CASPISNET SCIENTIFIC BRIEF

LATEST DEVELOPMENTS

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This is the first quarterly scientific brief by CASPISNET under its new arrangement with the Institute for Development and Diplomacy (IDD).

Overview

Since its inception, CASPISNET has been actively pooling scientific resources across national boundaries towards evidence-based policy formulation concerning Caspian environmental, social, and economic dynamics and challenges.

CASPISNET intends to position itself during the upcoming periods as a key contributor to its regional partners by linking evidence-based and practice-informed emerging risks with new scientific methods as well as recommending regional policies with the aim to connect mitigation and adaptation strategies. Thus, ensuring the well-being of communities in the region and the health of the natural environment in accordance with the UN 2030 Agenda for Sustainable Development and the implementation of the Sustainable Development Goals (SDGs).

The pooled knowledge of the Caspian basin will enable regional professionals and policymakers to upgrade their understanding and analysis of the complexity and interconnected elements of planetary change, including climate, biodiversity, national resource management, demographic distribution, and infrastructure deployment, among a wide array of other dynamics.

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During the past five years, CASPISNET has successfully organized a series of international multidisciplinary events (conferences, technical workshops, expert meetings, roundtables, and trainings) involving participants (experts, young researchers, engineers, and students) from over 20 countries focused on studying the Caspian Sea Basin following the UN SDGs 2030 Agenda. Moreover, this work is successfully continuing in terms of collaborative projects in cooperation with CAPISNET's local and international partners, such as Cleaning Riverine Plastic from a Transboundary Inflow to the Caspian (CRIPTIC), the Caspian Sea Digital Twin, and others.

CRIPTIC Project

CPRIPIC was the first project that CAPISNET founded in Azerbaijan with its partners. It is a joint Norway-Azerbaijan project funded by the Norwegian Retailers' Environment Fund (Handelens Miljøfond) to map and clean up plastic waste in the Caspian Sea. The two-year project combined a range of advanced digital methods, educational programs, and citizen science to engage local stakeholders and society in plastic mapping and clean-up activities and was successfully completed and submitted at the end of March 2023.

On the Norwegian side, the project was led by Akvaplan-niva, and other partners included the Norwegian Institute for Water Research, SALT, and TerraNor. On the Azerbaijani side, it was co-led by CASPISNET and the Azerbaijan Geographical Society, with partners such as the Institute of Geography, the Ministry of Science and Education, Sukanal SRDI of Azersu OJSC, and the Water Expert Union. Additionally, the project had the active support of the Executive Power of Neftchala region, BP Azerbaijan, AT-GEOTECH, ESRI, Azercosmos, Caspian Locus, Spectra, Baku Engineering University, AZ EKOL, and AZ-GREEN.

The main part of the project's implementation coincided with the COVID-19 pandemic. This led to problems implementing the project, especially regarding the organization of site visits to different schools and the quantity of field surveys, which could only have 50 participants. Despite this, the team successfully managed to complete the project, and the initial consortium of project partners increased from ten to more than twenty.

Four events were organized during the project: two online international workshops on marine litter cleaning techniques involving about 150 participants from over ten countries and two physical field visits to the CRIPTIC pilot project zone with 100 participants from Azerbaijan and other riparian countries. In total, participants from different local and international universities, state organizations, and the private sector from Argentina, Azerbaijan, China, France, Greece, Iran, Italy, Kazakhstan, Russia, Spain, Switzerland, Türkiye, and others attended the events.

The main objective of CRIPTIC is to improve regional capacity to reduce plastic pollution in the Caspian Sea. To that end, sub-objectives include:

- Harmonizing mapping methods.
- Mobilizing local organizations in mapping and cleaning operations.
- Running a local pilot project on plastic waste mapping and cleaning using multidisciplinary tools.
- Raising public awareness and community engagement in combating plastic waste.

The methodology applied in this project is relatively new for the Caspian region and involves a range of multidisciplinary approaches. Thus, the CRIPTIC project is organized into three interconnected parts:

The *first* part involves riverbank cleaning and classifying the collected plastic from the Kura River. This includes the conduct of an analysis of all collected marine litter from riverbanks, beaches, and coastal lines in quantitative and qualitative ways.

The *second* part aims to produce maps for cleaning and using different modern digital solutions with the active application of remote sensing observations, including high-resolution satellite and drone images. Additionally, advanced robotics, data processing (machine learning, deep learning), and different types of high-resolution ocean modelling (multi-resolution) are to be used to map plastic waste for cleaning.

The *third* and final part of the project is to build a strong community engagement strategy to establish and maintain a strong community coalition to support the Kura River and the Caspian Sea waste management policies.

Initially, the project was planned to be implemented in four different places: three in the continental part of Azerbaijan through the Kura riverbank and one in the Caspian Sea coastal zone. However, our initial inspection assessment identified the Neftchala region as containing numerous and diverse plastics along the coastal zone, from fish nets to urban plastic, and therefore could be a really interesting location for the project. As a result, the coastal area, with a dimension of 1,200 square meters, located near Beacon 1 in the Neftchala region, approximately 180 kilometers from Baku, was selected as CRIPTIC's pilot zone.

