Also by Donald Worster

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RIVERS OF EMPIRE
Water, Aridity, and the Growth of the American West

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ONE

INTRODUCTION

Reflections in a Ditch

The problem of the West is nothing less than the problem of American development.

—Frederick Jackson Turner, "The Problem of the West" (1896)
In his 1862 essay “Walking,” Henry David Thoreau described a daily ritual that was characteristically American in his time. Coming out of his house on Main Street in Concord, Massachusetts, he would pause for a moment to consult his instincts. Which way should he go for his ramble into the countryside? Generally the needle of his inner compass would settle west or southwest, and he would head off in that direction, just as thousands of pioneers were doing, had done, and would go on doing for a long time to come. “The future lies that way to me,” he wrote, “and the earth seems more unexhausted and richer on that side.” Going west, he anticipated finding a wilder America where the trees grew taller, the sun shone brighter, and the field of action was still open to fresh heroic deeds. That way the landscape was not yet owned as private property, and the walker could still enjoy a comparative freedom. As he set off in a long, springing stride, he soon left behind him the settled parts of Concord, the constraining fences, the narrow house lots, the clamoring institutions, the dead hand of tradition, the old closed world of diminished opportunity, left them at least for an hour or two, partaking temporarily of the migratory impulse, the spirit of adventure, that had seized so many of his countrymen. “Eastward I go only by force; but westward I go free.”

Had Thoreau kept on walking toward the west, traveling well beyond the outskirts of Concord clear to the Pacific shore, had he walked on and on through time into the late twentieth century, what would he have discovered? Would he have come upon a West that had delivered on its promise to him and the nation? Would he have found there in fact a greater scope for individuality, for innovation, for the creative mind, than existed in the East? A people who put less emphasis on the accumulation of property, who practiced less stratification in their society? Would he have found a more perfect democracy? A flourishing of personal freedom? A vindication of the idea of progress?

Thoreau died in the year his essay appeared in print and thus he could not have seen, could not even have anticipated, the real West as it has
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evolved. For that matter, many who have lived out their lives in the region during more recent times have not seen it either, or at least have not seen some of its more telling outcomes. Even now, a century and more past Thoreau’s age of romantic optimism, many westerners—not to mention millions living elsewhere—remain confused by idealizing myths and ritualistic incantations of the old slogans. The West is still supposed, in popular thinking, to be a land of untrammeled freedom, and in some of its corners it may be just that. However, that is not all it is, is not even the more important part of what it is. The American West is also more consistently, and more decisively, a land of authority and restraint, of class and exploitation, and ultimately of imperial power. The time has come to brush away the obscuring mythologies and the old lost ideals and to concentrate on that achieved reality. In 1862, Thoreau was writing about a vaguely located, unrealized, unsettled West still to be experienced, to be made. We, on the other hand, have to come to terms with an established West that now has a long history. To understand that history, to probe the meaning of that region, its dynamics, its contradictions, its dreams and realizations, is to understand better some broader American aspirations and, it may be, something of the aspirations and fates of modern people everywhere.

Perhaps the best place to begin that reexamination of the West is by sauntering along one of its irrigation ditches. In it are important, neglected clues to the meaning of freedom and autonomy, of democratic self-determination and openness, in the historical as opposed to the mythical West. One might choose, for example, the Friant-Kern Canal coming down from the Sierra foothills to the desert lands around Bakersfield in the Great Central Valley of California. It is a vastly different stream of water from the Sudbury and Concord rivers on which Thoreau paddled his boat: those were, in Thoreau’s time as they still are today, grass-and-tree-edged rivers moving sluggishly to the sea and required to do little work en route. After 350 years of white settlement, they remain more or less natural flows draining their natural watersheds. Friant-Kern, in contrast, is a work of advanced artifice, a piece not of nature but of technology. It has no watershed of its own but rather draws off water from a reservoir and transports it briskly to deficient areas to raise a cash crop. It means business. For long sections it runs straight as an arrow over the land, cutting across the terrain with a devastating efficiency. Engineers report that it carries, at maximum, 5,000 cubic feet of water per second. In that method of precise calculation is hinted the determination on the part of engineers, farmers, and other modern westerners to wrest every possible return from the canal and its flow. The American West literally lives today by that determination. Though its importance has seldom been well understood, more than any other single element, it has been the shaping force in the region’s history. In that determination to exploit to the uttermost, there is little of Thoreau’s ideal of freedom sought or expressed or possible. There is no freedom for nature itself, for natural rivers as free-flowing entities with their own integrity and order, and there is very little of the social freedom Thoreau expected humans to enjoy in the West. Friant-Kern offers a study in ecological and social regimentation.

