

Sustainable Agriculture in Ancient Egypt

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The search for an ancient society that approached a sustainable balance with the environment must inevitably lead the environmental historian to Egypt. The Egyptians were in charge of their own government and able to set their own environmental policies from before 3000 B.C. to after 1000 B.C. No other ancient civilization lasted so long, while maintaining a stable pattern in its economy, government, religion, and ecological viewpoints and techniques. Many historians of Egypt remark upon the stability of Egyptian culture in a pejorative tone, attributing a lack of change to traditionalism and absence of creative thought, as if stability were only stagnation. But it will be suggested here that the stability of Egyptian civilization was the result of the sustainability of Egypt's ecological relationships.

In his book, *Early Hydraulic Civilization in Egypt*, Karl Butzer remarked with great insight, "It has become difficult to ignore the possibility that major segments of ancient Egyptian history may be unintelligible without recourse to an ecological perspective."¹ His advice should be followed by anyone who seeks understanding of ancient Egypt. Butzer also remarked that the history of flood-plain civilization in the Nile Valley offers a test case of human-land relationships.² But a further observation can be made: The ecological attitudes and practices of the Egyptians were rooted in a world view that affirmed the sacred values of all nature, and of land in particular.

Egypt, although one of the first societies to attain civilization in the sense of developing cities, remained basically agrarian rather than urban. As Adolf Erman said, "Agriculture is the foundation of Egyptian civiliza-

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1. Karl W. Butzer, *Early Hydraulic Civilization in Egypt* (Chicago: University of Chicago Press, 1976), 56.

2. *Ibid.*, 2.

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tion.”³ Unlike Mesopotamia, mutually hostile city-states did not become the characteristic political units in Egypt, nor were urban centers separate from, and dominant over, the rural landscape. This can be seen in the absence of fortified walls, so that Egyptian cities were integrated into the countryside. The representation of walled cities in early art indicates that they existed in predynastic times, but with the unification of the Two Lands under the god-king (pharaoh), need for them disappeared except in frontier areas such as the cataracts and the margins of the Delta, and whenever central authority broke down. Thus it is agriculture that manifests the characteristic ecological relationships of Egyptian civilization.

The sustainability of Egyptian agriculture was made possible first of all by the annual flood of the Nile and the deposition of fertile alluvial soil containing phosphorus and other minerals and traces of organic debris brought down from the mountains and swamps of lands further south. The Greek historian Herodotus, observing that the very soil of Egypt had been formed by river sediment, pronounced Egypt the “gift of the Nile.”⁴ The Egyptians were aware of this, for as an early inscription witnesses, the Nile “supplies all the people with nourishment and food.”⁵ Second, they knew a stable climate without freezing or storms, and although there was little rain, the river supplied the water needed. Their environment encouraged them to think of processes of nature as operating in predictable cycles. The Nile flooded its banks at the same time every year, bringing moisture and new soil to the fields, and then subsided. As Pliny the Elder remarked, “In that country the Nile plays the part of farmer.”⁶ The only fertile land was what the river watered, both in the long, narrow cultivated valley floor of Upper Egypt and in the broad, flat, fruitful Delta of Lower Egypt.

Of all the world’s great rivers used in early times for flood agriculture, the Nile was the most regular.⁷ Of course, it was not totally predictable. Disasters occurred in years when a high flood washed away irrigation works, storage facilities, and villages, or when a low river failed to water or fertilize the black land adequately.⁸ Lapses in sustainability occurred, partly due to periods when the Nile failed, and partly due to invaders who took advantage of weakness produced by flood and famine. As a result,

