

The Ecological Lessons of the Past: An Anthropology of Environmental Decline

**By
Timothy C. Weiskel**

All civilisations depend ultimately on the ecological viability of their agricultural base, as the environmental archaeology of ancient civilisations makes clear. Expansionist Western industrial culture, dependent on resource-depleting petroleum-based agriculture, is only different in terms of its global scale. If the lessons of the past are not heeded its collapse will also be global.

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The great ziggurat of Ur, built approximately 2100B.C. The collapse of ancient civilisations is often attributed to political and economic rivalry but modern archaeological research indicates that degradation of the ecological resource base was usually the underlying cause.

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All civilisations depend ultimately on the ecological viability of their agricultural base, as the environmental archaeology of ancient civilisations makes clear. Expansionist Western industrial culture, dependent on resource-depleting petroleum-based agriculture, is only different in terms of its global scale. If the lessons of the past are not heeded its collapse will also be global.

It is often stated that our present ecological crises are totally unprecedented. We are told that 1988 saw "the hottest summer on record" in North America, that Boston harbour has never in its history been so polluted, and that the European seal virus epidemic is on a scale never before witnessed by man. By stressing this 'never before' aspect of events, it is sometimes argued that the experience of the past is largely irrelevant for policy planners. Since circumstances are so new, so the argument goes, past experience leaves us with little or no instruction as to how to formulate a practical public policy for the environment.

This is not altogether true. While particular types of industrial pollution may be new and the scale of ecological devastation may be greater now than previously, the modern world is *not* confronting com-

pletely unprecedented circumstances — numerous civilizations before our own have confronted environmental degradation and have paid the price. If we continue to tie our society's infrastructure and agricultural production to a declining resource base — as ancient civilizations did with such depressing regularity — we too will suffer the fate of unavoidable collapse.

The Ecological Decline of Ancient Civilizations

Many ecological catastrophes which have long been understood as 'acts of God' or 'natural disasters' were in fact largely generated or substantially aggravated by collective and cumulative human behaviour.¹ The repeated pattern of the rise and fall of ancient civilizations in the Mediterranean region is especially revealing in this respect. Recent archaeological research indicates that there was a substantial ecological component to the

emergence and collapse of agricultural complexes in ancient Mesopotamia, Phoenicia, Palestine, Egypt, Greece and Rome.²

These civilizations had to solve the basic problem of producing food surpluses and collecting raw materials from rural areas to sustain large urban populations engaged in commerce, ritual, government and the arts. Over time the strategies that each society pursued to produce food and procure resources left their characteristic mark on the environment. Some of these strategies proved not to be sustainable and overtaxed the regional natural resource base resulting in the depletion of water, soil, or forest reserves. The general pattern was one of gradual emergence, brief flowering, and rapid collapse of civilizations, often taking the form in the final stages of devastating military struggles for the control of arable land or essential resources.

Techniques of agricultural intensification, — terracing, crop selection, animal

Dr. Timothy Weiskel is an anthropologist and historian who works on problems of tropical deforestation in West Africa. He is currently a Henry Luce Fellow at Harvard University.

husbandry, irrigation, and the like — were devised to meet repeated crises of production. Despite short-term improvements in output, however, the long-term consequences of these technologies were not foreseeable by early agricultural innovators. In subsequent decades or centuries, problems of over-grazing, water-shed deforestation, soil erosion, siltation, water-logging, soil salinization and crop blight often left whole regions permanently destroyed for agricultural use.

Contemporary documents frequently explain these phenomena in terms of military, political or religious rivalry and conflict, perhaps most obviously because the élites that wrote such literature were part of military, political or religious institutions. These explanations inevitably oversimplify and distort a more fundamental understanding of the dynamic of agricultural civilizations.

