

## Source materials for fishing in antiquity and the early middle ages

When Poul Holm first mentioned the idea of extending the timescale of the HMAP project all the way back to antiquity, my immediate reaction was that it sounded pretty hopeless. It is a well-established truism that in ancient history, there are few quantitative data and even fewer time series.<sup>1</sup> For the same reason, ancient economic history as a discipline tends to focus on patterns of behaviour, socio-economic questions and so forth, rather than on economy in the “hard” sense, and has for the last thirty years been dominated by the so-called “primitivist” paradigm.

On closer reflection, the idea did not seem so absurd after all. While the sources that we have for fishing in the medieval, early modern and modern periods are much better, they are not first-hand data. No one has actually counted the fish in the world’s oceans. What HMAP strives to establish is reliable information on a) marine animal populations and b) the impact of human activity, i.e. harvesting of marine animal populations, but in practice the evidence for a) is indirect and largely derived from b).

Once we accept that applying indirect evidence is legitimate and necessary, it may be possible to make some meaningful statements about ancient and early medieval fish stocks. Instead of searching for ancient parallels to the fishery statistics, tithe-books and tax records of the early modern periods – a waste of time, since such records are not preserved and probably never existed – we should look at all possible approaches to the problem and all possible sources.

### Literary sources

One reason that medieval and more recent fishing is fairly well documented is that fishing was subject to taxes and tithes.<sup>2</sup> Unfortunately from our viewpoint (but not from that of the fishermen) there seems to have been no systematic taxation of sea fishing in the Roman Empire,<sup>3</sup> nor, which is perhaps more surprising, in the Byzantine Empire. The fiscal administration of Byzantium was

---

<sup>1</sup> The leading scholar within ancient quantitative economic studies has been Richard Duncan-Jones (*The Economy of the Roman Empire*, Cambridge: Cambridge University Press, 1974; *Structure and scale in the Roman economy*, Cambridge: Cambridge University Press, 1990) but his work, based on an exhaustive search through the extant sources, actually reveals how little we know about the quantitative aspects of the ancient economy.

<sup>2</sup> Cf. Joan Alegret’s contribution to this conference

<sup>3</sup> See, e.g., Peter Ørsted: Salt, Fish, and the Sea in the Roman Empire, in Inge Nielsen and Hanne Sigismund Nielsen (ed.), *Meals in a Social Context* (Aarhus Studies in Mediterranean Antiquity, 1). Aarhus: Aarhus University Press, 1998, pp. 13-35.

detailed and intricate, in one word, Byzantine; but sea fish was one of the few resources that did not come within its scope.<sup>4</sup>

While quantitative data are lacking, in qualitative terms the sources at our disposal can tell us a good deal about ancient fish stocks in the Mediterranean and the Black Sea. First, species. What species were present? The data pertaining to this question are in fact quite detailed. One needs only to consult one of the two standard handbooks on the subject, d'Arcy Thompson's *Glossary of Greek Fishes* or Strömberg's *Griechische Fischnamen* to appreciate the range and detail of ancient fish nomenclature, reflecting the detailed knowledge of ancient fishermen and the vast number of references to fish and fishing that are scattered throughout classical literature.<sup>5</sup>

For a general impression of ancient fisheries and fish stocks, the best starting-point is the *Halieutica* of Oppianus, written in the late second century AD. The *Halieutica* is a didactic poem of more than 3,000 hexameters, preserved in its entirety and supplemented by an ancient prose paraphrase which though only partially preserved helps us to decipher the somewhat intricate poetic language of the poem itself. The recent edition by Fritz Fajen with a German translation is in many respects an improvement on the older edition of A.W. Mair in the Loeb series.<sup>6</sup>

Oppian's book is no first-hand report, rather a digest of second-hand and third-hand information, but it provides us with an overview of migration routes, seasonal variations, and other aspects of direct interest to HMAP. If one were to try and locate the literary references of d'Arcy Thompson or Strömberg on a map of the Mediterranean and correlate them with the information given by Oppian and in the *Natural History* of the Elder Pliny, it might provide us with a good impression of which fish species were present where and at what time. It is a quite simple exercise that, to my knowledge, has not been attempted so far.

