

Robert Wellman Campbell  
University of Kansas, Department of History  
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## **Watering the Killing Fields: An Environmental Assessment of the Khmer Rouge**

First a foreword, or even a "forewarned:" I do work on the U.S. landscape, and so this has been just a side-project for me. When I was working at the U.S. Geological Survey, at their Landsat image archive, these images were dropped on my desk, as it were, and I was asked to write a short article explaining them.

Here **[graphic: Phnom Penh 1973]** is Cambodia's capital city Phnom Penh in 1973, before the Khmer Rouge came to power. The capital is just west of what they call the "four faces," where four rivers meet. In these images, red signifies photosynthesizing plants. Water shows up as dark blue if it's clear water, or much brighter blue if it's silty or shallow. Notice the area within the curve of the Mekong, how few linear features such as roads and canals it has. And here **[graphic: Phnom Penh 1986]** is the same area in 1986, after they were gone.

You can see just how transformed that area is-- irrigation canals are spaced every kilometer across much of that area. And this is what is said to have happened across Cambodia generally: a rapid transformation to a rationalized grid of irrigated rice. Because of the availability of cloud-free scenes, these images are spaced about thirteen years apart, but this transformation almost certainly happened much more abruptly, under the Khmer Rouge regime of 1975-1979. So I wrote my article, but I asked, what about the rest of the country? And what about more recently-- do these canals still exist? Thanks to the United Nations Environmental Programme (UNEP), and the Tropical Rainforest Information Center (TRFIC), as well as USGS, I finally got about three dozen images, covering Cambodia for three dates: before the Khmer Rouge, after the Khmer Rouge, and recent. Here for example is one graphic of the whole country, in 1986 **[graphic]**.

I am surprised how inaccessible and unused these data are. Satellite images are no magic bullet, but information on the Khmer Rouge period is scarce in general, so I hope to put these out-- perhaps on UNEP's servers-- and hopefully spur more research among the real experts, because amazingly, as far as I can tell, not reading Khmer or French, no one has really ever told the environmental story of this regime. People misperceive their enormous crimes as a political liquidation, whereas I see it primarily as an environmental story. The humanitarian concern is the appropriate one here, obviously, but alongside the infamous killing fields, and the prisons where people were assassinated, we should be looking at the rice paddies, where overwhelmingly more deaths were caused, from the overwork there, and from the failure of those fields to feed the nation.

### **I. The humanitarian disaster**

Some people take an impression that to discuss any possible successes of this regime, such as irrigation works which may prove useful, is to weigh them against this human loss, or

even apologize for these crimes. I don't think I have to tell you that this is a false impression. Likewise I don't think causes equal excuses for these crimes.

Just to be clear, here is the point of this story: while many communist regimes might be considered "mitigated disasters," the Cambodian communists, or Khmer Rouge, were a humanitarian calamity. The Cambodian Genocide Program at Yale estimates that under them, 1.7 million Cambodians died, just over a fifth of the country's population. This includes not only executions but death through starvation and work programs initiated by the government. In absolute terms, this is a September 11th every day for a year. In relative terms, for the U.S. to suffer a loss in that proportion, we would have to relive that day every day for a quarter century.

David Chandler, one of the leading historians of Cambodia, was one source to whom I looked to place this in some context. But instead Chandler tended to use the Khmer Rouge as the reference point by which to place even ancient civilizations. Probably many of you have scanned images and selected a "black point," the image's darkest area which serves as a practical zero for setting the contrast; the Khmer Rouge tend to stand as this kind of extreme, and I think of this now when I read of "Year Zero," their term for 1975, the beginning of a new era. The secondary literature strains to place this calamity in any other context. Chandler resorts to a metaphor of a natural disaster which just swept down upon them; for most Cambodians, he says, this regime

made as little sense as an earthquake, a prairie fire, or a typhoon, and for most of them, the memories, damage, and effects of the [Khmer Rouge] era were to persist, like the memory of a natural disaster, for the remainder of their lives. (*History of Cambodia*, 3rd ed., p. 173)

## II. The disaster's immediate political context

Well, let me address the immediate political context. It was very involved, so in this time available the simplest way may be to chart the civil war of the first half of the 1970s, which brought the Khmer Rouge to power. **[graphic:]**

"united front" resistance:

ousted Prince Sihanouk

rural Cambodians

communist Vietnam

**Khmer Rouge, under Pol Pot**

Khmer Republic:

Prime Minister Lon Nol

U.S. 1970 invasion, 1973 bombing

**urban Cambodians**

The eccentric, vaguely socialist Prince Sihanouk, who had ruled Cambodia since 1941 and amazingly is still on the political scene, was overthrown in a coup in the spring of 1970. To regain power he immediately allied with the communists in China and Vietnam, and with the tiny communist force in his own country which he had been fighting only months earlier-- the "Khmer Rouge," which essentially means "communist Cambodians." Over five years of ensuing civil war, the Khmer Rouge took over this collection of strange bedfellows, eventually making Sihanouk less than a figurehead, under house arrest. And it was communist Vietnam which eventually overthrew the Khmer Rouge in 1979, replacing them with other puppet communists.

