Furcellaria fields near the Lithuanian coast. Could be used for galactans production

Role of Scientific Research in the Sustainable Use of Marine Resources

Prof. dr. **Artūras Razinkovas-Baziukas**

For millennia the sea has provided humankind with food, facilitated travel and territorial expansion. Nowadays the sea still provides food and is one of the most economic means of transportation, but also gives a variety of other goods and services such as minerals and organic fuel and even energy. However, during the last decades marine resources became overexploited causing a decline in fishery stocks, degradation of habitats and a marine environment in general. The Baltic unfortunately is no exception.

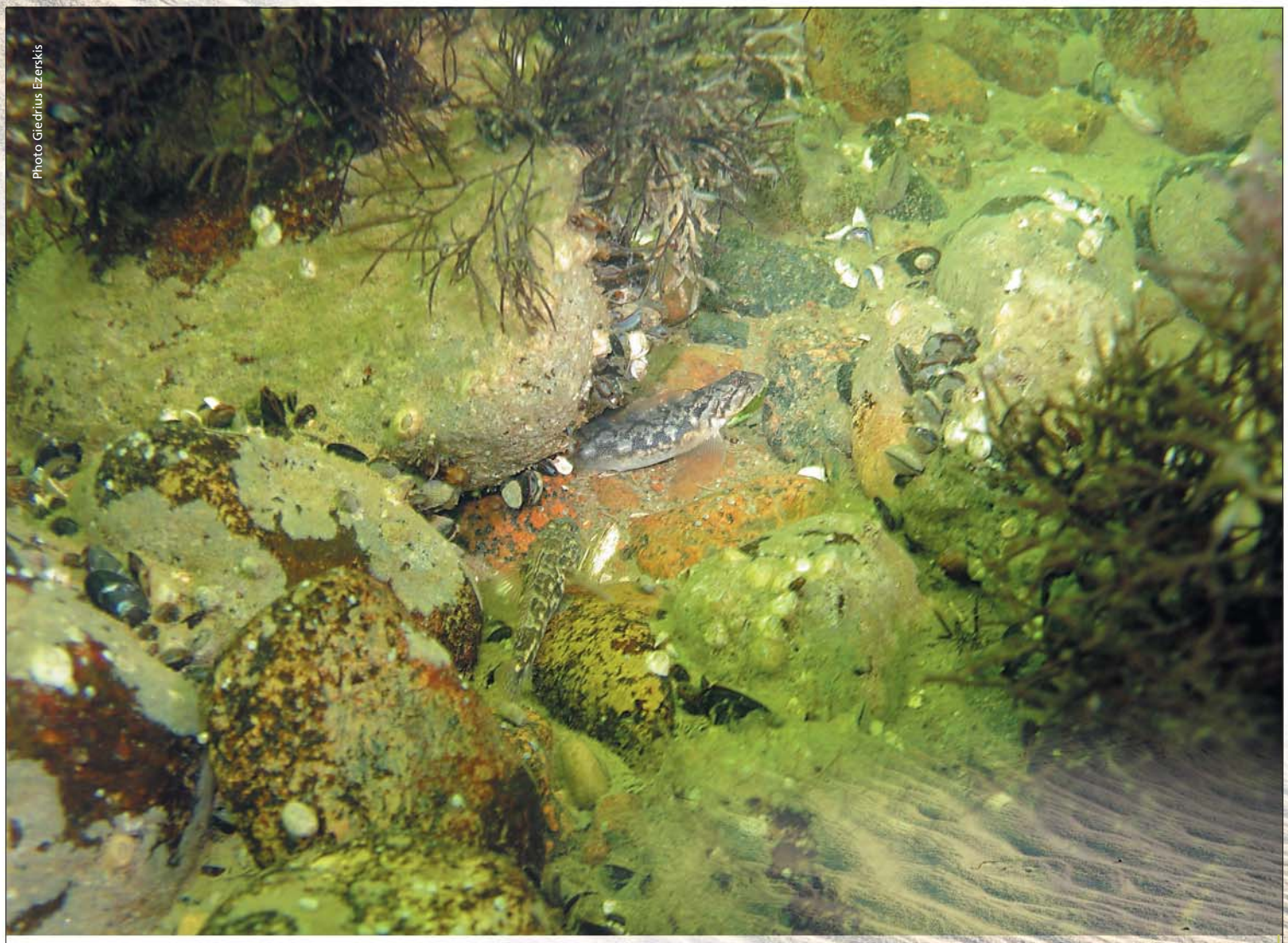

Photo Giedrius Ežerskis

Gobius in the natural habitat near Palanga

Eutrophied and heavily polluted with decreasing commercial fish stocks the Baltic Sea is considered as one of the most vulnerable seas in the world. How could we make use of the Baltic Sea resources sustainable?

For years the approach has been quite straightforward: to legi-slate the use of resources (e.g. by imposing quotas on fishery). However, during recent decades the spectrum of exploitable marine resources has become much wider and even our knowledge of the processes underlying the dynamics of the commercial fish population became more complete and linked with other fields of science. To use the resources sustainably we definitely need not only to know how the stocks are but also to follow different processes that have an impact on them. To manage the fishery we also need to know the most sensitive areas for pollution or what the risks of habitat degradation are. All that means that we need to apply an ecosystem-based approach to the management of marine resources. Oceans perform a variety of important functions. They are a source of food and income, a source of non-living resources, a source of recreational enjoyment, a source of cultural experience, a medium for transport, a recipient of waste products and pollutants, and a source of the marine biodiversity and ecological processes, which underpin most of the above functions. But for the sound sustainable management we need not only to employ our knowledge of biological and physical processes but to learn as well the social and economic drivers for the consumption and instruments aimed at the protection and regulation.

Only scientific knowledge could give power to predict future projections of marine development, threats and availability. However, that is a very complicated task and predictions could fail or miss, similarly to the weather forecasts. If meteorologists say that a major storm is coming, people are relocated to safer places, and houses and buildings are boarded up. Even if the predictions

