

Water and the Course of Empire in North Africa

Author(s): Melvin M. Knight

Source: *The Quarterly Journal of Economics*, Vol. 43, No. 1, (Nov., 1928), pp. 44-93

Published by: The MIT Press

Stable URL: <http://www.jstor.org/stable/1883941> Accessed: 23/07/2008

These arguments are important enough to warrant a very brief summary. The amounts of rain and irrigation water in such a vast area are closely associated. If the ancients had more of the latter, then the climate was wetter and they needed less. Even without the fairly specific accounts of how North Africa was farmed, the supposition of a much heavier rainfall would have to be rejected as inconsistent with the ruins. Roman bridges still in place were evidently designed to span no more water than the maximum amounts flowing under them today. Ancient wells, cleaned out, show the underground water to have been at about the same depth as it is now. The aqueducts, most of which carried drinking water and are too small for irrigation purposes, could be repaired and their supply again captured. Oases mentioned as such in Roman times have about the same boundaries today, and ruins along the shores show that the same is true of the lakes.

Thirty-five years ago, M. Paul Bourde, then Director of Agriculture in Tunis, became convinced, from a study of Roman ruins, climate, and soils, that the southern part of the country was not the incurable waste it seemed, and that the ancient olive groves could be restored by the same methods.¹ A forest of olive trees, numbering three millions in the calidat of Sfax alone, has been created almost entirely since that time. In this zone, which gets less than 300 millimeters of rain per year, the trees must be specially watered during the first two seasons, until their roots get down to the moist subsoil. Only about ten trees to the acre can find sufficient moisture, as compared with thirty to fifty in the 300-millimeter zone and sixty-five in the rainy north. In the south, the last drop of rainwater is utilized, employing walls, terraces and impluviums of the same types found in the ancient ruins. This is not irrigation proper, but rather a mode of "dry-farming," applied to trees instead of to annual plants.

The ancient methods, with the present amount of rain and without irrigation, are capable of restoring the olive groves. Their disappearance during the nomad invasions

1. Paul Bourde *Rapport sur les cultures fruitières et en particulier sur la culture de l'olivier dans le centre de la Tunisie*, Tunis, 1893 and 1899.

requires no such far-fetched explanation as a change of climate. Olive trees, especially in dry regions, require expert care. They must be grafted, watered, weeded, and protected from animals, among which the worst is the camel, a huge beast capable of reaching even the upper branches with his sharp teeth. There must be a market for the oil, and a financial organization of society able to carry the enterprise during five or six years with no fruit at all, and seven or eight before the returns equal the annual cost of exploitation. In ten or twelve years, the cost of establishing the grove is covered, and the height of productivity is reached in about ten more. A grove will last a century if properly pruned and otherwise methodically cared for, but goes to pieces very quickly otherwise, especially in a camel country. Amusing anachronisms in modern literary works have obscured the important fact that the Carthaginians did not use camels, and that these animals were rarely mentioned by Roman writers on Africa up to the third and fourth centuries A.D., when the peak of economic development was already past.

There was very little, if any, more rain or irrigation water two thousand years ago than now. That water was scarce and the summers dry in ancient times is attested by the ruins of innumerable impluviums, wells, and cisterns. The olive has to be planted and grafted in southern Tunis, but in the north it grows wild, and the producing varieties can be grafted on these oleander roots. Surveys have indicated that the wild olive predominates in nearly 800,000 acres of forest and brush in Algeria alone, and the belt is wider in Tunis.³ Given the same marketing, transport, and labor conditions as in ancient times, there is no reason to doubt that the olive area is potentially the same; but the economic frontiers of crops can shift within fairly wide limits even if the geographic basis remains constant. That the olive area expanded more rapidly than the grain area after the period of Roman beginnings is no more surprising than in the modern case of French rule.