The most durable political division in Cambodia became rural vs. urban. Rural Cambodians revered Prince Sihanouk, and it was they who suffered as the U.S. bombed the countryside and protected Lon Nol's regime holed up in the cities. The Khmer Rouge tapped in to this rural resentment. Within days of capturing the capital city of Phnom Penh the Khmer Rouge virtually emptied it of its 2-3 million people, as they did the smaller cities. They proceeded to blow up banks, outlaw private property and currency and even barter, kill educated people, and close most schools. Besides these forms of urbanity and modernity they also attacked Buddhist monks and temples, Muslim Chams, and ethnic Vietnamese. They discriminated between rural Base People, on whom the new state could be built, and New People, who were suspect. The division was roughly half and half, since many peasants had tainted themselves simply by fleeing to the cities. The Khmer Rouge began to force people into communal labor, and the New People were worked harder, fed less, and punished more, probably as a deliberate liquidation. Instead of recovering from civil war, conditions deteriorated for everyone as the regime consolidated: starvation, overwork, epidemics, political purges, continued warfare. (For example, it has been estimated that 85% of women stopped menstruating in this period.) Agriculture was severely disrupted, and not just in the transition; Cambodia could not feed itself until the late 1980s.

The Khmer Rouge killed not only political enemies but political allies, class enemies, ethnic minorities, apolitical peasants, and even Vietnamese citizens through foolhardy invasions. It attempted a sort of antimodern, anti-urban Great Leap Backward to "Year Zero," wrenching Cambodia back to an agricultural society.

### **III. The disaster's environmental context**

Physically, Cambodia is like a tilted saucer; round, higher at the edges, flat and wet in the middle, and "cracked" north-to-south by the Mekong River. **[graphic: map of Cambodia]** Only five thousand years ago it was a bay of the South China Sea, between two peninsulas which today are Vietnam and Thailand. The Mekong carried Cambodia downstream and dumped it where it lies today. This is why the country's center is so flat; this is why it has almost no petroleum or minerals. The great natural force in this neighborhood is the Mekong River.

Cambodia's great shallow lake, Tonle Sap, is in the country's center, connected to the Mekong by a spur. It is extremely productive of fish, including ocean species still living there, and at its lowest it is only 60 centimeters above sea level, if that can be believed. For about a third of every year the Mekong floods, reversing the flow of Tonle Sap's outlet and ballooning it to about six times its normal area. A Cambodian proverb says, "When the waters flood, the fish eat ants; when the waters recede, the ants eat fish." The flooded lands around the Mekong and the great lake, enriched by annual silt, constitute the main rice-growing areas.

The Khmer Rouge made it their main goal to harvest two or even three crops of rice per year within this central agricultural area, and to expand rice production outward into higher areas. This would require a great deal of new canals, bunds, and reservoirs, but ironically required much tearing down as well. New rectangular paddies required the tearing down of the old, irregular patchwork. The old, seminatural irrigation through *colmatage*, which entailed short canals through the Mekong's natural levees, was encouraged by the French but disliked by the Khmer Rouge, since it limited planting to the one natural season; they ordered many such canals blocked or filled in. On the whole, however, communal work gangs built regular grids of

one-hectare paddies, and long, straight canals to irrigate them, often at one-kilometer intervals regardless of topography. Western authors travelling through or over post-Khmer-Rouge Cambodia reported vast expanses of such landscape. Pol Pot, almost certainly lying, told sympathetic visitors how each region had a large reservoir, each province a medium-sized one, and each district a small one, claiming that 1/3 of all agricultural land had been irrigated.