Here then is the true West which we see reflected in the waters of the modern irrigation ditch. It is, first and most basically, a culture and society built on, and absolutely dependent on, a sharply alienating, intensely managerial relationship with nature. Were Thoreau to stroll along such a ditch today, he would find it a sterile place for living things. The modern ditch is lined along its entire length with concrete to prevent the seepage of water into the soil; consequently, nothing green can take root along its banks, no trees, no sedges and reeds, no grassy meadows, no seeds or blossoms dropping lazily into a side- ditch. Nor can one find here an egret stalking frogs and salamanders, or a red-winged blackbird swaying on a stem, or a muskrat burrowing into the mud. Quite simply, the modern canal, unlike a river, is not an ecosystem. It is simplified, abstracted. Water, rigidly separated from the earth and firmly directed to raise food, fill pipes, and make money. Along the Friant-Kern Canal, as along many others like it, tall chain-link fences run on either side, sealing the ditch off from stray dogs, children, fishermen (there are no fish anyway), solitary thinkers, lovers, swimmers, loping hungry coyotes, migrating turtles, indeed from all of nature and of human life except the official managerial staff of the federal Bureau of Reclamation. Where the canal passes under highways large, ominous signs are posted: “Stay alive by staying out.” The intention of the signs, of course, is to promote public safety by warning the innocent of the dangers of drowning, of being sucked into siphons by the swift current. However, their darker effect is to suggest that the contrived world of the irrigation canal is not a place where living things, including humans, are welcome.

And what of the social order, the shape of western community, which is reflected in the waters of the ditch? That matter is to be the burden of this book, but a few preliminary suggestions may be made here. Exploring the settlements in the vicinity of the Friant-Kern Canal yields at first a sense of social chaos, of a bewildering disorder of people and their daily lives, contrasting markedly with the rigid, clean geometry of their water system. Here, for example, sits in isolation an old black woman in the scanty shade of a peach tree, her chickens scratching in the dust, a hand-lettered advertisement, “Okra for sale,” dangling from a stick. Across the road a noisy gang of white children are splashing in a galvanized horse-tank outside their
mobile home. Next-door to them is a desolate brown field with rusted irrigation equipment stacked to one side, growing nothing now, as devoid of vegetation and interest as a parking lot, totally divorced from the lives of the children or the woman. Farther down the same road is a new suburban hacienda, separated from the neighbors by an ornate wrought-iron gate and brick wall. This home of a wealthy agribusinessman is resplendent in its brilliant sea of green lawn, the ignored roadside in front of it littered with empty beer cans. Beyond the house, at the end of rows of grapevines ready for harvest, are stacks and stacks of boxes piled by the road. “Maligno de Visalia” is printed on their wooden sides—they are not the property of the hacienda. The smell o’ oil wells rises incongruously out of alfalfa fields, and silver tanker trucks rumble along the country highways, past olive and almond groves. Intermixed are expanses of sugar beets, lying like rows of brown rocks in a field. The cacophonous sounds of machinery are everywhere in the rural air: irrigation pumps, tractors, tomato harvesters, helicopters spraying herbicides, the roar of a cotton gin, the scream of a black supercharged Chevy painted with red swirling flames, carrying migrant workers on to their next job. On every hand one finds a loose miscellany of buildings, crops, and other artifacts scattered across the landscape. The Vineyard Chapel of the Pentecostal Church of God. Our Lady of Guadalupe. Rose of Sharon and True Light Gospel. Trinity Episcopal. Iglesia Bautista Mexicana. Corterian Farms. Tenneco Farms. Zaragoza Market. Safeway Incorporated. The blue-green stucco Mootzuma Cafe. The drab pink Pioneer Club. Los 3 Aces Club. Progress Road. Seventh Standard Road. Brown and Bryant Agricultural Chemicals plant. DiGiorgio Park in the town of Arvin, where old Mexican men sit and talk softly in the late afternoons. The defiant words “Fight for Socialism—Power to the Workers” painted on a new wooden stockade surrounding a housing development. A billboard touting a pesticide: “We Kill to Live.” There is nothing harmonious, nothing picturesque about the western world that has developed beside the irrigation ditch. There is little peace or tidiness or care, little sense of a rooted community. There is no equitable sharing of prosperity. The human presence here often seems very much like the tumbleweeds that have been caught in the barbed-wire fences: impermanent, drifting, snagged for a while, drifting again, without grace or character, liable to blow away with a blast of hot desert wind.

