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***Instabilis Terra: Perception and Representation of Low Coastal Areas in  
Modern Times***

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# *Instabilis Terra: perception and representation of Low Coastal Areas in Modern Times*

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*Gli spazi costieri costituiscono attualmente un'area con un'elevata presenza di insediamenti ed attività economiche. La conoscenza della loro evoluzione naturale e delle trasformazioni indotte dalle attività delle società umane è un elemento importante per una corretta definizione degli interventi di tutela e sviluppo di questi spazi. La cartografia è tra le fonti più importanti per la ricostruzione delle condizioni geografiche delle coste nel passato. L'impiego di queste fonti richiede però una attenta valutazione delle loro caratteristiche come medium e delle modifiche apportate dall'evoluzione della tecnica cartografica. La cartografia del territorio italiano si presta in modo particolare a contribuire alla conoscenza sia del dinamismo naturale delle coste basse della penisola sia dell'evoluzione della presenza di insediamenti e di attività economiche. La documentazione cartografica consente soprattutto di seguire sia le fasi di avanzamento ed arretramento della linea di costa e l'evoluzione delle foci fluviali sia la crescita delle infrastrutture di comunicazione, la diffusione degli insediamenti residenziali e produttivi e le trasformazioni nelle forme di uso del suolo.*

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One of the last International Geographic Congresses was devoted to the topic: "Land, Sea and Human Effort". The preparatory document indicated that at least two thirds of the world's population lives within less than hundred kilometres of the sea and less than 15 m above sea level. Predominantly urban, these people are packed into towns and cities along the interface between the continents and the oceans. Twenty-two of the world's thirty-two largest cities are sited on outlets of rivers.

That thin coastal fringe, itself less than the 20% of the total area of land surface on earth, includes a large proportion of the world's arable land and natural food resources and also supports a huge range of human activities. Not only is the sea a barrier for agriculture and settlement, it is also a highway for trade, as harbours are essential links between maritime lands and other parts of the world. For many the coast is a home, a work environment, simply a border area or a resort for a holiday. Many major urban and industrial areas have developed near coasts. Harbours are nodes linking commerce, industry and services. The coastal areas also include some of the most important wetland areas, havens for a rich

diversity of plants and animals. Many of the most productive and heavily populated coastal areas around the world are also the most low-lying. Either just above, or even slightly below mean sea level, these areas must be protected by dikes and they need to be kept dry by regular pumping. The balance between wet and dry, useful or desolate coastal lands is determined to a very great extent by the sea level and the tidal range. In many parts of the world a raising of sea level would cause enormous disruption to human activities as we know them. Current concerns about Climatic Change resulting from the “Greenhouse effect” are largely based on the fact that sea level change would affect a huge proportion of that vital 100 km strip. The stakes for coastal areas of the worlds are high. Always dynamic, always changing, these areas are vital for human society, as we know.

This is, shortly, the present state of the world’s low coastal land.

It is essential to understand how the marine and land areas of the coastal zone interact together as well as with the rest of the world. The coastal environment is complex and subject to various forces. It is a world of transition and exchanges between land and water where many conflicting activities may also be found. We should consider that in the coastal zone space and time act along different spatial and temporal scales. We have a natural space – the sea-land interface – where natural factors of the land interact deeply with those of the sea within short, medium and long time scale. In the last four centuries, human actions have been acting on these natural, changing spaces, creating a new territory <sup>1</sup>.

How can we study the geographical status of the coastal land in the past? Cartography – with other relevant documents – can give us a large amount of information.

But we should use the maps carefully, because if the scale of temporal analysis is broad, we will use maps of different quality. Therefore we need meta-information; that is to say, information that allows an evaluation of the techniques and cultural contexts in which the maps were drawn. Such characteristics, not always stated explicitly in the documents and often of uncertain nature, are essential for evaluating the accuracy of the details and information contained on the map, an evaluation which is necessary prior to any elaboration and consequent comparison either in basic research or in processes of modelling and simulation. Historical analysis of maps considers that “every map [...] contains an invisible landscape of ideas in addition to its tangible terrain of distributions, shapes and directions. The meaning of maps is decipherable not just on the basis of their ‘factual’ content or on that of their measurable accuracy and their tradition of representation [...] but also through the cultural and historical *milieu* in which images were viewed and used” <sup>2</sup>.

