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Pathways for Regional Environmental Cooperation in the Gulf

Edited by

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Chapter 1

Collective Environmental Action to Preserve the Gulf's Marine Ecosystem

*Mohammad Al-Saidi*¹

Abstract

The Gulf's marine ecosystems are vital for economic activities and the security of food and other necessities for tens of millions of people. The environmental footprint arising from the use of the Gulf's environmental resources is becoming larger. With climate change and the expansion of coastal infrastructure, mitigating the environmental challenges that face the Gulf requires collective action and transboundary cooperation. In 1978, the littoral states of the Gulf formed the Regional Organization for the Protection of the Marine Environment (ROPME) as a collective action platform towards enhancing the health of the Gulf – for example, through common measures to reduce pollution from oil and other substances. However, this organisation does not tackle many of the contemporary challenges facing marine ecosystems. Regional environmental cooperation also needs to be expanded to other issues, such as climate change impacts and the mitigation of environmental risks. This chapter explains the need for expanding and enhancing cooperation and provides examples and future directions for Gulf-wide environmental cooperation.

Introduction

The land around the shared body of water that borders Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE) had a population of about 190 million people in 2021. Some of the world's largest and most rapidly expanding cities are located on the Gulf's coasts, particularly cities in the countries of the Gulf Cooperation Council

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(GCC). Coastal cities in the Emirates, Bahrain, and Qatar have expanded from a few thousand in the 1970s to modern urban agglomerations with millions of inhabitants.² For all littoral countries, the Gulf is of high economic importance as a trade hub. It is also a key source of food and clean water through desalination. The Strait of Hormuz, the only sea passage to the Gulf, is one of the most important global energy chokepoints, transiting one-third of the global seaborne-traded oil and one-quarter of the global liquefied natural gas in 2018.³ The expansion of the coastal built environment, desalination activities, and the production and transport of carbon fuel resources have meant more pollution and the destruction of vital marine ecosystems in the Gulf. Future pressures on the Gulf, including climate change, will require the enhancement of cooperative mechanisms to capture synergies and effectively mitigate environmental impacts.

Environmental pressures on the Gulf result from internal factors such as population and economic growth and external effects such as climate change. They are not adequately addressed because of low levels of environmental regulation and the lack of effective regional cooperation. This chapter argues that Gulf countries need to enhance regional environmental cooperation by strengthening current institutions – particularly the mandate and instruments of ROPME – and expanding the cooperation areas, including climate action. First, it will briefly outline the mounting pressures on Gulf waters, including pollution, the destruction of ecosystems, and climate change as an aggravator. Next, it will explain the legacies of Gulf-wide cooperation and the priorities so far. This contribution will then explain the need for expanded and enhanced cooperation, and it will provide examples and future directions for Gulf-wide environmental cooperation.

A microcosm of biodiversity and environmental change

The Gulf is endowed with a great biodiversity of ecosystems, including wetlands, mangroves, and coral reefs that are home to fish, turtles, and marine mammals, particularly dolphins and whales. The exceptional conditions of the Gulf as a semi-closed body of water with high salinity and temperature fluctuations have created unique marine ecosystems that have adapted to extreme climatic conditions.⁴ Large islands in the Gulf, such as Qeshm and Kish in Iran, exhibit rich biodiversity that makes them popular touristic destinations in the Middle East.⁵ For GCC countries, the eco-tourism sector is growing, with whale and turtle-watching

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- 2 Jong M de, Hoppe T, Noori N. City Branding, Sustainable Urban Development and the Rentier State. How Do Qatar, Abu Dhabi and Dubai Present Themselves in the Age of Post Oil and Global Warming? *Energies* 2019;12(9):1657. <https://doi.org/10.3390/en12091657>
 - 3 US Energy Information Administration. The Strait of Hormuz is the world's most important oil transit chokepoint; 2019. <https://www.eia.gov/todayinenergy/detail.php?id=39932>
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attracting both locals and foreigners.^{6,7} Importantly, these marine ecosystems are of the utmost importance for the cultural identity of cities in the Gulf. Global cities such as Doha, Abu Dhabi, and Dubai pride themselves on their pre-oil history of fishery and pearl diving.

