

## Rutger Rosenberg: A pioneering marine ecologist

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Professor Rutger Rosenberg died on 6 January 2024 (Fig. 1). He was almost 81 being born on 11 February 1943 in Laholm, Sweden. Rosenberg received his PhD in 1973 from Lund University. His thesis was titled “Macrofaunal Recovery in a Swedish Fjord Following the Closure of a Sulphite Pulp Mill” and set the scene for his research for the following 45 years.

After getting married to Kerstin Rosenberg, a talented scientific illustrator and artist, and completing his studies, Rutger Rosenberg took a post-doctorate position at Duke University Marine Lab in Beaufort North Carolina. After that, he worked for several years at the Swedish Environmental Institute and the Institute for Marine Fisheries in Lysekil. He then took an academic position at Kristineberg

Zoological Station (now Kristineberg Center for Marine Research and Innovation, University of Gothenburg), where he was professor of marine biology from 1986 until his retirement in 2008. After retiring, he focused his professional efforts on his company Marine Monitoring, which he owned and led for over 20 years together with his partners Åke Granmo and Leif Pihl. In 2011, Rutger Rosenberg was conferred a Doctor Honoris Causa in biosciences from Åbo Akademi, University in Finland, for his outstanding contributions to science and for his ability to communicate environmental science to society as a basis for governance and management.

He went on to publish some 250 papers and reports, and is cited over 29,500 times (Google Scholar, 20 April 2024), an astonishing number for a marine biologist. Interestingly, one of his first publications was with Kerstin (Rosenberg and Rosenberg 1972).

Rosenberg’s best-known works synthesized many different concepts from ecological succession to biogeochemistry in an environmental context. He was a big thinker who believed in fostering strong collaborative ties with other scientists and students. Much of Rosenberg’s legacy lives on in his many students and colleagues. As an example, the pioneering sulphite pulp mill recovery study set the foundation for one of his most important contributions to marine ecology. Rosenberg along with his colleague Tom Pearson (Scottish Association for Marine Science, Oban) developed paradigms for generalized response of communities to organic enrichment and pollution. Their publication of “Macrobenthic succession in relation to organic enrichment and pollution of the marine environment” (Pearson and Rosenberg 1978) inspired generations of ecologists and became one of his most highly cited papers. This work was so influential that a



**Fig. 1** Pioneering marine ecologist who developed paradigms for response of benthic communities to organic enrichment, pollution, and low dissolved oxygen, as well as methods to study these responses. Photograph credits: Johanna Bergkvist, Marine Monitoring

special meeting was organized for the sole purpose of discussing and expanding his paradigms. This is an accomplishment that few of us can ever claim for our own work.

In the late 1980s, Rosenberg turned his attention to the problem of low dissolved oxygen (hypoxia). In his generous Rosenberg style, he formed collaborations with scientists in Europe and America. In 1995, his publication of “Marine benthic hypoxia: a review of its ecological effects and the behavioural responses of benthic macrofauna” (Diaz and Rosenberg 1995) brought the plight of hypoxia to the attention of many. This was followed up with a global review of hypoxia effects, which not only informed scientists of the spreading consequences of “Dead Zones” but also society in a broader sense (Diaz and Rosenberg 2008). Press all around the globe picked up this article and brought the problem of hypoxia to the general public. That same year the dead zone database was added to the newly created Google Oceans.

In addition, Rosenberg contributed to developing and adapting novel methods for the study of marine coastal sediments, such as sediment profile imaging, numerical developments of environmental indices to measure ecological status as a basis for environmental decision-making (for example, the Benthic Habitat Quality index; Nilsson and Rosenberg 1997), and he also developed experimental designs both in the field and laboratory (intact sediment samples for studying responses to varying environmental conditions).

Rutger Rosenberg was a good academic teacher, supervisor, and mentor, and over the years, he supervised numerous PhD’s both for his home university and internationally. He also hosted several international post-docs as well as visiting professors and contributed to career building for his former students and post-docs. Four of his former students went on to become full professors in marine biology and ecology. After retirement, he remained active as Professor Emeritus at the Department of Biological and Environmental Sciences, University of Gothenburg, until spring 2023. He was also active within scientific publishing after he had retired, and his last scientific contribution came in 2019, almost 50 years after his first paper was published in 1971. Other well-known papers relate to the large-scale ecosystem-level effects of hypoxia and anoxia of the Baltic Sea (Karlson et al. 2002; Conley et al. 2009), and to the use of novel methods, both technical and numerical, in the study of benthic succession (Nilsson and Rosenberg 2000; Rosenberg 2001).

He valued the experiences that could come from daily living and taking time to appreciate nature and art. He still has many friends and colleagues that will miss socializing and working with him. Rutger Rosenberg remained active and engaged with his family, friends, and science up to his untimely end. We will all miss him greatly.

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