So far, I have considered only sources purporting or attempting to describe the contemporary situation, i.e. the state of fishing in the writer's own lifetime or the recent past. I have ignored those that are "historical" in the strict sense, i.e. those that purport to tell us about *past* fishing or compare past conditions to those of the writer's time. On the face of it, such evidence may seem highly useful; in fact it is, however, largely anecdotal and, at best, based on second or third hand information, hearsay and the writer's own memory. Furthermore, there is the problem of what we

---

<sup>4</sup> See, e.g., Franz Dölger, *Beiträge zur Geschichte der byzantinischen Finanzverwaltung besonders des 10. und 11. Jahrhunderts*, Stuttgart: Teubner, 1927, esp. pp. 12ff.

<sup>5</sup> d'Arcy Wentworth Thompson, *A Glossary of Greek Fishes*, Oxford: Oxford University Press, 1947; Reinhold Strömberg, *Studien zur Etymologie und Bildung der griechischen Fischnamen*, Gothenburg: Wettergren and Kerber, 1943

<sup>6</sup> *Oppian, Colluthus, Tryphiodorus*, with an English translation by A.W. Mair (Loeb Classical Library), London: Heinemann, 1927; Oppianus, *Halieutica*, edited and translated by Fritz Fajen, Stuttgart: Teubner, 1999.

might call *the mythical baseline*. When writers describe life in an earlier age, certain idealising themes recur. Young people were better behaved; the forests were more extensive; fish was so abundant and cheap that everyone could afford it. This may be based on solid evidence; it may be based on anecdotal information; or it may merely reflect a shared ideal about a “golden age” in the past.

### **Pictorial representations**

Now, the works of Thompson and Strömberg cited above deal only with the textual sources, but there is a considerable body of pictorial evidence for ancient fish and fishing. Our pictorial evidence for fishing comes very largely from mosaics, not necessarily because mosaics were the only medium used to depict fish, but because they are a more durable medium than, for instance, wall paintings or painting on wood. For late antiquity and the early middle ages, this evidence is supplemented by manuscript illustrations, and for the high middle ages by sculpture and frescoes. Again, to my knowledge no attempt has been made to collect and analyze this material in a systematic manner, for instance to attempt a detailed identification of the fish that are depicted in the pictorial evidence, or to study their spatial distribution. For instance, it is well known that fish and fishing scenes are especially popular in North Africa during the third and fourth century; but why?

### **Fish remains**

A third category of sources, that deserves more attention than it has so far received, is the actual fish themselves. Fish bones and other remains have been recorded at innumerable sites in the Mediterranean-Black Sea region, and at a substantial number of sites there are rubbish dumps and pits, the contents of which can be – but rarely are – dated and systematically analyzed.<sup>7</sup> The most ambitious attempt in this direction of which I am aware is Natasha Ivanova’s study of fish remains from the Greek colony of Olbia and the settlement on Berezan island in the northwestern Black Sea.<sup>8</sup> Among the findings of Ivanova were a drastic change in the composition of fish catches (and thus presumably fish stocks) from antiquity to the present day. This will come as no surprise to HMAP researchers and marine biologists, but runs counter to what is still the prevalent orthodoxy

---

<sup>7</sup> In 1996, Desse and Desse-Berset noted that „osteometry has not been systematically applied to fish bones from archaeological sites“.

<sup>8</sup> Natasha V. Ivanova, *Fish remains from archaeological sites of the northern part of the Black Sea region (Olvia, Berezan)*, *Offa* 51 (1994), pp. 278-83.

among ancient historians, that fish stocks can be treated as a stable variable and that fishing statistics of the 19<sup>th</sup> or even the 20<sup>th</sup> centuries can cast light on the conditions under which ancient fishermen worked.<sup>9</sup> The concept of “shifting baselines” has not found its way into the study of ancient fishing. Ivanova notes that sturgeon, which accounted for about 50% of the catch in antiquity, today makes up no more than 3 to 4% of catches in the same area; its place has been taken by carp, which nowadays makes up some 50% of catches but in antiquity only c. 16%. On the other hand, some species, such as catfish, have maintained a remarkably stable share of the catch. The figures I give here are based on the number of individuals, but since the average sturgeon is much larger than a carp, the difference in terms of tonnage or nutritional value is even more dramatic. Ivanova is also able to trace, century by century, changes in the average size of different species and the age at which they are caught, though in this respect the picture is less clear. Another, related approach is to take a stratified sample from the seabed, then analyzing the composition of fish scales and bones to gain an impression of the species composition and how it changes over the centuries, somewhat like pollen analysis from terrestrial sites. This will ideally provide a time series of quantitative data, which are in such short supply in the ancient and early medieval period, but the process is not without its problems, and in any case requires a substantial input of time and money and also that the sample must be taken in an oxygen-free marine environment.