Two groups of drivers are negatively impacting the Gulf's ecosystems. First, the internal factors of environmental change related to coastal development, sea-based infrastructure (including carbon fuel extraction and shipping), and land-based pollution (including the ever-growing problem of plastics). Coastal urbanisation has damaged coastal ecosystems such as mangroves and coral reefs, making the Gulf the most degraded marine ecosystem in the world.⁸ With urbanisation comes the need for the expansion of desalination at a significant environmental cost. For example, desalination produces highly saline rejected water (called desalination brine), which is disposed of in the Gulf, endangering marine ecosystems.⁹ Plastic litter is also an increasing transboundary problem, starting to be tackled through regulations and bans.¹⁰ All of these disturbances should also be seen alongside the traditional risk of oil spills that occurred in 1980, 1983, and 1991.

Second, the external factor of climate change and variability is exacerbating the environmental problems of the Gulf. Global warming means a higher evaporation rate in the Gulf, while climate disasters like heatwaves are particularly concerning.¹¹ Higher temperatures can lead to coral bleaching and the loss of fish stock. Some of the major warming events of 1996, 1998, 2001, and 2010 have increased seawater temperatures beyond 35°C, leading to mass fish deaths.¹² Sand and dust storms have closed marine terminals for oil exports, and they could impact new infrastructure for aquaculture or fisheries.¹³

When the Gulf's ecosystems are damaged, there are severe impacts on economies and supply chains. The increased salinity and pollution of the Gulf can threaten desalination activities, which already require advanced technologies. Traditionally, the GCC states relied on distillation technologies for desalinating seawater because of the high salinity and

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- 6 Lambert E, Hunter C, Pierce GJ, MacLeod CD. Sustainable whale-watching tourism and climate change: towards a framework of resilience. *Journal of Sustainable Tourism* 2010;18(3):409–27. <https://doi.org/10.1080/09669581003655497>
 - 7 Busaidi MA, Bose S, Claereboudt M, Tiwari M. Sea turtles tourism in Oman: Current status and future prospects. *Tourism and Hospitality Research* 2019;19(3):321–36. <https://doi.org/10.1177/1467358417751026>
 - 8 Burt JA. The environmental costs of coastal urbanization in the Arabian Gulf. *City* 2014;18(6):760–70. <https://doi.org/10.1080/13604813.2014.962889>
 - 9 Hosseini H, Saadaoui I, Moheimani N, Al Saidi M, Al Jamali F, Al Jabri H et al. Marine health of the Arabian Gulf: Drivers of pollution and assessment approaches focusing on desalination activities. *Marine Pollution Bulletin* 2021;164:112085. <https://doi.org/10.1016/j.marpolbul.2021.112085>
 - 10 Stöfen-O'Brien A, Naji A, Brooks AL, Jambeck JR, Khan FR. Marine plastic debris in the Arabian/Persian Gulf: Challenges, opportunities and recommendations from a transdisciplinary perspective. *Marine Policy* 2022;136:104909. <https://doi.org/10.1016/j.marpol.2021.104909>
 - 11 Ben-Hasan A, Christensen V. Vulnerability of the marine ecosystem to climate change impacts in the Arabian Gulf—an urgent need for more research. *Global Ecology and Conservation* 2019;17:e00556. <https://doi.org/10.1016/j.gecco.2019.e00556>
 - 12 Al-Saidi M. Coastal Development and Climate Risk Reduction in the Persian/Arabian Gulf: The Case of Qatar. In: Harris PG, editor. *Climate Change and Ocean Governance: Politics and Policy for Threatened Seas*. Cambridge: Cambridge University Press; 2019, p. 60–74.
 - 13 Al-Hemoud A, Al-Sudairawi M, Neelamanai S, Naseeb A, Behbehani W. Socioeconomic effect of dust storms in Kuwait. *Arabian Journal of Geosciences* 2017;10(1):18. <https://doi.org/10.1007/s12517-016-2816-9>

