

教育部補助大專校院延攬國際頂尖人才執行成果簡介

請依下列標題提供中英文版本，影音、照片及檔案若無，可免填。***為必填。**

*標題	<p>Spatial patterns of essential fish habitats in the western Taiwan coast. 台灣西部海岸魚類重要棲地</p>
*計畫成果簡述	<p>We analyzed trawl survey data collected twice a year over 11 coastal sites across western and southwestern Taiwan along a north-south axis from 2020 to 2023. We recommend prioritizing the protection of croakers (Sciaenidae) as they may be particularly vulnerable to global warming and coastal development due to their preference for cold, shallow waters. This study is published in a SCI journal <i>Estuarine, Coastal and Shelf Science</i></p> <p>團隊分析過去四年中山大學利用新海研三號研究船之拖網調查資料，發現不同魚類有不同的空間分布趨勢，而且發現石首魚科的魚類喜好低溫深水的水域，因此可能在未來氣候變遷下會有較高的敏感度，因此建議石首魚應有優先進行保育。此研究已發表在“<i>Estuarine, Coastal and Shelf Science</i>”。</p>
*成果說明	<p>Habitat conservation can substantially enhance the resilience of coastal ecosystems to both anthropogenic pressure and global climate change. We analyzed trawl survey data collected twice a year over 11 coastal sites across western and southwestern Taiwan along a north-south axis from 2020 to 2023. This analysis allowed us to identify essential fish habitats with higher fish abundances and set management objectives and designate protected areas. We applied a generalized additive model to reveal the spatial patterns of environmental parameters, the univariate fish community index (e.g., species richness, diversity), and the abundance of the top 13 fish families. We applied a generalized linear latent variable model to isolate the effects of environmental parameters on the multivariate abundances of fish families. Significant north-south patterns were detected for the abundances of the 13 fish families, indicating that different coastal areas of western Taiwan serve as essential fish habitats. The varying north-south patterns among fish families suggest that different areas serve as essential fish habitats for different families. Different</p>

	<p>responses of fish family abundances to environmental parameters provide information for predicting how coastal development and future climate change might alter fish community composition. This information is crucial for developing effective conservation strategies. Our results can inform the development of ecological objectives and priorities for coastal development and conservation strategies. We recommend prioritizing the protection of croakers (Sciaenidae) as they may be particularly vulnerable to global warming and coastal development due to their preference for cold, shallow waters.</p>	
成果影音	成果影音標題	https://www.cna.com.tw/news/ahel/202504240070.aspx
	Youtube網址	https://www.youtube.com/watch?v=_Z6Z70OcM3M
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*標題	Decreases in pH from effluent had a devastating but reversible impact on the coastal plankton communities. 廢水所造成的酸度增加會導致浮游生物聚落毀滅性但可逆的影響	
*計畫成果簡述	We found serious declines in the abundances of all plankton group because of the low pH, and it went back to the normal levels as pH bounced back, further indicating that the negative impacts of decreases in pH on the marine plankton communities were reversible. This study is published in a SCI journal <i>Marine Pollution Bulletin</i> 團隊分析台灣西海岸之長期浮游生物時間序列，發現 pH 下降會對浮游生物所有大類都有毀滅性的影響。隨著 pH 回復原本水準，浮游生物豐度也隨之回復，顯示此影響應為可逆。此研究已發表在 SCI 國際期刊 " Marine Pollution Bulletin" 。	
*成果說明	An event of releasing untreated effluent caused serious decreases in surface seawater pH from 8.1 to lower than 7.5 in seven years and increased back to prior levels after 15 years. It gives us a rare natural experiment to examine the impacts of decreases in pH on the marine plankton communities (phytoplanktons, zooplanktons, shrimp larvae, crab larvae, fish eggs, and larvae) in the natural environment. Observed decreases in pH had a nonlinear effect ubiquitous on all plankton groups, leading to a reduction of approximately 50 % in their density and abundance compared to the level at pH 8.1. Non-linear responses of planktons implied the existence of specific groups more robust to decreases in pH. As pH bounced back to normal levels, the density and abundance of the plankton communities also recovered, further indicating that the negative impacts of decreases in pH on the marine plankton communities were reversible.	
