

MENA NWC

Middle East and North Africa Network of Water Centers of Excellence

MENA NWC Research Project Summary

COMBATING THE EMERGING IMPACTS OF HARMFUL ALGAL BLOOMS (HABs) ON DESALINATION PLANTS: BLOOM DETECTION, FORECASTING, AND STRATEGIES FOR IMPACT REDUCTION



Non-Conventional Water

Marine and fresh waters teem with life, much of it microscopic and most of it harmless. In fact, it is this microscopic life on which all aquatic life ultimately depends for food. Algal blooms occur in natural waters when certain types of microscopic algae grow quickly, often in response to changes in levels of chemicals, such as nitrogen and phosphorus from fertilizer, in the water.

The impacts of harmful algal blooms (HABs) are widespread. They can deplete the oxygen and block the sunlight that other organisms need to live. Some produce toxins that are harmful to the health of the environment, plants, animals, and people. HABs also disrupt desalination operations by clogging intake filters, fouling surfaces, and compromising membranes. These impacts can be severe, as seen during a 2008-2009 HAB in the Gulf of Oman that negatively affected multiple desalination plants, including one that had to cease operations for 55 days.

To address this challenge, an international research team led by the Middle East Desalination

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Co-Principal Investigators:

- Sultan Qaboos University (SQU), Oman
- Regional Organization for the Protection of the Marine Environment (ROPME), Kuwait
- University of California Santa Cruz (UCSC), USA
- Woods Hole Oceanographic Institution, USA
- National Oceanic and Atmospheric Administration (NOAA), USA

Photo courtesy of MEDRC



An algal bloom at the Sohar Industrial Estate in Oman.

Research Center (MEDRC) in Oman will use state-of-the-art satellite remote sensing and numerical modeling technology to develop an early warning system. This system will alert desalination plant operators to the presence and predicted transport pathways of algal blooms. As a result, operators will have a broader view of their environment, allowing them to observe and understand approaching algal blooms and engage in more adaptive management and informed decision-making. A demonstration project is proposed at Barka, a desalination facility in Oman that was shut down during the 2008-2009 HAB. Other validation sites will be included in Oman and possibly the east coast of the United Arab Emirates (UAE).



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