turbidity of the Gulf. Only recently could they install the worldwide common technology using membranes, after this technology advanced to accommodate the Gulf's water quality.¹⁴ Membrane-based technologies are more efficient in terms of water recovery and energy use, but they produce more dense and salty brine. Membrane desalination accounts for more than 60% of produced desalination water globally, but this figure is only 6% in the Gulf – the other 94% are distillation-based technologies.¹⁵ However, newer plants in the GCC region are deploying membrane technologies using reverse osmosis. If this trend of expanding membrane-based technologies continues, any deterioration of the quality of the Gulf may have severe impacts on desalination because these membranes have limited filtration capacities.

With more desalination, pollution, and climate impacts, some speculate that the Gulf will reach a point of “peak salt,” in which desalination is hardly possible.¹⁶ Another traditional but growing threat is the presence of harmful algae blooms, also known as red tide. The algae arrive on shipping vessels from the Gulf of Oman or the Arabian Sea and can disrupt desalination. The last major incidents were in 2008 and 2009.¹⁷ Other coastal infrastructure for food – including the increasing number of aquaculture installations – and energy production are also at risk from environmental change.¹⁸ For example, the degradation of the Gulf threatens more than half a billion dollars of fishery activities annually.¹⁹

Larger marine animals in the Gulf – called charismatic species – might be more tolerant to variations in sea temperature and salinity compared to other stressors they face, such as pollution, loss of habitat, military exercises, or boat traffic.²⁰ These charismatic species include dolphins, dugongs, and green and hawksbill turtles, all of which are highly important for biodiversity and as cultural resources for Gulf societies. In fact, the temperature tolerance rates of marine species might be changing worldwide and in the Gulf, the world's hottest sea. Therefore, some scholars regard the Gulf as a “natural laboratory” to understand how marine ecosystems adapt to extreme conditions caused by climate change.^{21,22}

14 Moossa B, Trivedi P, Saleem H, Zaidi SJ. Desalination in the GCC countries- a review. *Journal of Cleaner Production* 2022;357:131717. <https://doi.org/10.1016/j.jclepro.2022.131717>

15 Hosseini et al. Marine health of the Arabian Gulf, 112085.

16 Leahy S, Purvis K. Peak salt: is the desalination dream over for the Gulf states? *Guardian* 2016, 29 September 2016; Available from: <https://www.theguardian.com/global-development-professionals-network/2016/sep/29/peak-salt-is-the-desalination-dream-over-for-the-gulf-states> [September 26, 2023].

17 Al Shehhi MR, Gherboudj I, Ghedira H. An overview of historical harmful algae blooms outbreaks in the Arabian Seas. *Marine Pollution Bulletin* 2014;86(1):314–24. <https://doi.org/10.1016/j.marpolbul.2014.06.048>

18 Al-Saidi M, Saliba S. Water, Energy and Food Supply Security in the Gulf Cooperation Council (GCC) Countries—A Risk Perspective. *Water* 2019;11(3):455. <https://doi.org/10.3390/w11030455>

19 Burt. The environmental costs of coastal urbanization in the Arabian Gulf, 760–70.

20 Wabnitz CCC, Lam VWY, Reygondeau G, Teh LCL, Al-Abdulrazzak D, Khalfallah M et al. Climate change impacts on marine biodiversity, fisheries and society in the Arabian Gulf. *PLoS One* 2018;13(5):e0194537. <https://doi.org/10.1371/journal.pone.0194537>

21 Riegl BM, Purkis SJ (eds.). *Coral Reefs of the Gulf: Adaptation to Climatic Extremes*. Dordrecht: Springer Netherlands; 2012.

