HELENA GRANJA
Multidisciplinary Analysis Of Historical Sources.
The Geo-Morphological Approach
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MULTIDISCIPLINARY ANALYSIS OF HISTORICAL SOURCES – THE GEO-MORPHOLOGICAL APPROACH*

Helena Granja[1]

Abstract

The progress of science, including the improvement and development of very specialised fields, has not made the multidisciplinary approach obsolete. On the contrary, it is fundamental for the understanding of a wide range of interconnected issues.
Understanding the changes of the European seaports in early Modern Age, is certainly one of these issues. Here, historical research gains from the application of other sciences, like geomorphology. And the contrary is also true.
The reconstruction of (palaeo)environments through a geomorphological approach, can help historical research to understand the reasons why changes in seaport development took place, changes, that most of the times, had dramatic socio-economic consequences. The increase or decrease of seaport activities not only depends on economical constraints, but also on other complex natural or human-induced causes. The main natural forcing factors are related to climate, sea level, and sedimentary budget. The main human factors are related to the artificial changes of fluvial systems and drainage basins. The world-wide character of some natural factors helps to understand the identical behaviour of European seaports during specific time periods. Through some examples, the importance of the geomorphological approach for the understanding of Northwest Portuguese seaports will be highlighted.

Geomorphology:

- The science that treats the general configuration of Earth' s surface
- The study of the classification, description, nature, origin and development of present landforms and their relationships to underlying structures, and of the history of geologic changes as recorded by these surface features
- Strictly, any study that deals with the form of the Earth (including geodesy, and structural and dynamic geology)
- Science of the Earth

– Glossary of Geology (Bates and Jackson, 1987)

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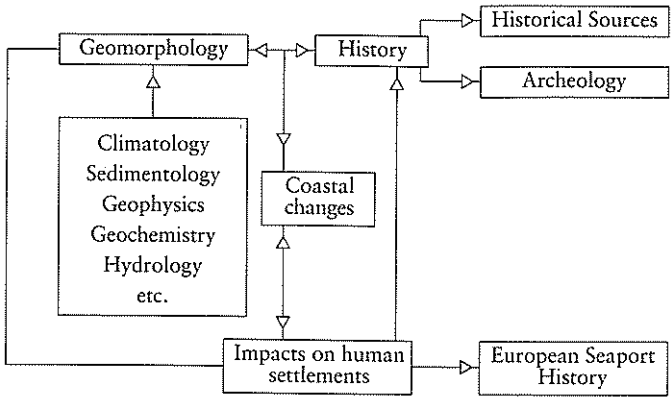
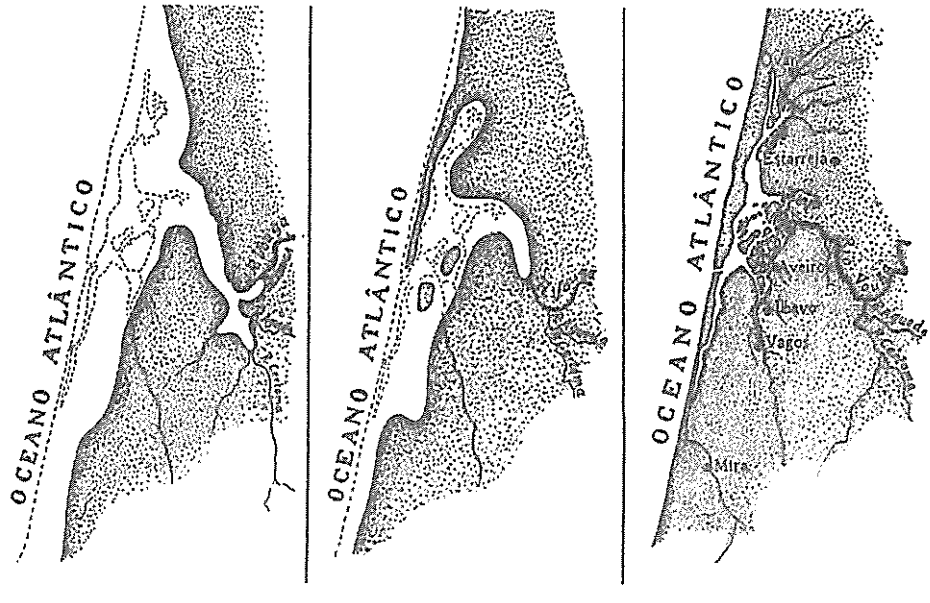
1. Universidàde do Minho



Let' s look at some historical cases...