Current archaeological research based upon scientific analysis of soil profiles, vegetation, and landscape evolution indicates that in the rise and fall of ancient civilizations there was at the base of nearly all sustained conflict a vital ecological component. Patterns of rivalry in the Mediterranean region could express either a momentary ecological crisis or a long-term depletion of some fundamental element of ecological capital. The ecological dislocations were frequently most visible in the 'peripheral' areas of the great Mediterranean empires, for it was here that the imperial powers established systems of commercial agriculture and proceeded to exact levels of agricultural production that exceeded the ecological capacity of the land.³

The Ecology of European Expansion

The European expansionism of the last five hundred years has overshadowed — indeed, nearly totally eclipsed — the lessons that we should have learned from the repeated decline and collapse of ancient agricultural civilizations. This has led to a potentially fatal cultural blind-spot as to the vulnerability of our current industrial system of agriculture. Because of its experiences between roughly 1450 and 1950 — a period marked by seemingly unlimited expansion — the Western industrial world now finds itself conceptually ill-equipped to understand, and politically impotent to address, the problems of ecological adjustment that currently face all societies in our finite world.

"The dynamic of industrial growth served to sustain the mythology of 'unlimited frontiers' and further transformed these formative frontier myths into a belief in perpetual economic growth. Having expanded upon the things of nature, the West came to believe that expansion was in the nature of things."

Colonial discovery and settlement was to transform European agricultural techniques substantially in the New World. In the circumstances of comparative abundance, conservation of resources no longer seemed necessary. Whereas intensive techniques of resource husbandry had come to characterize the confined land-base of medieval European agriculture, the New World afforded rich new possibilities for agricultural expansion. In effect, since the discovery of the New World, predatory expansive agriculture and parasitic resource use has come to characterize European civilization, leading some emergent cultures to believe in a mythology of expanding 'frontiers'.

It is important to realize, however, that increases in agricultural output over most of this period were accounted for not so much by improvements in basic technology, as they were by the overall expansion of the land surface under cultivation. While total production rose dramatically, productivity per acre and productivity per unit of energy input often declined. Nevertheless, profits from total agricultural surpluses helped to finance the emergence of urban-based industrial systems. The dynamic of industrial growth served, in turn, to sustain the mythology of 'unlimited frontiers' and further transformed these formative frontier myths into a belief in perpetual economic growth. Having expanded upon the things of nature, the West came to believe that expansion was in the nature of things. Perpetual growth was considered both natural and good. The European experience of overseas expansion and the ensuing pattern of industrialization has engendered deep-seated habits of thought and images of cultural self-perception.⁴ These images and mental metaphors leave the industrial world poorly equipped to construct a sustainable system

of production. In effect, we are trying to sustain a 'frontier culture' in a post-frontier world.

Development and Ecological Degradation

In the present, just as in ancient times and in the age of colonial expansion, it is in the 'remote environments', distant from the centres of power, that the first indicators of environmental catastrophe become apparent. These regions are characterized by weak economies and highly vulnerable ecosystems, in our time just as they were in the past. The environmental condition of these regions constitutes an early warning mechanism for the ecological stability of the global ecosystem. If we begin to monitor this early warning system, we will recognize that the signs are not encouraging. Edward Goldsmith has summed up the overall situation:

"the last thirty years have been the most disastrous in the history of most, if not all, Third World countries. There has been massive deforestation, soil erosion and desertification. The incidence of floods and droughts has increased dramatically as has their destructiveness, population growth has surged, as has urbanisation, in particular the development of vast shanty-towns, in which human life has attained a degree of squalor probably unprecedented outside Hitler's concentration camps. With such developments, have come increased malnutrition and hunger; so much so, that today we are witnessing for the first time in human history, famine on a continental scale, with two-thirds of African countries to some degree affected."⁵

Several well-documented environmental and economic trends are of particular importance.⁶ These include deforestation, the expansion of petro-chemical agriculture, the shift in weather patterns and perhaps climate in the semi-arid areas, continued population growth, and the penetration of local food markets with Western food surpluses through dumping or foreign aid. Deforestation is now becoming measurable from satellite in space. The scope of the transformation is massive (see *The Ecologist*, Vol. 17, No. 4/5). Yet despite the volumes of scientific studies that warn against the dangers, the pattern

of deforestation has not been noticeably reversed by acts of policy in recent years. Third World countries involved in the process of forest loss are by now genuinely concerned about its impact, but they are frequently impotent to do anything more than monitor what has occurred and is occurring.