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*標題	<p>Life history traits and abundance trends of emperor fish <i>Lethrinus nebulosus</i> and <i>L. lentjan</i> (Teleostei: Lethrinidae) in the western Arabian Gulf.</p> <p>阿拉伯灣西部青嘴龍占及紅耳龍占之生活史參數及豐度趨勢</p>
*計畫成果簡述	<p>The team compared the life history traits and abundance of two emperor species from the western Arabian Gulf. We found that the abundance trends were not affected by the life history traits, but rather by the coral reef ecosystem. This study is published in a SCI journal <i>Regional Studies in Marine Science</i></p> <p>團隊分析了兩種龍占魚類生活史參數並比較其長期豐度指標，結果發現生活史策略似乎對於龍占長期豐度影響較小，而比較與珊瑚礁健康系有關。此研究已發表在 SCI 國際期刊 “ Regional Studies in Marine Science” 。</p>
*成果說明	<p>Overexploitation and habitat loss are the two most important threats that cause the losses of marine populations. The understanding of the relationships between life histories and vulnerability to overexploitation could provide the basis for predicting possible trajectories of abundance under increasing levels of fishing pressure. The spangled emperor <i>Lethrinus nebulosus</i> and the pink ear emperor <i>Lethrinus lentjan</i> are the most important species contributing to the landings of the western Arabian Gulf. In this study, we integrated multiple surveys to provide information about life history traits, spatial distributions, and fisheries-dependent and independent abundance indexes from 1997 to 2015 and tested the hypothesis that the species of higher vulnerability more likely exhibited a declining population trend. Both species have experienced an increase of 100 % in fishing exploitation pressure since 1997, and <i>L. nebulosus</i> is expected to exhibit a declining population more likely based on the life history traits and other vulnerability indexes. However, we did not observe declines in fisheries-dependent and -independent population indexes of <i>L. nebulosus</i>, which might be due to its preference of residing in the northern areas where high numbers of oil-gas facility patchworks are installed and fishing activities are much restricted. The fisheries-dependent abundance index of <i>L. lentjan</i> from the large boats significantly correlated with the abundance index from the coral reef monitoring. Information</p>

	included in this study can be used for fisheries stock assessment models in the future and we recommended that the emperor fisheries could benefit from the conservation of the coral reefs.	
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*標題	Long-term monitoring dataset of plankton assemblages in western Taiwan coastal water. 台灣西海岸之浮游生物長期觀測資料	
*計畫成果簡述	The team shared the long-term monitoring data for the plankton assemblages for around three decades. This study is published in a SCI journal <i>Scientific Data</i> 團隊將過去29年對於台灣西部沿海地區浮游生物觀測資料整理後，並公布於開放資料期刊，望能吸引更多相關研究機關研究。已發表在SCI 國際期刊 “ Scientific Data” 。	
*成果說明	Plankton plays important roles in the marine ecosystems as important producers for primary production, major components in the global biogeochemical cycles, and the foundation of the marine food web. Despite their importance, long-term monitoring data about marine plankton are fairly limited, especially in the Asia-Pacific region. We fill this knowledge gap by providing a 29-year long-term monitoring data on the coastal areas of western Taiwan quarterly from 1993 to 2021. This long-term monitoring data can be used to set proper baseline for detecting human-induced impacts on the plankton, as well as modelling future scenarios under global changes.	
