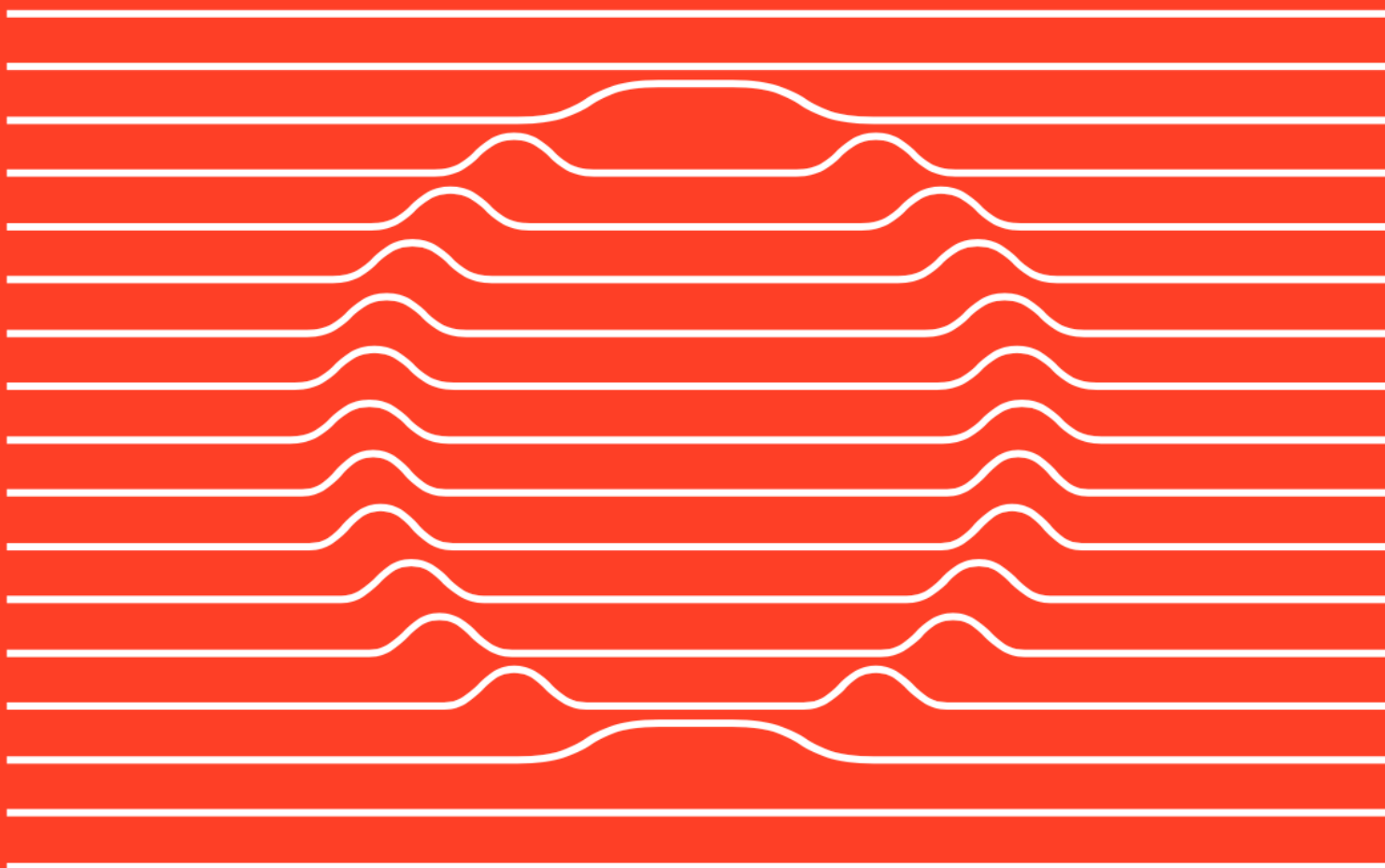


Transnational
Red Sea
Center

Bridging Science
& Diplomacy for
the Future of Corals

A Swiss initiative
to save the last « coral refuge » on Earth



PRESS KIT



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Over the past 30 years, 50% of corals have disappeared worldwide due to global warming, pollution, and other destructive human activities, and only 10% are expected to survive past 2050. The demise of coral reefs, which are of utmost importance for marine life, means the loss of the planet's most diverse ecosystems and poses a major threat for the stability of many countries and regions around the globe, where hundreds of millions of people rely on these fragile ecosystems for their existence.