Landsat images show an impressive amount of new gridwork reported by many observers, though principally around Phnom Penh, particularly east and south of the city. While not sufficient resolution to show the jumbled old bunds transformed to one-hectare plots, they do show many linear features at perfect one-kilometer intervals, which are almost certainly canals and not roads. There are also an impressive number of new canals, reservoirs, and possibly roads around Tonle Sap. What the images do not show is the country as a whole transformed to a mass grid like the Midwestern United States. Western visitors to Cambodia, particularly in the 1980s while most of the country was very dangerous for travel, may have spread a false impression, that the impressive developments near the capital was more widespread than it really was.

The Khmer Rouge have been bitterly ridiculed for their technical incompetence. Part of this was their habitual inflexibility. They thought in terms of one reservoir per district, one canal per kilometer. Even personal work quotas were fixed and rigid, many said; some workers would knock off early while others would stay and work in the dark. Districts likewise had quotas, regardless of their appropriateness according to folk knowledge or technical specialists. Zhou Enlai criticized them personally for their hubris in sticking to a Great Leap Forward model. The few engineers around criticized them for their misplaced pride in their waterworks. Even the peasants ridiculed them; instead of singing "With water we grow rice, with rice we make war," they sang "Before, we cultivated the fields with the heavens and the stars [i.e. followed the seasons] and ate rice. Now, we cultivate the fields with dams and canals, and eat gruel." People laughed at Khmer Rouge reliance on "the strength of our people" while leaving 200 donated Chinese tractors to rust.

This image of incompetence can become a caricature, which some have tried to rectify. Karl Jackson has argued that the Khmer Rouge were not all antimodern or anti-industrial, that the attempt was to leap *forward*, after all, though emulating the past in some respects. For example, he emphasized the cities being gradually repopulated by trustworthy peasants to work in factories. John Dennis has pointed out that Cambodia did have modern rice varieties coming in before the Khmer Rouge, and they brought in the modern, short-stemmed "friendship rice" varieties from China. Charles Twining takes many reports of failure with a grain of salt, considering the disgruntled sources; Vietnamese encouragement of Cambodians to maintain the new waterworks should show some of their value from a skeptical source, he argued. Foreign technicians attempting to assist relief work during in the early 1980s suggested that poorly-designed Khmer Rouge waterworks were not to blame for that period's heavy flooding to the extent that others were suggesting. In fact, as it stands it is hard to judge what went on. With much of the society's competent people killed or hiding, and with so much fear current among survivors, even Pol Pot and Sihanouk had very poor information about real conditions. With the paucity of sources, especially environmental ones, we should remain open-minded to some benefits from an odious regime.

#### **IV. Summary: the broader context?**

How to fit this four-year episode into the broader scheme of things?

One possibility suggested by this panel is to blame it on communism. Some say, straight-faced, that this is a red herring. I would not be so quick to dismiss it as a factor, however simple it seems, but I would not presume to state any grand, comparative conclusion at this point.

Another possibility is to fit this in as an extreme and eccentric example in an attack on the Green Revolution. Some of the elements are indeed here: Imported rice varieties, for example, were a minor part of this program, and sadly many domestic varieties adapted to varied parts of Cambodia were also scrambled together when ordered to warehouses in Phnom Penh. This may be the ugly downside to agricultural intensification.

More broadly, can we see in the Khmer Rouge a freakish variety of the "high modernism" recently described by James Scott? Is this an example of "seeing like a state"? Many of the elements are there: the desire to start from a clean slate, the imposition of grids, the simplified monocular goals, the disregard for local knowledge, and the weakness of civil society to resist. Of course, the Khmer Rouge were not modernist, in the sense that they killed technicians, and they hearkened back to the feudalist old days of the Khmer empires.

I would instead try to place this episode in the context of the Cambodians' own culture. Not that they were vicious-- in fact, they prided themselves on the mildness of their politics. They certainly gained independence without the violence which beset Vietnam. As the "Poland" of Indochina, and as a small nation, they had long sought to play other powers off each other rather than engage in war. The Khmer Rouge were the very reverse of this, and I think that's some kind of context. Before the 1970 coup they were an insignificant faction, exiled out in the forest. One can imagine Pol Pot stewing and dreaming of revenge. Five years later, through their own ruthlessness and the hatred stirred up by American bombs, they ruled the country. Rather than relax, they intensified their hold over their own people, and attempted to extend their aggression to powers far greater than themselves. If the Khmer Rouge could rule over Cambodia, perhaps Cambodia could push around Vietnam, and indeed the Mekong River.

