Marsa Shagra, February 2012

Annual Report of RSDS Reef Monitoring Programme

Stephan Moldzio, Reef Check Team Scientist & EcoDiver Trainer

Since we started our Reef Monitoring Programme with **Red Sea Diving Safari** (RSDS) in 2009, we have run four EcoDiver courses with 19 participants from ten different countries. Every participant has successfully passed the tests and been certified as a Reef Check EcoDiver. They may now participate in Reef Check surveys throughout the Indo-Pacific. With this dynamic team we have conducted 20 Reef Check surveys at the ten most important RSDS dive sites. Each location has been surveyed twice. Surveys were done along two depth contours (3.5 m & 8.5 m depth), so all in all we have contributed 40 data sets that have been included in the international database at Reef Check HQ. Prior to March 2012 the database included 8,432 survey data sets from 3,974 sites in 99 countries & territories.

We are in the fourth year and are happy to report our efforts again:

In the class room we worked through the presentations and all participants successfully passed the tests.
The Beach Exercise was very amusing and the three survey teams fulfilled their task with passion!
Group photo: Gerhard, Kamil, Marco, Stephan, Pavlina, Jiri, - front: Slavek and Martina.

There was no EcoDiver course scheduled for 2011, but in November 2011 the RSDS Reef Check team made a serious effort to complete the team goal of five surveys per year at Marsa Shagra north and south, Marsa Nakari north and south, and Sharm Abu Dabab.

In 2012, we had seven participants from the Czech Republic, Austria, and Germany. During the 4-day course, EcoDiver Trainer Stephan Moldzio, gave presentations about fish, substrate, invertebrates and human impacts. During our dives we searched for the indicator organisms in Marsa Shagra house reef and practised the underwater hand signals. The beach exercise was a highlight: we practised the Reef Check method using all of our equipment and underwater communication through hand signs. The passing grade of 80% for the tests was no problem for the motivated participants.

As in previous years, participants appreciated the opportunity to learn and apply the Reef Check method to monitor the abundance of specific reef organisms and human impacts that reflect the condition of the coral reef ecosystem. A particular motivation for participating in Reef Check is that volunteers are contributing to real science by collecting valuable data about the health status of coral reefs. The data is an important tool for local reef managers and decision makers, as well as scientific publications such as the report "*Status of Coral Reefs of the World*". Everybody in 2012 was very keen to start with the field work, so our group conducted five surveys at Marsa Egla, Elphinstone, Marsa Gabel El Rosas, and two sites at Wadi Lahami.

We surveyed 'permanent transects', meaning that we use the same starting points for our transects each year. For this purpose Stephan had photographed some prominent coral formations, block corals for example, during the former surveys, and created some laminates. Using these laminates underwater, we were able to return to the exact starting point of the last survey. The advantage of this method is that it is not necessary to install a permanent mark in the reef to survey the same transect area over the years and ensures the detection of any changes, e.g. in substrate cover.

Using laminated UW-Photographs we found the starting and end points of our survey sites.
A heron *Egretta garzetta* hunting for small fish in the mangroves of Wadi Lahami.

Our team leader and videographer was Shantel, who has participated on nearly all surveys conducted by RSDS. She made the briefings, laid out the transect line, and supervised the underwater activities. Team Scientist, Stephan, was responsible for the accuracy of the data collection, data entry, and submission. Our zodiac driver Mohamed brought us to the starting points, which were usually at the corner of a Marsa. Mohamed formerly worked as a fisherman and knows the sea like the back of his hand. Now he is sharing his skills with the Eco-Tourism sector. After deploying the transect line, the three survey teams went into the water, starting with the fish team. The teams remained the same for about 2 or 3 surveys and then changed. Since 2011, we have acquired a second transect line which has considerably increased our team efficiency. Now, both depth contours can be laid out during one dive prior to the survey dives. You can find our results below:

Our Team was really doing a great job, data collection was done very thoroughly. Every free minute on the boat was utilized to practise the UW-signs. After the surveys we took a well-deserved rest…Yeah, we had a lot of fun!