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*標題	Resource use by <i>Sphyrna mokarran</i> and <i>S. lewini</i> (Chondrichthyes) neonates and juveniles in the western Arabian Gulf: a stable isotope analysis. 利用穩定同位素研究西阿拉伯灣雙髻鯊之資源利用	
*計畫成果簡述	The team measured stable nitrogen and carbon isotopes in the muscle tissues of neonates and juveniles of two hammerhead species from the waters of the western Arabian Gulf. We found both species relied on food sources with low nitrogen values. The western Arabian Gulf likely serves as a key feeding ground for both the neonates and the juveniles of <i>S. mokarran</i> . This study is published in a SCI journal <i>Endangered Species Research</i> 團隊分析西阿拉伯灣兩種雙髻鯊稚魚之肌肉穩定同位素含量，結果發現雙髻鯊稚魚捕食相當程度的食物鏈低階層食物，並暗示著西部阿拉伯灣可能是雙髻鯊稚魚捕食區域。已發表在“SCI 國際期刊” <i>Endangered Species Research</i> ”。	
*成果說明	The great hammerhead shark <i>Sphyrna mokarran</i> and the scalloped hammerhead shark <i>S. lewini</i> are marine top predators with global distributions. However, limited information is available on the trophic ecology of hammerhead sharks in the Indian Ocean. In this study, we measured stable nitrogen and carbon isotopes in the muscle tissues of neonates and juveniles of <i>S. mokarran</i> and <i>S. lewini</i> from the waters of the western Arabian Gulf. In general, values of $\delta^{15}\text{N}$ were lower in <i>S. mokarran</i> (10.8–18.7‰) than in <i>S. lewini</i> (12.2–18.7‰), indicating a reliance on food sources with low nitrogen values. Isotopic niche similarities were observed between female and male <i>S. mokarran</i> . We further observed considerable ontogenetic changes in the $\delta^{15}\text{N}$ values of both <i>S. mokarran</i> and <i>S. lewini</i> neonates (a reduction from 19 to 12‰), reflecting the maternal effect. The effects of total length and sex on the nitrogen and stable isotope values were nonsignificant in <i>S. mokarran</i> juveniles. The western Arabian Gulf likely serves as a key feeding ground for both the neonates and the juveniles of <i>S. mokarran</i> . By contrast, <i>S. lewini</i> appears to have a low level of reliance on this region.	
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*標題	<p>To pool or not to pool data? Applying a generalized depletion model to assess American eel elver <i>Anguilla rostrata</i> fisheries from multiple rivers in Nova Scotia, Canada.</p> <p>利用泛減損模型評估加拿大新蘇格蘭多條河川之鰻線漁業</p>	
*計畫成果簡述	<p>The team assessed the catch and effort data from three rivers of Nova Scotia, Pooling nearby river systems can greatly reduce modeling effort, at the cost of ignoring fine-scale variability in elver recruitment and having coarser spatial scale for the management. This study is published in a SCI journal <i>Fisheries Management and Ecology</i></p> <p>團隊評估加拿大三條河川之鰻線漁業資料，發現將三條河川合併評估，可有效減少評估工作成本，但無法顯示各條河川之個別鰻線洄游動態。已發表在 SCI 國際期刊 “ Fisheries Management and Ecology” 。</p>	
*成果說明	<p>Spatial scales are important for examining health of exploited fishery stocks and guiding management actions. However, information about the optimal spatial scale is still unclear for assessment of transit fisheries, such as elver fisheries of the American eel <i>Anguilla rostrata</i>. We applied a generalized depletion model to assess catch and effort data from three nearby rivers (within 50 km) to test the hypothesis that modeling on pooled and separate data from nearby rivers would give similar estimates of abundance and exploitation rate. Overall, pooling data from rivers within 50 km did not result in large differences (<20% in relative difference) in estimates of abundance and exploitation rate with close mean abundance estimates and similar temporal trends in abundance, exploitation rate, and relative escapement. Pooling nearby river systems can greatly reduce modeling effort, at the cost of ignoring fine-scale variability in elver recruitment and having coarser spatial scale for the management. When only an index of annual recruitment and exploitation rate are of interest, pooling data may be practical from different locations up to 50 km.</p>	
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*標題	<p>Coral reefs in the northeastern Saudi Arabian Red Sea are resilient to mass coral mortality events. 沙烏地阿拉伯西北部紅海的珊瑚對於大量死亡有強韌性。</p>	
