MIDEAST CORAL REEF SOCIETY (MCRS)

NEWSLETTER

Mideast Coral Reef Society

Issue 4 April 2016

Our Goals

- Promote collaboration among researchers
- Promote Knowledge Exchange with stakeholders outside academia
- Generate a deep understanding of Middle Eastern coral ecosystems
- Promote their conservation and sustainable use

Inside this issue:

Editorial

Welcome to *Mideast Coral Reef Society's* (MCRS) 4th newsletter.

In February 2015, a large number of international experts and regional stakeholders, including a high number of MCRS members met at the "*Coral Reefs of Arabia*" conference in Abu Dhabi. The meeting facilitated new collaborations and gave important impulses to research in the Middle East.

As a result of these efforts, 26 papers were contributed to the special issue "*Coral Reefs of Arabia*" that just came out in "*Marine Pollution Bulletin*". We take the opportunity to mark this event and dedicate the present MCRS newsletter to the contents of this landmark publication.

We thank Prof. Charles Sheppard and his team for the support and for offering a prestigious platform for research specifically focused on reefs of the Middle East.

"*Coral Reefs of Arabia*" covers an exciting breadth of topics which provide a significant boost to our understanding of the coral ecosystems of the region.

Papers on abiotic conditions and the oceanographic characteristics of Arabian reefs provide a background helpful to understand other contributions that analyze how the reefs and the associated biodiversity responded to natural and anthropogenic stress leading to the decline of many coral ecosystems over the recent years and decades. Importantly, recommendations are provided how to halt and hopefully reverse this trend by knowledge-based environmental management. We hope you enjoy these papers as much as we did!

With best wishes,

Prof. J. Burt

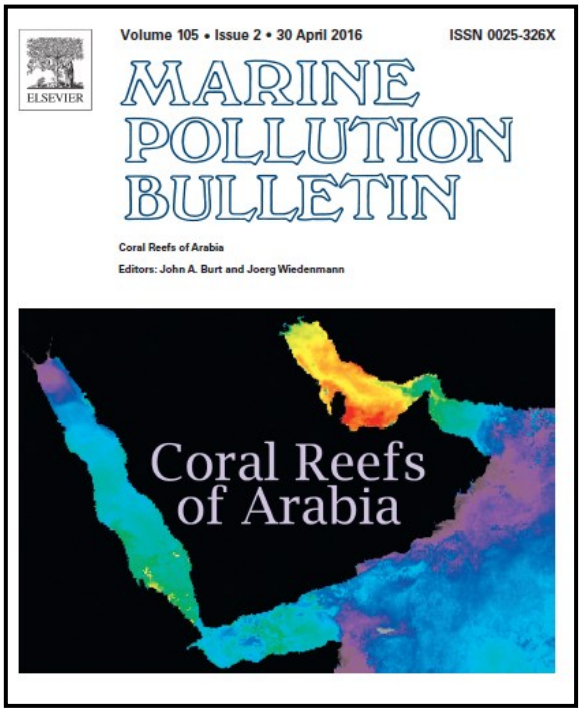
Prof J. Wiedenmann

Several papers of the special issue are open access and can be downloaded for free. If you have difficulties to access a paper - simply email the author - their address is provided on the journal webpage within the link under each paper !

Right: Front Cover

Marine Pollution Bulletin Volume 105, Issue 2, Pages 441-676 (30 April 2016). Coral Reefs of Arabia. Edited by John A. Burt and Joerg Wiedenmann.

Weblink: http://www.sciencedirect.com/science/journal/0025326X/72



Join us!

If you are interested in the MCRS Initiative you can become a member and subscribe to receive the 6-monthly newsletter in our webpage http://mideastcrs.org/

We welcome contributions about meetings and conferences relevant to the Mideast Coral Reef Society (MCRS), as well as outreach events and links to recent publications.

