Man’s Impact on the Evolution of the Physical Environment in the Mediterranean Region in Historical Times*

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This article is dedicated to my academic teacher, Prof. Dr. Armin Gerstenhauer, on the occasion of his 60th birthday.

Abstract: Holocene fluvial and marine sediments have been found in many areas of the Mediterranean region. In Basilicata, for example, four periods of accumulation can be identified. Only the first one was climatically/eustatically caused, whereas the other three — dating from the Greek-Roman Epoch, the medieval times, and the last two centuries — owe their origin to man’s activities (deforestation, farming etc.).

The ecologically vulnerable environment (Mediterranean subtropics, easily erodable marls and clays, steep relief) was the main reason why man’s influence on nature has had catastrophic effects (badland formation in the hinterland and on the valley slopes, enormous accumulations in the valleys and coastal plains).

Introduction

In the Mediterranean region enormous valley fills and extension of deltas characterize the last millennia. Alluvial deposits buried historical sites (e.g. Olympia in Greece, Sybaris and Metapontum in Italy, parts of Miletus and Ephesus in Turkey). Archaeological findings as well as intercalated palaeosols help to date and classify the sediments and reveal their origin.

Alluvial Deposits in Southern Italy

A detailed study was carried out on the rivers Brëdano and Cavone which flow into the Gulf of Târanto (Fig 1). In their catchment areas (2,755 and 600 km²) mainly the clays and marls of the Calabriano-formation (early Pleistocene) crop out. Out of the original plain, extensive erosive and denudative processes have created the deeply dissected badland-like Lucanian Hill Country. In the debouchure areas negative shifts in the shoreline, caused by fluvial alluviation within historical times, have been reported (for erosion and accumulation rates during the Quaternary see Brückner 1982). Fine sediments, eroded from the Lucanian Hill Country and the valley slopes, build up big Holocene terraces, 2–3 km wide and more than 20 m thick (Fig 2).

The alluvial fills are stratified by palaeosols and are rich in artifacts. These characteristics permit to distinguish episodes of areal denudation, favouring fluvial accumulation, and periods of stability on the slopes, favouring pedogenesis. From these findings the morphodynamic processes are understood.

The profiles (Fig 1) which are described in detail by Brückner (1983) display four sediments, the first three of which form the main Holocene terrace H1 (Fig 3) while the fourth one is the morphologically separated H2.

After an erosional disconformity, Sediment 1, up to 8 m thick, was accumulated. It is interpreted as a river terrace that was developed by natural morphogenesis. The typical structure with graded bedding indicates that it was climatically/eustatically caused.

It is not known when the sedimentation started, though late Würm or early Holocene are most probable, because sea level fluctuations are reflected in the lower river courses. The Würm regression caused fluvial erosion and the late Würm/early Holocene transgression fluvial accumulation.
Fig 1 The study area in the S Italian regions Basilicata (= Lucania) and parts of Apulia and Calabria.

(SBückner 1980, p. 83 ff.). Radiocarbon dating of the lowest palaeosol indicates stable conditions from about 4,150 to 1,400 BC (Fig 3, samples BR PS 1 and CA PS 1A). This soil was formed after the Versilian Transgression, mainly during the second pre-Christian millennium.

Sediment 2 can best be interpreted as mainly reworked material from the Lucanian Hill Country and the valley slopes. By the facial structure, with nearly exclusively fine sediments and missing graded bedding, it is different from the climatically caused Sediment I. The intercalated palaeosols, being reassorted Ah-horizons, provide more proof or areal denudation. They cannot be found in the first sediment.

The allochthonous palaeosol-sediment in profile I, age 890 BC, and the archaeological and charcoal dates in profile III indicate that the alluviation leading to Sediment 2 began at the earliest in the 9th century and was most active in the 5th to 3rd centuries BC. Cotecchia et al. (1969, p. 102) have found considerable alluviation around 210 ± 160 BC represented by a thick layer of at least 4 m containing Hellenistic sherds and charcoal. The poorly developed topsoil of Sediment 2 is dated back to AD 70, 220 and 260 (Fig 3). In the Brādano alluvial deposits at Carmignano, directly under it at 1.70 m below the surface, Neboit (1980; Fig 3) found late Roman roofing tiles and ceramics from the 2nd to 3rd centuries AD.

This evidence leads to the conclusion that Sediment 2 was built up during the time of the Great Greek colonization and the Roman Empire by human activities. Historical sources confirm this.

Colonization at the time of the Magna Grecia included the foundation at the end of the 8th century BC of several cities like Tāranto and Metaponto and caused the occupation of the interior by the Lucanians (Ranieri 1972, p. 22 f.).

The research area is located in the Mediterranean sub-tropics, which is an ecologically unstable environment. Even relatively small intervention of man causes great changes in the natural environmental balance. As soon as the vegetational cover was destroyed by farming, the sediments of the Calabriano-formation—already easily erodible—could no longer resist the concentrated Mediterranean rains (as nowadays is obvious in the many landslides). Heavy erosion and denudation took place (Fig 2 foreground, and Fig 8). The big amount of load turned the normally linear runoff into braided rivers thereby accumulating alluvial