Seasonal changes of reef fish in relation to the sessile benthic cover at Paraviwella reef, Tangalle, Sri Lanka

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Abstract

Reef fish are indicators of reef health as their feeding types directly affect the benthic environment. The present study was performed at the Paraviwella reef at Tangalle, Sri Lanka with the objective of understanding the seasonal changes of dominant reef fish in relation to the sessile benthic cover. Data were collected between two seasons April to May 2014(Season 1= T1) and September to October 2014 (Season 2 =T2). Permanent transects were established (n=4, 25m, parallel to shore, t1, t2, t3, t4). Sessile benthic community cover including living coral(LC), algae (AL), rock(RC) and others(O), Reef fish species were also observed with respect to their feeding habit [i.e, herbivores(H), carnivores(C) and omnivores(O)]. Benthic community cover was measured and reef fish were identified using field guides. Benthic composition showed that the % of living coral cover was increased from T1 to T2 (LC from 57.6±11 to 61.4±19 respectively) and algae cover decreased from T1 to T2 (AL from 31.0±14 to 23.6±14). During the study 36 species for T1 and 33 species for T2 were observed and they belonged to 4 major families: Surgeon - Acanthuridae, Damsel - Pomacentridae, Wrasse - Labridae, Butterfly –Chaetodontidae). Results showed that higher % of herbivorous fish were recorded at T1 and T2. [For T1= H-(59±10), C-(34.2±4.3), O-(6.7±5.2) and T2= H-(42.4±6.6), C-(40.9±5), O-(16.6±3)].There is a significant difference between reef fish abundance (H and C)between the two seasons (t-test, $p<0.05$), observation showed consistent with LC cover and AL cover at Paraviwella reef. Further studies are necessary to establish relationship to benthos and reef fish feeding for Paraviwella reef.

Keywords: Reef fish, benthic communities, Seasonal changes, Paraviwella

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Introduction

Coral reefs are subjected to much anthropogenic impacts such as overexploitation and co-lateral damages from destructive fishing practices (Olsen *et al.*, 1992; Fairoz, 2006). Coral reef fish behaviors and patterns are controlled by biological processes, such as recruitment, competition and predation that influence to habitat by the spatial arrangement of sessile benthic organisms such as algae. (Roberts and Ormond, 1987). Algae grazing by reef fish is an important ecological process with practical significance to the management and conservation of coral reefs have played a great role by herbivore for structuring of sessile benthic community of coral reef areas of high

grazing on benthic algae. This affects to the interaction between macro algae and corals, particularly in increasing coral recruitment. High fishing intensity has led to a reduction in abundance and mean size in reef fish, and in some locations has been correlated with increased macro algae cover. Distribution of the herbivorous fish is important because the grazing depend in part on spatial abundance patterns. Topographic features of reef habitats also a major factor in structuring fish communities (Nemeth and Appeldoorn, 2009). Fringing coral reefs and barrier reefs including lagoonal patch reefs are studied commonly (Ohman *et al*, 1996). The objective of understanding the seasonal changes of dominant reef fish with relation to the sessile benthic cover and supply a basement for further research, conservation and management.

Methods and Materials

Present study was perform at the *Paraviwella* reef ($6^0$01'17.09"N, $80^0$48'01.21"E), Tangalle, southern Sri Lanka. DATA were collectedbetween two time periods from 25th of April to 31(season 1=T1) of May and 10th of September to October 31(season 2=T2) of 2014. Training session for fish identification has been conducted one and half month before collecting the DATA. Four Line Intercept transect (LITs) (T1, T2, T3 and T4) were selected (each was 25 m long) and estimated by using underwater tape parallel to the shore line (English et al 1999). All the substratum and benthic components (LC-living coral, AL-algae, RC-rock, O-others) were recorded along transect and Reef fish were identified using field guides such as reef fish identification tropical pacific (Allen, 2003). Species from different families were counted on separate snorkeling each transacts and identified feeding habit (H-herbivores, C-carnivores and O-omnivores) of that fish. In addition the physical parameters (Temperature, Salinity and Turbidity) were measured. Collected data were analyzed by using Microsoft Excel 2007 and also SPSS 13 version was used to determine any significant deference in feeding habit of fish between, two time periods.

Results

In two time periods of abundance results have shown 36 species at first time period and 33 species shows at second time period were dominated by four fish families [T1-(Surgeon-*Acanthuridae*(41.20±14.03%), Damsel-*Pomacentridae*(27.25±2.47%), Wrasse-*Labridae*(18.14±7.06%) Butterfly-*Chaetodontidae*(8.37±5.44%)and others(5.05±1.19%)] and [T2- (Surgeon-*Acanthuridae*(25.20±4.10%), Damsel-*Pomacentridae*(29.27±7.37%), Wrasse-*Labridae*(30.49±16.22%) Butterfly-*Chaetodontidae*(6.91±3.26%)and others (8.13±5.89%)].