Vaughan GO and Burt JA (2016) The changing dynamics of coral reef science in Arabia. Marine Pollution Bulletin 105:441-458. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.10.052

Six percent of the world's coral reefs occur around the Arabian Peninsula, providing a valuable ecological, economic and scientific resource for the nations bordering its shores. We provide the first region-wide assessment of the current status and historical trends in coral reef research, focusing on research in the Red Sea, Arabian Sea, and Arabian Gulf. In total, 633 regional reef publications have been produced since the 1930s, covering a wide variety of themes and taxa. Our results show a great deal of commonality in regional reef research, but also highlight important differences in research among the various seas as well as knowledge gaps that represent opportunities for future research. A regionally-integrated approach to future research is essential. There is a growing need for large-scale research to guide management of reefs and their stressors, as these operate at much larger scales than the national borders within which most research currently occurs.

Bauman AG, Dunshea G, Feary DA and Hoey AS (2016) Prickly business: abundance of sea urchins on breakwaters and coral reefs in Dubai. Marine Pollution Bulletin 105:459-465. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.026

Echinometra mathaei is a common echinoid on tropical reefs and where abundant plays an important role in the control of algal communities. Despite high prevalence of E. mathaei on southern Persian/Arabian Gulf reefs, their abundance and distribution is poorly known. Spatial and temporal patterns in population abundance were examined at 12 sites between breakwater and natural reef habitats in Dubai (UAE) every 3 months from 2008 to 2010. Within the breakwater habitat, densities were greatest at shallow wave-exposed sites, and reduced with both decreasing wave-exposure and increasing depth. Interestingly, E. mathaei were significantly more abundant on exposed breakwaters than natural reef sites, presumably due to differences in habitat structure and benthic cover. Population abundances differed seasonally, with peak abundances during summer (July–September) and lower abundances in winter (December–February). Seasonal fluctuations are likely the result of peak annual recruitment pulses coupled with increased fish predation from summer to winter.

Bento R, Hoey AS, Bauman AG, Feary DA and Burt JA (2016) The implications of recurrent disturbances within the world's hottest coral reef. Marine Pollution Bulletin 105:466-472. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.10.006

Determining how coral ecosystems are structured within extreme environments may provide insights into how coral reefs are impacted by future climate change. Benthic community structure was examined within the Persian Gulf, and adjacent Musandam and northern Oman regions across a 3-year period (2008–2011) in which all regions were exposed to major disturbances. Although there was evidence of temporal switching in coral composition within regions, communities predominantly reflected local environmental conditions and the disturbance history of each region. Gulf reefs showed little change in coral composition, being dominated by stress-tolerant Faviidae and Poritidae across the 3 years. In comparison, Musandam and Oman coral communities were comprised of stress-sensitive Acroporidae and Pocilloporidae; Oman communities showed substantial declines in such taxa and increased cover of stress-tolerant communities. Our results suggest that coral communities may persist within an increasingly disturbed future environment, albeit in a much more structurally simple configuration.

Burt JA, Smith EG, Warren C and Dupont J (2016) An assessment of Qatar's coral communities in a regional context. Marine Pollution Bulletin 105:473-479. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.09.025

Qatar's once extensive coral communities have undergone considerable change in recent decades. We quantitatively surveyed three coral assemblages in Qatar to assess current status, and compared these against 14 sites in Bahrain and the United Arab Emirates to evaluate Qatar in a larger biogeographic context. Umm Al-Arshan had the highest species richness of 17 sites examined in the southern Arabian Gulf, as well as the highest coral cover and the only Acropora observed on sites in Qatar. Coral cover and richness were more modest at Fuwayrit and Al-Ashat, reflecting greater impacts from earlier stress events. Two distinct communities were identified across the southern Gulf, with Umm Al-Arshan clustering with high-cover, mixed merulinid/poritid assemblages that were less impacted by earlier bleaching and long-term stress, while Fuwayrit and Al-Ashat grouped with a lower-cover, stress-tolerant community characteristic of more extreme environments in the southern Gulf. We recommend implementation of a nation-wide baseline assessment of coral communities to guide development of an MPA network and long-term coral monitoring program for Qatar.