Looking at the charts, concerning the Ria de Aveiro (in fact a lagoon system), from Amorim Girão (1941). The lagoon evolution would be like this? Or not? *(fig.1)*

If so, how can the presence of this geo-indicator be explained? This lagoon environment was protected by a barrier placed, elsewhere, westwards of the present coastline.



Proto-historic times From old maps Present configuration

Fig. 1

Fig. 2

Fig. 3

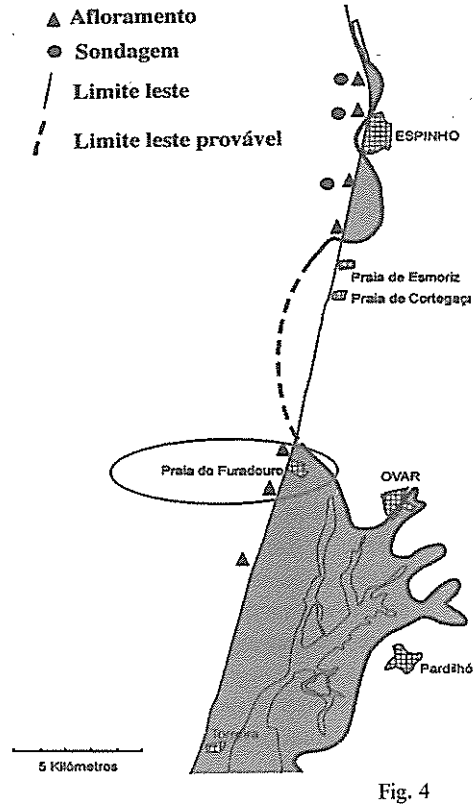


Fig. 4

Where is the truth? Or is something missing on the whole story? And if so, what? *(fig 2, 3, 4)*

Figure 5 shows a chart of 1623 (?). Rivers mouths are wide and spits do not close them. Why? The silting up of river mouths was not yet important? Inaccuracy of the chart? Or both? Or other reasons?

Looking now at Cávado estuary and the Apúlia residual lagoon: a story that crosses historical data with (geo)morphological indicators, and seems to fit quite well.

- Progressive silting up of Cávado estuary from 16th century onwards
- Cávado mouth would be located southwards – Fão inlet – before the end of the 15th century

- The Apúlia lagoon (today completely silted up) would receive boats, with oil and wine, during the 1st millennium *(fig. 6, 7)*

