

Societal, philosophical and cultural changes as a result of soil erosion, soil collapse etc (Dust bowl ; Nazca, Africa, Central Asia , USA, etc)

(backgrounder)

Why societies collapse

Throughout human history societies have prospered and collapsed leaving behind tantalizing glimpses of their magnificence in crumbling temples, ruins and statues. Why did these ancient civilisations fall apart? Why did some collapse and not others? And what lessons do they have for our civilisation? Among the list of reasons on the first place is the Environmental Damage. Environmental damage involves inadvertent damage to the environment through means such as deforestation, soil erosion, salinisation, over-hunting etc,.

The Anasazi

The Anasazi were ingenious at managing to survive in that environment, with low fluctuating, unpredictable rainfall, and with nutrient-poor soils. The population built up. They fed themselves with agriculture, in some cases irrigation agriculture, channelled very carefully to flood out over the fields. They cut down trees for construction and firewood. In each area they would develop environmental problems by cutting down trees and exhausting soil nutrients, but they dealt with those problems by abandoning their sites after a few decades and moving on to a new site. **(Source 1)**

Erosion of topsoil is already a serious problem in Australia, China and parts of the US - threatens modern civilisation as surely as it menaced societies long since vanished, Iraq, part of the Fertile Crescent in which agriculture started 10,000 years ago, was once the wealthiest, most innovative, most advanced country in the world. But today it was a "basket case", mainly because of "soil problems, salinisation, erosion, coupled with problems of deforestation".

Although more than 99% of the world's food comes from the soil, experts estimate that each year more than 10m hectares (25m acres) of crop land are degraded or lost as rain and wind sweep away topsoil. An area big enough to feed Europe - 300m hectares, about 10 times the size of the UK - has been so severely degraded it cannot produce food, according to UN figures. In many places, soil is being lost far faster than it can be naturally regenerated. Attempts to irrigate arid lands have produced soils so salty that nothing will grow.

Societies in the past had collapsed or disappeared because of soil problems. Easter Island in the Pacific was a famous example, Prof Diamond said. Ninety per cent of the people died because of deforestation, erosion and soil depletion.

"Society ended up in cannibalism, the government was overthrown and people began pulling down each other's statues, so that is pretty serious. In another example, Pitcairn and Henderson island in the south-east Pacific, everybody ended up dead. Another example was Mayan civilisation in the Yucatan peninsula of Mexico and Guatemala. Again, people survived but about 90% of the population was lost," he said.

Other examples, he said, include Iceland, where about 50% of the soil ended up in the sea. Icelandic society survived only through a drastically lower standard of living. **(Source 2)**

Why Did the Mayan Civilization Collapse? A New Study Points to Deforestation and Climate Change. A severe drought, exacerbated by widespread logging, appears to have triggered the mysterious Mayan demise. It's long been one of ancient history's most intriguing mysteries: Why did the Maya, a remarkably sophisticated civilization made up of more than 19 million people, suddenly collapse sometime during the 8th or 9th centuries? Although the Mayan people never entirely disappeared—their descendants still live across Central America—dozens of core urban areas in the lowlands of the Yucatan peninsula, such as **Tikal**, went from bustling cities to abandoned ruins over the course of roughly a hundred years.

Scholars and laypeople have proposed countless theories accounting for the collapse, ranging from the plausible (overhunting, foreign invasion, peasant revolt) to the absurd (alien invasion, supernatural forces). In his 2005 book *Collapse*, though, Jared Diamond put forth a different sort of theory—that a prolonged drought, exacerbated by ill-advised deforestation, forced Mayan populations to abandon their cities. That hypothesis has finally been put to the test with archaeological evidence and environmental data and the results published this week in a pair of studies. **(Source 3)**

Cleared land absorbs less solar radiation, less water evaporates from its surface, making clouds and rainfall more scarce. As a result, the rapid deforestation exacerbated an already severe drought—in the simulation, deforestation reduced precipitation by five to 15 percent and was responsible for 60 percent of the total drying that occurred over the course of a century as the Mayan civilization collapsed. The lack of forest cover also contributed to erosion and soil depletion. The ancient Nazca civilisation of Peru made famous by the giant geoglyphs it left etched in the soil, partly triggered its own downfall by chopping down forests and creating a desert, according to researchers. The society vanished 1,500 years ago after flourishing for centuries, during which it made sophisticated arts and crafts as well as the famous Nazca lines. A study published today suggests its collapse was caused by the clearing of huarango trees, which had maintained an ecological balance in that corner of South America. The Nazca wanted land for corn and other crops and did not realise the forests were crucial to soil fertility and moisture, said the Cambridge University-led report. **(Source 4)**

Soil erosion may get us before climate change does. No society collapses because of a single reason, but declining soil health is always prominent among the usual suspects — no food, no civilization. The civilization of Egypt was the oddball. It thrived longest because of the unique characteristics of the Nile Valley. Then, in the twentieth century, the Egyptian government strangled the golden goose by building dams, which ended the annual applications of fertile silt, led to soil destruction, and shifted the system into self-destruct mode.