Buchanan JR, Krupp F, Burt JA, Feary DA, Ralph GM and Carpenter KE (2016) Living on the edge: Vulnerability of coral-dependent fishes in the Gulf. Marine Pollution Bulletin 105:480-488. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.033

In the Gulf, multiple human impacts and recurrent bleaching events have resulted in serious declines of coral assemblages, particularly in near-shore areas. However, the degree to which the extinction risk of coral-dependent fishes is impacted by these coral declines has been uncertain. Using primary literature and expert knowledge, coral-dependent fishes of the Gulf were identified and species-specific data on the regional distribution, population status, life history characteristics, and major threats were compiled to determine their likelihood of extinction under the IUCN Red List of Threatened Species' Categories and Criteria. Due to the limited area and degraded and fragmented nature of coral assemblages in the Gulf, all coral-dependent fishes (where data was sufficient to assess) were listed at elevated risk of extinction. Cross-boundary collaboration among Gulf States is necessary for effective management and protection of coral assemblages and their associated communities within this globally important region.

Cavalcante GH, Feary DA and Burt JA (2016) The influence of extreme winds on coastal oceanography and its implications for coral population connectivity in the southern Arabian Gulf. Marine Pollution Bulletin 105:489-497. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.10.031

Using long-term oceanographic surveys and a 3-D hydrodynamic model we show that localized peak winds (known as shamals) cause fluctuation in water current speed and direction, and substantial oscillations in sea-bottom salinity and temperature in the southern Persian/Arabian Gulf. Results also demonstrate that short-term shamal winds have substantial impacts on oceanographic processes along the southern Persian/Arabian Gulf coastline, resulting in formation of large-scale (52 km diameter) eddies extending from the coast of the United Arab Emirates (UAE) to areas near the off-shore islands of Iran. Such eddies likely play an important role in transporting larvae from well-developed reefs of the off-shore islands to the degraded reef systems of the southern Persian/ Arabian Gulf, potentially maintaining genetic and ecological connectivity of these geographically distant populations and enabling enhanced recovery of degraded coral communities in the UAE.

Burt JA, Coles S, van Lavieren H, Taylor O, Looker E and Samimi-Namin K (2016) Oman's coral reefs: A unique ecosystem challenged by natural and man-related stresses and in need of conservation. Marine Pollution Bulletin 105:498-506. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.010

Oman contains diverse and abundant reef coral communities that extend along a coast that borders three environmentally distinct water bodies, with corals existing under unique and often stressful environmental conditions. In recent years Oman's reefs have undergone considerable change due to recurrent predatory starfish outbreaks, cyclone damage, harmful algal blooms, and other stressors. In this review we summarize current knowledge of the biology and status of corals in Oman, particularly in light of recent stressors and projected future threats, and examine current reef management practices. Oman's coral communities occur in marginal environmental conditions for reefs, and hence are quite vulnerable to anthropogenic effects. We recommend a focus on developing conservation-oriented coral research to guide proactive management and expansion of the number and size of designated protected areas in Oman, particularly those associated with critical coral habitat.

Erpenbeck D, Voigt O, Al-Aidaroos AM, Berumen ML, Büttner G, Catania D, Guirguis AN, Paulay G, Schätzle S and Wörheide G (2016) Molecular biodiversity of Red Sea demosponges. Marine Pollution Bulletin 105:507-514. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.12.004

Sponges are important constituents of coral reef ecosystems, including those around the Arabian Peninsula. Despite their importance, our knowledge on demosponge diversity in this area is insufficient to recognize, for example, faunal changes caused by anthropogenic disturbances. We here report the first assessment of demosponge molecular biodiversity from Arabia, with focus on the Saudi Arabian Red Sea, based on mitochondrial and nuclear ribosomal molecular markers gathered in the framework of the Sponge Barcoding Project. We use a rapid molecular screening approach on Arabian demosponge collections and analyze results in comparison against published material in terms of biodiversity. We use a variable region of 28S rDNA, applied for the first time in the assessment of demosponge molecular diversity. Our data constitutes a solid foundation for a future more comprehensive understanding of sponge biodiversity of the Red Sea and adjacent waters.

