

## In Djibouti, the protection of healthy coral reefs resistant to climate change mobilizes local and regional actors at the initiative of Switzerland

The Transnational Red Sea Center, a Swiss initiative bridging science and diplomacy for the study and preservation of the corals of the Red Sea, the most promising coral "refuge" in the world, has just completed a twelve-day scientific mission in the Gulf of Tadjoura in collaboration with its Djiboutian and Sudanese partners.

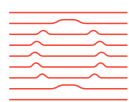
With the support of the Ministry of Environment and the participation of scientists from the University of Djibouti, the Centre d'Etudes et de Recherches de Djibouti and the Red Sea University in Port Sudan, this multidisciplinary mission witnessed coral reefs in excellent health despite a water temperature near its seasonal peak.

This new joint mission, following the one carried out in July-August in the northern Gulf of Aqaba, is part of a Red Sea-wide coral ecosystem and biodiversity 'baseline' study, currently underway. Both are part of the scientific diplomacy promoted by the TRSC with the official support of the Swiss Confederation.

Lausanne/Djibouti, 5 October 2022 - In Djibouti, the corals of the Gulf of Tadjoura are doing extremely well. This observation should be an obvious reality requiring no special comment, but in the current environmental context it actually deserves to be strongly highlighted. Along the coasts of the small state of the Horn of Africa located at the southern end of the Red Sea, these animals - which carry rich and complex ecosystems on their shoulders, and are thus essential to the underwater life - offer a particularly delightful shimmer of forms and colors. In sharp contrast, at many other coral reefs localities outside the Red Sea region, their fellow creatures are facing rapid decay from the combined effects of global warming and local pollution, which is an ecological disaster that poses massive threats to the populations living directly and indirectly from their critical services, primarily fishing and tourism.

In this context, the exceptional health of Djibouti's corals is a welcomed reality that the Transnational Red Sea Center was able to observe during the scientific mission it carried out in Djiboutian waters from September 16 to 28. Despite an average water temperature of 31 degrees Celsius - its seasonal peak -, no signs of bleaching (i.e., the rupture of the symbiosis between the coral and the micro-algae that it shelters in its tissue and which brings it its color, but above all provide the coral with most of its nutrients) was detected on the six sites studied by the mission.

*"At each of the six sites where we conducted our different scientific programs, we were struck by the excellent health and the very high diversity of Djibouti's corals,"* says Prof. Anders Meibom, director of the Transnational Red Sea Center, a Swiss initiative created in 2019 at the



Swiss Federal Institute of Technology in Lausanne (EPFL) with the support of the Swiss Federal Department of Foreign Affairs (FDFA), and combining science and diplomacy in favor of the study and preservation of the Red Sea corals.

*"The very good health of the Djiboutian corals confirms the notion of the Red Sea region as a coral reef refuge from the effects of global warming. Here, corals are particularly resistant to rising water temperature. The temperature of the water in which these corals live was on an average 31 degrees Celsius during our mission, i.e., near the seasonal maximum and well above what most other corals can withstand in other parts of the world," the researcher adds.*

*"The corals in the Red Sea region represent one of the few chances that a last major coral reef will remain by mid-century. It is therefore urgent to preserve them from local sources of pollution and destruction through protection mechanisms developed and implemented at the scale of the entire Red Sea," explains Prof. Meibom, one of the authors of the first scientific studies that revealed the resistance of Red Sea corals to climate change, and one of the initiators of the TRSC.*

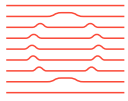
*"This is the ambition of the Transnational Red Sea Center in close collaboration with its regional, academic and governmental partners," he insists.*

During the Djibouti mission, the TRSC continued the implementation of five core science programs on 1) evaluating the metabolic response of corals to thermal stress in order to estimate their potential to adapt to global warming; 2) assessing coral reef population structure, dynamics, and adaptive potential through seascape genomics; 3) estimating coral species assemblages through environmental DNA (eDNA) metabarcoding; 4) assessing the metabolic response to thermal stress to increase our knowledge about fundamental cellular metabolism; assessing the impact of plastic and trace-metal pollution on corals, and 5) 3D-mapping of shallow coral reefs using computer machine learning.

The TRSC intends to conduct these programs in a systematic manner throughout the Red Sea as part of its 2022-2025 expedition aiming to establish the first-ever Red Sea-wide inventory of coral reef ecosystem and biodiversity. The results of these programs are to be made available to governmental actors in the region to contribute to the development of relevant and effective conservation policies, as well as to the scientific community at large in accordance with the Open Science principle.

The coral samples collected during the mission in Djibouti will undergo DNA extraction in the laboratory of the Marine Science Station (MSS) in Aqaba, Jordan, a TRSC partner, before DNA sequencing and genomic characterization are conducted at EPFL.

For twelve days, the mission brought together a multinational team including, in addition to researchers and students from several EPFL laboratories, teachers, technicians and students from the University of Djibouti, CERD and the Red Sea University in Port Sudan.



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The mission also aims to raise awareness among local students of the specificity of Red Sea corals and the preservation issues that arise from them, by fully involving them in a long-term initiative whose goal is also to create vocations and strengthen skills in the field of marine sciences.

After Israel, Jordan and Djibouti in 2022, the next mission of the Transnational Red Sea Center is scheduled to take place in Sudan in early 2023.

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