22 Bouwmeester J, Riera R, Range P, Ben-Hamadou R, Samimi-Namin K, Burt JA. Coral and Reef Fish Communities in the Thermally Extreme Persian/Arabian Gulf: Insights into Potential Climate Change Effects. In: Rossi S, Bramanti L, editors. *Perspectives on the Marine Animal Forests of the World*. Cham: Springer International Publishing; 2020, p. 63–86.

The cooperation imperative despite rivalry and competition

Regional environmental cooperation in the Gulf is underwhelming compared with benchmark regions. Cooperation among regions in Asia (for example, ASEAN countries) or Europe exhibits more multilateral agreements, supranational delegation, common targets, and investment commitments,²³ despite the Gulf littoral countries having more in common in terms of shared resources, history, and culture than other regions. Besides the focus on marine protection and pollution issues, ROPME does not have any other clear mandate. There are also no other major institutional arrangements for inclusive Gulf-wide environmental cooperation. The failure to advance cooperation despite the increased urgency of environmental issues can be attributed to the status quo of mistrust and latent conflicts, particularly among the regional rivals of Iran and Saudi Arabia.²⁴ Recent diplomatic developments and reconciliations across the region suggest a new horizon for environmental cooperation.

Even within the GCC, environmental cooperation has been below expectations. It has largely followed a narrow path of the smallest common denominator, mainly focusing on harmonising policies in the areas of marine life, water production, agriculture, and energy.²⁵ The GCC cooperation legacies have also exhibited periods of competition and discord, such as the 2017 Gulf crisis or the failure of joint projects, such as a GCC-wide nuclear program. Recent diplomatic developments around the region also extend to the mending of ties within the GCC itself, and closer cooperation on environmental issues could be expected. While it is important to strengthen integration among GCC states, regional environmental challenges can succeed only if Iran and Iraq are included as well.

Iran has the longest Gulf coast, with important terrestrial and marine ecosystems as well as industrial sites. The Gulf coastline harbours the majority of Iran's desalination capacity, which is expected to increase through new plants and water transfer infrastructure to counteract the country's growing water crisis.²⁶ A large expansion of supply infrastructure on the Gulf's coastline in Iran increases the need for coordination and collaboration. Desalination activities across Iran's Gulf coast is negligible compared with the GCC states. Iran has 75 desalination plants with a total capacity of 450,000 cubic metres per day, and 92% of them are located

23 Al-Saidi M. Cooperation or competition? State environmental relations and the SDGs agenda in the Gulf Cooperation Council (GCC) region. *Environmental Development* 2021;37:100581. <https://doi.org/10.1016/j.envdev.2020.100581>

24 Al-Saidi M. Regional Environmental Cooperation: The (Lost) Potential for a Sustainable Future in the Arabian/Persian Gulf. In: Standish K, Devere H, Suazo A, Rafferty R, editors. *The Palgrave Handbook of Positive Peace*. Singapore: Springer Singapore; 2022, p. 813–831.

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26 Keynoush B. With the Hope Line, Iran aims to boost seawater transfer to fight growing drought; 2021. Middle East Institute. <https://www.mei.edu/publications/hope-line-iran-aims-boost-seawater-transfer-fight-growing-drought>

in the southern provinces of Hormozgan, Bushehr, Sistan-Baluchistan, and Khuzestan.^{27,28} The whole region has about 850 desalination plants, predominantly in the GCC countries, which have about 50% of the world's desalination capacity of 95 million cubic metres per day.^{29,30} Along the Gulf coast, some of the large desalination sites in GCC states exceed Iran's entire desalination capacity, such as Jubail in Saudi Arabia, which has a capacity of 1.15 million cubic metres per day, and Jabal Ali in the UAE, which has a capacity of 2 million cubic metres per day.³¹

Similarly, Iraq faces a water crisis, with a decreasing flow and deteriorating quality of the Tigris and Euphrates rivers because of upstream damming.³² Iran and Iraq are the only sources of freshwater in the Gulf, thus influencing the salinity and quality of Gulf waters.