Grizzle RE, Ward KM, AlShihi RMS and Burt JA (2016) Current status of coral reefs in the United Arab Emirates: Distribution, extent, and community structure with implications for management. Marine Pollution Bulletin 105:515-523. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.10.005

Coral reefs of the United Arab Emirates were once extensive, but have declined dramatically in recent decades. Marine management and policy have been hampered by outdated and inaccurate habitat maps and habitat quality information. We combined existing recent datasets with our newly mapped coral habitats to provide a current assessment of nation-wide extent, and performed quantitative surveys of communities at 23 sites to assess coral cover and composition. Over 132 km2 of coral habitat was mapped, averaging 28.6 ± 3.8% live coral cover at surveyed sites. In the Arabian Gulf low cover, low richness Porites dominated communities characterized western Abu Dhabi, while reefs northeast of Abu Dhabi city generally contained higher richness and cover, and were dominated by merulinids (formerly faviids). Distinct communities occur in the Sea of Oman, where cover and richness were low. We provide management recommendations to enhance conservation of vulnerable coral reefs in the UAE.

Hoey AS, Feary DA, Burt JA, Vaughan G, Pratchett MS and Berumen ML (2016) Regional variation in the structure and function of parrotfishes on Arabian reefs. Marine Pollution Bulletin 105:524-531. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.035

Parrotfishes (f. Labridae) are a unique and ubiquitous group of herbivorous reef fishes. We compared the distribution and ecosystem function (grazing and erosion) of parrotfishes across 75 reefs in Arabia. Our results revealed marked regional differences in the abundance, and taxonomic and functional composition of parrotfishes between the Red Sea, Arabian Sea, and Arabian Gulf. High densities and diversity of parrotfishes, and high rates of grazing (210% year− 1) and erosion (1.57 kg m− 2 year− 1) characterised Red Sea reefs. Despite Arabian Sea and Red Sea reefs having broadly comparable abundances of parrotfishes, estimates of grazing (150% year− 1) and erosion (0.43 kg m− 2 year− 1) were markedly lower in the Arabian Sea. Parrotfishes were extremely rare within the southern Arabian Gulf, and as such rates of grazing and erosion were negligible. This regional variation in abundance and functional composition of parrotfishes appears to be related to local environmental conditions.

Howells EJ, Ketchum RN, Bauman AG, Mustafa Y, Watkins KD and Burt JA (2016) Species-specific trends in the reproductive output of corals across environmental gradients and bleaching histories. Marine Pollution Bulletin 105:532-539. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.034

Coral populations in the Persian Gulf have a reputation for being some of the toughest in the world yet little is known about the energetic constraints of living under temperature and salinity extremes. Energy allocation for sexual reproduction in Gulf corals was evaluated relative to conspecifics living under milder environmental conditions in the Oman Sea. Fecundity was depressed at Gulf sites in two Indo-Pacific merulinid species (Cyphastrea microphthalma and Platygyra daedalea) but not in a regionally endemic acroporid (Acropora downingi). Gulf populations of each species experienced high temperature bleaching at the onset of gametogenesis in the study but fecundity was only negatively impacted in P. daedalea and A. downingi. Large population sizes of C. microphthalma and P. daedalea in the Gulf are expected to buffer reductions on colony-level fecundity. However, depleted population sizes of A. downingi at some Gulf sites equate to low reef-wide fecundity and likely impede outcrossing success.

Ketchum RN, Dieng MM, Vaughan GO, Burt JA and Idaghdour Y (2016) Levels of genetic diversity and taxonomic status of Epinephelus species in United Arab Emirates fish markets. Marine Pollution Bulletin 105:540-545. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.042

Understanding the patterns of genetic diversity of fish species is essential for marine conservation and management. This is particularly important in the Arabian Gulf where marine life is subject to extreme environmental conditions that could impact genetic diversity. Here we assess genetic diversity of the most commercially important fish in the United Arab Emirates; groupers (Epinephelus spp.). Sequencing of 973 bp mitochondrial DNA from 140 tissue samples collected in four main fish markets revealed 58 haplotypes clustered within three groups. Data analysis revealed the presence of three distinct Epinephelus species being marketed as one species (hammour): Epinephelus coioides, Epinephelus areolatus and Epinephelus bleekeri. We report species-specific genetic markers and demonstrate that all three species exhibit relatively low levels of genetic variation, reflecting the effect of overfishing and environmental pressures. In light of the genetic evidence presented here, conservation and management of groupers in the UAE warrant the implementation of species-specific measures.