*計畫成果簡述	<p>The team conducted an integrated survey combining visual census and baited remote underwater video survey on the coral reefs in the northeastern Red Sea and examined their health by comparing the baseline information from two decades ago. Similar levels of coral coverage compared to two decades ago indicated their resilience to past events with mass coral mortality. This study is published in a SCI journal Marine Pollution Bulletin. 團隊利用多種方式評估沙烏地阿拉伯西北部紅海的珊瑚礁，並與二十年前的資料做比較。發現與二十年前相比，總石珊瑚覆蓋率並無顯著減少。過去紅海已發生過多次珊瑚大量死亡事件，因此相似的覆蓋率顯示珊瑚能夠在這些災難性的事件中回復，有其強韌性。已發表在 SCI 國際期刊 “ Marine Pollution Bulletin”</p>	
*成果說明	<p>This study examines the directional asymmetry in the gonad length of 20 species of moray eels (Muraenidae) and two outgroup species with 2959 individuals. We tested three hypotheses: (1) moray eel species did not exhibit directional asymmetry in the gonad length; (2) the directional asymmetry pattern was the same for all selected species; (3) the directional asymmetry was not related to the major habitat types, depth and size classes, and taxonomic closeness of the species. Moray eels were generally “right-gonadal” , the right gonad length being constantly and significantly longer than the left one in all studied Muraenidae species. The degree of asymmetry varied among species and was not significantly related to taxonomic closeness. The habitat types, depth, and size classes had intermingled effects on observed asymmetry without a clear correspondence. The directional asymmetry in the gonad length is a unique and widely occurring phenomenon in the Family Muraenidae, which was likely a by-product in the evolutionary history without significant disadvantage in survival.</p>	
成果影音	成果影音標題	https://www.cna.com.tw/news/ahel/202403110054.aspx
	Youtube 網址	https://www.youtube.com/watch?v=92pNKCujapM

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*標題	Directional asymmetry in gonad length indicates moray eels (Teleostei, Anguilliformes, Muraenidae) are “right-gonadal. 鯧類生殖腺之左右不對稱性。	
*計畫成果簡述	We examined close to 3000 individuals of moray eels, and found the general occurrence of the asymmetry in the gonad length. Some of possible evolutionary origins were examined and ruled out. This study is published in a SCI journal <i>Scientific Report</i> 我們檢驗了將近三千隻鯧類及外群之生殖腺外觀，發現其長度普遍有左右不對稱的現象，並探討此不對稱可能之演化涵義。此研究已發表致 SCI 國際期刊 “ Scientific Report”。	
*成果說明	This study examines the directional asymmetry in the gonad length of 20 species of moray eels (Muraenidae) and two outgroup species with 2959 individuals. We tested three hypotheses: (1) moray eel species did not exhibit directional asymmetry in the gonad length; (2) the directional asymmetry pattern was the same for all selected species; (3) the directional asymmetry was not related to the major habitat types, depth and size classes, and taxonomic closeness of the species. Moray eels were generally “right-gonadal”, the right gonad length being constantly and significantly longer than the left one in all studied Muraenidae species. The degree of asymmetry varied among species and was not significantly related to taxonomic closeness. The habitat types, depth, and size classes had intermingled effects on observed asymmetry without a clear correspondence. The directional asymmetry in the gonad length is a unique and widely occurring phenomenon in the Family Muraenidae, which was likely a by-product in the evolutionary history without significant disadvantage in survival.	
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*標題	<p>Participatory stock assessment in West Java contributes to the management of glass eel fisheries in Indonesia. 利用參與式調查方法評估印尼西爪哇地區鰻線漁業</p>
*計畫成果簡述	<p>The team applied a participatory stock assessment in West Java, Indonesia on the glass eel fisheries. The result was promising, able to estimate the exploitation rate and natural mortality. This model has the potential to be applied to other regions in Indonesia. This study is published in a SCI journal <i>Marine Policy</i> 團隊應用參與式調查方法評估西爪哇島的鰻線漁業，並成功估計此漁業對於資源影響指標(開發率及自然死亡率)數值。此參與式研究方法，望可應用在印尼其他地區以評估鰻線資源量及漁業開發壓力。已發表在 SCI 國際期刊 “ Marine Policy” 。</p>