ROPME: Legacies and shortcomings

ROPME was established in 1978, one year after the adoption of the Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution. ROPME was seen as an implementation instrument of the Kuwait Convention, and it was thought of as an initial step for region-wide environmental cooperation. As a single-issue organisation, ROPME has largely focused on marine pollution issues, and it helped with the adoption of several accompanying protocols to the Kuwait Convention, namely on pollution from oil and other harmful substances (1978), pollution from the exploration of the continental shelf (1989), pollution from land-based sources (1990), as well as marine movements and the disposal of hazardous waste (1998). No new protocol has been adopted since.

ROPME has advanced environmental cooperation in the Gulf, although the institutional arrangements have not progressed beyond technical cooperation on the issue of marine protection. Most of ROPME's work focuses on promoting joint activities through action plans (lately the 2011–2020 Strategic Plan for Biodiversity). Also, ROPME's Marine Emergency Mutual Aid Centre (MEMAC) in Bahrain, which was established in 1982, aims to combat pollution by oil and other harmful resources. Cooperation through MEMAC can prevent serious incidents. The centre provides technical assistance to ROPME member states

27 Financial Tribune. Desalination Capacity to Reach 650,000 cm/d by 2025. Financial Tribune 2023, 8 January 2023; Available from: <https://financialtribune.com/articles/energy/116780/desalination-capacity-to-reach-650000-cm-d-by-2025#:~:text=%E2%80%9CThe%20plans%20are%20estimated%20to,quoted%20as%20saying%20by%20IRNA> [October 02, 2023].

28 Tehran Times. 75 water desalination plants operating across Iran. Tehran Times 2022, 2 August 2022; Available from: <https://www.tehrantimes.com/news/475292/75-water-desalination-plants-operating-across-Iran> [October 02, 2022].

29 Keynoush. With the Hope Line, Iran aims to boost seawater transfer to fight growing drought.

30 Jones E, Qadir M, van Vliet MTH, Smakhtin V, Kang S-M. The state of desalination and brine production: A global outlook. *Sci Total Environ* 2019;657:1343–56. <https://doi.org/10.1016/j.scitotenv.2018.12.076>

31 Al-Saidi and Saliba. Water, Energy and Food Supply Security in the GCC Countries, 455.

32 France 24. Twilight of the Tigris: Iraq's mighty river drying up 2022, 31 October 2022; Available from: <https://www.france24.com/en/live-news/20221031-twilight-of-the-tigris-iraq-s-mighty-river-drying-up> [September 26, 2022].

and, in exceptional cases, conducts operations to compact pollution incidents. The centre has reacted to incidents in the past, such as the fire on MT *Stolt Valor* in 2012 (no spillage reported) or the oil spill from MT *Desh Shanti* in 2013. In such instances, MEMAC monitors the incidents and coordinates with member states and regional and international private actors that do the actual rescue or clean-up. Its operational mandate also includes capacity building and nonbinding guidelines for member states.

ROPME has promoted the exchange of experiences among Gulf littoral countries through organising encounters on various environmental challenges, including convening scientists and officials on issues beyond its narrow scope on marine protection and pollution issues. For example, ROPME published a comprehensive report on marine climate change impacts. Many of the reviewed impacts have been shown to affect sectors such as power plants, tourism, and desalination.³³ It has also been engaged in partnerships with several international organisations, such as the Regional Seas Programme (RSP) of the United Nations Environment Programme (UNEP) and with nongovernmental organisations (NGOs), including the regional office of the World Wide Fund for Nature (WWF) and regional networks of marine scientists. Many of these partnerships focus on capacity building and studies quantifying risks and action fields. For example, because ROPME is affiliated with the Regional Seas Programme of UNEP, it has received support from UNEP in conducting regional studies and workshops.

