

The GIS Application to the Spatial Data Organization of the Necropolis of Poseidonia-Paestum (Salerno, Italy)

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ABSTRACT

This paper concerns about the spatial organization and the thematic management of the Poseidonia and Paestum's urban funeral areas. The wide archaeological heritage, investigated since the beginning of XIX century, had been studied using different research methodologies. These studies led to several inhomogeneous documents. First of all, we have to notice the absence of a general topographical map concerning the exact localization of each grave.

In front of this scenario, the aim for the researcher consisted in the documentary source's collection and the integration in order to construct an unique cartographical base to use as a corner stone for the Paestum's plain. This base has been realized through the acquisition of multi-temporal and multi-scalar supports. These different data have been organized within a Geographical Information System, according to the same cartographical projection system. The burial ground's geo-localisation has been realized through survey control operations, carried out by a satellite positioning system (GPS-Glonass) with subcentrimetrical resolution.

The second phase of the research aimed to the database construction in order to collect analytical records, relevant to each tomb, and to link the archaeological data to the geographical entities previously created. The target was to create an informative layer, selective and comprehensive at the same time, able to process specific thematic questions, analysis of singular funerary context and comparative examination of the entire necropolis.

INTRODUCTION

This work was born from a not recent but always new idea, that of archaeological mapping, according to which the trends of the historical development of a territory are represented. A territorial mapping drawn according to not conventional criteria, but by numeric criteria, makes it possible to take advantage of that potentiality represented by the numeric representation of graphic data. The possibility of making many thematic specific maps from topographic generic maps, including different data in different amounts, really represents a qualitative leap. In this way the potential information is represented by the mapping system which can be indefinitely enlarged.

Many factors invite us to use more and more GIS systems, but many risks are implied in the digital "conversion" stage of the data collected in the space, without an accurate definition of the reproduced information. In order to overcome the limits imposed by the electronic transfer of files, it is necessary to define the logic and physical set up of the application field which must refer to planning and construction of alphanumeric files and processing of the vectorial graphic base. The conversion in digital format of the paper alphanumeric data is carried out so that the processed information is compatible with a computer management of the files guaranteeing both the homogeneity of the data and their possibility of being interrogated.

Such an approach is based upon the consideration that the working out of any data processing system is independent from any data processing prototype. The stages of logical data processing system and that of physical representation are always distinct from each other.

As regards the construction of a mapping product, this project finally aims at the reconstruction and symbolic new setting of the archaeological datum with a precision proportional to the representation scale.

The project is carried out by examining the territory of the ancient town of Poseidonia-Paestum. The present stage concerns the space distribution and the thematic management of the funerary urban areas. The so called urban necropolises are situated to the north and to the south of the old town. In these places we find the burial areas of the inhabitants of Poseidonia-Paestum, since its colonization by the Sybarites (occurred in about 600 a.C.) until the period of the Latin colonization of the town occurred in 273 a.C. (Pontrandolfo, 1987, p. 225-267).

The tombs dating back to the period between the archaic and the Roman age can be distributed into four big burial nuclei, distinguished as Arcioni-Gaudo and Andriuolo-Laghetto burial areas, situated to the north of the walls, beyond the moat running along the travertine bank on which the town rises. The tombs cover a rather limited area in the archaic age, spreading out to the north-east and the north-west, up to the longest distance of a little less than 1 km from the walls. The two southern nuclei are those of Santa Venera-Spinazzo to the south-east and that of Licinella to the south-west. The largest extension of the necropolises takes place in the IV century a.C., during a big demographic expansion of the polis. Our choice of working to obtain a specific product concerning necropolises comes from the fact the corpus today existing

of funerary documents is among the most important ones today existing for the study of the territory of the town of Paestum. On the other hand the examination of the funerary areas is necessary to reconstruct the whole distribution of the polis of Magna Grecia.

At present detailed maps of findings are not always available. In many cases even the location of the single burial grounds is uncertain. The big archaeological heritage, subject to different investigation methods, is fragmented in a very unhomogeneous corpus of documents. We refer to the lack of a general plan of geographic and spatial report and sometimes to the lack of a punctual localization of each burial ground.

The big amount of information coming from very many, systematic and not systematic excavations, can run the risk of dispersing themselves in a space having no physiognomy, a territory without shape and, in some way, with a static character: background and neutral representation of daily events and of events occurred during the different ages in the valley of Poseidonia-Paestum.

The exact spatial reference of the funerary documents of the old town and, in general, a correct description and evaluation of the environmental context, can provide a renewed research and management basis for the study of the territory of the town (Cipriani and Avagliano 1987, p. 17-54; Greco, 1987, p. 471-500; Delezir and Guy, 1987, p. 463-470).

