Charcoal analysis from Lixus (Larache, Morocco)

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Summary: *The aim of this paper is to present the results of charcoal analysis from the site of Lixus (Larache, Moroco) during three key moments of human settlement.*

Key words: *Moroccan anthracology, landscape, firewood management, charcoal and wood analysis*

INTRODUCTION

Lixus **(**Larache, Morocco), the ancient city of Mauretania Tingitana, was settled by the Phoenicians during the 7th century BC. It gradually grew in importance and later came under Carthaginian domination. After the destruction of Carthage, Lixus fell to Roman control and became an imperial colony that reached its zenith during the reign of Emperor Claudius I.

This study addresses the management of the Lixus forest by analysing 5595 charcoal fragments during three key moments of occupation.

RESULTS

Seventeen wood taxa were identified: *Erica arbórea, Fraxinus* sp., *Juniperus* sp., *Leguminosae* sp., Monocotiledonea sp., *Olea europaea, Pinus pinea, Pistacea lentiscus, Populus* sp./*Salix* sp., *Quercus ilex, Quercus ilex-coccifera, Quercus suber, Rhamnus* sp., *Rosaceae* sp., *Tamarix* sp., and *Ulmus* sp. (Grau Almero, 2005; Grau Almero *et al.,* 2001, 2010a, 2010b, 2010c).

DISCUSSION

The flora identified in Lixus's Phoenician levels indicated the existence of a mosaic of biotopes which provided wood used for various activities carried out in Lixus.

The Phoenicians would collect firewood from ash, poplar, willow and elm trees in riparian communities. However, despite proximity to the Lucus River, the low presence displayed by this species indicates that this may not have been the place where the wood was collected.

The type of vegetation growing around Lixus is also reflected in palynological studies carried out in the Sakha-Sokha Oued bog, near Larache (Ballouche et *al*., 1986), where cork oak species were better represented in an open landscape with sun-loving herbs.

Other taxa came from areas with good limestone soils where oak formations grew. There would have been well-developed kermes oak formations as well as wild olive trees, mastic, leguminous plants, etc., in the underbrush of these oak forests.

Therefore, there were areas that contained various vegetation types of trees and shrubs near the site. Plants that were used for firewood such as cork, oak and heather grew in acidic soils within the area. The pine wood remains could have been either from the oak or cork forest areas.

During the Punic period, the relative frequency of all types of the evergreen *Quercus* decreased considerably. This would indicate an increased clearing of oak forests, cork trees and shrubs in order to provide wood for fuel furnaces and ovens. The persistence of anthropogenic pressures on the environment favoured the degradation of sclerophyllous oak forests and their replacement by scrub bushes and pine-covered areas.

During the Mauritanian period, wood resources from areas with acidic, wet and sandy soils found on the left bank of the Lucus River declined in comparison to previous phases. This could be interpreted as a relocation of the harvesting area of the wood used in combustion structures to zones where calcareous soils with Kermes oak bushes and mastic and leguminous plants were present at the expense of oak trees. At this point, the vegetation of the original forest could have begun to change, and forest management in Lixus would have varied depending on the evolution of the vegetation and changing resource priorities. Burning and clearing forests in order to obtain farmland and pastures caused these shifts in the evolution of the vegetation.

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