Observers of ROPME's work applaud its role in advocating joint action and sustainability in the Gulf. At the same time, they criticise the failure to broaden formal cooperative frameworks to include contemporary challenges related to the management of the Gulf's ecosystems in a more coordinated manner, or to establish comprehensive (that is, longer-term and better-funded) protection measures, including instruments for monitoring and valuation.^{34,35}

It is telling that important protocols from the Convention of Biological Diversity and the Establishment of Protected Areas have been discussed since the early 2000s but have not yet been adopted by the Gulf countries. This demonstrates how political tensions, particularly in the context of Iran's nuclear program and inner rifts among GCC states, have stalled effective environmental cooperation in the Gulf.

With the lack of broad regional frameworks, transboundary cooperation has largely taken place either among GCC states themselves or through occasional encounters facilitated by the membership of Gulf littoral countries in international environmental conventions. The participation of Gulf states in these conventions has proliferated since the late 1970s, with Iraq recently joining many of these agreements as well.³⁶ While conventions on biodiversity and marine pollution have been around for many decades, Gulf states are increasingly interested

33 ROPME. ROPME Marine Climate Change Impacts: Evidence Report; 2020.

34 Al-Saidi. Regional Environmental Cooperation, 813–831.

35 Sale PF, Feary DA, Burt JA, Bauman AG, Cavalcante GH, Drouillard KG et al. The Growing Need for Sustainable Ecological Management of Marine Communities of the Persian Gulf. *AMBIO* 2011;40(1):4–17. <https://doi.org/10.1007/s13280-010-0092-6>

36 Al-Saidi M, Zaidan E, Hammad S. Participation modes and diplomacy of Gulf Cooperation Council (GCC) countries towards the global sustainability agenda. *Development in Practice* 2019;29(5):545–58. <https://doi.org/10.1080/09614524.2019.1597017>

in the full scope of the global sustainability agenda, including issues such as climate change action, renewable energy, and circular economies.^{37,38}

Towards greater regional environmental cooperation

Regional institutions for environmental cooperation, such as ROPME, should be strengthened beyond the technical focus on quantification of the status quo of marine protection. Adopting additional protocols, such as the pending biodiversity protocol with significant commitments on Marine Protected Areas (MPAs) – including transboundary ones – will boost the mandate of ROPME.

Ideas such as marine spatial planning using ecosystem-based management and integrated coastal zone management can be better promoted through ROPME.³⁹ Many of the MPAs in the Gulf are not effective because they do not include marine spatial plans with designed zones and uses.⁴⁰ ROPME's potential is far from being fully exploited in terms of catalysing expertise and participation from the Gulf countries and the international marine research community.⁴¹

Regional environmental cooperation requires bold plans with significant commitments in terms of common targets and funds for marine protection. Such plans are required to better understand the risks facing the Gulf, develop coordinated monitoring systems, connect MPAs, and design restoration measures to sustain marine ecosystems. Some scholars have suggested GCC states to lead the regional efforts to integrate coastal management because of their active role in coastal development – the UAE, for example.⁴² In fact, the GCC states have been the most active users of the Gulf's coasts, and they should contribute more towards protection commitments. As an organisation, the GCC has experience and has established mechanisms to promote biodiversity and protection efforts, such as through the GCC Convention on the Conservation of Wildlife and their Natural Habitats and its follow-up instruments.

37 Al-Saidi et al. Participation modes and diplomacy of Gulf Cooperation Council (GCC) countries towards the global sustainability agenda, 545–58.

38 Al-Saidi M, Das P, Saadaoui I. Circular Economy in Basic Supply: Framing the Approach for the Water and Food Sectors of the Gulf Cooperation Council Countries. *Sustainable Production and Consumption* 2021;27:1273–85. <https://doi.org/10.1016/j.spc.2021.03.004>

39 Burt JA, Ben-Hamadou R, Abdel-Moati MA, Fanning L, Kaitibie S, Al-Jamali F et al. Improving management of future coastal development in Qatar through ecosystem-based management approaches. *Ocean & Coastal Management* 2017;148:171–81. <https://doi.org/10.1016/j.ocecoaman.2017.08.006>

