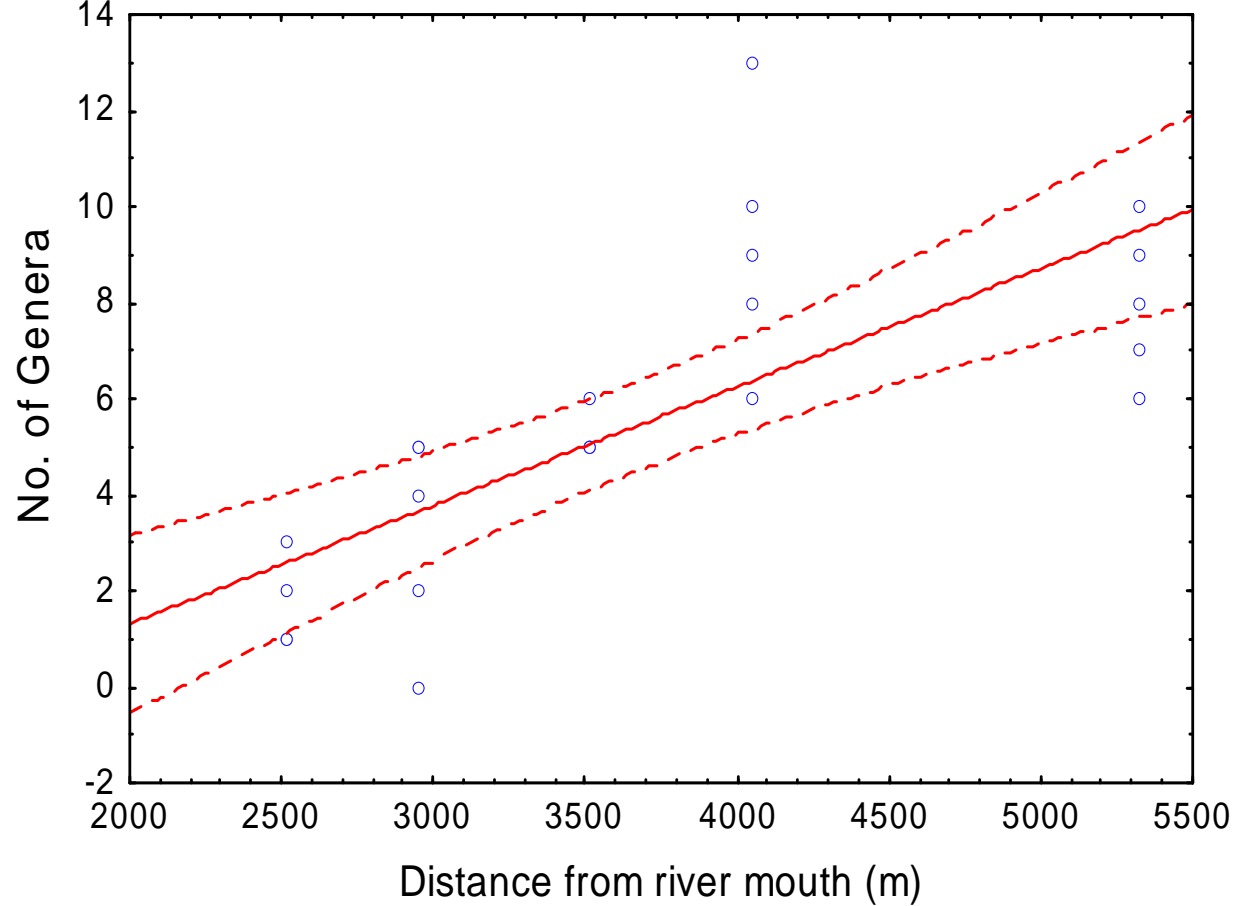
Site 1 dominated by mud-covered substrate

Site 5 dominated by consolidated substrate and coral communities



7% increase every km moving away from river mouth ($r^2=0.29$, $p<0.05$)

2.6% decrease with every increase of 1 mg l^{-1} SSC ($r^2=0.34$, $p<0.001$)



2.5 genera/transect with every km moving away from river mouth
($r^2=0.55$, $p<0.001$)

Reduction of 0.53 genera for every addition of $1 \text{ mg cm}^{-2} \text{ d}^{-1}$
($r^2=0.54$, $p<0.001$)



An increase of 3.2 recruits m^{-2} for every km (away from river mouth)
($r^2=0.66$, $p<0.001$)

