The trajectory of social complexity is hardly a linear progression, with twists and turns precipitated by unintended consequences, consequences that can be advantageous or deleterious to a society and the biophysical environment that society inhabits. The article by Liu et al. (1) provides clear evidence for a complex set of environmentally altered landscapes principally designed to accommodate sizable populations investing in water management infrastructure and the presumed intensification of paddy field rice production. Of critical merit for an understanding of the social conditions affecting the early archaic state, the site area of Liangzhu concentrates human-modified landscapes, productive resources, and the supporting labor responsible for the initiation of East Asia’s earliest known experiment in truly complex sociopolitical order. At 5,300 y ago, the authors reveal a very different level of social organization, unlike that identified from other regions of East Asia (2) or really anywhere else at a comparable time (3). The monsoonal “wet” setting for neolithic Liangzhu culture (3300–4300 BP) was a gravitational pull, preadapting the society to a water-abundant region that required a different kind of investment in landscape engineering (4) compared with the much better-known water infrastructure reported at the other end of the continent—the Near East—and its “dry” environmental context (5).

Although several forces beyond water management combine to precipitate the myriad of emergent social orders that result in social complexity, settings with either an overabundance of water or its sparse availability likely influenced the manner in which the archaic state was manifest. Within these contexts, the uncertainty associated with the severity of acute flooding compared with long or frequent drought-like conditions both resulted in landscape modifications and complicated spatial relationships, although demonstrably different from one another.

Karl Wittfogel’s controversial “hydraulic hypothesis” (6) that stridently professed water control as the primary triggering agent for the earliest states globally has been denounced by most members of the academic community as far too deterministic. Although a half-century old, it nevertheless continues to be a citation when issues of social complexity are addressed. Given the ever-increasing role that diminishing freshwater access is having on our current planetary boundaries (7, 8), Wittfogel’s thesis with its causal and controversial simplicity seems to partially rise or precipitously fall within each passing decade since its introduction in the late 1950s. This article again provides that forum, implicitly justified by the authors, in part, because Wittfogel was a trained sinologist before going global with his theory.

One of the principal objections to the hypothesis has been the timing of the first estates or state-like managers and the resulting institution of kingship in Mesopotamia. Drawing from years of directed fieldwork, laboratory assessment, and several highly influential publications, Robert M. Adams (9) and his teams demonstrated that the southernmost Mesopotamian cities and related indicators of societal scale and complexity frequently predated large canalization efforts. Early Sumerian “states” were contemporary with Liangzhu developments; however, in the latter case, the authors herein indicate that significant aspects of the complex hydraulic infrastructure resulting in high dam construction appeared several hundred years before sophisticated urban development.
occurred at the centralizing city of Liangzhu itself. Although greater investment in cross-cultural and cross-temporal analytical comparison is required, the role of biophysical environments with too much water as opposed to too little may well have affected socioeconomic and sociopolitical decision-making and outcomes (10).

To feed, fuel, and house growing sedentary populations, group concentrations and their associated refined resources required increasingly complex organizational parameters. At the outset, the necessary labor was unlikely sanctioned by force or decree. In most regions of the world where an archaic state arose, it developed in environmental contexts of mounting ecological stress due, in part, to human-use impact—unintended consequences like salinization or accelerated erosion and sediment aggradation—that likely added to the complicating natural vagaries of weather and climate in concert with soil inadequacies, topographic gradient concerns, and the availability, or lack thereof, of domesticated plants or animals. These environments were uncertain backdrops for sustained societal longevity and necessitated degrees of accelerated alteration to manage increasing societal demands (11).

Weather change and the greater trajectory of climate change remain fundamentally an issue of water availability—too much/too little. This unpredictability challenges human well-being and the persistence of societal institutions. Although change is the default option for all life, the pace of change is confounding and the degree to which life is adaptable is at the heart of resilience. Some environments and the human groups that occupy them are less resistant to “turnover” than others. For example, the wet tropics may leave humans more responsive to the rapidity of change as they mimic the surrounding biological variability and its rhythms (12). Acid settings may result in humans being more resistant to such seasonal and annual adjustments, in part, because of limited rainfall and a heavy reliance on primary rivers with their replenished watersheds many hundreds of kilometers upstream—the Nile, Tigris–Euphrates, and Indus, for instance, backdrops for three of the first semiarid archaic states. In all examples of the primary state, societies must cultivate the interplay between their built environments and the necessary labor to construct and maintain their food production infrastructure (13). At that juncture, before standing armies or coercive kings, how were societies able to transition to these new levels of social complexity?

Ritualized landscapes embodying daily routines and predictable sequences of behavior may have set the stage for the emergent conditions leading to the archaic state (14, 15) (Fig. 1). The authors of this article reference the role of ritual and its associated artifacts in suggesting the importance of such acts of devotion in concert with water management infrastructure. Ritual provides a set of routinized behaviors deeply embedded in the worldview of many societies and promises that their performance will ensure predictable outcomes for the group—certainty. The creation of certainty developed in tandem with the hydraulic infrastructure to establish the early Liangzhu context. The impetus for water infrastructure was the explicit need to curb the uncertainty of not having appropriate resource concentrations to support the existing population. However, to initiate the intricate interplay between convincing a labor force to construct and maintain an infrastructure and the external threats of weather and climate, to say little about issues of subgroup equity, conflict, or planning competency error, was extremely tricky. Nevertheless, if certain prescribed behaviors were institutionalized and the fabric of society conditioned to view ritual acts as accenting elevated degrees of certainty—actions highly integrated into the production and maintenance of water systems that allowed predictable food outlays—then a cycle of reinforced feedback behaviors could perpetuate. The ecological anthropologist Roy Rappaport (ref. 16, p. 96) notes, “Ritual occurrence, which separates the before from the after with absolute clarity, is admirably suited to impose upon the continua of nature, generally, distinctions much sharper than nature’s own. Annual rounds of festivals, for instance, distinguish the seasons from each other more sharply than do changes in the weather. . . . The certainty of their occurrence stands as if in defiance of the vagaries of weather as it careens from the hottest time of the year to the coldest.” We might add, from the wettest to the driest.

The relationship between infrastructure and its ritualized sanctioning may aid our understanding of early socially complex civilizations—whether rains were diverted and channeled away or stored behind dams for subsequent seasonal release, or redirected into parched fields following their praiseworthy arrival. This article provides another way of viewing the origins affecting many of our current societal institutions by way of assessing our interrelationships with the environment. Our technologies and economies of scale have transformed the surfaces of the earth, frequently resulting in unsustainable resource exploitation and attempts to homogenize the commercial productivity of disparate environments—cattle pasturage in Amazonia to cotton fields watered from the Aral Sea. The role of localized landscape knowledge and the sustainability of both a food supply and cultural identity for a region are resiliency lessons learned in the context of much of the archaeological record.

6 Wittfogel KA (1957) Oriental Despotism (Yale Univ Press, New Haven, CT).