### **Processed fish**

Finally, we should not overlook the sources that deal with *processed* fish. In antiquity, the two commercially most important products were salt-fish (*tarichos*) and fish-sauce (*garum*). The two activities are chronologically distinct: the earliest evidence for salt-fish production in the Pontic regions, whence it was exported to Athens, comes from the classical period, whereas fish sauce becomes an important commodity only in the late Hellenistic and early Imperial period. They are also distinct in terms of fish input: fish-salters would presumably go for the larger species, whereas fish sauce could be made from smaller fish.

Apart from the fish itself, the only other inputs required for fish processing were salt and water, which were readily available anywhere; so the geographical location of ancient fish processing

---

<sup>9</sup> On this question, see Anne Lif Lund Jacobsen, *The Reliability of Modern Fishing Statistics as a Source for Ancient Catches*, in Tønnes Bekker-Nielsen (ed.), *Ancient Fishing and Fish Processing in the Black Sea Region* (Black Sea Studies, 2), Aarhus: Aarhus University Press (forthcoming).

establishments would tend to reflect the distribution and migration patterns of certain fish species, such as mackerel, which was particularly valued as raw material for fish sauce. Fish salting installations and containers – amphorae – for fish products together provide important evidence, even quantitative data, not for fish stocks, but for the impact on fish stocks of human exploitation, which is of course equally important. Since the goal of HMAP is to understand the long-term fluctuations in fish stocks, it is not enough to establish *that* marine populations fluctuate but also, a much more difficult question, *why*. Which brings me to the second part of my paper.

### **Fish in context**

Speaking as an historian, and not as a specialist on the development of marine populations, I would say that we can only understand what happens in a sea if we view it in context, or rather in plural: contexts. On the one hand its societal context, on the other its environmental context. Obviously variations in fish stocks reflect variations in the marine environment, such as changes in salinity, rising or falling sea temperature, introduction of new fish species, availability of food (e.g. plankton or smaller species), etc. The long-term temperature fluctuation has been extensively studied and is well documented. Short-term climatic fluctuations, e.g. the impact of El Niño, can also be traced. For these, we have the evidence of the ice cores taken from the Greenland ice cap, whose stratification can yield information about individual years.<sup>10</sup> Unfortunately, the chronology proposed by the ice core teams does not quite tally with the accepted chronology for antiquity. We have valuable, unbroken data series for the rise of the Nile at Cairo going back to the seventh century AD, with fragmentary series for even earlier periods.<sup>11</sup> Since El Niño affects the spring rainfall in eastern Africa, but more generally the summer climate in the entire Mediterranean basin, it is generally accepted that the Nilometer data can be used to postdict El Niño-type phenomena in the early middle ages and perhaps even earlier. The most difficult climatic phenomena to deal with are those which are at once short-term and unique, such as the series of cold summers in the early sixth century, probably related to a large-scale volcanic eruption in southeast Asia.<sup>12</sup> This is known to us because it took place during the lifetime of the historian Prokopios, who described it; it is also

---

<sup>10</sup> E.g., the Greenland Ice Sheet Projects 2 (GISP2), 1988-1993, and the Greenland Ice Core Project (GRIP), ongoing.

<sup>11</sup> G. Wang. Nilometers, El Nino, and Climate Variability, *Geophysical Research Letters*, 26 (1999) 489-92; O. Toussoun. Memoire sur l'Histoire du Nil. *Memoires a l'Institut d'Egypte* 18 (1925) 366-404; L. Borchardt, *Nilmessern und Nilstandsmarken* (Abhandlungen der königlich Preussischen Akademie der Wissenschaften, 1906, Anhang, Philsoophische und historische Abhandlungen) ) Berlin: Georg Reimer, 1906; C. Jarvis. Flood-Stage Records of the River Nile, *Transactions of the American Society of Civil Engineers* 101 (1936) 1012-71.

<sup>12</sup> Joel D. Gunn (ed.), *The Years without Summer: Tracing AD 536 and its Aftermath* (British Archaeological Reports International Series, 872) Oxford: Archaeopress, 2000.

traceable in the Greenland ice cores as a layer of ash. Similar if less drastic climatic phenomena are recorded by later Byzantine historians but this evidence has apparently not so far been studied in a systematic fashion; or if it has, the results have not, to my knowledge, been published in an international journal. A further source of information on year-by-year variations are dendrochronological time series of tree rings.