3. Adolf Erman, *Life in Ancient Egypt* (London: Macmillan, 1894; Reprint, New York: Dover, 1971), 425.

4. Herodotus, *Histories* 2. 5.

5. Erman, 425; from R. Lepsius, *Denkmaeler aus Aegypten und Aethiopen* (Berlin, 1858), vol. 3, 175. d.

6. Pliny the Elder, *Natural History*, 18, 47, 167.

7. John Baines and Jaromir Malek, *Atlas of Ancient Egypt* (New York: Facts on File Publications, 1980), 14.

8. Butzer, *Early Hydraulic Civilization in Egypt*, 51–56.

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Egyptian history is punctuated by difficult times when pharaonic government collapsed, and these "intermediate periods" have been correlated with anomalies in the average level of Nile floods.⁹ But traditional patterns of culture, including environmental relationships, reasserted themselves after these intervals with remarkable tenacity. John Wilson expressed it well: "The Nile never refused its great task of revivification. In its periodicity it promoted the [Egyptians'] sense of confidence; in its rebirth it gave [them] a faith that [they], too, would be victorious over death and go on into eternal life. True, the Nile might fall short of its full bounty for years of famine, but it never ceased altogether, and ultimately it always came back with full prodigality."¹⁰ Thus the natural regime provided the environmental insulation necessary for a sustainable society. But the river alone could not assure sustainability; for that the perceptive efforts of the Egyptians themselves were necessary. To see why these occurred, it will be instructive to examine some aspects of the Egyptian world view.

Egyptian religion held as sacred the forces of nature that assured sustainability, and urged the people to cooperate with rather than to interfere with them. The world to them was a place of system and regularity, qualities attributed to Ma'at, goddess of balance. But she was more than a goddess; she was cosmic consciousness itself. She embodied the order that includes and harmonizes what appear to be antitheses in nature. Gods and pharaohs alike were expected to act in accord with her principles, so that she was implicitly recognized as the basis of civilization.

There were many creation myths in ancient Egypt, since varied sacred texts were never reduced by authority to rigid consistency. But all of them display the idea that the world, with everything in it, is the expression of a creator, or creators, that acted in congruence with the harmony that Ma'at represents. The universe, then, is exactly what the word implies: one, whole, and natural. Its parts are sacred, and are envisioned as spiritual powers. For example, the yearly Nile inundation reenacted creation, with the "primeval hillock" appearing to view above the sinking primordial waters. The first dry land emerging from the flood promised renewed life in the coming agricultural season.¹¹

The orderly movements of the heavens were also evident to the Egyptians, whose sky was so seldom clouded. Re-Harakhte, the Sun God, ap-

9. Karl W. Butzer, "Long-Term Nile Flood Variation and Political Discontinuities in Pharaonic Egypt," in J. Desmond Clark and Steven A. Brandt, eds., *From Hunters to Farmers: The Causes and Consequences of Food Production in Africa* (Berkeley: University of California Press, 1984), 102–12.

10. John A. Wilson, *The Culture of Ancient Egypt* (Chicago: University of Chicago Press, 1951; Phoenix Edition, 1956), 13.

11. John A. Wilson, "Egypt," in Henri Frankfort, et. al, eds., *Before Philosophy* (Baltimore: Penguin Books, 1949), 37–133.

peared every morning and crossed the sky to his western harbor, and the movement of his path to north and south showed the passage of the year. The stars marked hours and seasons; when Sothis, star of the goddess Isis, rose just before the sun, it was always a sign that flood time was at hand. As above, so below: the sky goddess Nut arched her body above her fertile consort, the male Earth god Geb, in perfect balance. When the stars, the children of Nut, showed the proper season, then Geb's children, the plants, bore fruit. It is interesting to note the reversal of identifications common in other societies, where Earth is usually feminine and Sky masculine. But the principle in Egyptian myth was a balance of sexual roles, not the dominance of either. The deities often occurred as balanced pairs of male and female, like Geb and Nut. Sometimes the pairs balanced two sides of the feminine, such as kind Hathor and angry Sekhmet, who could be transformed into each other; or two aspects of the masculine—for example, Horus, hero-god of fertile land, and his counterpart, the desert-god Set—these two were enemies whose battles ended in reconciliation and peaceful co-rule.

The land was a god, and therefore sacred, and all its aspects were gods. Osiris, one of the most widely worshipped gods, embodied among other things vegetation and agriculture. The annual cycle of flood, planting, harvest, and fallow was expressed as his birth, growth, death, dismemberment, burial, and resurrection, so that every stage of the agricultural year repeated an event in the life of Osiris.