Their model was the ancient Angkor civilization, dating from about the 800s to the 1400s AD and centered north of Tonle Sap. These constitute the glory days for the Khmers and a two-level debate for historians: how did Angkor rulers farm, and how did the Khmer Rouge think they farmed? Neither level has conclusive evidence, but there was definitely centralized irrigation involved. Art historian Philippe Stern, studying Angkor inscriptions, identified irrigation as the first phase in an Angkor ruler establishing his reign. When Indravarman became king in 877 A.D. he said, "In five days I will begin to dig." These very words could as well have come from Pol Pot. Angkor rulers had religious motivations for digging; the canals were dedicated to their subjects but also to the water gods, and reservoirs were built partly to recreate the mythical landscape around Mount Meru in northern India, where lakes surrounded the central mountain. In fact, the last phase cited by Stern was mountain- or pyramid-building, dedicated to the king himself as a memorial and burial vault. It is not hard to see the special significance of digging up or down in a very flat land.

But of course the kings had practical reasons to irrigate. The Mekong flooded rice lands once a year with water and silt, but what if they could be flooded with water more often? Multiple croppings could support a larger number of parasitical bureaucrats and enhance the power of the king. This is just what Indravarman's distant successor Suryavarman was reported to do, achieving all the elements of the "Asiatic" mode of production. One of the best documents

of this came in 1296 from a Chinese envoy, Zhou Daguan, who reported that 3 to 4 crops were being harvested per year. Some believe this was an unsustainable practice, given Cambodia's soil, and they see in the data signs of decline from the 1100s. Cities were being established far from Angkor itself, perhaps among fresher soils, perhaps because poorly maintained canals went stagnant, breeding mosquitoes and their diseases, cutting further the labor available for maintenance. Others believe that Zhou Daguan, Pol Pot, and many historians are all wrong, that multiple-cropping was limited to very small areas of lowland, or was in fact just different varieties of rice at their various stages of growth when Zhou Daguan went out touring. It is possible the canals discovered by archaeologists delivered water to cities, not to rice paddies.

At any rate, the Khmer Rouge *believed* that, just as the Angkor kings, with water they could make rice, and with rice make war. But in fact they saw the whole process as a war. If I tell you they waged a war on nature it is not my metaphor, but their propaganda. In it, agricultural workers were seen as soldiers. The national anthem celebrated martyrdom rather explicitly:

The red, red blood spatters the cities and plains of the Cambodia fatherland  
The sublime blood of the workers and peasants . . .  
The blood spills out into great indignation and a resolute urge to fight . . .  
The blood certainly liberates us from slavery

Combat propaganda went out over the radio, applied to agriculture:

At Chikreng, in Siem Reap province, almost twenty thousand people are united in an offensive struggle to build dikes with a positive and combative attitude . . . Today the dike-building sites are the front lines of the battlefield on which the struggle is being zealously waged, and the peasants of our cooperatives are striving to fight vigorously and without pause, day or night, to achieve the great leap forward . . .

Just as [workers, peasants, and troops] struck down the enemy and his lackeys in the time of the revolutionary war . . . they are now resolved to launch another violent and relentless offensive. . . . all our cooperatives are waging an offensive, struggling on the network of dikes and canals so that there will be many of them in a very short time."

Khmer Rouge songs, some based on folk melodies, emphasized the mastery this small nation could achieve over nature if not its neighbors:

Dear brothers and sisters . . . let us . . . construct new rural areas.  
We raise embankments, and these form a network, like spider-webs, everywhere.  
We dig canals, small and large, long and short, bringing water and loam to pour on to our fields.

We use fertilizer now, and now we raise embankments, high and low. We choose the seed we want. We wipe out peats. We build fences to protect our plots from beasts.

And we are very happy because we are the masters to a great degree. Problems of water no longer worry us. Even with the floods and droughts, we can grow rice.

O solidarity group, working in unison, happy and self-assured! Dry-season rice, wet-season rice, light and heavy varieties of rice: our husbandry is successful everywhere. . . .

Westerners monitoring this rhetoric from over the border via radio and press release, noted all the mastery in Khmer Rouge slogans, with working people now or soon to be

master of the country  
master of the earth and water  
master of the rice paddies and fields, the forests and all plant life  
master of the water problem, the annual floods  
master of nature  
master of the future, of our destiny  
master of the revolution  
master of the factories, of production  
total mastery over water at all times, mastery during the dry season and the rainy season

Cambodian communists attacked not only Vietnam, modernism, internal enemies and external models of development-- they attacked nature. They said so; they chanted and sang of their mastery over nature. Nature, in that neighborhood, is basically the Mekong River, and sadly the Mekong was scarcely more affected by Cambodians' dying than was Vietnam or modernism.