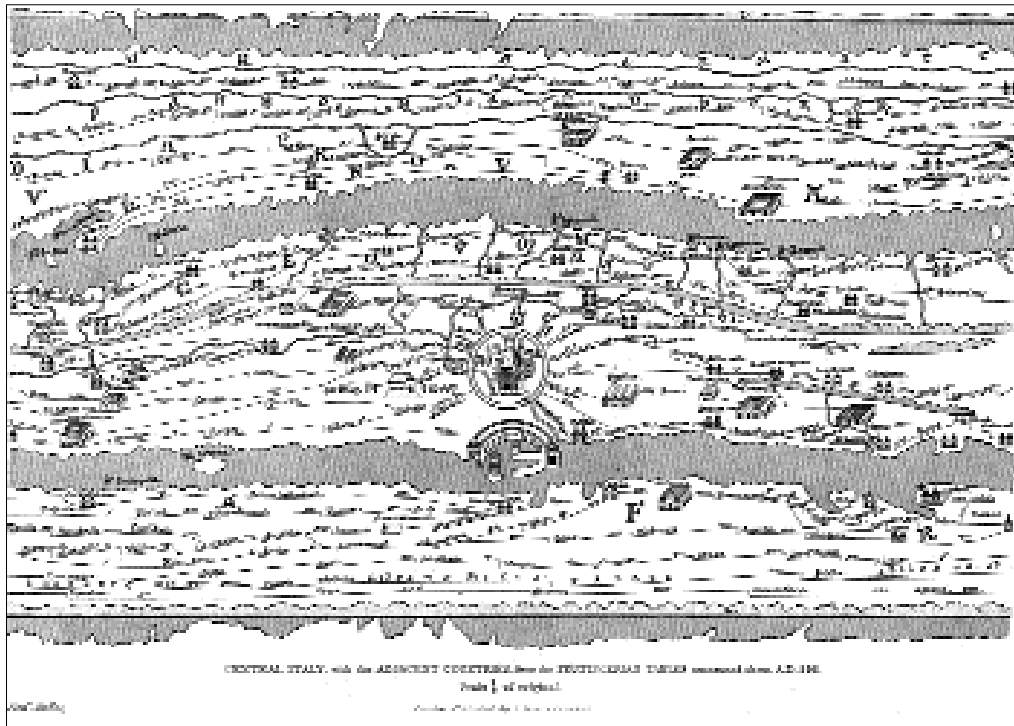
This principle has already found some applications in the specific field of the use of early maps as historical evidence for coastal change. In fact *cartographic evidence from the earliest periods is rarely good enough to stand by itself, but considered together with other kinds of evidence can be suggestive. [...] The significance of a map as evidence is always relative to the knowledge otherwise available* <sup>3</sup>.

Historical and geographical research can make available large quantities of information relative to historical maps with particular reference to the following themes:

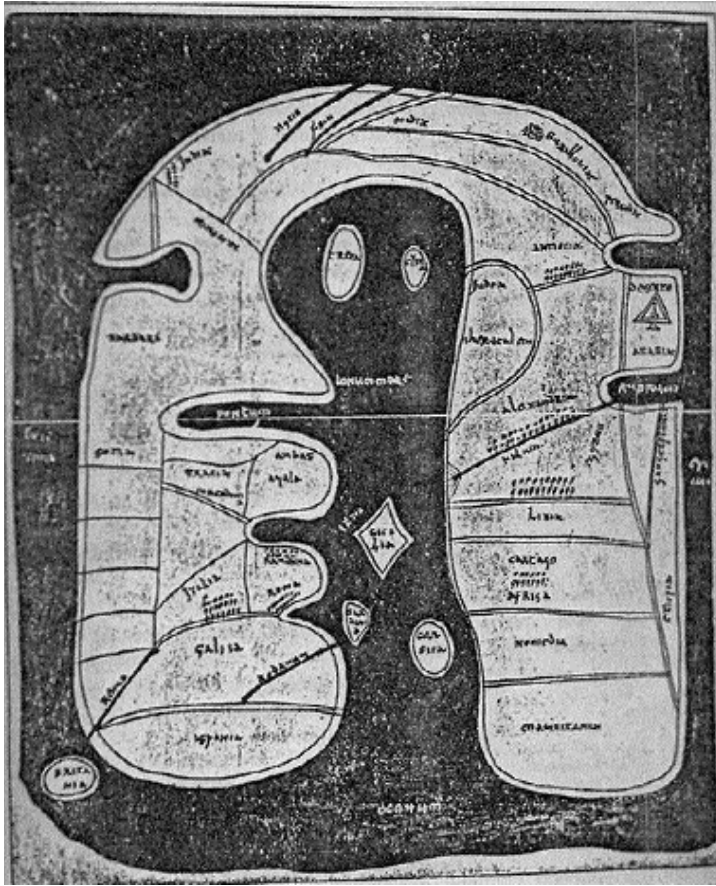
- the placing of the map in a technical and cultural context in relation to its date of production (descriptive memoirs, essays, etc.);

- the pinpointing of possible documentation accompanying the map;
- an evaluation of the quality and the reliability of the map;
- hypotheses for a comparative analysis using classification systems;
- research into sources available in libraries and archives.

If we observe maps from various phases of the history of cartography, the representation of the coastal areas varies significantly. We could easily create an excursus through the various phases of the history of cartography simply by having recourse to one of the many Internet sites which allow us to search the map collections of museums, libraries and private dealers (see box). For now, let us observe a few significant maps in chronological order: the first is the famous Tabula Peutingeriana, a medieval copy of an ancient *itinerarium pictum*, a kind of map which had as its purpose that of guiding the traveller on a land journey (Map 1). We can easily see that the coast is represented in a very off-hand fashion: it was not a matter of pressing interest to the map-maker. A second example is a manuscript map preserved in the Municipal Library of the city of Albi, in southern France (Map 2). This map, from the Merovingian period, again shows a formalized coastline. The object in this case was to show the whole world (basically the lands bordering the Mediterranean) surrounded by the Ocean, all in a smooth, almost abstract shape. Although the coastline is the most important feature in the Albi map, coastline detail is of no interest and is not

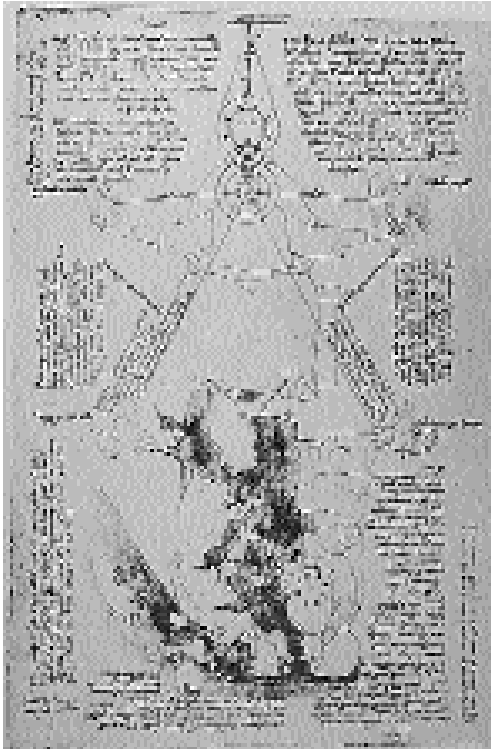


**Map. 1**  
The Tabula Peutingeriana. A medieval copy of an "itinerarium pictum" of the 5th-6th centuries A.D. [detail]. Vienna, National Library.