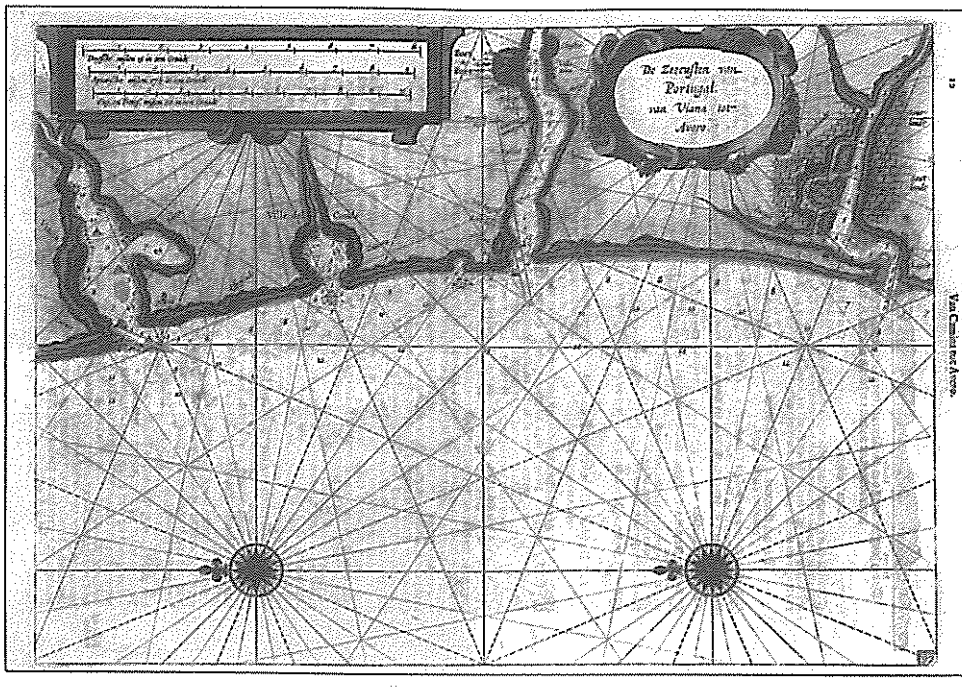


Fig. 5

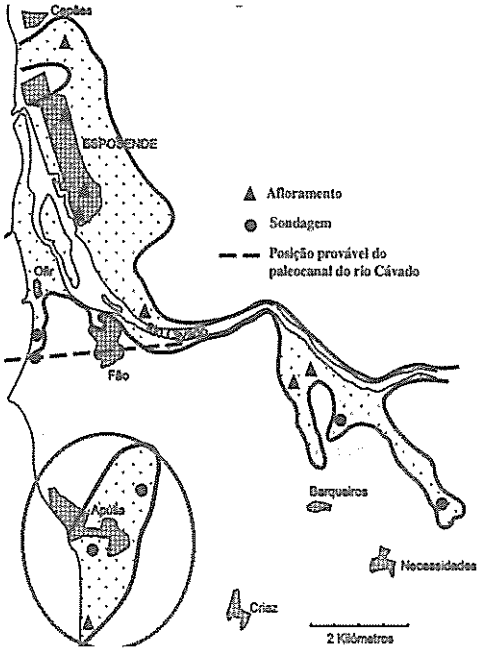


Fig. 6

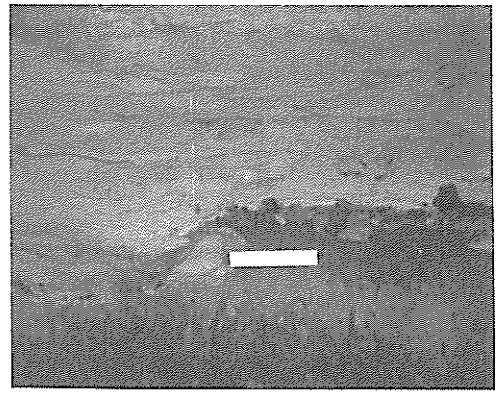


Fig. 7

Fig. 8

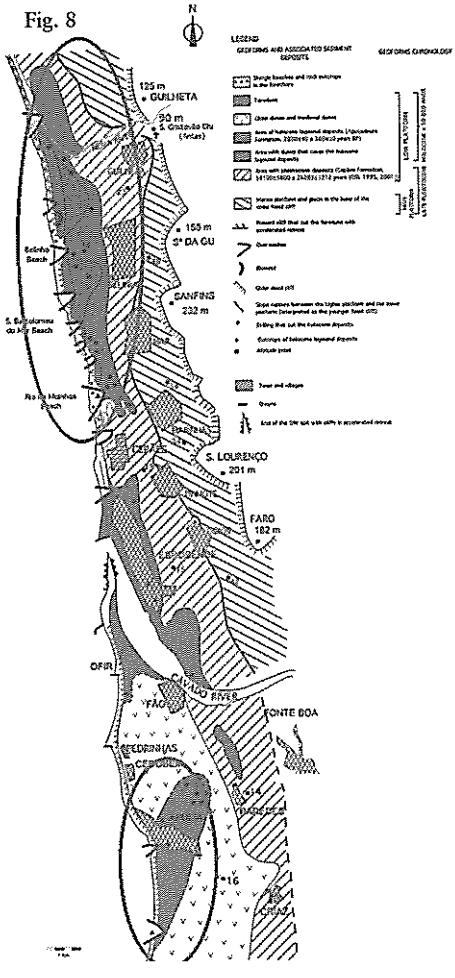


Fig. 9

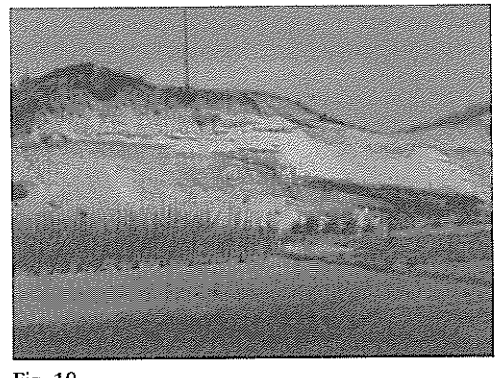


Fig. 10

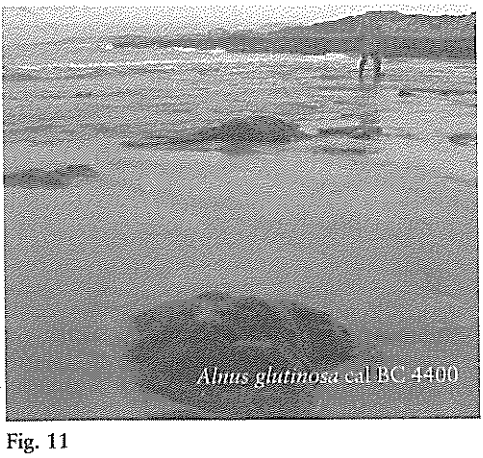


Fig. 11

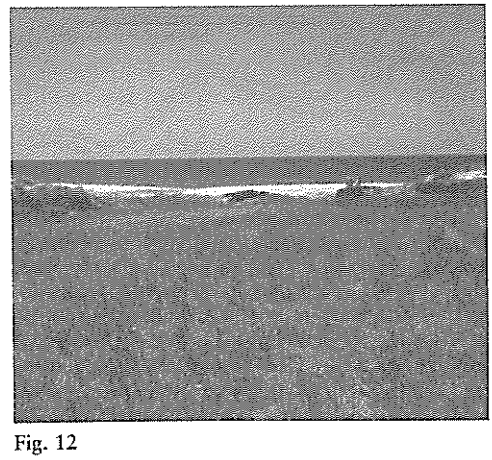


Fig. 12

But, along the coast, more lagoons were present. These lagoons were active between cal BC 3253 and cal AD 1511, when they dried up and a new event happened. *(fig. 8, 9, 10)*

And today' s very small brooks were rivers, sided by large trees. And today' s agricultural fields were bogs and wetlands. The landscape was very different from today... so the human activities too. *(fig. 11, 12)*

Another historical event is also corroborated by geomorphological evidences. The Medieval salt pans were abundant during the 11 and 12th centuries (Medieval Optimum). Their decline seems to correspond to a period of worsening of the weather conditions, corresponding to the Little Ice Age. Stratospheric volcanic dust (1752-1840) would have been one of the forcing factors? *(fig. 13, 14)*

The Little Ice Age is dominated by strong winds, transporting sands onshore, and by the increase of storminess. Both historical and geomorphological data point out a general sand cover and dune formation on low coastal areas. *(fig. 15, 16, 17)*