Substrate Surveys

Within our 40 surveys, each comprising four 20m transects, making up 160 replicates, we found a total coral coverage (hard and soft corals, HC + SC) of 50.8% ± 4.3% compared with a value of 50.5% ± 3.1% in 2009/2010. At 3.5m depth we found coral cover of 52.2% ± 3.7% and at 8.5m depth 49.7% ± 4.8%. The mean value of soft corals (SC) for all sites in both depths is 9.4% ± 1.6% (n=160). For all non-living substrate categories - rock, rubble, sand, silt, and recently killed coral (RC+RB+SD+SI +RKC) we recorded a mean percentage cover of 47.6% ± 4.6% for all surveys in both depth contours (n=160). In 2009 and 2010 we found 47.7% ± 3.1% non-living cover (n=80). The "*Status of Coral reefs of the World 2008*" reported an average live coral cover of 48% (34% hard coral, 13% soft coral) on the Egyptian reefs.

As expected each reef site has its own unique set of conditions and reef topography, reflected by the community structure. For example, the sheltered part of Wadi Lahami house reef showed the highest values of sand (SD) and silt (SI), 10.2% at 8.5m depth, due to naturally increased sedimentation, as well as more soft corals (SC) and sponges (SP) than on the exposed fringing reefs.

At the offshore reef of Elphinstone we found much more soft coral (SC) than at the other sites, which are fringing reefs (2012: 36.3% ; 2010: 32.5%).

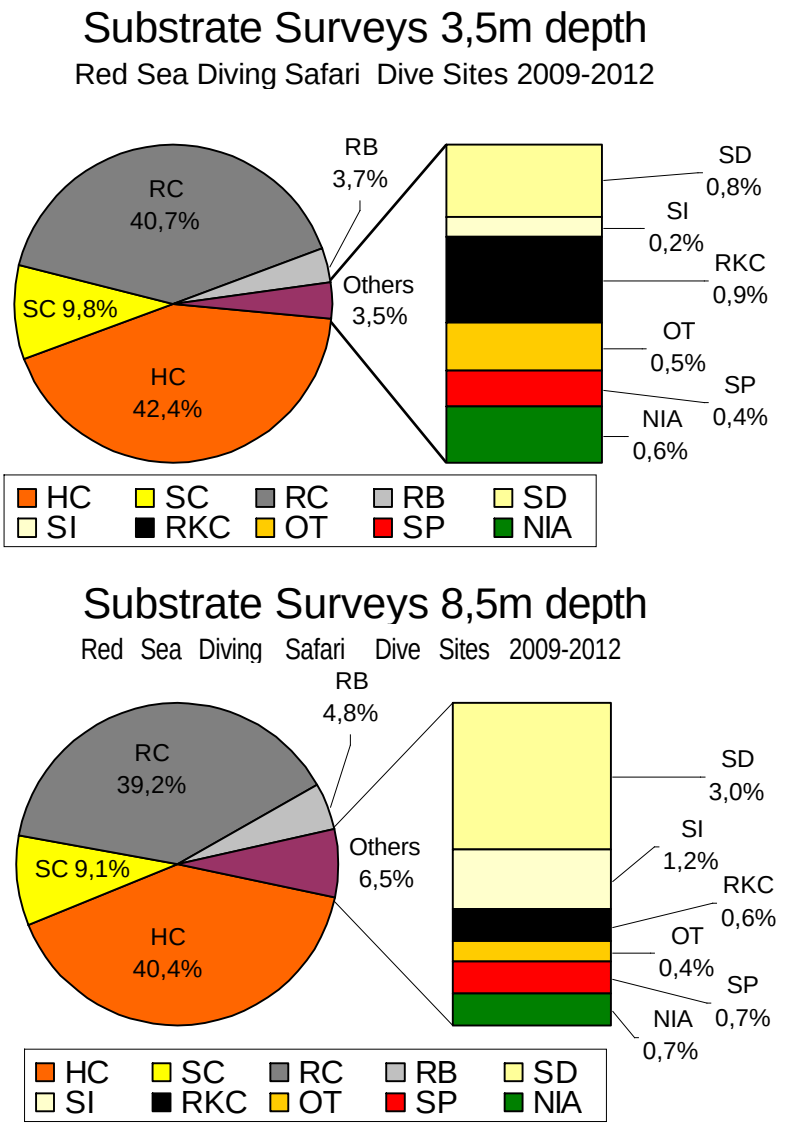


Figure 1: Mean substrate cover [%] of line transects in 3,5m and 8,5m depth.