**Map. 2**  
The Albi map. A manuscript map from the 8th century A.D. [Albi, Municipal Library]

depicted except in an extremely general way. A third medieval mapmaker, working in the late 13th century, is *Opicinus de Canistris*. He exploited his skill in draftsmanship and his much greater knowledge of Mediterranean geography to make a 'world' map which had more complex allegorical objectives (Map 3; Plate 1). The lands on the two sides of the Mediterranean, Europe and Africa, are drawn to look like human forms, that of a man and a woman: the detail of the coasts were more important for *Opicinus*, but the overriding concern was the final effect with its meanings going far beyond strictly topographical data. Although knowledge of the entire globe, oceans and continents increased dramatically in the early modern age, mapmakers were often still interested creating maps which had other dimensions. An example might be the many maps made from the late 16th century on to represent the Low Countries in the form of a lion, the so-called *Leo Belgicus* (Plate 2). This witty representation, invented by Michael Aitzinger in 1583, and copied by many, made the coast line look like the lion's back; the paws, the roaring open mouth and tongue could be fit nicely into appropriate topographical features, while the lion's tail was made to switch across the Channel, thus barring the way to enemy ships. Maps of this sort, usually etchings subsequently hand-coloured, were a great success with the public, since they represented a fierce determination to defend the country and its coasts from invasion. The



**Map. 3**  
*Opicinus de Canistris* (1296 - 1350 ca.), Representation of the Mediterranean Sea. Europe and Africa are shown as human forms [Rome, Vatican Library].

final stop (Plate 3) on our brief excursus is a carefully depicted 'chart' or map intended for navigators, drawn up at the beginning of the 19th century on the basis of a 'survey', and presented as a product for the admiralties of the area. We might be tempted to say that this map is more 'exact', but in this case too a selection has been made of certain data (useful for navigation) to the exclusion of other elements, such as richer detail about the coasts themselves.

All in all we can say that cartography has a unique dimension since the end product, the map, is a geographic presentation of the data investigated. It allows the graphic portrayal of spatial distributions that are often difficult to grasp by other means and enables the researcher to speculate on the spatial relationships he visualises on the map.

Nonetheless, it is evident that in such a map as the *Leo Belgicus* the political overtones are predominant in the representation, even if topographical data is certainly also present. Particularly in the coastal outline this double meaning is a characteristic constituent – more or less explicit – of all cartographic documents. Indeed: “[...] the purpose of maps, in spite of the rhetoric of many positivistic cartographers, is not mimetic [...], but to communicate ideas within a cultural and political context. Therefore the questions that we should ask [...] are: under what cultural and political conditions did such a representation seem useful, and what rhetorical devices did it use to communicate? [...] It is precisely the problem of representation as it pertains to the geographical world [...]. Geographical writing is not a faithful duplication of an external reality. But how might we read the metaphor?”<sup>4</sup>.

Much research on coastal environment, whether it is focused on man or environment, recognises the fundamental role of old cartographic sources to pinpoint situations in the past and to produce historical reconstruction. Even the analysis of coastline variations require the study of 'historical' maps and archival documents to identify trends which can be used for present shoreline management. This kind of approach receives further impulse from the study of connections in the analysis of territorial models supported by the application of neural nets, used as a tool for the delineation of shorelines <sup>5</sup>.

To look critically at the legacy of historical cartography, including the testimony of those who commissioned maps and those who actually drew them, implies travelling along the paths of numerous abstractions, some of which have been selected and transformed into signs on maps. An historical map together with the documents that often accompanied its project and use constitute – when taken together – a kind of net, which filters the past. In this net many elements may have been left out or overlooked, but some of them are still trapped in it, and so are visible to the careful researcher, providing useful indicators for evaluating the performance of socio-economic systems related to the environment. Graphic information which maps supply tell about the path taken by abstraction and can help to understand – when compared with descriptions, written memories and other images – the criteria for the choices made by the map-maker and those who commissioned the map and their relation to sections of society and natural environments different from our own. It is this difference which represents the most important point, the element which challenges our ability to see into the future of possibilities and alternatives. What relationship existed between man's presence and coastal areas without those elements – industrialisation and modern urbanisation – which have taken over the pre-existing coastline? Were there, in the past, other waterfront models which can contribute to the ideas behind modern coastal planning?