There is, however, if one looks carefully, a kind of order underlying this jumbled, discordant West, though it is not in the main the order of nature or of landscape aesthetics or of closely integrated community life. It is a techno-economic order imposed for the purpose of mastering a difficult environment. People here have been organized and induced to run, as the

water in the canal does, in a straight line toward maximum yield, maximum profit. This American West can best be described as a modern hydraulic society, which is to say, a social order based on the intensive, large-scale manipulation of water and its products in an arid setting. That order is not at all what Thoreau had in mind for the region. What he desired was a society of free association, of self-defining and self-managing individuals and communities, more or less equal to one another in power and authority. The hydraulic society of the West, in contrast, is increasingly a coercive, monolithic, and hierarchical system, rule by a power elite based on the ownership of capital and expertise. Its face is reflected in every mile of the irrigation canal. One might see in that reflection the qualities of concentrated wealth, technical virtuosity, discipline, hard work, popular acquiescence, a feeling of resignation and necessity—but one cannot find in it much of what Thoreau conceived as freedom.

Few parts of the American West, or for that matter of the world, have been changed so thoroughly as the Great Valley of California. Already at the time Thoreau wrote of walking west, the valley was beginning to undergo an ecological revolution. In turn, that upheaval brought about a social transformation of extraordinary proportions. In both respects, the valley can be seen as representative of an emerging West and its sudden transition, more sudden than in any other region, from wilderness to technological dominance.

The Great Valley is an immense trough extending four hundred miles from north to south. It is hedged about by mountain barriers, the Sierra Nevada to the east, rising to over 14,000 feet in elevation, and the Coast Ranges to the west, not nearly so lofty. In recent geological times (the past million years or so), the floor of the valley has become a poorly drained alluvial plain. Its sandy soils derive from the granite and shale peaks on either side. A cross-section of the pristine natural valley in, say, the Friant-Kern area would show a number of distinct ecological communities, arranged largely by elevation. In the foothills were originally found rolling savannas dotted with magnificent oaks (the valley oak, *Quercus lobata*, mixed with the blue and live oak). At the low-lying extreme in the river bottoms, other trees, including the box elder, Oregon ash, Fremont poplar, walnut, alder, willow, and cottonwood (not to mention the wild grapes and blackberry vines), joined the oaks to form dense riparian jungles. Otter and beaver swam in the rivers, as did salmon, rainbow trout, perch, and sturgeon. In the southern portion of the valley, south of what is now the city of Fresno, the runoff from the Sierras had great difficulty finding an outlet to the ocean. In fact, several of the rivers there emptied into landlocked
lakes—Tulare and Buena Vista were the largest of them—and in flood season they created shallow marshes covering millions of acres. Elsewhere the periodic overflow of the San Joaquin and Sacramento rivers obliterated their edges, making sloughs and wetlands all the way to the delta. Here grew the tules, or bulrushes, reaching as high as eight feet. For several months each year the tule marshes became a wintering ground for migratory waterfowl, including Canada geese, pintails, cinnamon teal, whistling swan, and others. Finally, among the major ecological communities were the flat, dry grasslands, making up the largest portion of the valley. The perennial bunch grass was a dominant species there, and on it subsisted the pronghorn antelope and the uniquely Californian herbivore, the tule elk, which ranged in herds of one to two thousand individuals.²