Lozano-Cortés DF and Berumen ML (2016) Colony size-frequency distribution of pocilloporid juvenile corals along a natural environmental gradient in the Red Sea. Marine Pollution Bulletin 105:546-552. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.10.051

Coral colony size-frequency distributions can be used to assess population responses to local environmental conditions and disturbances. In this study, we surveyed juvenile pocilloporids, herbivorous fish densities, and algal cover in the central and southern Saudi Arabian Red Sea. We sampled nine reefs with different disturbance histories along a north–south natural gradient of physicochemical conditions (higher salinity and wider temperature fluctuations in the north, and higher turbidity and productivity in the south). Since coral populations with negatively skewed size-frequency distributions have been associated with unfavorable environmental conditions, we expected to find more negative distributions in the southern Red Sea, where corals are potentially experiencing suboptimal conditions. Although juvenile coral and parrotfish densities differed significantly between the two regions, mean colony size and size-frequency distributions did not. Results suggest that pocilloporid colony size-frequency distribution may not be an accurate indicator of differences in biological or oceanographic conditions in the Red Sea.

Noori Koupaei A, Dehghani H, Mostafavi PG and Mashini AG (2016) Phylogeny of Symbiodinium populations in zoantharians of the northern Persian Gulf. Marine Pollution Bulletin 105:553-557. doi: http://dx.doi.org/10.1016/j.marpolbul.2016.02.058

Zoantharians of the Persian Gulf (PG) experience periods of anomalous high temperature, irradiance and desiccation. Their survival largely relies on the symbiotic relationship with single celled dinoflagellates of the genus Symbiodinium. However, the phylogeny of symbionts of zoantharians has not been investigated in the region. In this study, the second internal transcribed spacer region of ribosomal DNA (ITS2) was used to recognize in hospite populations of Symbiodinium in Palythoa aff. mutuki, Palythoa tuberculosa and Zoanthus sansibaricus colonies from Hengam, Kish, Larak, and Qeshm Islands, in the PG. The results showed subclade D1–4 and a variant of A1, were the most prevalent subclades of Symbiodinium. Predominance of stress tolerant subclade D1–4 and putatively radiation tolerant variant of A1 of Symbiodinium in zoantharian species might suggest an adaptation strategy to the extreme physical environment of the PG.

Roberts MB, Jones GP, McCormick MI, Munday PL, Neale S, Thorrold S, Robitzch VSN and Berumen ML (2016) Homogeneity of coral reef communities across 8 degrees of latitude in the Saudi Arabian Red Sea. Marine Pollution Bulletin 105:558-565. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.024

Coral reef communities between 26.8°N and 18.6°N latitude in the Saudi Arabian Red Sea were surveyed to provide baseline data and an assessment of fine-scale biogeography of communities in this region. Forty reefs along 1100 km of coastline were surveyed using depth-stratified visual transects of fish and benthic communities. Fish abundance and benthic cover data were analyzed using multivariate approaches to investigate whether coral reef communities differed with latitude. A total of 215 fish species and 90 benthic categories were recorded on the surveys. There were no significant differences among locations in fish abundance, species richness, or among several diversity indices. Despite known environmental gradients within the Red Sea, the communities remained surprisingly similar. The communities do, however, exhibit subtle changes across this span of reefs that likely reflect the constrained distributions of several species of reef fish and benthic fauna.

Robitzch VSN, Lozano-Cortés D, Kandler NM, Salas E and Berumen ML (2016) Productivity and sea surface temperature are correlated with the pelagic larval duration of damselfishes in the Red Sea. Marine Pollution Bulletin 105:566-574. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.045

We examined the variation of pelagic larval durations (PLDs) among three damselfishes, Dascyllus aruanus, D. marginatus, and D. trimaculatus, which live under the influence of an environmental gradient in the Red Sea. PLDs were significantly correlated with latitude, sea surface temperature (SST), and primary production (CHLA; chlorophyll a concentrations). We find a consistent decrease in PLDs with increasing SST and primary production (CHLA) towards the southern Red Sea among all species. This trend is likely related to higher food availability and increased metabolic rates in that region. We suggest that food availability is a potentially stronger driver of variation in PLD than temperature, especially in highly oligotrophic regions. Additionally, variations in PLDs were particularly high among specimens of D. marginatus, suggesting a stronger response to local environmental differences for endemic species. We also report the first average PLD for this species over a broad geographic range (19.82 ± 2.92 days).