David Harvey suggested a way to 'read' the map: "constructing a map without explicit theory about the real world amounts to stating an *a priori* model; with explicit theory it amounts to stating an *a posteriori* model. The *a posteriori* model, however, can be related only to the domain of the theory which it represents. Using a particular *a posteriori* model to examine phenomena outside the domain of the theory, which it represents, amounts either to assuming the domain can be extended to phenomena not initially covered by the theory, or to using the *a posteriori* model as an *a priori* model" <sup>6</sup>.

The map has validity (with respect to the real world) only if the conceptual scheme, which governs its construction itself, has validity with respect to that same real world. The map is, therefore, simply a model of a theory about real-world structure. Constructing a map without explicit theory amounts to stating an *a priori* model. The *a posteriori* model, however, can be related only to the domain of the theory, which it represents.

Geographers <sup>7</sup> have elaborated an accurate methodology in order to evaluate historical maps using "a variety of ways to assess map accuracy. Most of these techniques involve the accurate placement of cultural and topographic features on large-scale maps" <sup>8</sup>. This method was used in "traditional" studies of the historical changes of coastlines, therefore including in its various sources also pre-geodetic cartography <sup>9</sup>.

Coastline changes are directly related to a topographic, and therefore cartographic, ele-

ment and consequently they are represented on maps. To that reason we should add others – sometimes more relevant – such as political actions related to the control and planning of resources, which, in such a territory, were almost always connected with interventions on the hydrographic network. In this context the maps have the role of enforcing specific and often conflicting plans.

Now I wish focus our attention on the Italian coastal lands. About 65% of the total of Italian shores are formed by a low coast, subject in the modern period to deep changes which had important consequences on human settlement. Up to the beginning of the 20th century, these coasts have shown a trend to progradation due to siltation by rivers, thus resulting often in swampy areas. This is why original settlements privileged high coasts, turning to the low ones only when watercourse controls and farming techniques for lowlands were acquired. The density of settlement may be evaluated only by using homogeneous and sufficiently reliable statistical data. In Italy such conditions only date back to the 19th century. For earlier times the analysis must necessarily rely on qualitative trend evaluations, although demographic dimensions of some coastal cities are occasionally documented by historical or archaeological sources.

The low coasts have a more dynamic population trend in the modern age: alternating, growing and decreasing due to the complex historical and economic processes and events of the Italian peninsula.

Settlement along Italian coasts has been subject to alternate phases. In the antiquity, different and remarkable kinds of colonisation were carried out by the Greeks, the Etruscans, the Romans, although along limited parts of the coast, and since the Middle Ages by the maritime city-states (*repubbliche marinare*), in particular the city of Venice<sup>10</sup>. Long regressive phases are related to the decay of economical activities and the upsurge of a feeling of uncertainty due to both Muslim invasions and raids, particularly in the 7th-11th and 16-18th centuries, and the spreading of malaria in the often marshy low coastal plains. Along the Adriatic coast cartographic sources of the 19th century show a landscape with long stretches without settlements. The ancient maritime towns, scattered in different points of the coast with scarce reciprocal linkages obviously constitute an exception. Everywhere there were problems of fresh and salt water flooding, stagnation; malaria was widespread.

These conditions not only applied to the coastal area of the Northern Adriatic bordered by the marshlands and numerous deltas. In the central part of the area as well, behind the dune ridges and in lands where rivers could hardly flow into the sea, there was stagnation. Farther south, the areas surrounding the coastal lakes of Lesina and Varano were also unattractive environments. South of the Gargano promontory a very long ridge of dunes included wide marshy areas and the lake of Salpi: there were all relics of the ancient lagoon where in antiquity towns had flourished.