Hapi was god of the Nile itself. Bringer of fertility, though male, he was portrayed with breasts to show his power to nurture. He was called "Father of the gods" because so many of them depended on the Nile for offerings, or for their very existence. For example, he suckled Osiris, helping to resurrect him, a myth that stands for the reliance of vegetation on the Nile flood. So when the flood came at its appropriate level, people rejoiced at the advent of their god. In the words of one of the pyramid texts, "They tremble, that behold the Nile in full flood. The fields laugh and the river-banks are overflowed. The god's offerings descend, the visage of the people is bright, and the heart of the gods rejoices."¹² At such a time, Hapi was worshipped not only in temples dedicated to him, but throughout Egypt, with hymns such as the following:

Adoration of the Nile (selected)

Praise to you, O Nile, that issues from the Earth, and comes to nourish Egypt . . .

12. "Joy over the Inundation," from the *Pyramid Texts*, Utterance 581, quoted in *The Ancient Egyptians: A Sourcebook of their Writings*, edited by Adolf Erman (London: Methuen, 1927; Reprint, New York: Harper and Row, 1966), 10.

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That waters the meadows, he whom Re has created to nourish all cattle.
That gives drink to the desert places . . .
Beloved of Geb (the Earth-god),
That makes barley and creates wheat,
If his flood is low, breath fails, and all people are impoverished; the
offerings to the gods are diminished, and millions of people perish.
The whole land is in terror . . .
When he rises, the land is in exultation and everybody is in joy.
All mouths begin to laugh and every tooth is revealed.
It is he that brings victuals and is rich in food, that creates all that is
good . . .
He fills the storehouses, and makes wide the granaries; he gives things
to the poor.
He makes trees to grow . . . and people have no lack of them . . .
Your children shout for joy over you, and the people hail you as king.
Your laws are unchanging . . . People drink your water.
You come in flood, giving water to the fields to drink and making the
people strong.
Musicians play to you on the harp, and singers sing to you, keeping time
with their hands . . .
You make green the two riverbanks. You are verdant, O Nile, you are
verdant.¹³

"For the Egyptians the ideal society on Earth . . . was a fundamental reflection of a divine order," observes Barry Kemp.¹⁴ Farmers who cared for the Earth carried on a long-established tradition. It was believed that hoeing, properly done, was an act of veneration of the Earth-god. The round of the agricultural year had a numerous series of festivals honoring the recurrence of natural events. Originated by villagers in neolithic times, these celebrations were later institutionalized. At the harvest festival of Min-Amun in Thebes, Pharaoh cut the first sheaf of wheat and a bull was led in procession. So the actions of the Egyptians in agricultural ritual reflected their sacred vision of the Earth.

The sciences of sacred geometry, sacred astronomy, and sacred records (hieroglyphics) were marshalled to assure the dependability or relationship to the environment. Similarly, the technology of irrigation was developed to utilize the flood. Geometry, which was necessary to reestablish boundaries between fields when markers had been swept away in the flood, was not a mundane skill, but a hallowed occupation originated by the god Thoth and entrusted to especially trained scribes. Although all Earth was holy, certain places had a more sacred character, and they and

13. Erman, *The Ancient Egyptians*, 146–49, modernized and abridged.

14. Barry J. Kemp, *Ancient Egypt: Anatomy of a Civilization* (London: Routledge, 1989), 20.

their produce were often holdings of temples located according to geomancy and oriented to important points in the revolutions of the sun and stars. Papyri containing these arcane branches of knowledge were kept by scribes in the House of Life, the temple library.

Irrigation was a form of sacred technology shown by art to be an activity of the pharaoh and the gods themselves. Indeed, canal-building was believed to be a major occupation of those in the blessed world beyond death. Some scholars maintain that the absolute monarchy of the pharaoh grew out of the need to marshal labor and direct hydro-engineering on a national scale.¹⁵ This seems supported in that the first-dynasty Scorpion-King Mace Head shows the king digging a canal, and that "Canal-digger" was an important title. But recent research has discovered that most irrigation work was supervised by local officials in the nomes (small administrative units somewhat like American counties). Butzer states that nomes developed as local irrigation units.¹⁶