Rowlands G, Purkis S and Bruckner A (2016) Tight coupling between coral reef morphology and mapped resilience in the Red Sea. Marine Pollution Bulletin 105:575-585. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.027

Lack of knowledge on the conservation value of different reef types can stymie decision making, and result in less optimal management solutions. Addressing the information gap of coral reef resilience, we produce a map-based Remote Sensed Resilience Index (RSRI) from data describing the spatial distribution of stressors, and properties of reef habitats on the Farasan Banks, Saudi Arabia. We contrast the distribution of this index among fourteen reef types, categorized on a scale of maturity that includes juvenile (poorly aggraded), mature (partially aggraded), and senile (fully aggraded) reefs. Sites with high reef resilience can be found in most detached reef types; however they are most common in mature reefs. We aim to stimulate debate on the coupling that exists between geomorphology and conservation biology, and consider how such information can be used to inform management decisions.

Jafari MA, Seyfabadi J and Shokri MR (2016) Internal bioerosion in dead and live hard corals in intertidal zone of Hormuz Island (Persian Gulf). Marine Pollution Bulletin 105:586-592. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.048

Internal macrobioeroders and their erosion rate in three live and dead coral genera (Favia, Platygyra and Porites) from the intertidal zone of the Hormuz Island were studied by collecting five live and five dead colonies from each genus, from which 4 mm cross-sections were cut and photographed. Photos were analyzed using the Coral Point Count with Excel extensions. Totally, 9 taxa were identified: four bivalve species, one sponge, three polychaetes, and one barnacle. Bioerosion rate did not significantly differ among the three live corals, but among the dead ones only Porites was significantly more eroded than Favia. Sponge had the highest role in the erosion of the dead Platygyra, while barnacles were the most effective eroding organism in the live Platygyra. Polychaetes, followed by bivalves, were the most destructive bioeroders on the dead and live Porites. Further, none of the bioeroding organisms had selectively chosen either the dead or live Favia.

Sheppard C (2016) Coral reefs in the Gulf are mostly dead now, but can we do anything about it? Marine Pollution Bulletin 105:593-598. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.09.031

This article discusses two key issues: firstly, the demise of reefs in the Gulf which is happening probably more rapidly than elsewhere; and secondly, the reasons why this remains such an intractable problem. Most reasons for this decline are scientifically well understood, though clearly not by the region's managers. Several factors may cause people to ignore the problem, even though habitat loss is vastly costly to the region. About 70% of the Gulf's reefs have essentially disappeared in a few decades, and although scientific indicators confirm that this is happening, it is commonly discounted as even being a possibility. Management of human interactions with the Gulf's marine systems remains very inadequate, to the detriment of the Gulf's marine systems and its people. It is clear that this not a scientific issue any longer but rather it is a political problem and failure.

Ghazilou A, Shokri MR and Gladstone W (2016) Coral reef fish assemblages along a disturbance gradient in the northern Persian Gulf: A seasonal perspective. Marine Pollution Bulletin 105:599-605. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.10.050

Seasonal dynamics of coral reef fish assemblages were assessed along a gradient of potential anthropogenic disturbance in the Northern Persian Gulf. Overall, the attributes of coral reef fish assemblages showed seasonality at two different levels: seasonal changes irrespective of the magnitude of disturbance level (e.g. species richness), and seasonal changes in response to disturbance level (e.g. total abundance and assemblage composition). The examined parameters mostly belonged to the second group, but the interpretation of the relationship between patterns of seasonal changes and the disturbance level was not straightforward. The abundance of carnivorous fishes did not vary among seasons. SIMPER identified the family Nemipteridae as the major contributor to the observed spatiotemporal variations in the composition of coral reef fish assemblages in the study area.