*成果說明	<p>Following the decline of Japanese eel catches and the EU European eel trade ban, other regions, such as Southeast Asia, have become increasingly important sources of juvenile anguillid species for aquaculture. Although appropriate fishery management of tropical eel species is urgently required, data collection by the government or scientific authorities is extremely difficult, because tropical glass eel fisheries are small-scale fisheries conducted in the Global South, where expertise and resources are sometimes limited. To collect data on glass eel fisheries, participatory stock assessments were conducted in West Java, Indonesia, where a Fishery Improvement Project (FIP) and an Aquaculture Improvement Project (AIP) were launched in collaboration with industries, middlemen, fishermen, NGOs, national and local agencies, and scientists. This participatory study successfully collected data on more than 3000 daily fishing practices from approximately 400 fishermen in a single water system in 2019. Even though the assessment was not species-specific, the data collected allowed estimation of the natural mortality rate as being 0.011 day^{-1}. The annual exploitation rate of the glass eel fisheries was estimated as 24.9%, based on a generalised depletion model developed for the data-limited situation where only fishery catch and effort data are available. The data collection scheme for glass eel fisheries was disseminated by local and national agencies to glass eel fishermen in Indonesia and contributed to developing the Eel Conservation National Action Plan.</p>

成果影音	成果影音標題	https://www.miragenews.com/global-team-enables-glass-eel-stock-assessment-1206055/
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*標題	<p>Bioaccumulation of trace elements and hydrocarbons in chondrichthyans of the western Arabian Gulf: Environmental and human health risk assessment and implications for conservation.</p> <p>阿拉伯灣西部軟骨魚類中微量元素與碳氫化合物的生物累積：環境與人類健康風險評估及保育意涵</p>	
*計畫成果簡述	<p>The team assessed the levels of trace elements, PAHs, and TPHs in six elasmobranch species from the western Arabian Gulf. For all species, contaminant concentrations were significantly higher in the liver than in the muscle. Muscle contaminant concentrations differed significantly with respect to species' lifestyles and families. None of the analysed contaminants exceeded the internationally recognized standards in all studied species. This study is published in a SCI journal <i>Science of The Total Environment</i></p> <p>團隊評估採集自西阿拉伯灣六種軟骨魚類，肌肉和肝臟之微量元素濃度。發現肌肉的微量濃度組成，與分類相似性及生活習系有關。然而肌肉的微量元素濃度，皆在現有國際的食用標準之下濃度。已發表在SCI 國際期刊 “ Science of The Total Environment” 。</p>	
*成果說明	<p>This is a first attempt to assess the levels of trace elements, PAHs, and TPHs in six elasmobranch species (<i>Carcharhinus dussumieri</i>, <i>C. sorrah</i>, <i>Chiloscyllium arabicum</i>, <i>Gymnura poecilura</i>, <i>Sphyrna lewini</i>, <i>S. mokarran</i>) from the Arabian Gulf. The chemical analysis showed that the concentrations of contaminants differed significantly between liver and muscle samples with both pelagic and benthic species and all families. For all species, contaminant concentrations were significantly higher in the liver than in the muscle. While muscle contaminant concentrations differed significantly with respect to species' lifestyles and families, those of liver showed no significant differences between pelagic and benthic species, neither between the four families nor between the six species. None of the analysed contaminants exceeded the internationally recognized standards in all studied species. These results enrich the knowledge on the bioaccumulation of contaminants in elasmobranchs and allow to assess the environmental status of the Arabian Gulf</p>	
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*標題	<p>Compartmentation of trace metals in <i>Cymodocea nodosa</i> from a heavily polluted area (Central Gulf of Gabes; Southern Mediterranean Sea): Potential use of the seagrass as an environmental monitoring and bioremediation tool</p> <p>地中海重度污染加伯斯海灣的海草微量金屬區隔化: 海草做為潛在環境監測及生物移除工具之研究</p>	
*計畫成果簡述	<p>We examined the contaminants in the seagrass in the central Gulf of Gabes, Mediterranean. We found that the seagrasses can remove the pollutants in the soil for able to trap the pollutants in root and transfer them to the leaves. This study is published in a SCI journal. "Regional Studies in Marine Science"</p> <p>我們檢驗在地中海重度污染的加伯斯灣海草的重金屬含量。海草能夠將汙染物捕捉進根部，進而將其轉移至葉片。因此海草有可能作為一潛在之生物移除工具。此研究已發表致 SCI 國際期刊 "Regional Studies in Marine Science"。</p>	