Artificial irrigation increased the cropland area beyond that originally flooded by the Nile. These two types of land were kept distinct. Local laborers dredged channels, dug ditches, built earthen dams, constructed dikes and basins, and raised water with buckets. These activities were considered to be part of a holy occupation. Major projects sponsored by Pharaoh were commemorated as good works; inscriptions boast, "I brought the Nile to the upland in your fields so that plots were watered that had never known water before."¹⁷ "I caused the water of the Nile to flood over the ancient landmarks."¹⁸

As centuries passed, technological innovations were made, such as the shaduf, a bucket on a long counterbalanced arm for lifting water, introduced from Mesopotamia about 1500 B.C. Nilometers were installed near the First Cataract to measure the height of the river and help predict the extent of the flood. Egypt accepted such advances and incorporated them into the sacred system of environmental regulation; the Nilometer was inscribed with religious symbols and attended by special priest-scribes.

In spite of Egypt's remarkable success in maintaining sustainable agriculture, some environmental problems appeared. One, ironically, was a result of the success of the Egyptians in producing the ancient world's most reliable food supply. The most dependable system will fail with over-

15. See Karl Wittfogel, *Oriental Despotism: A Comparative Study of Total Power* (New Haven: Yale U. Press, 1957).

16. Butzer, *Early Hydraulic Civilization in Egypt*, 105; see also Michael A. Hoffman, *Egypt Before the Pharaohs* (New York: Alfred A. Knopf, 1980; Reprint. London: Ark Paperbacks, Routledge and Kegan Paul, 1984), 30–32.

17. First Intermediate Period tomb inscription, Siut.

18. Hoffman, 313, from Breasted, *Records of Ancient Egypt* (Chicago: University of Chicago Press, 1906), Vol. 1, 188–89.

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population. When population increased to near a level that could be supported in a year of good harvest, an abnormally low harvest would bring famine. Works of art such as the causeway of Unas at Sakkara show people starving, with their ribs prominently visible. Egypt suffered because fat years alternated with lean ones, and population had its peaks and valleys as a result. Governmental officials tried to even out fluctuations of supply and demand by storing surplus in good years and distributing it when the harvest failed. The story of Joseph's interpretation of Pharaoh's dream, and his advice to build granaries to prepare for hard times, is a reflection of the actual situation in Egypt.¹⁹ The storechambers of the Ramesseum, built at the order of Ramses II, could easily have held 590,000 cu. ft. of grain, enough to support 3,400 families for a year.²⁰ In difficult periods, prices fluctuated widely. In the 55 years between the reigns of Ramses III and Ramses VII, for example, emmer wheat rose from 8 to 24 times base price.²¹ At times, famine relief had to be distributed over wide territories.²² Even so, Egypt remained the breadbasket of the ancient world, exporting wheat and barley with few interruptions.

The Egyptians' joy in their environment can be sensed in pictures of activities such as plowing, hunting, and building. But Egyptian art shows little realization that nature was being altered in the process. For them, the Earth was unchanging: time ran in cycles, not along an inexorable line. But changes, some destructive, were nonetheless occurring. Dangers to sustainability included practices that produced salinization, deforestation, overdevelopment, and habitat destruction. Invasion and imperialism also had serious environmental effects.

Salinization, the accumulation of salts in the soil as a result of water evaporation, is a danger wherever irrigation is practiced in dry climates. In extreme cases, plants are unable to grow in salinized soil. Egypt suffered less from it because the Nile flood leached salt from the soil, but salinization occurred in irrigated areas above flood line, and was a serious problem in the Faiyum, an oasis below sea level with a brackish lake in its center.