Ghazilou A, Shokri MR and Gladstone W (2016) Application of baited remote underwater video stations to assess benthic coverage in the Persian Gulf. Marine Pollution Bulletin 105:606-612. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.09.034

A baited remote underwater video station (BRUVS) is generally considered an appropriate sampling tool for fish. The applicability of BRUVS to determine the substrate coverage was assessed by comparing stills from BRUVS videos to traditional point intercept transect (PIT) data to estimate percentage cover (PC) of different benthic substrate categories. Mean PCs of hard corals, rock, sand, and coral growth forms yielded statistically identical values with the two survey methods, while PCs of motile epibenthic invertebrates were underestimated by BRUVS in areas of both high and moderate relief. Yet, multivariate analyses revealed that the two methods yield similar substrate assemblage in an area of moderate relief. Results of our study suggest that the BRUVS can be effectively used to quantify both the presence/absence of a basic set of benthic habitat characteristics and diversity of coral growth forms on coral reefs in the Persian Gulf.

Hassan Ali MK, Belluscio A, Ventura D and Ardizzone G (2016) Feeding ecology of some fish species occurring in artisanal fishery of Socotra Island (Yemen). Marine Pollution Bulletin 105:613-628. doi: http://dx.doi.org/10.1016/j.marpolbul.2016.01.051

The demersal species Lethrinus borbonicus, Lethrinus mahsena, Lethrinus microdon, Lethrinus nebulosus, Lutjanus bohar, Lutjanus gibbus, Lutjanus kasmira, Epinephelus fasciatus, Epinephelus stoliczkae, Carangoides gymnostethus and Euthynnus affinis are important coastal fishes species of the northern coast of Socotra (Yemen), exploited by local fishery. The biology and feeding ecology of these species are poorly known in the area. A total of 1239 specimens were sampled from the main fishing landing site of the island (Hadibo). Total length and weight were measured, stomach contents were analyzed, diet overlap, Fulton's Condition index, and trophic levels were estimated. C. gymnostethus, L. microdon and L. kasmira occupied the highest position (T = 4.50), L. nebulosus occupied the lower one (TL = 3.41). The role of the increasing abundance of small pelagic fish in the diet of many species after the upwelling event is evident, but also different feeding strategies are reported, according to fish ecology.

Ziegler M, Roik A, Porter A, Zubier K, Mudarris MS, Ormond R and Voolstra CR (2016) Coral microbial community dynamics in response to anthropogenic impacts near a major city in the central Red Sea. Marine Pollution Bulletin 105:629-640. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.12.045

Coral-associated bacteria play an increasingly recognized part in coral health. We investigated the effect of local anthropogenic impacts on coral microbial communities on reefs near Jeddah, the largest city on the Saudi Arabian coast of the central Red Sea. We analyzed the bacterial community structure of water and corals (Pocillopora verrucosa and Acropora hemprichii) at sites that were relatively unimpacted, exposed to sedimentation & local sewage, or in the discharge area of municipal wastewaters. Coral microbial communities were significantly different at impacted sites: in both corals the main symbiotic taxon decreased in abundance. In contrast, opportunistic bacterial families, such as e.g. Vibrionaceae and Rhodobacteraceae, were more abundant in corals at impacted sites. In conclusion, microbial community response revealed a measurable footprint of anthropogenic impacts to coral ecosystems close to Jeddah, even though the corals appeared visually healthy.

Warren C, Dupont J, Abdel-Moati M, Hobeichi S, Palandro D and Purkis S (2016) Remote sensing of Qatar nearshore habitats with perspectives for coastal management. Marine Pollution Bulletin 105:641-653. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.036

A framework is proposed for utilizing remote sensing and ground-truthing field data to map benthic habitats in the State of Qatar, with potential application across the Arabian Gulf. Ideally the methodology can be applied to optimize the efficiency and effectiveness of mapping the nearshore environment to identify sensitive habitats, monitor for change, and assist in management decisions. The framework is applied to a case study for northeastern Qatar with a key focus on identifying high sensitivity coral habitat. The study helps confirm the presence of known coral and provides detail on a region in the area of interest where corals have not been previously mapped. Challenges for the remote sensing methodology associated with natural heterogeneity of the physical and biological environment are addressed. Recommendations on the application of this approach to coastal environmental risk assessment and management planning are discussed as well as future opportunities for improvement of the framework.