Is Development the Problem?

The issue of tropical deforestation may indicate whether institutions can adapt quickly enough to changing circumstance in the Third World. The World Bank intends to raise its funding for studies to preserve tropical forests from \$138 million to \$350 million by 1990. Moreover, it recognizes the need to fund projects that promote conservation, but it may well be that true conservation would require flat opposition to the 'development' programmes that have been launched and are likely to continue in the Third World. In any direct confrontation between the World Bank and the entrenched interests advocating conventional forms of trade, aid and development, it is not clear that the newly discovered environmental sensitivities of World Bank officials would prevail. Indeed, there are mounting signs that the policies of development that have caused the most rapid and irreversible forms of environmental degradation are

likely to endure. In fact, these policies are likely to be applied in an accelerated manner in the coming years, despite the best intentions of the World Bank's officials. For these reasons environmentalists are now beginning to ask: Is there not a fundamental contradiction between environmental conservation and 'development' as it has traditionally been conceived? Or, as Goldsmith has put it: "Is development the solution or is it the problem?"

The Underdevelopment Spiral

The destructive processes are so hard to stop because they are locked in what might be called: 'the underdevelopment spiral' (see Box). This is a syndrome of closely related social, economic and ecological phenomena which combine to cause a self-perpetuating cycle of environmental decline. As these phenomena interact they reinforce one another, accelerating a spiral of decline and making it increasingly difficult for any one party to intervene to arrest the process.

Additional elements may be present, and when they are, they tend to accelerate the pace of the spiralling interaction of the other elements. These added elements come into play when peasants rightly seek to arrest the underdevelopment spiral, and take matters into their own hands. Typically this involves attempts to:

- 1) seek to resist direct government exactions;
- 2) seek better trade terms for items they produce;
- 3) seek control over arable land in order to pursue autonomous farming.

Post-War Africa: A Case-Study in Ecological Devastation

Throughout Africa and much of the rest of the Third World during the colonial period, rural regions became accustomed to imported manufactured goods that had become essential for their households or their agricultural pursuits.⁸ Axes, machetes, hoes, pots, cotton cloth, and a whole range of petty manufactured goods, from matches to kerosene lanterns, penetrated into rural regions during the early years of colonial rule. At the same time, these regions had become accustomed to producing agricultural commodities like peanuts, coffee, cocoa and cotton to earn the money to purchase these products.

During the Second World War, however, the supply of European manufactured imports was cut off by scarce or non-existent shipping. This raised the price of imports considerably, and for some time many goods simply were not available at all. At the same time agricultural commodities produced for sale exceeded shipping capacity, and thus their price dropped in local markets. These combined phenomena created considerable pressure for economic and political change in the immediate post-war period. With the post-war increase in shipping capacity, there ensued a boom period of economic expansion. The colonial administrations could content themselves with building roads and public works while maintaining public order, and needed to do little positive planning to encourage economic growth. The cash-crop boom, although sustained for several years, remained nevertheless an inherently unsustainable phenomena, ironically because of its very success. So many peasants in the Ivory Coast, Ghana, Nigeria and the Cameroons turned to cocoa and coffee production that the mounting supply exceeded world demand, and the prices for these commodities began to fall in real terms during the 1950s. As Brazil and East African countries like Kenya entered the ranks of coffee and cocoa producers the purchase prices of these commodities declined even further.

