Razor-shell covered by egg capsules of dog whelks (photo © RIVO).

incrassatus) and that all species historically reported as *N. reticulatus* actually were *N. nitidus.*

For *N. reticulatus*, the colonisation of coastal waters could be explained as one typical for southern species spreading northwards as climate change warms coastal waters. In Belgium, the netted dog whelk has been quite common since 1993. The winters of 1995-96 and 1996-97 diminished the Belgian population but recovery has been reported since 1998 (Rappé, 2003). For *N. nitidus*, the change in distribution is not simply a northwards spreading. The species could have spread initially from the Grevelingen or the Oosterschelde and further distribution could be due to warmer water in the last couple of years. For both species, profit from changes in climatic conditions might be indirect, e.g. through decreased predation pressure on larvae. Higher water temperatures advance reproduction and hatching of many marine species while shortening the – risky – planktotrophic period. Decreased predation on larvae might also be due to a decrease in large carnivorous zooplankton, as has been suggested for Grevelingen Lake (Lambeck, 1982). Whether this is the case in the southern North Sea, we don't know, but the zooplankton species composition has certainly been altered by climate change (Beaugrand *et al*, 2002).

In 4-5 years, the dog whelk has spread from the Belgian border about 200km northwards. It is strange that *N. reticulatus* was common in Belgian coastal waters for about 10 years before it was first recorded in Dutch coastal waters. Even more so, as the capacity of *N. reticulatus* for dispersion is high; the species hatches as free-swimming veliger larvae, which drift as plankton for 2-3 months. Furthermore, *Nassarius reticulatus* has no distinct sediment preferences, which increases its colonisation potential (Rasmussen 1973; Kuhlmorgen-Hille, 1963). Unlike sandy shore-dwelling gastropods that need to attach their egg capsules to a relatively stable substratum, *N. reticulatus* prefers certain seaweeds, but in the absence of weed or when weed is scarce, capsules are deposited on rocks and other available hard substrates (Barnet *et al*, 1980). In the Dutch coastal zone, empty shells of razor clams might be a good substratum, as supported by recent observations. Since its introduction in 1979, *Ensis directus* has rapidly spread along the European coast. In Dutch waters it is nowadays one of the most common shells. It is likely that a combination of availability of empty razor-clam shells and higher temperatures has facilitated the spread of nassarids along the Dutch coast.

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Marine-B listserver

To facilitate communication of the project aims to as broad an audience as possible, and to disseminate the results of the project, the **Marine-B** (Marine Biodiversity) electronic mailing list is being utilised by MarBEF.

To join the list

This process will generate a piece of mail inviting you, as the owner, to add yourself to the list. Send an email to:
listserv@listserv.heanet.ie
and leave the subject line blank. In the main part of the mail, type in the command:-
subscribe MARINE-B <firstname surname>
Make sure that you do not add a signature at the end of the mail. You will then receive a message saying you are subscribed to the list.

To send mail to the list

When you want to send mail to the list, just enter MARINE-B@listserv.heanet.ie in the 'To' field and your mail message will be distributed to the people who have signed on to the list.

If you wish to check the list archives, go to:
http://listserv.heanet.ie/marine-b.html.

The website http://www.lsoft.com/ may be useful if you wish to get further information about listservers and the running of the list.

If you have any problems, please email Olive Heffernan (olive@ecoserve.ie).

R Hofrichter, ImagDop

Historial Perspectives

HMAP: History of Marine Animal Populations

An interdisciplinary research programme using historical and environmental archives to analyse marine population data before and after human impacts on the ocean became significant

By Anne Husum Marboe

THE HISTORY OF Marine Animal Populations (HMAP), the historical component of the Census of Marine Life (CoML), aims to improve our understanding of ecosystem dynamics, specifically with regard to long-term changes in stock abundance, the ecological impact of large-scale harvesting by man, and the role of marine resources in the historical development of human society.

Since the earliest historical records, man has harvested a variety of different animals from the oceans. The effects of this activity on marine populations have been of increasing interest over the last century. While ecologists have traditionally aimed to identify the current conditions of many of the animal populations affected both directly and indirectly by harvesting, much less focus has been given to the status of affected populations in earlier times. A historical reference point of marine populations against which modern populations can be compared is necessary in order to determine how ocean ecosystems are changing with respect to human impact and even climate change. HMAP addresses this issue through multidisciplinary studies integrating marine ecology, history and paleo-ecology. This innovative combination of research methods and analytical perspectives offers a unique approach to testing theories of the effects of both man's activities and natural environ-mental changes on our living marine resources.