40 van Lavieren H, Klaus R. An effective regional Marine Protected Area network for the ROPME Sea Area: Unrealistic vision or realistic possibility? *Marine Pollution Bulletin* 2013;72(2):389–405. <https://doi.org/10.1016/j.marpolbul.2012.09.004>

41 Sale et al. The Growing Need for Sustainable Ecological Management of Marine Communities of the Persian Gulf, 4–17.

42 Ibid.

There is also a need to expand regional environmental cooperation beyond marine protection. Climate change is a common challenge that requires catalysing regional expertise and data. Some of the climate change issues concerning the marine environment can be mainstreamed within the work of ROPME. In fact, ROPME has a long history of deliberating marine climate change, such as the 1994 climate change report prepared by UNEP and ROPME or the 2020 report. However, climate impacts extend to other sectors, including energy and supply infrastructure.

Regional cooperation can improve knowledge of the regional-level climate impacts. Within the GCC, the idea of establishing a regional climate change centre together with an environmental monitoring centre was agreed upon more than a decade ago, but the centres did not materialise.⁴³ In 2023, Saudi Arabia established a regional climate change centre within its Middle East Green Initiative, although its mandate is not clear yet.⁴⁴ In 2019, the UAE established a regional cooperation centre on climate change for the Middle East, North Africa, and South Asia, but it did not include Iran.

Another collaboration topic is the growing problem of plastic debris. ROPME's activities on this topic have been limited, and there is a need for a regional action plan to tackle land-based waste and to develop clear consumption, prevention, and recycling targets.⁴⁵ Furthermore, the scientific community should be more engaged in regional cooperation efforts to provide necessary advice and facilitate trust among Gulf countries.⁴⁶

In 2023, a coalition of Gulf scientists called for using science diplomacy as a way to build trust, share knowledge, and address common environmental risks facing the Gulf littoral countries.^{47,48} Instead of waiting for formal diplomatic measures or international agreements, peer networks of scientists can lead some projects related to knowledge co-production using multiple case studies, area-based conservation measures, and informing ocean protection strategies. To make this happen, the Gulf scientists have asked for more regional research funding, data sharing, and support for science-policy networks, as well as enhancing the work of ROPME or neutral boundary organisations in catalysing international science diplomacy efforts.^{49,50}

43 Al-Saidi M. Cooperation or competition?

44 Arab News. Saudi Cabinet approves regional center for climate change; 2023. <https://www.arabnews.com/node/2264641/business-economy>

45 Stöfen-O'Brien et al. Marine plastic debris in the Arabian/Persian Gulf.

46 Fieseler CM, Al-Mudaffar Fawzi N, Helmuth B, Leitão A, Al-Ainsi M, Al Mukaimi M et al. Expanding ocean protection and peace: a window for science diplomacy in the Gulf. *Royal Society Open Science* 2023;10(9):230392. <https://doi.org/10.1098/rsos.230392>

47 Fieseler et al. Expanding ocean protection and peace.

48 Fawzi NA-M, Fieseler CM, Helmuth B, Leitão A, Al-Ainsi M, Al Mukaimi M et al. Diplomacy for the world's hottest sea. *Science* 2022;376(6600):1389–90. <https://doi.org/10.1126/science.add1555>

49 Fieseler et al. Expanding ocean protection and peace.

50 Fawzi et al. Diplomacy for the world's hottest sea, 1389–90.

Conclusion

Gulf water is a common environmental resource that requires the regulation of its use to halt deteriorating environmental conditions. Populations of the Gulf states face an environmental predicament caused by the lack of coordinated action on the protection of this unique body of water and ineffective national regulations. The environmental issues of the Gulf should be shielded from political conflicts, which can happen only through strengthening multilateral institutions.

With the increasing complexity of environmental change facing the Gulf, regional environmental cooperation is more important than ever. As regional tensions have seemed to decrease after the restoration of relations between Iran and Saudi Arabia, this opportunity should be used to expand environmental cooperation in the Gulf. This means reinvigorating platforms such as ROPME and encouraging the participation of scientists and non-state actors in regional cooperation frameworks.