Elements of the 'Underdevelopment Spiral'

- the expansion of cash-crop agriculture in the Third World
- the secular decline of real prices of Third World commodities in world trade
- the growth of cash exchange, collapse of local artisans and expanded merchandising of European manufactured goods.
- displacement of indigenous food crops by exogenous, hybrid, or petro-intensive cultivars
- the decline of small-holding agriculture and increase of 'landless peasants'
- the movement of Third World populations from rural to urban areas
- demographic expansion in Third World populations
- the industrialization of agriculture and overproduction in industrialized nations
- changes in local weather and micro-climate patterns
- local and regional food shortages and the growth of international food trade and aid
- destruction of agricultural or pastoral lands through overgrazing, loss of topsoil, salinization, and flooding, and waterlogging
- the fitful but secular increase in the price of petroleum and petroleum products
- the long-term increase in relative prices of manufactured goods
- the growth of Third World indebtedness
- the expansion of bureaucracies, the collapse of public services and the growth of corruption

Added Elements in Exceptional Cases

- the escalation of conflict in rural areas, diverting efforts from agricultural production
- the growth of an international arms trade, costing further drains on foreign exchange
- the outright destruction of crops, villages, and ground cover through ground combat, bombing, chemical defoliation or purposeful torching of biota to destroy an opponent's means of securing shelter, food or a livelihood.

Development, War and Ecology

In taking into account the environmental costs of various development strategies, scholars have tended to neglect the ecological impact of open conflict. Not all concerns are similarly myopic. Businesses involved in Third World agriculture projects regularly include considerations of 'security' as part of the operating costs they need to incur to protect their investments. If peasant resistance or sabotage to these projects becomes too expensive, the enterprise nearly always calls upon the state military apparatus to undertake the effort and expense of suppressing peasant opposition. The costs of repressing peasant revolts are readily calculable in terms of munitions and manpower, but the

costs to the peasants' environment or to the world's ecosystem are usually overlooked. If we are to develop a reasonable means of assessing the environmental costs of development strategies, we should try to include this 'externality' in our calculations. The policy implications of undertaking these economic calculations would be significant, for whatever the economic virtues of pursuing conventional development strategies in regions like Central America, the ecological destruction involved in crushing peasant rebellions or launching counter insurgencies is massive and needs to be counted as a real cost in any cost-benefit analysis of proposed development strategies.

Urban Drift

Oversupply was at the root of the declining purchase price for these commodities and although the 'rational' economic response would have been for peasants to refrain from producing further cocoa or coffee or the like until the supply declined and the prices came up to a reasonable level, this was never really an option for most peasants as they had already made the infrastructural investment in the cocoa and coffee plantations. In the face of a depressed price, a peasant with fixed or escalating costs or other demands upon his income had basically two options open to him. Either to expand the scope and scale of his production to maintain or enlarge his income to meet his growing needs, or to leave cash-crop farming and go to the city in a hopeful search for non-agricultural work.

The option of engaging once again in food-stuff agriculture was largely precluded by the impact of the agricultural overproduction in the Western countries, particularly the United States. Through both aid and trade channels, the United States sought actively to export its agricultural surpluses. Since most capital cities of Third World countries were constructed as ports or trans-shipment centres during the colonial period, it became very easy — and even appeared wise — to purchase American grain surpluses to feed growing urban populations in the Third World. When disasters like floods, earthquakes or typhoons damaged the remaining local agricultural systems, U.S. aid agencies provided relief supplies of food at cost.⁹

The self-perpetuating nature of the problem started to become apparent by the early 1960s. Peasants, trying to stay afloat economically, began to devote more and more of their arable land to cash-cropping which, in turn, provided less and less, in relative terms, the more they produced. From the 1960s onward, with relatively

less land and labour devoted to foodstuff agriculture in Africa, not only its urban areas, but also major rural regions became dependent on substantial imports of foreign surpluses. According to Jennifer Whitaker, "food imports rose from 4 million to 24 million tons during the 1970s. By 1985, the continent was importing two-fifths of its food supply and about a third of its people depended wholly or partly on imported food."¹⁰ Meanwhile, those peasants or their children who had left the village began to swell the ranks of the urban unemployed or underemployed.¹¹