But there is hope. Recent studies involving scientists from the Ecole Polytechnique Fédérale in Lausanne (EPFL) have shown that corals in the Gulf of Aqaba are extremely resistant to rising water temperatures and ocean acidification compared with corals elsewhere in the world, because of their unique evolution in the Red Sea system. Therefore, the Red Sea and the Gulf of Aqaba *de facto* represent the most promising coral *refuge* on Earth, creating real hope for the survival of at least one major coral reef ecosystem, provided that the environmental pressure exerted by human activities in the surrounding countries (Djibouti, Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan, Yemen) is mitigated. The preservation of the coral reefs of the Red Sea can only be achieved through collaboration at the regional scale.

The Transnational Red Sea Center, a scientific research organization based at EPFL, was created in March 2019 with the support of the Swiss Confederation to raise awareness and promote such a joint effort. An independent and non-profit organization, capitalizing on Switzerland's neutrality, its long tradition of promoting dialogue and EPFL's reputation for scientific excellence, it intends to bridge science and diplomacy in a long-term vision, aiming to:

- Understand the biological mechanisms by which the Red Sea corals have developed an extraordinary resistance to climate change that makes them unique compared to other coral reefs in the world;
- Promote environmental protection policies for the Red Sea coral ecosystem by engaging public and private actors at the regional level, not only through scientific, but also through educational and cultural collaboration;
- On the principle of Open Science, pave the way for future technological applications potentially enabling to rehabilitate other reefs worldwide

From 2022 onward, the Transnational Red Sea Center will carry out a series of scientific and cultural expeditions in close collaboration with relevant regional and international marine institutions, with the support of the Federal Department of Foreign Affairs (FDFA). At the same time, high-tech monitoring stations will be deployed in strategic locations while outreach activities will be carried out to engage the local communities in partnership with local stakeholders.

The Transnational Red Sea Center is a significant example of science for diplomacy and diplomacy for science.

Background and Motivation

Coral reefs, host to millions of marine species, are under stress and dying from the effects of global climate change, primarily rising water temperature and ocean acidification caused by increased atmospheric CO₂-levels, and from local stress, such as pollution, overfishing, and physical destruction. The last few years alone have been tragic for coral reefs around the world. Due to massive bleaching events during the warm summers of 2016 and 2017, major damage and mass mortality occurred in many reef-localities, notably the iconic Great Barrier Reef in Australia, which has now lost about 50% of its coral cover. On the current trajectory of global warming, only about 10% of the preindustrial coral reef cover is expected to survive past the year of 2050. This is a profound problem for humanity, not only because of the gigantic loss of biodiversity that results from the decline of coral reefs, but also from a socio-economic perspective: hundreds of millions of people living in tropical countries are directly depending on the services from healthy coral reefs, e.g., seafood, shore protection, and tourism.

But there is one hope for a major coral reef ecosystem to survive until the end of this century. Several recent scientific studies (including by teams at EPFL, in Israel, Jordan, and Saudi Arabia) have shown that corals in the Gulf of Aqaba and the northern Red Sea are extremely resistant to rising water temperatures, compared with corals anywhere else in the world. The reason is that these corals have, since the last ice age, evolved in a geological setting and with an environmental history that are unique to the Red Sea region. This evolution has led to extremely high resistance to increasing sea-surface temperatures.

This represents a fantastic opportunity and creates real hope for the survival of at least one major coral reef ecosystem, which might serve as a source of corals for other reef environments in the future. However, this hope rests on the necessity to protect the Red Sea reefs from future sources of environmental stress. This, in turn, requires regional-scale collaboration between scientists, lawmakers and a broad range of stakeholders, including public and private investors.

Science for Diplomacy and Diplomacy for Science, the need for a neutral partner

All nations in the Red Sea region share a strong interest in protecting the Red Sea coral reefs. Indeed, these coral reefs are of the greatest importance to the cultural and national identities (and economies) of the Red Sea countries. At the same time, it is clear that effective scientific collaboration underpinning and informing effective coral reef protection calls for a neutral partner who can coordinate and manage the required research activities, which necessarily must be regional in scale and thus transnational in order to have a real meaning and impact.