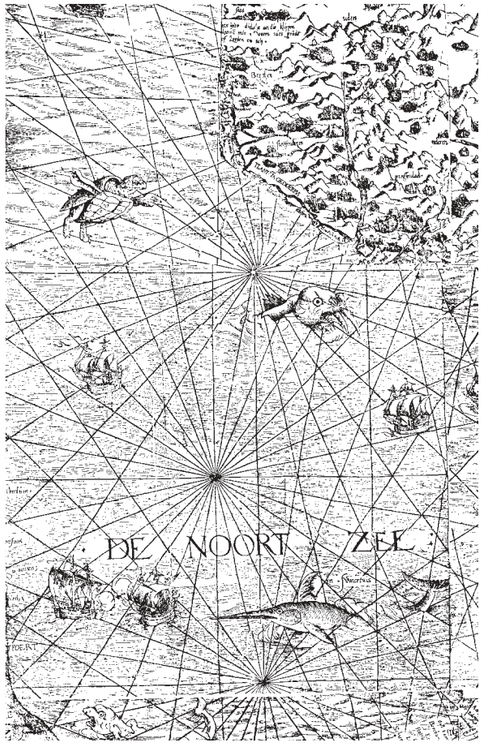
Methods and objectives

To achieve its goals, HMAP relies on the teamwork of ecologists, marine biologists, historians, anthropologists, archaeologists, paleo-ecologists and paleo-oceanographers. These integrated research teams analyse data from a variety of unique sources, such as colonial fisheries and monastic records, modern fisheries statistics, ship logs, tax documents, sediment cores and other environmental records, to piece together changes in specific populations throughout history. The resulting long-time series will improve our understanding of the effects of human activities and environmental factors, such as climate, currents and salinity, on marine ecosystems.

HMAP implements its global mission through a case-study approach. The case studies are generally regional in scope and focus on a few species of commercial importance or habitat and biodiversity changes. Individual studies are selected on the basis that the ecosystem has been subject to fishing and that there exists sufficient historical data on catches and harvesting effort. There are currently seven case studies around the world:

- Northwest Atlantic (Gulf of Maine, Newfoundland-Grand Banks, Greenland cod fisheries)
- Southwest Pacific (Southeast Australian Shelf and Slope fisheries, New Zealand Shelf fisheries)
- White and Barents Seas (Russian and Norwegian herring, salmon and cod fisheries, Atlantic walrus hunting)
- Norwegian, North and Baltic Seas (Multinational cod, herring and plaice fisheries)
- Southwest African Shelf (Clupeid fisheries in a continental boundary current system)
- Worldwide Whaling (Historical whaling in all oceans)
- Caribbean communities (Impact of the removal of large predators).

Many HMAP projects are interpreting changes in marine populations over the past 500-2,000 years, which provides researchers of current and future conditions a baseline that extends back long before the advent of modern technology, or before significant human impact on the ecosystem.



An historical view of the oceans (© CMRS).

HMAP will result in a better understanding of the role of marine resources in human history and of the factors controlling marine populations. The project will help improve ecological theory, which can be applied to predict the effects of human activities on marine and aquatic ecosystems.

Building a new discipline

Three HMAP Centres for the Study of Environmental History have been established at the University of Southern Denmark, the University of New Hampshire (USA) and the University of Hull (UK). These institutions act jointly as central coordinators of the project, maintaining research focus, identifying and aiding the implementation of priority research projects, ensuring synchronisation among the individual studies, and serving as points of contact for the media and the public.

Present-day uses of the oceans: fishermen from the Azores. (Photo: © Poul Holm, CMRS)

As this is a groundbreaking study, the centres also devise and run educational programmes to train graduate students in the multidisciplinary methods of ecological, historical and paleo-ecological research. Each summer, one of the centres holds an intensive two-week international summer school. The University of Southern Denmark hosted the 2001 summer school, attended by 25 students from eight countries. In 2002, the participation of 33 students from 10 countries in the University of New Hampshire's summer school showed the growing interest in this type of work.

The future

As it progresses, HMAP will expand its geographic scope through new case studies. Regions of particular interest and potential are Southeast Asia, the Wadden Sea and the Mediterranean. There will also be increased effort in the integration of the individual case studies with one another and with the other components of CoML. As is obligatory for all CoML projects, data collected through HMAP will form part of and be accessible through the Ocean Biogeographic Information System (OBIS), an online global atlas for accessing, modelling and mapping marine biological data in a multidimensional geographic context. Ecological models will then be applied to test hypotheses about the ecological and anthropogenic influences on the marine communities and to reconstruct historical pictures of global marine populations.

Project leaders:

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Relevant web links:

Census of Marine Life - www.coml.org

HMAP – www.hmapcoml.org.

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Ocean Education

The role of natural history museums

The 'Pietro Peranzan' museum, Salenta peninsula, Italy – a case study

By Anna Miglietta & Ferdinando Boero

SCIENCE TEACHING IN Italian schools is rigidly based on obsolete programmes. School curricula only occasionally involve an "immersion" in the environment that students perceive when out of school. Italian boys and girls thus have rare chances to learn about their territory from their school experiences.