Fish Surveys

Fish are highly mobile organisms that can easily be scared away, and the variability of counts is much higher than in the substrate survey. Thus, in some cases when the total counts are low, the standard error (SE) is nearly as high as the mean value. Nevertheless, our 2012 counts remained relative to those conducted in 2009 and 2010.

Again, the most abundant indicator group were butterflyfish with 6.0 ± 1.5 individuals/500 m³, followed by parrotfish (2.5 ± 0.9 Ind./500 m³), counted within a total number of 160 belt transects of 500 m³. The mean abundance of groupers was 1.3 ± 0.4 Ind./500 m³, a slightly increased value with respect to 2009 and 2010 (0.7 ± 0.3 Ind./500 m³).

These results compare with the figures for Egypt reported in "*Status of Coral Reefs of the World 2008*" with an average of 7.2 butterflyfish, 2.2 parrotfish and 0.8 groupers per 500 m³ each.

The number of Snappers remained at around 1,0 ± 0,5 per 500m³ transect, with the highest numbers at Marsa Shagra, 2,3 ± 1,0 Ind./500 m³ (n=32).

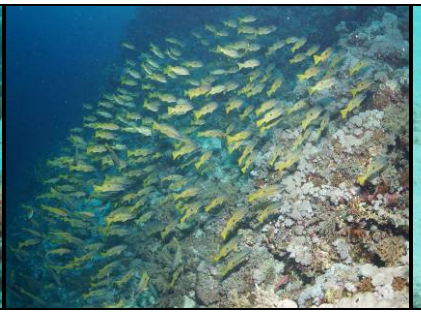
We recorded low numbers of sweetlips (0.1 Ind./500 m³) and broomtail wrasses (0.2 Ind./500 m³), with the highest abundances at Wadi Lahami of 0.5 sweetlips and 0.5 broomtail wrasses per 500 m³ (n=32).

During the past four years we counted a total of five moray eels inside the transects: one at Marsa Shagra and four at Elphinstone. Humphead wrasses were observed quite frequently, strictly speaking on eight surveys, but naturally only off-transect. Some animals just do not stay within or swim through a transect. Other off-transect sightings included 10 hawksbill turtles at Marsa Shagra, Marsa Nakari, Wadi Lahami, Marsa Egla and Sharm Abu Dabab. Altogether, we observed 15 dogtooth tuna at Shagra, Nakari, Sharm Abu Dabab, Marsa Egla and Elphinstone, seven of which were recorded at Elphinstone. Our underwater Reef Check activities were observed by dolphins at Marsa Nakari, Sharm Abu Dabab, and Elphinstone, where there was a large group of around one hundred.

Fish	Mean [Ind./500m³] (n=160)	SE
Butterflyfish	6,02	1,48
Sweetlips	0,10	0,08
Broomtail wrasse	0,21	0,15
Grouper	1,26	0,43
Humphead wrasse	0,00	0,00
Bumphead parrot	0,00	0,00
Parrotfish	2,50	0,85
Snapper	0,95	0,51
Moray eel	0,03	0,03

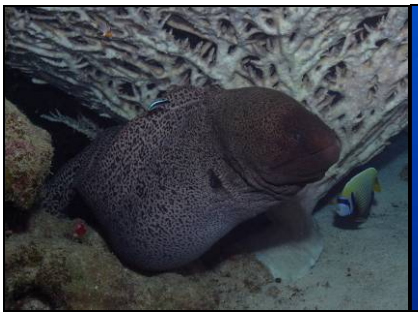
Table 1: Mean abundances and standard errors of Fish categories in a 500m³ belt transect**.**

Groupers can change their sex with size from female to male.