Deforestation was a major problem, which may seem surprising because Egypt is seldom thought of as a forested land. But although more than 90 percent of Egypt's area is desert, the watered land had large sections full of trees. Before agricultural clearing, the Nile Valley supported an evergreen forest of fig, jujube, acacia, and other trees. Pollen analyses undertaken in soil deposits in the Delta show that there were many wetland

19. Genesis 41:1–37.

20. Kemp, *Ancient Egypt*, 192.

21. Butzer, *Early Hydraulic Civilization in Egypt*, 55–56.

22. Kemp, *Ancient Egypt*, 239.

plants including trees.²³ This changed as cultivation extended. Tomb paintings show trees being cut as land was cleared. Egypt had plenty of firewood and some fine woods for carving and cabinet-making, but had few very tall, straight trees, and was forced to import larger timber from Phoenicia and other lands to the north. Egyptian ships reached Byblos and other ports as early as 2650 B.C. to obtain cedar, juniper, fir, pine, and other timber for construction. In the Middle Kingdom, as excavated tombs in Lebanon make clear, Egyptian influence dominated the Phoenician coast through political and cultural forces that followed the timber trade. In the New Kingdom, the same area was conquered by Egypt. In Egypt itself, in addition to cutting for fuel and other purposes, pasturing of domestic animals depleted the vegetation. Nothing deforests a dry land more thoroughly than the cutting of trees followed by grazing, which destroys shrubs and small trees before the forest can reestablish itself.

The reverence of Egyptians for sacred trees acted against total deforestation. Trees were worshipped, and deities were shown in tree form. Isis, for example, was symbolized by a tree with breasts from which Pharaoh received milk. The tree of life portrayed in mortuary paintings with the deceased bowing low before it or drinking from a spring of water at its base was not just imaginary. Trees such as *ished* and palm were planted in temple gardens beside sacred lakes and tended by priests and their servants. The planting of a tree was considered to be a good work that aided the soul on its progress toward justification in the next world. Great trouble was taken to plant and water trees near tombs and mortuary temples, as for instance the terraced monument of Hatshepsut.²⁴ Officials and affluent citizens planted gardens and groves, and Pharaoh had plantations of valuable species for royal use. These are shown in paintings and wooden models. Sycamore trees were exempted from taxation. The king rewarded his subjects for planting trees along roads, canals, field boundaries, and other places, and tree farming became an art and science. All these practices assisted the maintenance of trees within the context of sustainable cultivation.

The need for wetlands, plants, and wildlife in sustaining the ecology of this land threatened by desert is evident. But the habitats of wild animals, birds, and aquatic creatures shrank and then disappeared, perhaps so slowly that few noticed what was happening. Eventually "the almost total disappearance of large game from the [Nile] valley, with increasing importation of captured animals for symbolic hunts by the nobility, argues for

23. Ibid., 25.

24. Herrmann Kees, *Ancient Egypt: A Cultural Topography* (Chicago: University of Chicago Press, 1961), 78–79.

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eradication of the natural vegetation.”²⁵ Even such a ubiquitous plant as papyrus became less prevalent, though it did not totally disappear from Egypt before the end of antiquity.

Animals were highly sacred to the Egyptians, as anyone knows who has studied their religion. Species were regarded as visible manifestations of deity: the jackal of Anubis, the ibis or baboon of Thoth, the lioness of Sekhmet, and others too numerous to mention. Sacred groups of animals were kept in temple precincts, and when they died were mummified and accorded an honorable burial. Tens of thousands of these mummies have been found in special vaults: Horus hawks, Thoth ibises, and Bastet cats. Worship accorded to animals did not, however, prevent wild animals from being hunted; still less did it save them from the effects of habitat destruction. In predynastic times, as petroglyphs attest, Egypt possessed a variety of species as rich as that now found in East Africa. But by the end of the Old Kingdom, elephant, rhinoceros, wild camel, and giraffe were missing or rare. Barbary sheep, lion, and leopard were still present, but in reduced numbers. Some of this depletion was due to climatic change, since the Sahara did not dry to its present aridity until well into the Old Kingdom. But some was also due to deliberate destruction; Amenhotep III boasted of killing 102 lions by his own hand; lions were the prey of kings.²⁶ By the middle kingdom, the ranges of antelope species had been limited and their numbers decimated.²⁷