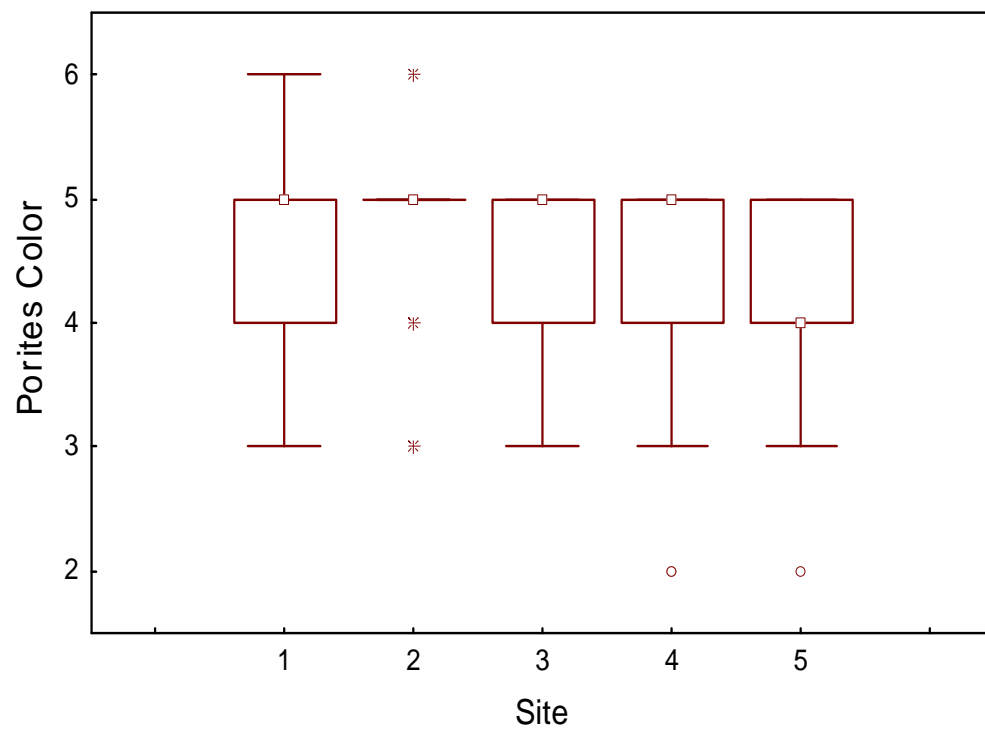
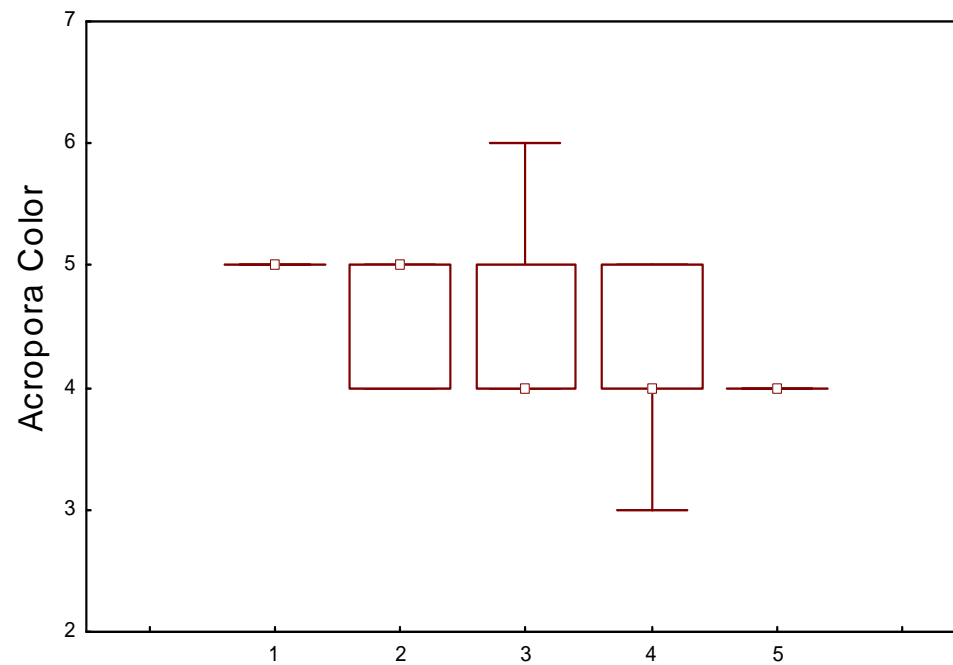
0.49 recruits m^{-2} decrease with every 1 $\text{mg cm}^{-2} \text{ d}^{-1}$ increase in SR
($r^2=0.33$, $p<0.001$)

An underwater photograph showing a sandy seabed with several coral transplants. The transplants are small, cylindrical, and have a yellowish-green color. A white tag with blue markings is attached to one of the transplants. The background is a dark, textured sand surface.

Acropora mortality higher than *Porites* at all sites

No significant difference in mortality of transplants among the five sites

No significant difference in growth of transplants among the five sites



The background of the slide is a collage of several underwater photographs of coral reefs. The images show various types of coral, including branching corals, table corals, and large, rounded brain corals. The water is clear and blue, and the overall scene depicts a healthy and diverse coral reef ecosystem.

Summary

Clear gradients: coral reef communities, recruit density and diversity, *Acropora* color

No difference: survival and growth of transplants

Transplants may have ‘escaped’ post-settlement mortality through sedimentation stress because of their large initial size

Significant relationships between coral reef community parameters and sedimentation and SSC

No significant relationship between coral reef community parameters and salinity

Conclusions

Transplant growth and survival may not be good indicators of reef health at the time scale of the study

Community composition, coral diversity, recruit density and diversity and transplants color were the most sensitive indicators of exposures to terrestrial influences

Recruitment processes are important in shaping the coral community structure

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