In the second half of the XIX century the environmental situation of the Adriatic coast was still unattractive for settlement. A large part of the southern marshes was also reclaimed through extensive works of drainage, thus allowing the subsequent agricultural development<sup>11</sup>. Along the Italian coastlands at the turn of last century evidence of the presence of man was still scarce, and natural processes were still the prevalent factor in modelling the shore.



Deltaic cusps looked well developed, as a result of extensive deforestation carried out in the uplands over previous centuries in response to the increasing demand of wood before and during the first stage of the Industrial Revolution.

A first important push towards man-induced modification of these deltaic plains was brought about by extensive operations of reclamation, which also had started at the turn of the century, with the aim of defeating of endemic malaria and gaining new farming areas. Along with reclamation, the creation of an artificial drainage network and the banking of rivers had been in previous centuries factors that had strongly influenced the evolution of the shoreline.

The main factors of population growth and economic valorisation of the coastal territories since the middle of 18th century can be found, in a chronological sequence with growing importance, in the following points:

- the establishment of the railway network and the enlargement of the road network along coast;
- coastal drainage with related expansion of cultivated land near the sea;
- the development of ports and related industries;
- tourism, the last chronologically, yet with a strong and wide influence on the delicate equilibrium of our coast.

As a provisional conclusion I can refer to a concept expressed by Wallin: “In traditional maps, based on paper as a storage, distribution and presentation medium, geographic space has appeared as a rather passive arena with no actors and with no play. [...] With the help of modern information technology [...] geographic phenomena could very well be dealt with as in a good story or a great drama”. But, from the survey of the historical cartographic sources, a map seems to be not an objective imitation of reality but a fruit of both a culture and specific mode of observation and interpretation of the world, thus permitting to us to trace ‘actors’, ‘play’, ‘story’ and ‘drama’.

## NOTES

<sup>1</sup> Jolliffe I.P., Patman C.R., *The Coastal Zone: The Challenge*, “Journal of Shoreline Management”, v. 1, n. 1, 1985, pp. 3-36.

<sup>2</sup> Harley J.B., *The evaluation of early maps: towards a methodology*, “Imago Mundi”, XXII, 1968, pp. 62-80.

<sup>3</sup> De Boer G., Carr A.P., *Early maps as historical evidence for coastal change*, “Geographical Journal”, 135, 1969, pp. 17-27.

<sup>4</sup> Barnes T.J., Duncan J.S. (eds.), *Writing Worlds. Discourse, text & metaphor in the representation of landscape*, London and New York 1992.

<sup>5</sup> Ryan T.W. et al., *Extracting of Shoreline Features by Neural Nets and Image Processing*, “Photogrammetric Engineering & Remote Sensing”, v. 57, n. 7, 1991, pp. 947-955.

<sup>6</sup> Harvey D., *Explanation in Geography*, London 1969.

<sup>7</sup> Koeman C., *Levels of historical evidence in early maps* (with examples), “Imago Mundi”, 22, 1968, pp. 62-74; Harley J.B., *The evaluation of early maps: towards a methodology*, “Imago Mundi”, XXII, 1968, pp. 62-80.

<sup>8</sup> Locke W.W., Wyckoff W.K., *A Method for Assessing the Planimetric Accuracy of Historical Maps: The case of the Colorado-Green River System*, “The Professional Geographer”, 45, n. 4, 1993, pp. 416-424.

<sup>9</sup> De Boer G., Carr A.P., *Early maps as historical evidence for coastal change*, “Geographical Journal”, 135, 1969, pp. 17-

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<sup>10</sup> Torresani S., *Historical evolution of the coastal settlement in Italy – Ancient Times*, in P. Fabbri (ed.), *Coastlines of Italy*, New York 1989, pp. 150-159.

<sup>11</sup> Lodovisi A., *Historical evolution of the coastal settlement in Italy – Modern Times*, in P. Fabbri (ed.), *Coastlines of Italy*, New York 1989, pp. 160-169.



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### SEE PLATES 1-3