The abundance of birds, particularly waterfowl, remained astonishing in Egypt, a “land of whirring wings”,²⁸ down through the New Kingdom, but it was gradually reduced. Nobles enjoyed bird hunting in marshes, but there were fewer marshes as drainage proceeded. Inscriptions say Ramses III gave over 426,000 waterfowl to temples, including 9350 per year at the Temple of Amun at Thebes alone. Some of these became part of temple flocks, while others were offerings; sacrifice in ancient Egypt did not consist of the ritual killing of animals and birds, but the presentation to the gods of food dishes already prepared. These were consumed by priests after the ceremony. Bird life, diminished but not destroyed by the ancients, is today at a low ebb. The ibis is scarcely seen, and of 14 species of duck in ancient Egyptian art, only one now breeds there.²⁹ A similar fate awaited the fish. Some were protected; it was forbidden even for Pharaoh to fish in sacred temple lakes. A stela from Abydos reports the words of

25. Butzer, *Early Hydraulic Civilization in Egypt*, 86–87.

26. Kees, *Ancient Egypt*, 20.

27. Butzer, *Early Hydraulic Civilization in Egypt*, 26–27, is the source for much of this paragraph.

28. Isaiah 18:1.

29. Kees, *Ancient Egypt*, 93–94.

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Ramses IV: "I ate nothing I should not eat, I did not fish in the sacred lake, I did not hunt with the bird-net, I did not shoot a lion at the festival of Bastet."³⁰

Environmentally, Egypt at the end of the ancient period was much changed, but still productive and full of life. The Nile continued to bring annual floods, with sufficient water and sediment in most years to guarantee good crops. Grain, other foodstuffs, and crops such as flax for linen and papyrus for paper, were usually abundant enough to meet Egypt's needs and to be exported as well. This is at least in part due to the attitude of reverence for the land and its denizens which was part of the Egyptian world view. The principles of sacred space guided the division of land and the regulation of irrigation. Egypt was not lacking in environmental problems such as gradual loss of natural vegetation and wildlife, but in every case where the influence of the realization of the sacredness of the Earth and living creatures was felt, it helped to mitigate damage and to preserve life and the environment.

Egypt was in most respects self-sufficient, so that the Egyptians were content with their land. Some modern writers have interpreted this contentment as an attitude that was "insular and self-satisfied."³¹ That this was not the case is clear from the vigorous way in which they pursued the timber trade abroad in order to obtain a necessary resource in which they were not well-supplied at home. Cedar wood from Mount Lebanon was called "a wood which [the God] (Amun-Re) loves,"³² so that journeys undertaken to secure it were believed to be commanded by the god. At home as well, they understood their relationship to the land to be governed by the gods and by sacred principles that derived from Ma'at, the universal order that controlled the pharaoh and even the gods themselves, and harmonized the people with their natural environment.

Today, unfortunately, the natural cycles that assured ancient Egypt's sustainability have been disrupted. That there might come a time when there would be no crocodiles or wild papyrus in their land was unimaginable to the ancient Egyptians. But such a time was to come; indeed, it has now come. The high dam at Aswan has put an end to the annual flood for the conceivable future. The rich mud and organic material once deposited to renew the fields now settles out on the bottom of Lake Nasser, which they will eventually fill. The enrichment they once supplied naturally must now be substituted by chemical fertilizers. The Delta, built up by rich, dark silt, is now being invaded by the sea. Many fish, once supported by nutri-

30. Ibid., 95. The lion was sacred to Bastet as cat-goddess.

31. Hoffman, *Egypt Before the Pharaohs*, 24.

32. Wilson, 183, quoted from G. A. and M. B. Reisner, *Zeitschrift fuer aegyptische Sprache und Altertumskunde* 69 (Leipzig, 1933), 34-35.

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ents from the river, have disappeared. Without the flushing action of the flood, the snails that carry the debilitating disease schistosomiasis have multiplied. Places held sacred since early antiquity were flooded by the new lake. The most visited structures, such as the great temples of Abu Simbel, were moved to new sites, but the land itself went under. Other areas have been irrigated with water from the dam, but not as successfully as had been hoped. Before the dam was authorized, possible negative effects were not given careful study or serious consideration, since those who could have commissioned such studies were already committed to the project.³³ If the experience of the great society of Egypt, with its incredible sustainability over so many centuries, has lessons to teach to the modern world, they seem as yet not to have been learned.

33. Gilbert F. White, "The Environmental Effects of the High Dam at Aswan," *Environment* 30 7 (September 1988): 4.