KFUPM

جامعة الملك فهد للبترول والمعادن

King Fahd University of Petroleum & Minerals

Applied Research Center for Environment and Marine Studies (ARCEMS)

Community Outreach and Engagement

Sustainable fisheries, overfishing awareness and collaboration with coastal communities

Purpose and scope

This report records the community-facing work carried out by the Applied Research Center for Environment and Marine Studies (ARCEMS) at King Fahd University of Petroleum & Minerals in support of Sustainable Development Goal 14, Life Below Water. It covers free educational programmes offered to local and national communities on the sustainable management of fisheries and aquaculture, awareness activities addressing overfishing and illegal, unreported and destructive fishing practices, and the University's direct collaboration with the coastal communities and public authorities of the Eastern Province in maintaining shared aquatic ecosystems.

All of the educational and awareness activities described here are delivered free of charge to participants. They are run by ARCEMS researchers, in several cases in partnership with the Eastern Province branch of the Ministry of Environment, Water and Agriculture (MEWA) and with the Food and Agriculture Organization of the United Nations (FAO).

Contents

SDG 14.2.2 Community education on the sustainable management of fisheries and aquaculture page 2

SDG 14.2.3 Community awareness of overfishing and illegal, unreported and destructive fishing page 3

SDG 14.5.4 Collaboration with local coastal communities to maintain shared aquatic ecosystems page 4

KFUPM
جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

SDG 14.2.2

Community education on the sustainable management of fisheries and aquaculture

KFUPM, through ARCEMS, offers educational programmes and outreach to local and national communities on the sustainable management of fisheries and aquaculture. All of the activities below are delivered free of charge.

Sustainability of Marine Fisheries workshop, Eastern Province Shrimp Festival

On 25 November 2025, as part of World Fisheries Day activities at the Eastern Province Shrimp Festival in Qatif, an ARCEMS marine biology researcher delivered the workshop “Sustainability of Marine Fisheries”. The session was attended by fishermen, students and researchers, and covered fisheries management and the conservation of marine biodiversity. Participants were briefed on the regulation of fishing methods, on how the environmental impacts of those methods are assessed, and on how marine life is monitored through field surveys and underwater imaging. The festival was organised by the Eastern Province branch of the Ministry of Environment, Water and Agriculture. Fishermen, students and researchers took an active part in the discussion, and the workshop closed with a recommendation for further training and awareness programmes and for stronger research partnerships between the University, government and the fishing community.

Structured consultations with artisanal fishers

ARCEMS fisheries researchers hold structured consultations with artisanal fishers in the fishing harbours of the Eastern Province to explain and discuss key fisheries management measures. The consultations cover the regulation of fishing fleet capacity, the duration of seasonal fishing closures, minimum size limits and other conservation-oriented interventions, and they record the fishers’ own perceptions of each measure. The sessions give fishers a direct account of why each measure exists and how it protects the stocks on which their livelihoods depend.

Training in the identification and safe release of protected species

Fishermen taking part in the programme receive practical training in identifying marine mammals and species whose capture is prohibited, and in how such animals should be rescued and released back to the sea unharmed.

Aquaculture: seaweed culture demonstration with the FAO

KFUPM/ARCEMS initiated seaweed culture in the Arabian Gulf in partnership with the Food and Agriculture Organization in Saudi Arabia, as one of the first steps towards sustainable aquaculture in a region where such practices are still developing. On 4 December 2023 the FAO provided specialised training to KFUPM researchers in seaweed culture techniques. An ARCEMS researcher then worked with FAO colleagues to collect the species Sarconema filiforme from the Ras Tanura offshore site and prepare seedlings for cage

culture at the KFUPM beach site, where five nylon cages, each stocked with two to five kilograms of seedlings, were fixed to the benthic substrate by divers. Biomass, in-situ water quality and sedimentation rates were measured weekly over the three-month trial from December 2023 to February 2024. The work demonstrates environmentally responsible aquaculture and is aimed at creating alternative livelihood opportunities for coastal communities through the sustainable use of marine resources.

Earlier programmes

The current programme continues fisheries awareness work delivered to local communities in previous years, including the awareness programmes held at the Jubail and Darin fisheries and the Fisheries Awareness Program at Al Qatif, both documented separately on the University's sustainability website.

SDG 14.2.3

Community awareness of overfishing and illegal, unreported and destructive fishing

KFUPM, through ARCEMS, runs free educational outreach activities for local and national communities to raise awareness of overfishing and of illegal, unreported and destructive fishing practices.

Overfishing awareness programme

ARCEMS fisheries researchers deliver a continuing series of awareness programmes addressing the ecological and socioeconomic implications of overfishing in the Arabian Gulf and the Red Sea. The programmes explain how fishing effort that exceeds the capacity of a stock to replenish itself affects both the marine ecosystem and the livelihoods of the fishing households that depend on it, and they set out the management measures — fleet capacity regulation, seasonal closures and minimum size limits — intended to prevent it. The programmes are delivered alongside the Center's socioeconomic surveys of fishing harbours and artisanal fisher communities, so that the awareness message is grounded in the conditions of the communities receiving it.