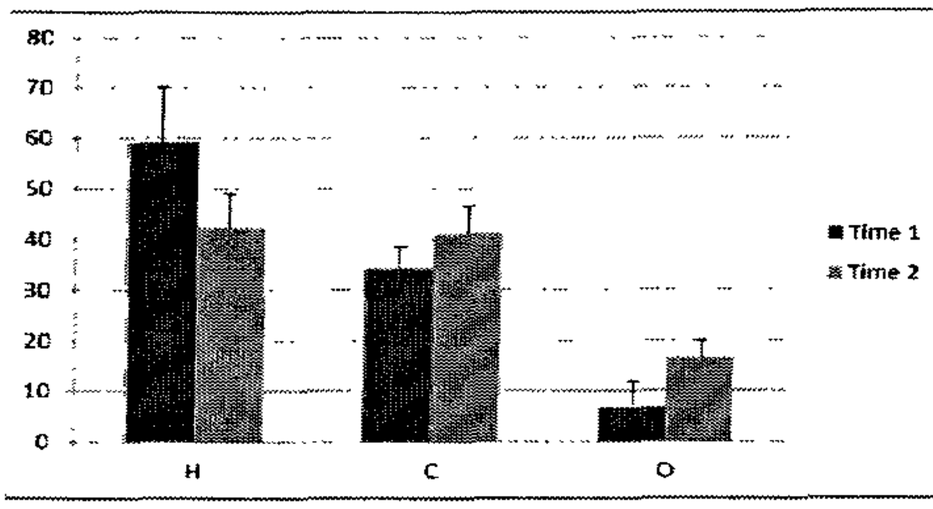

Figure 1- Percentage of fish feeding habit

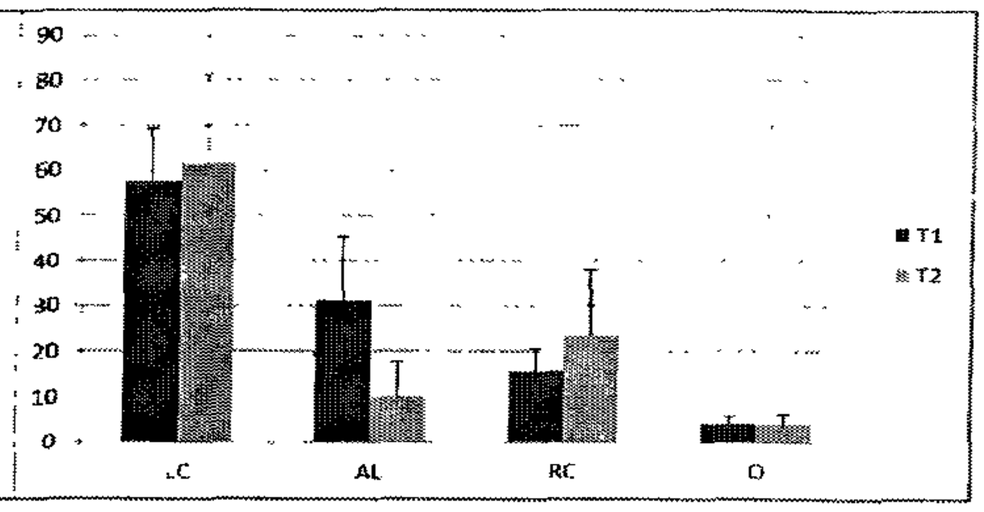

Figure 2- Percentage of Benthic composition

(Figure 1) shows percentage result of feeding habits in two time periods. T1 results were H-(59.07±10.98%), C-(34.22±4.37%) and O-(6.57±5.16%) and T2 result shows that, H- (42.44±6.62%), C-(40.99±5.71%) and O-(16.57±3.45%).

(Figure 2) Shows benthic compossition chart shows that in T1-[LC(57.58±11.77%), AL(31.08±14.51%), RC(15.92±4.63%) and O-(4.25±1.30)] and T2-[LC(61.40±19.80%), AL-(10.10±7.60%), RC-(23.60±14.40%) and O-(4±2%)]. Statistical analysis of H *(p=0.026)* and C *(p=0.027)* of T1 and T2 showed that there are significant differences (*t-test, p<0.05*) and O-*(p=0.067)* shows that there is no significant differences (*t-test, p>0.05).*

Discussion

Reef fish abundance results shows that dominated families were change and abundance diversity also change at the two time periods. According to feeding habits results shows that Herbivores were dominated and carnivores has shown considerable amount of percentage in both time periods. Benthic composition shows that higher percentage that was increasing of LC and decreasing the AL cover of the tow time of periods. Algae cover was decrease T1 to T2 that changes of benthic composition have any relationship with herbivores and carnivores.

Conclusion

Abundance of herbivores fish results shows that consideration to maintain higher coral cover in *Paraviwella* reef by grazing the algae cover observed within seasons showed consistent with living coral cover and algae cover at PWR. These results indicate that control of multiple local coastal ocean process to benthic cover and that was represented by reef fish community. Further studies are necessary with long time observation with other physical chemical process to establish relationship to benthos and reef fish feeding for PWR.

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