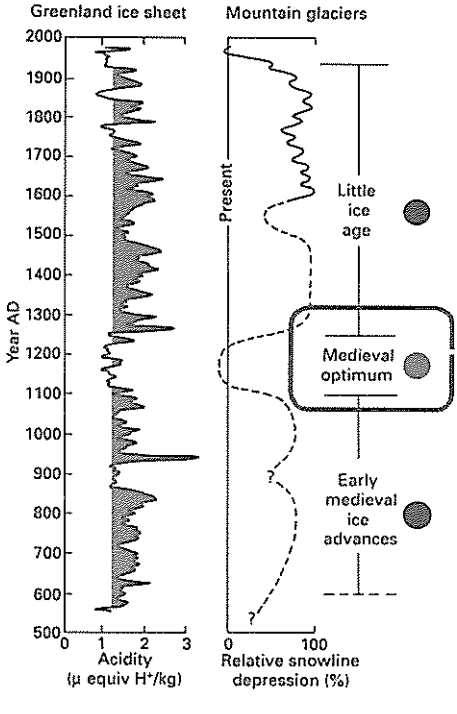


Fig. 13

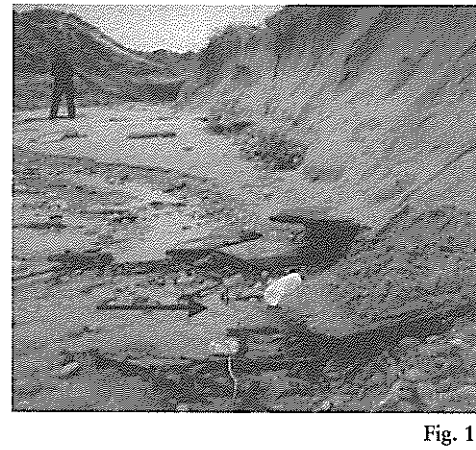


Fig. 14

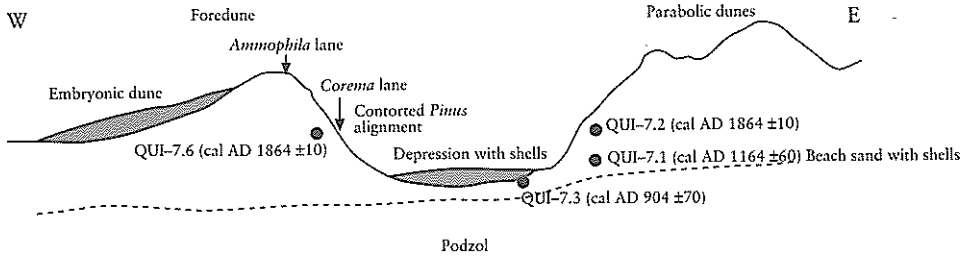


Fig. 15

Foredune Parabolic Dunes

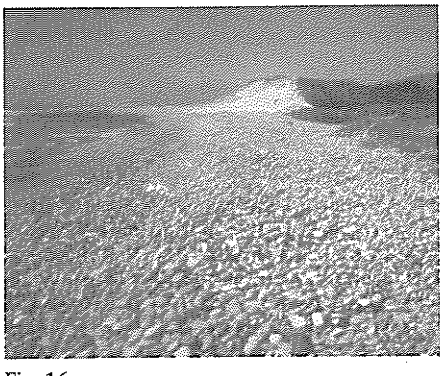


Fig. 16

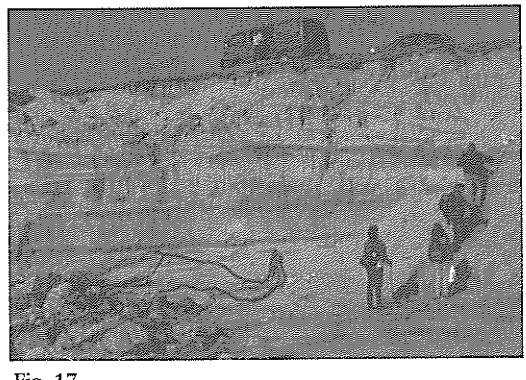


Fig. 17

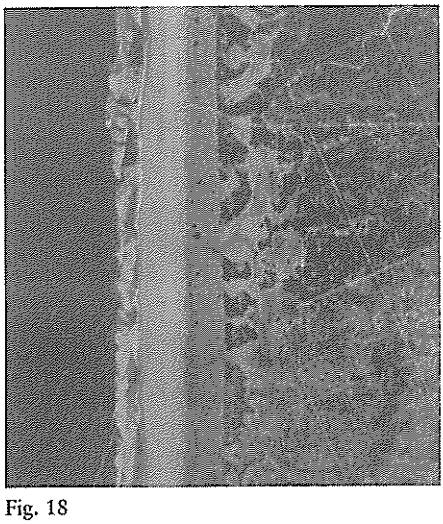


Fig. 18

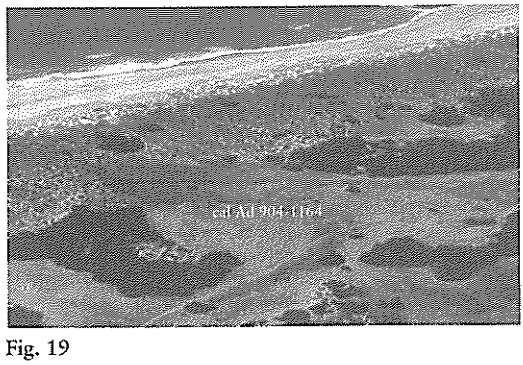


Fig. 19

And looking to the historical data collected during this project, we can observe that most of the events are due to morphological changes, some clearly induced by overall climatic changes. The evolution of the seaports is closely related to that changes. Let us look at some examples.

- Vila do Conde inlet
  - the silting up in 1540
    Indeed, dating from roots in a peaty layer at Vila do Conde paleoestuary points an age of 450±60 years BP (16th century), what confirms the historical record
  - Silting was probably due to a change of weather.
  - 1500-1550: the weather was warmer than during the 15th century (frequent anticyclones?)

- Aveiro
  - < 12th century: salt pans at Ovar and the inlet at N of Torreira?
  - 12th century: dunes along the coast were formed and inlet migrated S; 1052-1160; wetter and warmer years than during the 900' s *(fig. 18, 19)*
  - 13th century: at the beginning of the century, Murtosa spit would be already built and the Gafanha spit would grow at Mira sands in N direction. At this time, would an overall inversion of the littoral drift have taken place? And if so, why? Looking at some old maps it does not fit. But there are many references to the location change of the inlet. This is a common situation on lagoon systems.
  - 15th century: strong currents and big floods move the inlet to the S; very wet century
  - 1585: floods
  - 1570-1720: frequent surges due to big storms
  - 1755-1757: floods
  - 1751-1760: very wet summers

- Caminha
  - 1541: sea brings sands, closing the inlet
