

# Civilizing Climate: Social Responses to Climate Change in the Ancient Near East

Arlene Miller Rosen

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Reviewed by Matthew J. Forss

Goddard College, 123 Pitkin Road, Plainfield, VT 05667, USA; [worldmusicman2002@yahoo.com](mailto:worldmusicman2002@yahoo.com)

Arlene Miller Rosen's landmark book explores the interconnectedness of societies and paleoenvironments during the Terminal Pleistocene through the Late Holocene period around 13,000 to 1,500 calibrated years ago. Rosen sets out to determine how climate change impacted different communities from early hunter-gatherers to more complex societies in the Near Eastern Levant. The Levant is a geographical region approximately 500,000 sq. km that stretches from the Taurus Mountains in Turkey; east to Mesopotamia; west to the Mediterranean; and south to the Red Sea. Most of the discussion surrounding climate change and society pertains to three vital time periods. One such period is the Terminal Pleistocene Younger Dryas (YD) event that affected the hunter-gatherer communities of the Southern Levant. Around 4000 BP, another widespread climatic event brought drought to the Near East, which resulted in a much drier Late Holocene after the wetter Middle Holocene. The third period of climatic disruption occurred during the Late Holocene around 2000 BP, which led to Roman and Byzantine migrations into the desert zones of the Levant.

Fortunately, Rosen recognizes the multifarious aspects of studying paleoclimatic events in relation to how societies rise and fall by emphasizing, "...there are many ways in which societies can overcome major environmental shifts...[f]ailure to do so indicates a breakdown in one or more of the social and political subsystems" (p. 4). Furthermore, scales of environmental variation are used to classify climatic shifts from small-scale yearly anomalies to catastrophic climatic and societal disruptions with large-scale shifts. Yet, the smaller-scale variations are linked to social interactions between individuals whose goals and motivations differ depending on if they are 'high-order regulators' (wealthy landowners) or 'low-regulators' (peasant farmers). In effect, the wealthy landowners are more likely to grow several different types of cash crops that produce abundant yields, while peasant farmers grow only a few types that are not as productive, but mostly dependable, even in times of drought.

How does Rosen accurately determine climatic changes and their effects on communities and empires? Chapter two provides an answer as it describes the tools utilized for determining paleoclimatic events. Rosen examines the role of proxy data in climate research, which consist of, "...natural phenomena that have been directly impacted by climatic change, and therefore they themselves provide a secondary record" (p. 17). These climate records can be found in historical accounts of crop harvests, or palyno-

logical and geological data. Some researchers incorporate archaeological evidence as a form of proxy data, but Rosen notes, "...in addition to climatic change more complex societies are controlled by a number of other social and technological factors that work in concert to influence settlement and abandonment" (p. 18).

The most common techniques used for climatic reconstruction are detailed in historical records, pollen and isotopic analyses, and understanding of geomorphological fluctuations. Historical records fall into seven different categories including ancient inscriptions, annals/chronicles, government records, private estate records, maritime/commercial records, personal papers, and scientific writings or weather journals. However, many historical records suffer from a high degree of unreliability without the use of precise instrumentation, inconsistent observations, and vague or exaggerated accounts of religious phenomenology and climatic events.

Rosen's pollen analysis includes an excellent introduction to pollen core sampling and counting techniques, with pollen diagrams including pollen zones, percentages of occurrence, and arboreal vs. nonarboreal pollen. As is commonly interpreted, a rise in arboreal pollen signifies moister climatic conditions, while a rise in nonarboreal pollen indicates a dry-steppic climate. However, Rosen does not ignore the pitfalls associated with palynological analyses. One problem includes radiocarbon dates published with pollen sequences that are usually uncalibrated, which necessitates putting these dates into calibration programs so that comparability of data between calendar years and archaeological time periods can be gained. Another issue revolves around core sampling near waterways with carbonate or volcanic rock. This negatively influences radiocarbon dating by adding, "...up to 1200 years to the radiocarbon ages from mollusk shells and the remains of water plants" (p. 24). Other considerations depend on reforestation rates, distance from the region where pollen was collected, effects of rain and geomorphological deposition, human impacts and agriculture, and phenological (seasonal) considerations.

Geomorphology is another important facet of paleoenvironmental research. Soil sampling characteristics provide information on climate, hydrology, vegetation, and human impacts. Many different types of soil conditions are highly influenced by rainfall, temperature, topography, and anthropogenic disturbances. Furthermore, it is difficult to discriminate between natural climatic fluctuations on land and water, and human disturbances of land and water (ca-

nals, terraces, etc.) based solely on geomorphological analysis. For example, in an "...attempt to understand the cause of stream terraces in the Near East from Middle Holocene times, it is necessary to take into account the nature of the sediment lithologies and the spatial distribution of deposits throughout the stream system" (p. 87).

While chapters one through three cover introductory material, chapters four through eight cover a more in-depth study of the paleoenvironments and theoretical social constructs of the Terminal Pleistocene Natufian hunter-gatherers, Middle Holocene early complex societies, Early Bronze III period, and the Late Holocene Roman-Byzantine Empires. Each chapter provides palynological, geomorphological, paleoclimatological, and isotopic discussion of findings by many different researchers. In fact, Rosen provides nearly 380 cross-references for additional reading. After data is introduced and discussed, a helpful summary section follows at the end of each chapter. Tables, diagrams, and maps provide clarification and comparison of related data.

The rise of agriculture is a process affected by the two seemingly interrelated causes of population pressure and climate change. One possible scenario for agricultural origins involves systematic cereal cultivation by Natufian populations during the Younger Dryas period of drought. The other possibility is through opportunism, which suggests, "...agriculture began under conditions favorable for the growth and spread of cereals and that local populations were optimizing their resource options" (p. 105). Macrobotanical analyses of Natufian settlements discovered wheat, rye, legumes, and other edible seeds and fruits had fluctuating levels of abundance, which likely occurred at the mid-

point of the Younger Dryas dry phase. In other words, the choice of agricultural foodstuffs was determined by sedentism, social organizations, modes of subsistence, and other environmental stressors. An interesting study of cultivation reveals a 'push factor' and 'pull factor.' Push factors are, "...related to adverse climatic changes driving populations toward an agricultural economy" (p. 118). While the pull factor results, "...from environmental conditions favorable for wild cereals attracting populations to more intensive exploitation and the eventual switch to agriculture" (p. 118). Rosen provides comparative analysis of the Natufian model with three other case studies of hunter-gatherer societies, including the California Model, Northern Australia Model, and the North American Great Plains Model. These models were chosen to best illustrate comparative hunter-gatherers in different parts of the world, supported by archaeological evidence.

Rosen's detailed examination of paleoenvironments and social responses are well-documented and executed in a professional manner. A close study of political ecology and ancient empires is presented remarkably well, because it brings the interconnectedness of paleoclimatology and society into the forefront of larger communities living in marginal agricultural zones. In effect, the need for food within these paleoenvironments led to social upheavals, nation conquests, and ultimately, societal/agricultural advancements. Rosen's closing words highlight the uncertain future of man and climate: "...a more complete understanding of the past can, we hope, aid us in preparing for a future of uncertain climatic and environmental conditions" (p. 180).