Over the centuries, the region of Mesopotamia was conquered and lost many, many times. For the most part, replenishing soil fertility with manure and other fertilizers was a fairly recent invention.

The glory that was Rome, the longevity that is China. In the old days, an effective solution to soil depletion was to expand into less spoiled lands, and kill anyone who objected.

Rome, Greece, and other Mediterranean civilizations were all burnouts, trashed by a combination of heavy winter rains, sloping lands, overgrazing, deforestation, soil depletion and malaria. The legendary cedars of Lebanon once covered more than a million acres (404,000 ha). Today, just four tiny groves survive.

"Deforestation and the scavenger goats brought on most of the erosion which turned Lebanon into a well-rained-on desert." Much of once-lush Palestine, "land of milk and honey," has been reduced to a rocky desert.

Adria was an island in the Adriatic Sea, near the mouth of the Po River in Italy. Eroding soils from upstream eventually connected the island to the mainland. Today, Adria is a farm town, 15 miles (24 km) from the sea, and its ancient streets are buried under 15 feet (4.5 m) of eroded soil.

In Syria, the palaces of Antioch were buried under 28 feet (8.5 m) of silt. In North Africa, the ruins of Utica were 30 feet (9 m) below. **(Source 5)**

The Dust Bowl taught us hard lessons about the fragility of our soil, and the need for our care of it. Then, in the early 1950s, the wet cycle ended and a two-year drought replaced it. The storms picked up once more. Bad as the "Filthy Fifties" were, the drought didn't last as long as the "Dirty Thirties." The damage to the land was mitigated by those farmers who continued using conservation techniques. And because nearly four million acres of land had been purchased by the government during the Dust Bowl and permanently restored as national grasslands, the soil didn't blow as much. At least a few lessons had been learned. Right now, our climate is changing and we're experiencing the worst drought in more than 50 years **(Source 6)**

Three decades after the 1930 Dustbowl, history repeated itself in the Soviet Union. In an all-out effort to expand grain production in the late 1950s, the Soviets plowed an area of grassland roughly equal to the wheat area of Australia and Canada

combined. The result, as Soviet agronomists had predicted, was an ecological disaster—another Dust Bowl.

Kazakhstan, which was at the center of this Soviet Virgin Lands Project, saw its grainland area peak at just over 25 million hectares in the mid-1980s. (One hectare equals 2.47 acres.) It then shrank to less than 11 million hectares in 1999. It is now slowly expanding, and grainland area is back up to 17 million hectares. Even on the remaining land, however, the average wheat yield is scarcely 1 ton per hectare, a far cry from the 7 tons per hectare that farmers get in France, Western Europe's leading wheat producer.

Today, two giant dust bowls are forming. One is in the Asian heartland in northern and western China, western Mongolia, and central Asia. The other is in central Africa in the Sahel—the savannah-like ecosystem that stretches across Africa, separating the Sahara Desert from the tropical rainforests to the south. Both are massive in scale, dwarfing anything the world has seen before. They are caused, in varying degrees, by overgrazing, overplowing, and deforestation.

China may face the biggest challenge of all. After the economic reforms in 1978 that shifted the responsibility for farming from large state-organized production teams to individual farm families, China's cattle, sheep, and goat populations spiraled upward. Wang Tao, one of the world's leading desert scholars, reports that from 1950 to 1975 an average of 600 square miles of land turned to desert each year. Between 1975 and 1987, this climbed to 810 square miles a year. From then until the century's end, it jumped to 1,390 square miles of land going to desert annually.

While China is battling its expanding deserts, India, with scarcely 2 percent of the world's land area, is struggling to support 17 percent of the world's people and 18 percent of its cattle. According to a team of scientists at the Indian Space Research Organization, 24 percent of India's land area is slowly turning into desert. It thus comes as no surprise that many of India's cattle are emaciated and over 40 percent of its children are chronically hungry and underweight.

Africa, too, is suffering heavily from unsustainable demands on its croplands and grasslands. Rattan Lal made the first estimate of continental yield losses due to soil erosion. He concluded that soil erosion and other forms of land degradation have cost Africa 8 million tons of grain per year, or roughly 8 percent of its annual harvest. Lal expects the loss to climb to 16 million tons by 2020 if soil erosion continues unabated.

On the northern fringe of the Sahara, countries such as Algeria and Morocco are attempting to halt the desertification that is threatening their fertile croplands. Algerian president Abdelaziz Bouteflika says that Algeria is losing 100,000 acres of its most fertile lands to desertification each year. For a country that has only 7 million acres of grainland, this is not a trivial loss. Among other measures, Algeria is planting its southernmost cropland in perennials, such as fruit orchards, olive orchards, and vineyards—crops that can help keep the soil in place.

Andrew Goudie, professor of geography at Oxford University, reports that the incidence of Saharan dust storms—once rare—has increased 10-fold during the last half-century. Among the African countries most affected by soil loss from wind erosion are Niger, Chad, Mauritania, northern Nigeria, and Burkina Faso. In Mauritania, in Africa's far west, the number of dust storms jumped from 2 a year in the early 1960s to 80 a year recently.