Shuail D, Wiedenmann J, D'Angelo C, Baird AH, Pratchett MS, Riegl B, Burt JA, Petrov P and Amos C (2016) Local bleaching thresholds established by remote sensing techniques vary among reefs with deviating bleaching patterns during the 2012 event in the Arabian/Persian Gulf. Marine Pollution Bulletin 105:654-659. doi: http://dx.doi.org/10.1016/j.marpolbul.2016.03.001

A severe bleaching event affected coral communities off the coast of Abu Dhabi, UAE in August/September, 2012. In Saadiyat and Ras Ghanada reefs ~ 40% of the corals showed signs of bleaching. In contrast, only 15% of the corals were affected on Delma reef. Bleaching threshold temperatures for these sites were established using remotely sensed sea surface temperature (SST) data recorded by MODIS-Aqua. The calculated threshold temperatures varied between locations (34.48 °C, 34.55 °C, 35.05 °C), resulting in site-specific deviations in the numbers of days during which these thresholds were exceeded. Hence, the less severe bleaching of Delma reef might be explained by the lower relative heat stress experienced by this coral community. However, the dominance of Porites spp. that is associated with the long-term exposure of Delma reef to elevated temperatures, as well as the more pristine setting may have additionally contributed to the higher coral bleaching threshold for this site.

Zajonz U, Lavergne E, Klaus R, Krupp F, Aideed MS and Saeed FN (2016) The coastal fishes and fisheries of the Socotra Archipelago, Yemen. Marine Pollution Bulletin 105:660-675. doi: http://dx.doi.org/10.1016/j.marpolbul.2015.11.025

The Socotra Archipelago is situated in the Gulf of Aden where tropical and “pseudo-temperate” conditions combine to create a unique marine ecosystem. The diversity, ecology, productivity and fisheries of the coastal fish assemblages are still relatively understudied and no update of the scientific knowledge existed. The islands support unique coastal and coral-associated fish assemblages in spite of the limited biogenic reef frameworks. Fish diversity is the highest among comparable Arabian eco-regions, and fish biomass productivity high too by Indian Ocean standards. The production of the once traditionally-managed small-scale fishery is severely declining and whether it is sustainable nowadays is extremely doubtful. At a time when Yemen is torn apart by a severe political and humanitarian crisis it is timely to review and update the current state of knowledge for scientists and managers, and thereby ease access to existing information, facilitating follow-on studies and evidence-based conservation and fisheries management.

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Recent Publications of MCRS members

Benjamin C. C. Hume, Christian R. Voolstra, Chatchanit Arif, Cecilia D'Angelo, John A. Burt, Gal Eyal, Yossi Loya, and Jörg Wiedenmann. **Ancestral genetic diversity associated with the rapid spread of stress-tolerant coral symbionts in response to Holocene climate change**. *PNAS*, 2016 DOI: 10.1073/pnas.1601910113

Coral communities in the Persian/Arabian Gulf (PAG) withstand unusually high salinity levels and regular summer temperature maxima of up to ~35 °C that kill conspecifics elsewhere. Due to the recent formation of the PAG and its subsequent shift to a hot climate, these corals have had only <6,000 y to adapt to these extreme conditions and can therefore inform on how coral reefs may respond to global warming. One key to coral survival in the world's warmest reefs are symbioses with a newly discovered alga, *Symbiodinium thermophilum*. Currently, it is unknown whether this symbiont originated elsewhere or emerged from unexpectedly fast evolution catalyzed by the extreme environment. Analyzing genetic diversity of symbiotic algae across >5,000 km of the PAG, the Gulf of Oman, and the Red Sea coastline, we show that *S. thermophilum* is a member of a highly diverse, ancient group of symbionts cryptically distributed outside the PAG. We argue that the adjustment to temperature extremes by PAG corals was facilitated by the positive selection of preadapted symbionts. Our findings suggest that maintaining the largest possible pool of potentially stress-tolerant genotypes by protecting existing biodiversity is crucial to promote rapid adaptation to present-day climate change, not only for coral reefs, but for ecosystems in general.

Red Sea reef biodiversity (Image credit: Anna Roik, KAUST)

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Contributions are invited to the newsletter via email. Potential news can be references of publications in the interest areas of the MCRS Initiative, descriptions of research projects, job advertisements, etc. We cannot guarantee that all contributions can be accepted and we reserve the right to shorten contents.
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