  - 1575 and 1582: the Insua island attached the mainland; Times of severe winters and big storms and floods. The tombolo forms when there is enough sediment available (compare with the recent high rainy winter of 2000-2001)

Even a tsunami is inferred from the historical records of Póvoa de Varzim. And this means that the impact of the 1755 earthquake of Lisbon was felt, as a tsunami wave, on the North coast, which is a very important issue.

"Não padeceu esta villa ruina no terramoto do 1° de novembro de 1755- fez nélla ainda maior horror que o tremor da terra que aqui se sentiu na mesma hora em que geralmente tremeu, o que se observou no mar; porque estando este num brando sussuro, quietas as ondas, porque assim o permitia a tranquilidade

do áres, das onze para o meio dia principiou primeiro por uma contensão d'aguas descobrindo com ella pedras e area, que nunca se viram descobertas, e logo sem alterar o tranquilo se estendia em lingoetas de maré impetuosissimas, passando os limites a que chegam ainda na maior braveza levando comsigo os barcos, catraias e bateis que achou na area da praia, em que causou damno arrombando-os nos encontros que lhes fez dar nas paredes dos quintaes das cazas contiguas ao mar.

Assim continuou d'onda a onda quazi até à noute (...) [que] por castigo de Deus innundava a todos, submergindo no mar os barcos da pescaria, que se achavam n'esse dia n'elle por necessidade de colher as suas redes, os quaes chegando a terra ao mesmo passo em que os que estavam dez ou doze legoas ao mar confessaram nada sentir, e os de tres até quatro legoas, que só conheceram um movimento extranatural nos barcos.

Todos se assombraram do que viam obrar as lingoetas da maré e desampararam os barcos ..."

– *Barbosa, 1958 (p 339)*:::

References:

GRANJA H. M., 2002. Reconstituição paleoambiental da zona costeira, a norte da laguna de Aveiro, desde a Idade Média até à Actualidade. *O litoral em Perspectiva Histórica (séc. XVI a XVIII)*. Instituto de História Moderna, Porto, 93-109.

LAMB H. H., 1995. *Climate, History and the Modern World*. Routledge, London.