A large school of snapper *Lutjanus ehrenbergi* at Elphinstone reef.

Butterflyfish often live in pairs, like *Chaetodon paucifasciatus.*



A really gigantic Giant moray *Gymnothorax javanicus* at around 35m depth at Marsa Shagra south.

Spinner dolphins *Stenella longirostris* are regularly visiting Marsa Shagra and Marsa Nakari.

The green turtle *Chelonia mydas* seemed to be more shy at Marsa Egla than at Marsa Abu Dabab.

Invertebrate / Human Impact Surveys

The Invertebrate and Human Impact survey is the most complex survey. Not only do the giant clams have to be measured, but a further nine indicator groups must be observed. Most of these species are hidden during the day. Another task is to look for human impacts, such as coral damage by divers or anchors, lost fishing lines and nets, trash, coral diseases, coral bleaching, and any other conspicuous things.

The most abundant indicators were giant clams. At 3.5m depth we recorded a mean value of 9.9 ± 2.4 individuals per 100 m² transect area and 4.0 ± 1.4 Ind./100 m² in 8.5m depth (n=80 each). Interestingly, at Sharm Abu Dabab we once again recorded by far the most giant clams: at 3.5m depth contour 28.8 ± 6.3 clams/100 m² (2009: 29.8 ± 7.5 clams/100 m²).

This indicates good reproducibility when using permanent transects.

Diadema urchins (0,8 ± 0,4 Ind./ 100m²) were recorded in low numbers at most sites.

Collector urchins were frequently observed during night dives, but only in one case during the day within our transect area.

We counted a total of five pencil urchins, and four at Marsa Egla.

We recorded six banded coral shrimps, two at Marsa Egla, Marsa Gabel El Rosas, and Elphinstone. We didn´t find any lobster, despite our best efforts.

Invertebrates	Mean [Ind./100m²] (n=160)	SE
Banded coral shrimp	0,04	0,03
Diadema	0,79	0,37
Pencil urchin	0,03	0,02
Collector urchin	0,01	0,01
Sea cucumber	0,03	0,03
Crown-of-thorns	0,00	0,00
Giant clam	6,95	1,90
Triton	0,01	0,01
Lobster	0,00	0,00

Table 2: Mean abundances and standard errors of Invertebrate categories in a 100m² belt transect**.**

Sea cucumber populations still seem to be depleted, due to heavy overfishing since the late 1990s. Sea cucumber fishing was banned by the Egyptian Red Sea Governorate in 2000, then re-opened between 2002 and 2004, and finally, after the collapse of most stocks, banned completely since 2004. We hope that they will come back soon!

A beautiful seafan *Acabaria biserialis* at Elphinstone Reef.

A Crown of Thorns Star (COTS) *Acanthaster planci* at Elphinstone

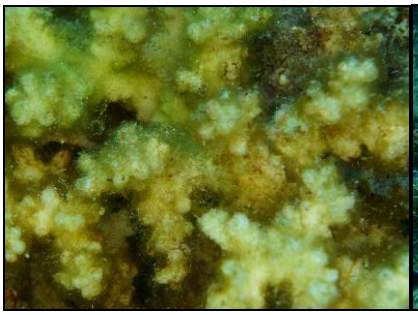
The Triton shell *Charonia tritonis* is a natural predator of COTS.

No crown of thorns starfish (COTS) were observed during our surveys, but a few days later we photographed a big specimen at Elphinstone. In addition, we also found its natural predator, the triton shell – but it was off transect…

At Marsa Shagra we recorded a feeding scar on a *Favia* coral which was produced by a juvenile COTS hiding inside a crack within the coral and feeding at night.

We also observed some strange circular blotches on a fire coral *Millepora*. We made an inquiry to several experts on the matter, but received no sufficient answer. In response to another inquiry through "NOAA Coral List Server" we received more than 20 possible explanations. Finally, Dr. Bruce Carlson solved this mystery – the leopard blenny *Exallias brevis* is an obligate corallivore that scrapes off the tissue with its upper jaw while anchoring the mouth with its lower jaw, producing sharp edged, circular feeding scars!