When Thoreau was coming of age in Concord, a town already two hundred years old in his lifetime, the Great Valley was still an environment virtually untouched by the white man. It was the undisputed province of those wild creatures and of several Indian peoples. The latter were the Wintun, Patwin, Valley Maidu, Valley or Plains Miwok, and, most numerous, the Valley Yokut tribes, of which there were fifty, each with its own name, dialect, and territory. All of the native peoples were lumped together by the invading white Americans under the contemptuous term “Diggers.” These native peoples lived in large villages on the riverbanks or on the borders of seasonal lakes. Although they drew on a variety of food sources—fish, shellfish, game, waterfowl, insects, roots and seeds—their most important staple was the acorn from the valley oaks. Acorns were collected in the fall and stored through the winter in granaries or ground into meal that could be eaten as mush or cake. There was such a plenty of the food that some 70,000 Yokut, along with the other groups, could subsist in the valley, forming one of the densest concentrations of natives found in North America. Unquestionably, they influenced the pristine ecological communities there, mainly through their use of fire to encourage the plants they wanted to see growing for food and game forage. But because the valley tribes were not agricultural and did not interfere at all with the river flow, their impact was insignificant compared to what came later. There was enough naturally produced food for them to hunt and gather in this place to support their numbers. More than that they did not need nor see any point in acquiring. After several thousand years of their habitation, the valley’s ecological order was still more or less intact.³

The Spanish rarely ventured into the valley, and when they did, they were repelled by the prospect. It was too hot, dry, and bleak, or alternately too swampy, to attract them away from their coastal missions. The American fur trapper and explorer Jedediah Smit passed through in 1827, and then

in 1849 came a voracious horde from the east, from all over the world, looking for gold. To protect the gold seekers from the Indians and make maps of the valley, the American government dispatched Lieutenant George Derby in 1849 and 1850. Derby was a twenty-six-year-old topographical engineer, about Thoreau’s age and from his part of the country, but he had received an education in the sciences at West Point and become a wide-ranging traveler with a practical mission. Derby made the first thorough, systematic survey of the valley’s agricultural potential. Of the possibilities for white settlers where the San Joaquin and Merced rivers converge, he wrote this: “Exceedingly barren, and singularly destitute of resources, except a narrow strip on the borders of the stream; it was without timber and grass, and can never, in my estimation, be brought into requisition for agricultural purposes.” When he moved on south toward Tulare Lake (he called it Tash Lake), he became even more pessimistic about the opportunities. The country was “a perfect desert” and there was “no forage for the animals but wire grass, the water standing in the tule marshes brackish, and no wood at all.” Near the present site of Bakersfield he came upon “the most miserable country that I ever beheld. The soil was not only of the most wretched description, dry, powdery and decomposed, but everywhere burrowed by gophers, and a small animal resembling a common house rat... The country presents the appearance of a large city which has been partially overwhelmed by the ashes of volcanic eruptions.” Indeed, from the perspective of traditional humid-land farming, the valley was, over most of its acreage, an uninviting place to settle, and that was Derby’s perspective. Consequently, it was for him an ugly, deficient land.⁴