For the students living in the Salento peninsula, the heel of Italy, the study of the coast and the sea should be a fundamental part of education within the programmes of natural sciences. Unfortunately, it is not. The University of Lecce, aware of this basic need scarcely met by traditional curricula, tries to fill this gap with the Marine Biology Museum "Pietro Parenzan," founded in 1966 by the marine biologist Pietro Parenzan, to whom the museum is dedicated. In the seventies, Parenzan donated his collections to the University of Lecce and, at present, the museum is managed through a convention among the University of Lecce, the Province of Lecce and the Municipality of Porto Cesareo, the coastal village where the museum is located. The museum is visited by more than 10,000 people per year. Half of these visitors are students, the rest are tourists. Many improvements have been made to the exhibits in an effort to involve the local fishing community in the Marine Protected Area that has since been instituted at Porto Cesareo.

Basking sharks ...and student curiosity

Two years ago, a fisherman accidentally caught a 7m-long specimen of basking shark *(Cetorhinus maximus)* and we decided to exhibit it in a special room, built just for the occasion. We also decided to make an inquiry among our visitors, in an attempt to understand their interests, their curiosities and their level of knowledge about a supposedly fascinating topic like a great shark feeding on plankton. We thus prepared a questionnaire that has been completed by 1,003 students between the ages of six and 18 years, thus covering the whole spectrum of education, from primary through to high school. The questionnaire covered topics regarding sharks in general, but also filter-feeding and plankton. The answers provided information on the level of knowledge of the interviewed students, and also on their preferences and on what they would have expected from the exhibit that we were preparing …for them. Questions were divided into seven areas: anatomy, ethology, paleontology-evolution, zoogeography, physiology, filter-feeding and plankton. The last two areas were included because basking sharks, just like whales, are filter-feeders and feed mainly on plankton. The preferences for the topics were not uniform. Anatomy received the lowest level of interest (12%), whereas the others ranged between 19 and 25%. Older students were more interested in ethology and zoogeography, whereas the interest for anatomy and paleontology and evolution decreased with increasing age. The interest for physiology remained stable at all ages. As far as filter-feeding was concerned, the existence of filter-feeding animals was known to 40% of the primary school students, but this knowledge decreased to 25% of older students. One explanation for this knowledge in younger students might reside in the presence of a whale in Pinocchio's tale. Little children know that, in the tale, the whale can only swallow human beings, it cannot chew them. This is confirmed by the fact that, among the examples of filter-feeders, whales were chosen by a higher percentage of primary-school students (61.3%) than middle-school (44.4%) and high-school (50.7%) students. Interest in marine filter-feeders was very high among primary- and middle-school students (more than 90%), whereas it was much lower for high-school students, with scientific high school being the only exception. This shows a decrease of interest in such topics among older students, and suggests that only students of scientific high schools are driven towards such topics by their curricula (or by their inclination). Only 5% of answers demonstrated knowledge of plankton, describing it as the organisms that live in suspension in the water column, some being able to move by their own means but being unable to swim against currents. Primary-school children were also more informed on this topic than middle- and high-school students, again with the exception of the scientific high school. We discovered that, even in textbooks, plankton is defined incorrectly. In one case, for instance, it is defined as "microscopic algae such as diatoms, eggs, larvae, protozoans and medusae that are unable to swim and that are carried by waves and currents."

School students learn about basking sharks.

Display at the marine biology museum 'Pietro Parenzan'.

A lesson from students

Our study provided useful information on how to organise the exhibit and showed that younger students have more information, interest, curiosity and enthusiasm for marine biology than older ones. Clearly, positive attitudes towards the environment decrease with age. The natural "biophily" characterising young specimens of our species decreases with the proceeding of education and is replaced by something else.

The natural sciences have a low status in school curricula, Italian education privileging classical topics. Science is invariably identified with mathematics, and the natural sciences, when covered, are often illustrated using anecdotal examples dissociated from mathematics and identified with charismatic organisms, as happens on TV. It is indicative that the Minister of Education, two years ago, proposed to remove evolution from middle-school programmes. A very influential scientist (the physicist Antonino Zichichi) wrote to the newspapers that evolution is not a science because there are no equations describing it, and there is no experimental evidence that species transform into other species. The scientific community raised its voice and the Minister appointed a commission that, after a year, advised reinserting evolution into the programme. Now the Minister is pondering the answer, but has not decided yet.

The general indifference towards natural sciences in Italy stems from the philosophy of Benedetto Croce, who designed our school curricula a long time ago. For him, science and technology were more or less the same; only mathematics received a high status, with the rest being marginal. This is still the general philosophy permeating Italian education, as demonstrated by the example of evolution. There is no space for nature, not even for science.

In spite of this, we continue to work at our museum, and the number of visitors increases every year.

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