The Bodélé Depression in Chad is the source of an estimated 1.3 billion tons of wind-borne soil a year, up 10-fold since measurements began in 1947. The nearly 3 billion tons of fine soil particles that leave Africa each year in dust storms are slowly draining the continent of its fertility and biological productivity. In addition, dust storms leaving Africa travel westward across the Atlantic, depositing so much dust in the Caribbean that they cloud the water and damage coral reefs.

In East Africa, Kenya is being squeezed by spreading deserts. Desertification affects up to a fourth of the country's 39 million people. As elsewhere, the combination of overgrazing, overcutting, and overplowing is eroding soils, costing the country valuable productive land.

In Afghanistan, a U.N. Environment Programme (UNEP) team reports that in the Sistan region "up to 100 villages have been submerged by windblown dust and sand." The Registan Desert is migrating westward, encroaching on agricultural areas. In the country's northwest, sand dunes are moving onto agricultural land in the upper Amu Darya basin, their path cleared by the loss of stabilizing vegetation due to firewood gathering and overgrazing. The UNEP team observed sand dunes as high as a five-story building blocking roads, forcing residents to establish new routes.

An Afghan Ministry of Agriculture and Food report reads like an epitaph on a gravestone: "Soil fertility is declining,...water tables have dramatically fallen, devegetation is extensive and soil erosion by water and wind is widespread." After nearly three decades of armed conflict and the related deprivation and devastation, Afghanistan's forests are nearly gone. Seven southern provinces are losing cropland to encroaching sand dunes. And like many failing states, even if Afghanistan had appropriate environmental policies, it lacks the law enforcement authority to implement them.

Neighboring Iran illustrates the pressures facing the Middle East. With 8 million cattle and 79 million sheep and goats—the source of wool for its fabled Persian carpet-making industry—Iran's rangelands are deteriorating from overstocking. In the southeastern province of Sistan-Balochistan, sand storms have buried 124 villages, forcing their abandonment. Drifting sands have covered grazing areas, starving livestock and depriving villagers of their livelihood.

In Iraq, suffering from nearly a decade of war and recent drought, a new dust bowl appears to be forming. Chronically plagued by overgrazing and overplowing, Iraq is now losing irrigation water to its upstream riparian neighbors—Turkey, Syria, and

Iran. The reduced river flow—combined with the drying up of marshlands, the deterioration of irrigation infrastructure, and the shrinking irrigated area—is drying out Iraq. The Fertile Crescent, the cradle of civilization, may be turning into a dust bowl.

As countries lose their topsoil, they eventually lose the capacity to feed themselves. Among those facing this problem are Lesotho, Haiti, Mongolia, and North Korea.

Lesotho, one of Africa's smallest countries, with only 2 million people, is paying a heavy price for its soil losses. A U.N. team visited in 2002 to assess its food prospect. Their finding was straightforward: "Agriculture in Lesotho faces a catastrophic future; crop production is declining and could cease altogether over large tracts of country if steps are not taken to reverse soil erosion, degradation, and the decline in soil fertility."

Michael Grunwald reported in the *Washington Post* that nearly half of the children under five in Lesotho are stunted physically. "Many," he wrote, "are too weak to walk to school." During the last 10 years, Lesotho's grain harvest dropped by half as its soil fertility fell. Its collapsing agriculture has left the country heavily dependent on food imports.

In the western hemisphere, Haiti—one of the early failing states—was largely self-sufficient in grain 40 years ago. Since then it has lost nearly all its forests and much of its topsoil, forcing it to import over half of its grain. Lesotho and Haiti are both dependent on U.N. World Food Programme lifelines.

A similar situation exists in Mongolia, where over the last 20 years nearly three fourths of the wheatland has been abandoned and wheat yields have started to fall, shrinking the harvest by four fifths. Mongolia now imports nearly 70 percent of its wheat.

North Korea, largely deforested and suffering from flood-induced soil erosion and land degradation, has watched its yearly grain harvest fall from a peak of 5 million tons during the 1980s to scarcely 3.5 million tons during the first decade of this century.

Soil erosion is taking a human toll. Whether the degraded land is in Haiti, Lesotho, Mongolia, North Korea, or any of the many other countries losing their soil, the health of the people cannot be separated from the health of the land itself. **(Source 7)**

We are facing issues of near-overwhelming complexity and unprecedented urgency. Our challenge is to think globally and develop policies to counteract environmental decline and economic collapse. The question is: Can we change direction before we go over the edge?

SOURCES:

1. Why societies collapse

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FYI /The heart of the Anasazi region lay across the southern Colorado Plateau and the upper Rio Grande drainage. It spanned northeastern Arizona, northwestern New Mexico, southeastern Utah and southwestern Colorado—a land of forested mountain ranges, stream-dissected mesas, arid grasslands and occasional river bottoms.

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Prepared by UNCCD library

Katya Arapnakova

16 January 2015