A very different view of the Great Valley, with different implications for white settlement, was taken by another early American traveler, one with more of the wilderness-loving spirit of Thoreau in him than Lieutenant Derby. In 1868, John Muir, a native of Scotland and Wisconsin, came plunging ecstatically down the eastern slope of the Diablo Mountains into what he described as “all one sheet of plant gold, hazy and vanishing in the distance, distinct as a new map along the foot-hills at my feet.” It was spring when he arrived, and the rains had produced a radiant world of flowers: gillas, lupines, chryopsis, clarkia, petunia, mint, nemeophila—the species ran on and on, forming “one smooth, continuous bed of honey-bloom.” Muir called the valley one of the great “bee-gardens” of California. He waded ankle-deep through the blooms, lay at night on them for a bed, shared their fragrance with the larks, antelopes, hares, and bees. Even then, however, destructive forces were at work in the valley, as he observed while working at a ranch there in the autumn of that year. With the gold seekers “a wild, restless agriculture” had come to the state. These
new farmers were destroying the wild flora wholesale with their plows, and, worse, there were sheepmen now in the valley, with their "flocks of hoofed locusts, sweeping over the ground like a fire, and trampling down every rod that escapes the plow as completely as if the whole plain were a cottage garden-plot without a fence." Someday, Muir supposed, the destruction would be at an end, and a more careful set of agriculturists would supplant that generation of exploiters and wasters. The entire valley would then be irrigated from end to end and carefully managed. At that future point, he feared, Americans, surrounded by an artificial world of their own making, would no longer remember the vanished splendor of an awakening prairie spring, when the primeval valley had been at its most magnificent.\footnote{8}

In the period from 1850 to 1910, writes ecologist Raymond Dasmann, the state of California experienced a series of massive environmental changes, and nowhere more so than in the Great Valley.\footnote{6} During those few decades, the fauna and flora went through an upheaval comparable only to the cataclysmic postglacial extinctions. However, in this later case, the changes were not the work of blind forces of nature but rather of conscious, rational men. Those men, driven by a vision of the valley’s potential wealth and by a passion to possess it, shot out the waterfowl. They trapped out the furbearers. They cut down large numbers of the great spreading oaks, burned away the saltbush, the chaparral, the blackberry and willow thickets, and drained the tule marshes. They decimated the large grazing herds, until only a tiny remnant of the elk remained in a wildlife preserve. As their food and habitat disappeared, so did the grizzly, the condor, and the wolf. And so did the aboriginal human settlers, the Yokuts and the rest, who became the victims of disease, of superior force, of land hunger. In their place developed the wealthiest agricultural operation in the United States. It was described in 1939 by John Steinbeck in *The Grapes of Wrath*, and since then has been observed by a succession of writers, some of them marveling over its output, some of them critical of its human and environmental costs. All of them would agree that Lieutenant Derby had been hopelessly wrong about the potential of the valley to produce crops and money. All that was required to make the "miserable country" over was the management of water, and by the twentieth century the valley had set up one of the most advanced hydraulic systems in the world, a system that has become more and more elaborate down to the present. The technological control of water was the basis of a new West. It made possible not only the evolution of a prosperous agriculture but also, to a great extent, the growth of coastal cities like Los Angeles and San Francisco. It eventually made California the leading state in America, and perhaps the single most influential and powerful area in the world for its size.

This ecological and social transformation of the Great Valley is one of the most spectacular, and most revealing, episodes of the American West. The point of this book is to explore the implications of that episode and others like it in the region, and to counterpose them to the mythic imaginings of Thoreau, standing at his gate, dreaming beautifully of the wild, the free, the democratic, the individual.

So far, this hydraulic perspective on the West, the view that the society in the region has been shaped by its advanced technological mastery of water, has not received adequate attention. Many books and articles have been written about the arid West and its search for water, and they are good, scholarly books, but they remain on the periphery; they have not yet penetrated very far the thinking of most generalizers and theorists of the region’s character. In those generalizers’ hands the history of the West has tended to remain, against all evidence to the contrary, what it was in Thoreau’s time: a saga of individual enterprise, of men and women going out from civilization to carve with their own hands a livelihood from nature, a tale of release (or attempted release) from eastern form, tradition, and control. To be sure, the West was all of that at times, but for most of its history and for most of its people the region has had a very different story to tell: one of people encountering difficult environments, of driving to overcome them through technological means, of creating the necessary social organization to do so, of leading on and on to indigenous bureaucracy and corporatism. It is time that this emergent technological West, the West of the hydraulic society, the West as seen in the Great Valley of California, be put beside the storybook West of fur trappers, cowboys, sodbusters, and intrepid adventurers.\footnote{7}