The first step of our work consisted of collecting and integrating the documentation material useful for the production of a reference mapping base of the territory of the Plain of Paestum. This research was carried out in the archives of the public bodies and institutes which could possibly keep documents. In such archives really mines of news are kept, they are precious for the amount and kind of information, but they are often unused.

The information base of topographic kind is made with multitemporal devices of different kind which required a different data processing:

- Landsat satellite shootings with ground resolution 30 m x 30 m, Spot with ground resolution of 15 m x 15 m, Ikonos II with ground resolution of 1 to 4 m. Such scenes were composed by working on different spectrum bands, in order to make the most of the components of the devices (Fig. 1);
- Aerial surveys regarding recent and past events. In the base photographs and the flight strips taken by the flights carried out in 2002 and in 1943, were put. In our field of study the latter ones taken by the British Air Force (R.A.F.) undoubtedly represent a useful "reading" tool of the region examined. They allow us to have a quite global idea of this territory, before its big transformation and decline which spared only some very limited areas (Fig. 1);
- Historical and updated maps drawn by the Military Geographic Institute to 25 000 and 10 000 scales, from the editions published after the unification of Italy to the most updated polychromatic representations;
- Geologic map of Italy drawn to a scale 1:100 000, the information included in it have been used as starting point for a geo-environmental classification of the location areas of the necropolises;
- Cadastre maps of the historical and present day archives drawn to a scale 1:2 000, such maps have been fundamental for the preliminary identification of the cadastre parcels, of which the names of the properties were available, and within which many funerary contexts were found;
- Photogrammetries of details with scale 1:5 000 provided by the Town of Capaccio; they are the last updated base regarding anthropic occupations and activities in the territory of Paestum, giving a detailed picture of the extension and expansion of the agricultural, urban planning, demographic and industrial interventions (Fig. 2);
- Vectorial reproductions of the old inhabited area of Poseidonia-Paestum, resulting from many excavation, survey and restoration interventions carried out from the last century up today;
- Excavation planimetries drawn by the Archive of the Archaeological Section of the Monuments and Fine Arts Bureau; they were collected, georeferenced and converted into vectorial format (Fig. 3).

The big numbers of different documents were organized within a Geographic Information System according to the same system of projection (Gauss-Boaga East area). Geolocalization was obtained by direct testing and survey operations carried out by a system of satellite positioning GBS-Glonass with subcentimetre reliability. The whole area of the plain of Paestum was inserted into a topographic grid, starting from known confidence points linked to the satellite network recently set up by the IGMI95.

In the second stage a database was created to include the whole analytic paper documentation of each tomb and to associate any archaeological information to the geographic items created before. This database is made of a relation structure which distinguishes two different document categories. First of all it was necessary to regulate the incoming and acquisition of the localization data and of the data concerning the structure of burials. To a second level of description the corpus of information related to the burial rites of corpses was associated. In this way it was possible to create information level singular and complex, useful to produce specific thematic researches, examinations of single funerary contexts, and compared analyses of all necropolises.

The development of the system led to the creation of a database able of interfacing with common geographic systems, since it was able of communicating, by sharing spatial information, the data linked to geometric units. The database, created by the software FileMakerPro, reproduces a typical method of filing geometric data by the information territorial systems. In most cases a software for managing vectorial spatial data links to a certain shape, a table in which the figure typology, the list of coordinate pairs, the representation parameters, and the formatting of the table fields of the linked

information. In this regard, within the database an exportation script was created editing two files in text format in which the above described geometric information and the data associated to it are included. The experimentation parameters meet the requirements for a GIS, for the viewing and analysis of the represented objects. In the same way it is possible to import data from a geographic information base collected on the spot or collected from archives.

The integration of the present system is under experimentation, within a management more general tool, set up during the last years and presented in 2004, at the foregoing edition of CAA. It is the Ekfrasys Prototype, a thematic GIS created for managing the data resulting from the main analyses of the archaeological research identified in a territory (Santoriello and Scelza, cop. 2004). It consists of a module structure, according to which each module corresponds to a documentary series in relation to a specific investigation activity: excavation, remote sensing, reconnaissance, archaeometry.

In conclusion this project was carried out to allow a rational updating of the knowledge of the territory of the colony of Magna Grecia. The topographic database allows the correct acquisition of information coming from the new findings and excavations, enlarging the heritage of the now available archaeological documents. It emphasizes the importance of a dynamic collection of data by starting a stable relationship between the past research and the present research; it offers tools for studying necropolises as well as the old landscapes; it is an efficient support for monitoring and programming town planning interventions because it helps the activities of public and private Institutes and Bodies working on the territory.

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FIGURES



Fig. 1 – Flight strips carried out in 2002 overlaid to the satellite scene (SPOT IMAGE).



Fig. 2 – Detailed photogrammetry of the Paestum territory.



Fig. 3 – Localization of the northern urban necropolis of Poseidonia-Paestum.