*成果說明	<p>This study was conducted to better understand the adaptative strategies of <i>Cymodocea nodosa</i> occurring in the heavily polluted environment of central Gulf of Gabes (SE Tunisia). Cd, Cu, Pb and Zn concentrations were assessed in the seagrass roots, rhizomes, and leaves, and in the surrounding seawater and sediments. Sediments were found to be the main source of contaminants bioaccumulated in <i>C. nodosa</i>. Bioaccumulation patterns differed significantly with metals and plant organs. While Cd, Cu and Zn were found to accumulate in leaves, Pb concentrates mainly in roots. In the heavily polluted environment of the Gulf of Gabes, <i>C. nodosa</i> seems to have developed two different adaptative strategies: metal trapping in roots and metal transfer from permanent (roots) to temporary (leaves) organs. These mechanisms allow the seagrass to remove the excess of metals. These properties show the potential use of <i>C. nodosa</i> not only as bioindicator but also as an effective bioremediation.</p>	
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	Youtube 網址	
	說明	
成果照片 (請另行提供圖檔)	成果照片	
	照片說明	
成果檔案 (請另行提供檔案)	檔案名稱	2. 執行成果簡介(可公開資訊)_11.pdf

*標題	Stomach Content Analysis for Juvenile Great Hammerhead Sharks <i>Sphyrna mokarran</i> (Rüppell, 1837) from the Arabian Gulf 沙烏地阿拉伯灣錘頭雙髻鯊稚魚的胃內含物分析。	
*計畫成果簡述	We examined the stomach contents in the great hammerhead sharks caught from the Arabian Gulf. Fish, the bartail flathead, was the most important prey. Juvenile great hammerhead sharks are a specialized predator at the top of the food web. This study is published in a SCI journal. "Fishes" 我們檢驗在沙烏地阿拉伯灣漁業所捕捉到錘頭雙髻鯊稚魚的胃內含物，結果發現魚類，特別是印度牛尾魚，是最重要的餌料生物。阿拉伯灣錘頭雙髻鯊稚魚是有選擇性、位在海洋食物網的最頂端的捕食者。此研究已發表致 SCI 國際期刊 "Fishes"。	
*成果說明	The stomach contents of 30 male and 43 female (age < 3 years) juvenile great hammerhead sharks (<i>Sphyrna mokarran</i>) obtained from commercial fisheries operating in Saudi Arabian waters of the Arabian Gulf were analyzed for the first time. After exclusion of parasites and abiotics, a total of 31 prey items, including the remains of cephalopods, fish, crustaceans, and bivalve mollusks, were identified in the stomachs of 59 great hammerheads. Based on the index of relative importance, teleosts were their main prey, and <i>Platycephalus indicus</i> (Linnaeus, 1758) was the most important prey at the species level. Significant age-related dietary differences were noted, indicating that the prey of the hammerheads aged 0–3 years shifted from Platycephalidae to Myliobatidae. Levin's niche overlap index was low (0.05–0.21), indicating that <3-year-old juvenile great hammerheads are specialized predators. The estimated trophic level was 4.40–5.01 (mean ± SD, 4.66 ± 0.45), indicating that the great hammerhead is a tertiary consumer.	
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*標題	Elasmobranchs of the western Arabian Gulf: Diversity, status, and implications for conservation. 西部阿拉伯灣之軟骨魚現況'、多樣性及保育。	
*計畫成果簡述	We examined the sharks and batoids collected from the trawl surveys in the western Arabian Gulf from 2013 to 2016. We revealed the hotspots of the sharks and batoids, and examined biodiversity properties and conservation statuses. 我們利用拖網調查，以及漁港調查檢驗阿拉伯灣軟骨魚類之多樣性與保育狀況。此研究已發表致 SCI 國際期刊。" Regional Studies in Marine Science"	
*成果說明	<p>This paper presents information on elasmobranch diversity in the Saudi waters of the Arabian Gulf based on fishery-independent and dependent surveys. A total of 369 individual sharks and batoids were collected from 228 trawl stations surveyed between 2013 and 2016. <i>Gymnura poecilura</i> and <i>Carcharhinus dussumieri</i> were the most dominant batoid and shark species, respectively. The catch per unit area indicated the waters around Jana Island as a hotspot of elasmobranchs.</p> <p>A total of 135 surveys at the landing sites and fish markets from 2016 to 2020 showed that 88% of elasmobranchs (out of 4,055 individuals recorded) were caught by gill nets. Sharks were the most abundant (> 80 %). Of the 47 species recorded, six species were Critically Endangered regionally, six Endangered, and seven species Vulnerable according to the IUCN Red List of Threatened Species, necessitating proper management and conservation measures.</p>	
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