The distribution and pollution of plastic waste in marine areas is not new, and many examples can be given in Asia. However, not much information exists on plastic pollution in the Silk Road region and the Caspian Sea region in particular. According to published reports, the major pollutants entering the Caspian Sea are plastic pollutants, and according to research, the volume is increasing. Thus, first of all, there is a strong need to harmonize the methodology for mapping the plastic pollutants in the Caspian Sea at a national level. The CRIPTIC project and its applied approach can be a valuable and reliable source of information, especially the data collected from the two field surveys organized in August 2021 and November 2022. CRIPTIC can also help to identify common political

solutions and consider appropriate migratory measures. Moreover, CRIPTIC's mapping, collecting, identification, and interpreting data on collected plastic can be crucial to save resources and provide stakeholders and policymakers with the requested information.

The Caspian Sea Digital Twin Project

CASPSINET is also actively involved in the UNESCO Intergovernmental Oceanographic Commission (IOC) Endorsement of Decade Action entitled "The Caspian Sea Digital Twin, ID 92" within the UN Decade of Ocean Science for Sustainable Development (2021-2030), which officially started in January 2022.

In December 2017, the UN General Assembly proclaimed the UN Decade of Ocean Science for Sustainable Development (2021-2030). The IOC has been tasked to coordinate this endeavor in the science and technology fields. According to the Decade Implementation Plan draft prepared by the IOC Secretariat in consultation with the scientific community, business representatives, and IOC member states, the vision of the Ocean Decade operates under the slogan, "the science we need for the ocean we want." The mission of the Ocean Decade is "to catalyze transformative ocean science solutions for sustainable development, connecting people and our ocean."

In October 2020, the IOC published its First Call, inviting proposals focused on real change and contribution to the strategic goal of the Decade of Ocean Science. One type of proposal is a "program," a global or regional initiative that addresses one or more of the Decade's priorities. This "program" is understood to be a long-term, multi-year, interdisciplinary, and international and brings together a number of included projects and supporting activities.

One of the programs accepted by the IOC was submitted by the P.P. Shirshov Institute of Oceanology at the Russian Academy of Sciences was "the Caspian Sea Digital Twin." Its goal is to establish a Caspian Sea Data Center, which would include a constantly updated archive of satellite data (infra-red, optics, radar, altimetry), oceanographic data (physical, chemical, biological parameters), hydrometeorological data, hydrodynamic model data, atmospheric reanalyzes data, the results of regional climate change forecasts, electronic atlases, an electronic library of publications (open access) on the Caspian Sea, and other materials. The flow of data and information will come from all Caspian Sea countries and other interested partners. The collected data will make it possible to assess anthropogenic loads on the environment of the Caspian Sea, the ongoing climate changes, extreme weather and climate events, the impact of climate change on natural and socio-economic systems, and to develop a strategy and mechanisms for adaptation to climate change and the state of the Caspian Sea. Furthermore, the established infrastructure will enable the provision of modern information resources in establishing improved conditions for the sustainable development of the Caspian Sea region. In the future, he Caspian Sea Data Center may be transformed into a Caspian Sea Analytical Data Center with additional consulting functions.

This project was launched on 1 January 2022. One of the project's important activities is collaboration with CASPISNET, whose members constitute about 30 percent of the whole team. All told, the project has 24 teams from 22 organizations in Azerbaijan, France, Iran, Kazakhstan, Russia, and Switzerland. The Azerbaijani team is a consortium of five organizations: the Institute of Geography at the Ministry of Science and Education, the French-Azerbaijan University (UFAZ), Baku Engineering University, Khazar University, and Azercosmos.

Since the start of the Caspian Sea Digital Twin project, 14 research works have been published by the project team members. Moreover, the next roundtable discussion and meeting of the international team of experts working on the project will take place in Baku at the Institute for Development and Diplomacy during the next CASPISNET Annual Meeting, which is planned to be held on 5-8 June 2023.

CRIPTIC Movie

The third project with active CASPISNET involvement is the CRIPTIC Movie, confirmed on 30 October 2022 with an implementation time for 2023. This project originated from the first fieldwork exercise organized in the Neftchala region (Beacon 1) on 8 August 2021 within the CRIPTIC project. It is a short movie filmed to describe the first fieldwork at the CRIPTIC pilot zone and was first shared on CRIPTIC's Facebook page. The public accepted it with great interest, and it quickly became popular, which further increased when Akvaplan-niva's YouTube account reposted the video.

The unexpectedly huge amounts of feedback led Akvaplan-niva, CASPISNET, and other partners to the idea of making other short videos to market HMF and practical cooperation and to raise awareness of the marine litter problem in the local, regional, and global context. The CRIPTIC movie project is funded by the Norwegian Retailers' Environment Fund (Handelens Miljøfond).

The plan is to produce videos in two formats, long and short. Short videos (5-10 minutes) will be distributed among open internet platforms, while extended versions (30-45 minutes) will be presented as an introductory lecture at educational and training courses. The project is currently in development, and project partners are cooperating in planning the video structure.

As noted above, in mid-June 2023, a roundtable discussion with the participation of all CRIPTIC partners on the theme of "macro plastic distribution in the Caspian Sea" will take place at the Institute of Development and Diplomacy. Discussions will focus on presenting and analyzing the final results of the project to local and international partners and introduce the CRIPTIC Movie project to partners.