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Blue mussel beds near the Lithuanian coast

Chinese mitten crabs *Eriocheir sinensis* caught near Šventoji in different environment

Photo Arturas Razinkovas-Baziukas

about when and where the storm will hit – provided by extensive networks of expensive ground-based monitoring devices and weather satellites – are not very accurate (because the storm's behavior is unpredictable). Precautions are still taken, often over a very wide geographical area… just in case. This illustrates that society does not expect meteorologists to predict the weather with any degree of accuracy, yet we have somehow learned to live with that, and take appropriate precautions. Perhaps, similarly now it is better to take further precaution and regulate the use of marine resources as based on already existing, even, possibly not adequately accurate scientific forecasts than face tragic consequences of depleted stocks, unemployed fishermen and polluted empty beaches in the middle of holiday season.

As natural resources have become scarcer, new approaches to environmental management have emerged. However, there are many uncertainties about how to design appropriate administrative systems for achieving environmental objectives. Generally, it is very

Photo Arturas Razinkovas-Baziukas

Chinese mitten crab Eriocheir sinensis, invasive species in Lithuania, but could be very delicious, when adequately prepared

Photo Giedrius Ežerskis

Flatfish in the natural habitat near Palanga. One of the most common commercial fish in the coastal zone of Lithuania

unusual for one instrument to be able to solve a complex problem. Instead, a combination of instruments is needed to achieve the desired outcome which requires concerted activities of decision makers, stakeholders, and individuals, and to account for the variability in the background conditions. Questions that require answers are whether direct regulations can and should play a supportive role and whether the introduction of a wider range of incentive instruments needs to be accompanied by a change in administrative arrangements for environmental and resource protection.

All the resources are limited and must be deployed where they are most likely to have the greatest positive impact. The knowledge and science of multidisciplinary processes related to functioning and use marine resources are critical to assessing the strengths and weaknesses of the range of possible incentive instruments and, thus, are key prerequisites to achieve the good state of our seas and their resources.

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