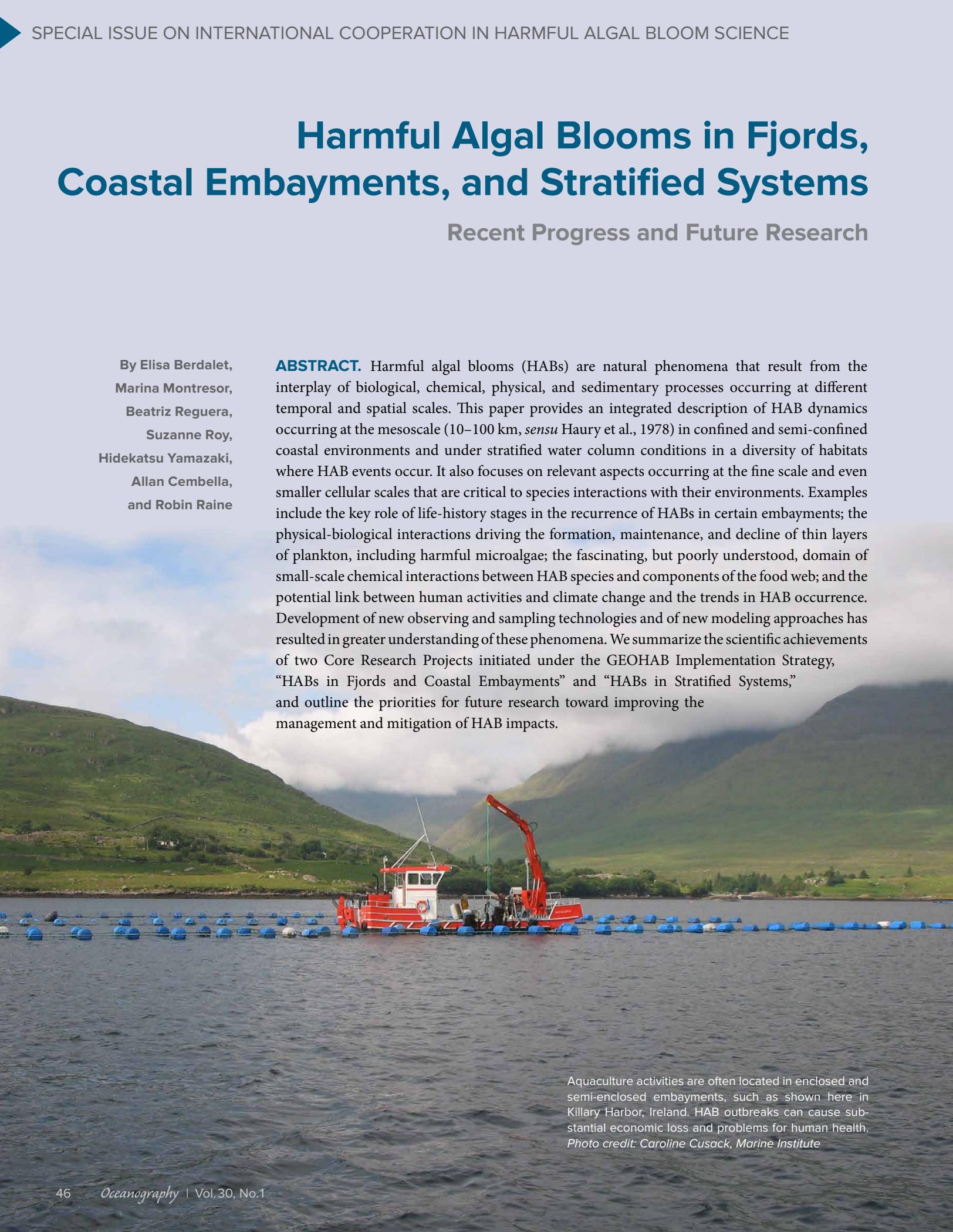


Harmful Algal Blooms in Fjords, Coastal Embayments, and Stratified Systems

Recent Progress and Future Research

By Elisa Berdalet,
Marina Montresor,
Beatriz Reguera,
Suzanne Roy,
Hidekatsu Yamazaki,
Allan Cembella,
and Robin Raine

ABSTRACT. Harmful algal blooms (HABs) are natural phenomena that result from the interplay of biological, chemical, physical, and sedimentary processes occurring at different temporal and spatial scales. This paper provides an integrated description of HAB dynamics occurring at the mesoscale (10–100 km, *sensu* Haury et al., 1978) in confined and semi-confined coastal environments and under stratified water column conditions in a diversity of habitats where HAB events occur. It also focuses on relevant aspects occurring at the fine scale and even smaller cellular scales that are critical to species interactions with their environments. Examples include the key role of life-history stages in the recurrence of HABs in certain embayments; the physical-biological interactions driving the formation, maintenance, and decline of thin layers of plankton, including harmful microalgae; the fascinating, but poorly understood, domain of small-scale chemical interactions between HAB species and components of the food web; and the potential link between human activities and climate change and the trends in HAB occurrence. Development of new observing and sampling technologies and of new modeling approaches has resulted in greater understanding of these phenomena. We summarize the scientific achievements of two Core Research Projects initiated under the GEOHAB Implementation Strategy, “HABs in Fjords and Coastal Embayments” and “HABs in Stratified Systems,” and outline the priorities for future research toward improving the management and mitigation of HAB impacts.



Aquaculture activities are often located in enclosed and semi-enclosed embayments, such as shown here in Killary Harbor, Ireland. HAB outbreaks can cause substantial economic loss and problems for human health. Photo credit: Caroline Cusack, Marine Institute