Destructive fishing practices and marine litter

At the Eastern Province Shrimp Festival in Qatif on 25 November 2025, ARCEMS researchers raised visitors' awareness of the harm caused by overfishing and by the dumping of waste and fishing gear at sea, and of the physical damage that fish traps, anchors and ropes inflict on the seabed and on coral reefs. Visitors were shown how these impacts are detected and quantified through marine surveys and underwater imaging. The accompanying "Sustainability of Marine Fisheries" workshop addressed overfishing directly and the consequent decline of fish habitats.

Evidence base: abandoned, lost and discarded fishing gear

The awareness work is grounded in ARCEMS' own field evidence. Under the KFUPM MEWA Fishing Methods Project, ARCEMS surveyed 7.58 square kilometres around Jana Island — a potential fishing area and a known nesting ground for green and

hawksbill turtles in the Arabian Gulf — using visual and remotely operated vehicle surveys. The survey identified 46 distinct locations containing derelict fishing gear, together with one case of turtle entanglement. Gillnets were the most commonly observed item, followed by metal debris from fishing activities and ropes, and then monofilament lines and trawl nets, either submerged on the seafloor or entangled. Kernel density analysis placed the accumulation hotspots approximately 800 metres from the Jana Island shoreline, in the shallow nearshore water of two to three metres depth where gear is most often snagged and lost. These findings are used in community sessions to show fishers the concrete consequences of gear loss and abandonment, and they are reported in full in the Center's HADAQ newsletter.

Protected and prohibited species

As part of the same programme, fishermen are trained to identify marine mammals and species whose capture is prohibited, and to rescue and release them back to the sea, so that incidental and illegal capture is reduced at the point where it occurs.

SDG 14.5.4

Collaboration with local coastal communities to maintain shared aquatic ecosystems

KFUPM collaborates with the local community of the Eastern Province coast, and with the public authorities that serve it, in efforts to maintain and protect the aquatic ecosystems they share.

Socioeconomic surveys in fishing harbours and fisher communities

ARCEMS has undertaken comprehensive socioeconomic surveys within the fishing harbours and residential communities of artisanal fishers in order to assess their livelihood conditions. The surveys document the fishers' perceptions of fisheries management measures — fleet capacity regulation, seasonal closures and minimum size limits — and collect detailed information on the government subsidies allocated to local fishers, examining both their effect on household livelihoods and their wider ecological impact on marine fishery resources. The work is carried out in the communities themselves, and its findings inform the management measures that govern the fishery on which those communities depend.

KFUPM
جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

Qatif and Saihat coastal seawater quality investigation, May 2025

In May 2025 ARCEMS, in collaboration with the Ministry of Environment, Water and Agriculture, conducted a seawater quality investigation of the Qatif and Saihat coastal areas. The study was initiated in response to a major fish kill reported in Kuwait earlier that month, in order to assess environmental conditions along the Eastern Province coast and evaluate the risk of a similar event in the waters used by local communities.

Samples were collected from two stations, at Qatif and at Saihat, following USEPA protocols, and analysed for in-situ physical measurements, nutrients, photosynthetic pigments, phytoplankton community structure and waterborne contaminants.

pH, temperature, salinity and dissolved oxygen were all within acceptable ranges, with dissolved oxygen averaging 7.19 mg/L, well above the critical threshold and indicating no immediate hypoxic threat. Saihat showed markedly elevated ammonia at 14.73 µmol/L and silicate at 88.3 µmol/L, while Qatif showed moderate nutrient concentrations and a higher chlorophyll-a level of 7.11 µg/L, indicating active phytoplankton production. Pigment analysis placed Qatif in an active bloom with a healthy photosynthetic community and Saihat in a post-bloom phase of cell degradation, with the bloom dominated by the non-toxic diatom genus Thalassiosira. Cadmium, mercury and lead were below detection limits or significantly under the thresholds set by the National Center for Environmental Compliance, and polycyclic aromatic hydrocarbons and total petroleum hydrocarbons were well within permissible limits, indicating no significant anthropogenic pollution at the time of sampling.

The investigation concluded that, although dissolved oxygen levels were stable, the nutrient enrichment and phytoplankton dynamics observed — particularly at Saihat — leave both areas susceptible to future fish kills should sustained high temperatures, poor water circulation or further nutrient loading occur, and it recommended continued monitoring and management of nutrient inputs.

Partnership with the Ministry of Environment, Water and Agriculture

ARCEMS works with the Eastern Province branch of MEWA, which itself works jointly with government and private bodies, across several strands of this programme: the Shrimp Festival at which the Center delivered its November 2025 fisheries workshop, the Qatif and Saihat water quality investigation, and the Center's MEWA-supported research on the environmental impacts of fishing gears and methods. Through these partnerships the evidence the University generates feeds directly into the management of the community's own fishery and coastal waters. KFUPM also maintains a Mangrove Ecopark on the University shoreline, used to raise community awareness of mangrove ecosystems and their role in protecting the coast.