

Differences in fish communities on artificial reefs of different ages in the United Arab Emirates

Paolo Usseglio¹, Andrew Bauman¹, John Burt^{2,3}

¹ International Network on Water, Environment and Health, United Nations University

² School of Natural Science and Public Health, Zayed University, Dubai, UAE

³ Biological Sciences, University of Windsor, Windsor, Canada



Abstract

Artificial reefs are being increasingly promoted as a means to mitigate environmental impacts and to enhance fisheries yield. Assessments of artificial reefs typically occur shortly after deployment. However, changes in benthic communities over longer time scales may affect associated fish assemblages. These changes may be perceived as positive or negative depending on management goals. The purpose of this study was to compare fish communities associated with 4 large artificial reefs ranging in age from 2 to 35 years. Fish communities differed significantly on artificial reefs of different age, with older reefs having higher overall species diversity and abundance. Abundance of herbivores was negatively correlated with age, while facultative coral dwelling species were positively correlated with age. Intermediate age reefs (5-25 years) showed assemblages similar to each other, but distinct to very young (2 years) and very old (35 years) artificial reefs. Results suggest that artificial reefs of different age have distinct fish communities, and that assessments of artificial reefs should occur over longer timescales.

Objective:

• To examine and compare patterns in fish community structure between artificial reefs of varying ages

Study location:



Figure 1: Dubai, UAE



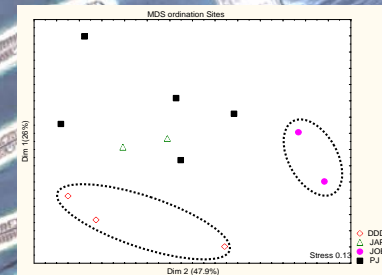
Figure 2: Four artificial reefs of different ages

Methods:

- Research was conducted at 4 artificial reef of different age in Dubai, UAE in the summer of 2007 (Figure 1)
- Age of artificial reefs ranged from 2 years to 35 years (Figure 2)
- We used twelve 30mx1m belt transects to examine fish communities at the four artificial reefs.

Analysis:

- NM-MDS was used to produce an ordination of species at all 4 study sites. The model was run using 10 runs of real data and
- Species richness analysis



Dim 1	Sp. Code	Guild	Family	Species
-0.9364	UPTRA	Invertebrate	Mullidae	<i>Upeneus taqale</i>
-0.76047	SILLR	Herbivore	Siganidae	<i>Siganus lineatus</i>
-0.71791	NESIN	Planktivore	Pomacentridae	<i>Neogomocentrus aeneus</i>
-0.70623	ACSOH	Herbivore	Acanthuridae	<i>Acanthurus salbai</i>
0.76932	CRLUT	Invertebrate	Gobiidae	<i>Cryptocentrus lalandi</i>
1.00311	RHSAR	Invertebrate	Sparidae	<i>Rhabdosargus sarti</i>
Dim 2	Sp. Code	Guild	Family	Species
-0.81467	THLIN	Invertebrate	Labridae	<i>Thalassoma lineare</i>
-0.77560	NESIN	Herbivore	Pomacentridae	<i>Neogomocentrus aeneus</i>
0.68304	SILAV	Herbivore	Siganidae	<i>Siganus lineatus</i>
0.96208	SILLR	Herbivore	Siganidae	<i>Siganus lineatus</i>

Figure 3: NM-MDS ordination of the 4 artificial reef sites (Stress 0.13). Resulting ordination explained 73.9% of the variation.

Table 1: Species Score Table for ordination.

Results and Conclusions:

- Fish assemblages differed between artificial reefs of different ages (Figure 3).
 - The oldest artificial reef (35 yrs) had higher species diversity than the youngest artificial reef (2 yrs).
 - Both intermediate aged artificial reefs (age 5 and 25 yrs) held similar reef fish diversity.
- There were distinct assemblages found at each artificial reef.
 - The abundance of herbivorous fish species (i.e. Siganidae) were highly correlated with the youngest artificial reef and negatively correlated with the oldest artificial reef.
 - The abundance of coral associated fishes (i.e. Chaetodontidae) were highly correlated with the oldest artificial reef.

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