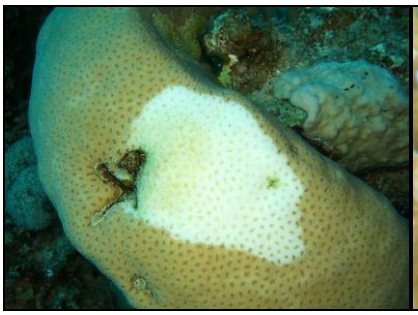
At virtually all sites, especially at the heavily dived sites, we recorded small coral damage by divers. At Wadi Lahami and Marsa Gabel el Rosas we encountered greater damage caused by anchoring. At Elphinstone we documented a Safari-Boat using a steel loop to anchor. This is prohibited by law, but nevertheless it is a widespread practice often causing major coral breakage. Since our first survey at Marsa Gabel El Rosas in 2010, a new hotel complex has opened. We will see if there will be any changes within the next years. At many sites we found some old fishing lines entangled in the reef which were already overgrown with benthic organisms.



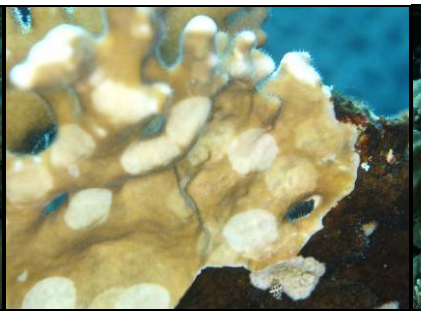
Recently Killed Coral (RKC) already overgrown by green algae.

A live-aboard anchored at Elphinstone using a steel loop.

A massive anchor damage at Marsa Gabel El Rosas.



Juvenile COTS feeding scar on *Favia stelligera* at Marsa Shagra.



Feeding scars of the corallivore leopard blenny *Exallias brevis* on *Millepora* at Marsa Shagra.

Parrot fish feeding scars are often observed on *Porites* corals.

At Marsa Egla we found conspicuously low number of fishes during our surveys in 2010 and 2012. Mohamed, our zodiac driver told us that this location is intensively fished, because there is no hotel at this Marsa. A few days after our survey we went there again to visit the local dugongs. It was a nice dive along the seagrass bed inside this Marsa; we saw some big green turtles, but unfortunately no dugong.
The extensive mangroves at Wadi Lahami are a special highlight. These are not only an important nursery area for fish, they are also inhabited by herons, ospreys and many other sea birds.

What can we discern from our findings?

With regard to coral cover, our Reef Check surveys indicate that reefs at the ten surveyed sites remain generally healthy. Sewage and other pollution, as well as sedimentation from soil erosion seem not to be a problem. We did not observe any coral diseases, excessive nutrient indicator algae (NIA), or sponges (SP) at the surveyed sites. Coral recruitment was good, for example at places with anchor damage where new coral colonies were beginning to grow and build up the next generation.
Maybe the most striking finding was that the results were quite similar to the previous years' surveys. At each survey site the results were quite similar as in the previous survey, due to the application of permanent transects.
A coral reef is a very variable environment and Reef Check alone is not sufficient to provide a complete picture of reef health. We should keep in mind that our results are just a momentary snapshot of the reality of these marvellous coral reef ecosystems.
For example, at Marsa Shagra house reef alone we have listed and photographed 224 fish species of 58 families (see **www.marsa-alam.org, www.fishbase.org**). Therefore, we are also working with other monitoring methods at the dive sites of RSDS, e.g. Coral Point Count and species lists for fish, invertebrates and corals. Furthermore, a large amount of data is needed to make any significant conclusions. Reef Check can act as an early warning system for major threats such as overfishing and poaching, coral bleaching, COTS outbreaks, as well as eutrophication and sedimentation.
The next Reef Check EcoDiver courses are scheduled for 2013, for further information please visit: **www.redsea-divingsafari.org** and **www.reefcheck.de**