The Debt Burden

Hungry urban populations prove to be politically volatile, and so urban-based political elites tended to continue to buy political tranquillity in the short-term by purchasing food from the cheapest source — the surpluses of Western industrial countries. In order to gain the foreign exchange to purchase this foreign food, the state exported its cash-cropping peasants to produce ever greater quantities of export commodities. While exports expanded, commodity prices slumped with oversupply, and foreign exchange became scarce, despite expanded output, the states concerned therefore either had to seek food aid or incur foreign debt to purchase the food upon which they had come to depend. Indebtedness proved to be only a short-term solution, and many African countries soon found themselves devoting much of their foreign exchange earnings to servicing these debts. The overall debt burden for the continent rose from \$14 billion in 1973 to an estimated \$125 billion in 1987.¹²

Faced with the departure of the young, able-bodied members of their households to the rapidly growing cities, families often resorted to having several children in the hope that some would remain to under-

take the ever more demanding cash-crop work. Collectively this translated itself into a rapid spurt in population growth, particularly as this period also witnessed the arrival of rudimentary medical facilities and the equipment for clean water supplies in rural areas which contributed to the decline in infant mortality.

During the 1950s and 1960s, the area devoted to agricultural activity greatly expanded while the technologies applied to production changed little. In bush-fallow systems, fallow periods were shortened or eliminated altogether, and on the thin and nutrient poor soils this new pattern of usage rapidly exhausted arable lands. In addition, previously undisturbed forests began to be cleared as governments short of foreign exchange, extended rights to timber concessions for cutting and exporting tropical hardwoods and as peasants, often displaced from their own lands began to encroach upon the remaining areas of uncut forest.

Changing Weather Patterns

The removal of large portions of tropical forest cover and conversion of whole regions to cropland and grassland had the effect of changing the nature of the local hydrological regime. Water which previously was held in the canopy or locked in the root systems of vegetation in the forest, ran off at accelerated rates with little or no ground cover left to hold it. Dramatic flooding became a feature of the rainy season in many parts of Africa, and considerable topsoil was lost to sheet and rill erosion. Some regions of African rural areas have been so overgrazed, over-cropped and eroded that it is doubtful that agriculture can continue on these soils for much longer without considerable imported subsidies to rebuild soil structure and fertility. In areas where soil depletion and the change of ground cover has been

in long-term decline, local weather patterns may be disrupted.¹³

Populations that have become dependent upon purchasing food in exchange for cash can find themselves short of food for reasons well beyond their control. Fluctuations in the price of oil affect both international shipping and internal transport costs of food as well as the total foreign exchange profile of individual countries. Thus, the fitful increases in oil prices have been translated in local terms in Africa into an increase in the price of imported food and occasionally a pattern of seasonal or chronic shortage. This is compounded as the world market in grains fluctuates with the purchasing habits of major industrial countries. When Soviet, Chinese or Indian harvests are poor and Western grain surpluses are bought up on the international market, prices rise beyond African countries' purchasing power. As we have seen in recent years, food shortages can become acute and famine widespread in these circumstances.

Green Revolution

'Modernized' agriculture based on 'green revolution' technology is offered by Western agricultural experts in the wake of these famines to meet the urgent and evident need for expanded food production. Generally these technological packages are based upon 'high-yield-varieties' (HYVs) of crops that have been selected to respond well to a combination of fertilizers and pesticides designed for their needs. In this regard, the HYVs are more appropriately labelled 'high response varieties' (HRVs). They respond well to the petro-chemical subsidies which they were engineered to use, but on their own their performance is often not even equal that of traditional varieties.¹⁴ When one considers the probable rise in cost of the petro-chemical additives needed to produce a reasonable crop, along with the infrastructural investments required for irrigation systems, storage systems and mechanized equipment associated with the 'modernized' agriculture, it is clear that the choice of these technologies is not a wise one. Similar investments in roads, marketing facilities, or land directed towards traditional crops may well prove over the long run to be better spent than the money devoted to the alluring promise of 'miracle' crops. In the face of declining petro-chemical supplies, it is questionable whether development schemes based upon increas-