The fundamental new idea is to use Switzerland's and EPFL's neutrality, its longstanding tradition of promoting dialogue, and its reputation for scientific excellence, to unite scientists in the Red Sea region and drive scientific collaborations among regional stakeholders, while connecting at the highest political level to promote the preservation of Red Sea corals. The Swiss Foreign Ministry has pledged its full support to this idea and is already working across the region, through its diplomatic network, to create high level links with key governmental agencies to help the planned scientific work move forward. The explicit objective of the collaboration between the Transnational Red Sea Center and the Swiss Foreign Ministry is thus to merge science and diplomacy in an effort to boost environmental protection of the Red Sea coral ecosystem.

The short-, mid-, and long-term vision to match the timescale of global change

Four *Red Sea Coral Science Expeditions* (see below) will constitute the first phase of activity of the Transnational Red Sea Center. However, in the mid- and long-term, the Transnational Red Sea Center will increasingly federate scientists from each partner country and from a wide range of disciplines, including oceanography, biology, genetics, ecology, geology, nature conservancy, civil and environmental engineering, social science, demography, agronomy, industrial fishery, water resources, economy, informatics, and 'big data'.

The Center will make direct use of already existing research platforms in the different partner countries, for example at the Jordanian Marine Station in the Gulf of Aqaba, the InterUniversity Institute for Marine Sciences (Israel), King Abdullah University of Science and Technology (KAUST, Saudi Arabia), and marine stations along the Egyptian coast. In addition, new autonomous monitoring stations will be created in strategic localities, equipped with *state-of-the-art* instrumentation. In this way, the Center will become a virtual Environmental Science University of the Red Sea region and will have a very significant and broad international outreach, including to coral research centers in Australia, Japan, China, France, and the USA.

2022-2025, a series of scientific expedition

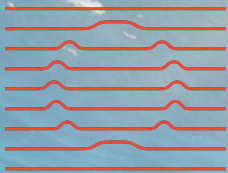
As a first step in the development of the vision described above, the Transnational Red Sea Center is launching a series of Science Expeditions during the summers of 2022 to 2025. These expeditions will cover the entire Red Sea system and beyond (the waters from where the Red Sea corals ancestors originated) and have the following scientific priorities:

- Establish the first ever Red Sea-wide coral ecosystem and biodiversity 'baseline'
- Quantitatively determine the resilience of 6-10 key coral species through systematic thermal stress testing
- Assess the environmental impact of socio-economic development and identify hotspots of environmental stress – today and in the future – along the shores of the Red Sea
- Systematically sample for water and air quality, as well as microplastics pollution
- Genetically analyze coral and environmental DNA (eDNA), shedding light on the unique evolution and biodiversity of Red Sea corals reefs in comparison with corals from the Indian Ocean, the Persian Gulf, and Great Barrier Reef (Australia).
- Use cutting-edge seascape genomics, i.e., the combination of genomic information with environmental mapping (incl. satellite remote sensing), to understand and predict the coral adaptation patterns on the scale of the entire Red Sea system.

An important aspect of the planned expeditions will be the employment and testing of new technologies under challenging fieldwork conditions. As an example, these expeditions will test the most recent eDNA analytical technologies, providing on-board genetic information on reef-biodiversity, which can support sampling strategy in quasi real-time. These technical advances will be directly transferable to future expeditions and contribute strongly to the introduction of relatively small vessels into coastal oceanography.

Bridging cultural differences

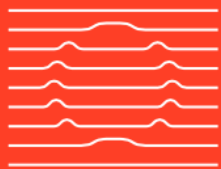
The Red Sea region is rich in cultural and religious diversity that has, in the past, led to conflict and geopolitical tension. A key objective of the Center is to unite the Red Sea countries across religious and cultural boundaries in the common pursuit of scientific knowledge that will form the basis for protection of the Red Sea corals. Science is not only the basis for effective environmental protection, it also offers a common and even platform for dialogue, permitting people of different religious conviction and cultural background to communicate effectively. The Center will therefore, through its scientific activities, contribute directly to create a peaceful dialogue between all partner-countries in the Red Sea region.



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Transnational Red Sea Center
Ecole Polytechnique fédérale in Lausanne (EPFL) - Switzerland
www.trsc.org

Media contact:
Samuel Gardaz
samuel.gardaz@epfl.ch / +41 76 563 65 43

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