It would be useful to correlate the anecdotal evidence for climatic extremes from the Nilometer data, tree ring data and the evidence of the ice cores, and with other information such as that of the early medieval monastic annalists who sometimes record climatic extremes, floods and so on. The *History of the Franks* by Gregory of Tours, for instance, contains a good deal of such information that was presumably taken from monastic or diocesan annals.<sup>13</sup>

On the other hand there is the societal context. In the pre-industrial period, i.e. before c. 1850, this is generally less important for fluctuations in fish stocks than the environmental context, but not entirely irrelevant. Since humans are in the last analysis predators, their presence or absence on shore influences the marine population. Demographic growth in the coastal zone up to c. 30 kilometres from the sea will lead to greater consumption of fresh sea fish and more fishing; demographic growth further inland would have little impact on the consumption of fresh fish. The introduction of fish-salting on a commercial scale, however, extended the marketing range of fish, and the spread of garum as a cheap commodity for mass consumption throughout the Roman Empire created a demand for large amounts of industrial fish such as mackerel or anchovies. Processed fish is an especially promising field of study for the archaeologist because it is transported in containers of durable materials such as pottery. The remains of fish sauce containers are scattered throughout the Roman Empire, though mainly concentrated in urban areas; in some exceptional cases, fish sauce amphorae account for one-third of all amphora fragments found on a city site.

The extent of fish consumption in prehistoric societies can be estimated not only from dumps of fish waste but through isotope studies of human skeletons; I believe that Greek scientists were the first to apply this technique, which led to some revision of our ideas about fish-eating Minoans and Myceneans. More recently it has been applied to Roman material from central Italy.

Even if we do not have quantitative data, it would certainly be possible to give a rough idea of the development of fish consumption throughout antiquity, taking into account such documented variables as fish prices, population growth or decline, degree of urbanization, dietary restrictions of

---

<sup>13</sup> E.g., *Historia franconum* 6.25 on the weather in AD 583.

a religious nature, and changes in culinary preferences. *Garum*, which at one time was as widespread in Roman cuisine as tomato ketchup is among us, went out of fashion in late antiquity; this must have meant that certain species were no longer fished at all, save as by-catches. The decline of the monetary economy in the western Mediterranean must have meant a corresponding decline in the market for salt-fish; and so on.

### **A test case: the Black Sea**

To sum up: there is a large body of evidence, written, pictorial and archaeological, for fish stocks and fishing in the ancient world, less so for the late antique and early medieval period. It is a challenging, some would say daunting, task to combine these disparate sources of data into a coherent picture of the development of fish stocks in the pre-medieval Mediterranean-Black Sea region. But it is feasible? And what kind of effort is required? One way to find out is a pilot project, and the Black Sea with its adjunct, the Sea of Azov, might provide a suitable test case. The Black Sea shares many of the characteristics of the Mediterranean, to which it is connected, but has certain specific characteristics that make it more manageable.

First, it is not a very large body of water from our point of view. The Black Sea is deep, but from a couple of hundred metres downwards it is anoxic and thus irrelevant to marine animal populations of any description. The coastal shelf to the northwest is quite shallow.

Second, it is a very young body of water. The Black Sea as we understand it now is only some 7,000 years old, formed when the salt water of the Mediterranean breached the Bosphorus. In writing the ecohistory of the Black Sea, we are dealing with a short time span. For the same reasons, there are fewer saltwater species in the Black Sea than in the Mediterranean – today, c. 170 and in antiquity even fewer.

Along the northern coast there are several archaeological sites with large dumps of fish waste, going back as far as the sixth to seventh century BC, from which it might be possible to extract data allowing us to follow the changing composition of fish catches. There are also remains of extensive fish salting and processing installations at a number of sites. The Black Sea has a long history of scientific study, so there is much published and archival data to work from. The downside is that the literary sources are not that plentiful, but there is a substantial body of epigraphic evidence, which is currently being re-edited by a team at the university of Bordeaux. Finally, since the lower Black Sea is an anoxic environment, it will be possible to verify the results of the pilot study against seabed sediment samples.

*Author's address:*

Tønnes Bekker-Nielsen, dr.phil.

senior researcher

Danish National Research Foundation's Centre for Black Sea Studies

Building 328

University of Aarhus

DK-8000 Aarhus C, Denmark

[www.pontos.dk](http://www.pontos.dk)

e-mail: [tonnes@hist.sdu.dk](mailto:tonnes@hist.sdu.dk)