ingly energy-intensive technologies can be sustained much longer.¹⁵

Problems of Perception

The problem of perception complicates the issue of achieving an adjustment between expanding demand and declining resources. In general, it is recognized that there are upper limits involved in the amount of information that an individual or a society can successfully absorb and act upon. After a certain threshold, as the environment becomes more complex, a society's ability to recognize or use information about its circumstance effectively declines. It is as though things become too complicated to know what is happening. This may well reflect our current position as regards the Third World. Ecological problems are global in scope, and we will need to develop a matching degree of perception. Tropical deforestation affects both local weather and world-wide climate patterns. Food from Iowa feeds both Boston and Burundi. Currently, it is in the Third World that global ecological crises become most pronounced, but it would be a major mistake of perception for Western

leaders to assume that the problems in the Third World are merely the Third World's problem.

Cooperation For Stabilization

Broadly speaking, there seem to be two possible patterns that emerge. First, it is possible that a stable adjustment can be achieved. This would be possible if the entire population concerned perceives the problem of adjustment as a real one, and simultaneously cooperates to achieve stabilization. Such a resolution implies that the society can exercise a remarkable degree of self-imposed restraint.

Ecological Overshoot

An alternative resolution of current and future trends involves the phenomena of ecological 'overshoot' and subsequent collapse. This would most likely occur either if the society did not perceive the problem at hand or if it did not succeed in achieving cooperation in a transition to a stable adjustment. The time lag involved between the overshoot and subsequent

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collapse is not at all clear. Nor is it clear just where we are located at the current moment in either of these two possible scenarios. Some scientists feel that we may already have exceeded the earth's capacity to sustain present populations on a permanent basis.¹⁶ We are perhaps beginning to witness the phenomena of collapse in indicative catastrophes ranging from repeated Bangladesh floods to recurrent African famine.

Whatever the time-scale, there are very definite signs of difficulty emerging. Briefly put, Western agriculture, and American agriculture in particular, has achieved enormous levels of output through a pattern of substituting human agricultural labour with fossil fuel-driven machines. The result is that while there has been a substantial decrease in the human labour used on American farms during this century, there has been an overall increase in the energy subsidy required to obtain one calorie of consumable food in the American food system.¹⁷

Moreover, the vast majority of the energy subsidy provided to the food system in the United States is not reflected in the amount of food energy consumed. The long range trend from the 1920s until the present suggests that increases in energy inputs into the system have been approaching a point of diminishing returns in terms of overall food production. If this trend persists, future increases in food output will require even higher rates of energy inputs. This is a disturbing circumstance, particularly in view of the decline in food self-sufficiency of large numbers of Third World countries.

Dead End

We cannot base our agriculture on fossil fuels and expect that agriculture to outlast the supply of this resource. Unless steps are taken in the near future to change to bio-sustainable forms of agricultural technology we can expect wide-scale disasters including famine, disease and open armed conflict on an ever-larger scale, as oil supplies decline and competition to control its use intensifies. We live in a highly industrialized, urban culture, but it is important to remember that there is no such thing as a 'post-agricultural' society. Policy decisions concerning agriculture, our environment and the future provision of public works (water projects, transport systems, land-use patterns, etc.) need to reflect this fundamental truth. Cultures that failed to understand this in the

past have proved to be short-lived. We will be no exception to this pattern.

With our current patterns of resource-depleting, petroleum-based agriculture, it is as if we are travelling down a dimly lit, one-way street at 90 miles per hour, and we are just beginning to realize that the sign post we passed a while back said "Dead End". Action to avert future catastrophe in this circumstance must begin now on the part of all responsible political leadership. The remaining transition period cannot be very long. This is not a party-political issue. Nor is it simply a problem for the welfare of particular nation-states. It concerns our survival as a species.

This article is an edited version of testimony submitted to a hearing on the Environmental Protection Act of 1988 held by the United States Senate committee on Environment and Public Works.

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