What I mean to suggest here, then, is a radically new angle of vision on the region and its historical significance. To do that some prevailing ideas must first be cleared out of the way, and that will not be easy. Even though there have been other, challenging voices asking for new departures, the standard interpretation of the West still begins with the old, much-handled frontier theory of Frederick Jackson Turner, a theory that has no water, no aridity, no technical dominance in it, that indeed has very little in it of the West as it is geographically defined today. Turner’s views, first expressed in his celebrated essay “The Significance of the Frontier in American History” (1893), were shaped by the early period of the agricultural settlement of Wisconsin. That experience was one of dispersed occupation of a humid forest and prairie environment, and out of it came, so Turner maintained, a culture of individualism, self-reliance, and diffused power—the culture of American democracy. For all of its shortcomings the theory still
remains plausible for the history of Wisconsin or Ohio. But it is not a theory that is readily applicable to the West that lies beyond the Mississippi River, especially the West of deserts, semideserts, and dry cracking plains, of dust storms, cactus, alkaline wells, and brush grass, the West of California, Idaho, Utah, and New Mexico—in other words, the West as we commonly locate it today. Turner himself had little direct experience of that West, so it is not surprising that scarcely entered into his thinking.  

Turner was aware, nonetheless, that the western half of the United States would work a few changes in his theory of frontier culture and society. In an Atlantic Monthly article of 1903, he noted that in the preceding fifteen years western settlement had reached the Great Plains, where “new physical conditions have ... accelerated the social tendency of Western democracy.” The conquest of that country would be impossible, he went on, “by the old individual pioneer methods.” The new frontier required “expensive irrigation works,” “cooperative activity,” and “capital beyond the reach of the small farmer.” What Turner called “the physiographic province,” that is, the condition of water scarcity, “decreed that the destiny of this new frontier should be social rather than individual.” He compared it to the changes in social structure going on elsewhere in America: this West would be from the outset an “industrial” order, giving rise to “captains of industry,” home-grown or imported versions of men like Andrew Carnegie, who were taking charge of the country generally. The task of settling the arid West, like that of creating a technological society, was too awesome for ordinary people using ordinary skills to carry out; they must therefore “combine under the leadership of the strongest.” They would also be forced to rely on the federal government to build for them huge dams, reservoirs, and canals as well as show them “what and when and how to plant.” “The pioneer of the arid regions,” he concluded, “must be both a capitalist and the protegé of the government.” That these were fundamental differences from the requirements of the old eastern frontiers, Turner clearly understood, yet strangely he assumed that his American democracy would be unaffected by them. The region would become a “social” rather than an “individual” democracy, but all the same it would be a democracy, freedom-loving and self-governing. To see matters otherwise would have shattered the hopeful, nationalistic pride that Turner felt in the westward movement.

After Turner’s theory of the frontier, the most influential interpretation of western American history has been that of Walter Prescott Webb, first developed in his book The Great Plains, published in 1931. It too has to be heavily revised to account for the West reflected in the waters of the Friant-Kern Canal. Professor Webb grew up in a milieu of dispersed small farmers trying to survive in droughty Texas. From that vantage, he sought to correct Turner by maintaining that there had not been a single process of frontier settlement, but two distinctly different processes, one involving an adaptation to the humid, forested landscape of the eastern states, the other an adaptation to the dry, treeless ecology found on the plains and westward. In the latter situation, settlers had to devise altogether new technologies and institutions or they would lose out. They had to begin using barbed wire instead of rail fencing, windmills and underground aquifers instead of springs and brooks, to adopt new weapons, new water laws, and new housing materials. The American pioneers had come to “an institutional fault (comparable to a geological fault) running from middle Texas to Illinois or Dakota, roughly following the ninety-eighth meridian. At this fault the ways of life and living changed.” This latest and last West must therefore become a unique region of the United States, one that could be understood only in terms of its own arid environment and of its people’s ingenuity in meeting that condition.

So far, Webb was perspicacious and on his way to a profound historical insight. A problem in developing this interpretation appeared, however, when he became caught in a misleading comparison of the West to the American South, making both regions work, exploited dependencies of the main national power centers. At first the West was supposed by him to be innovative, unique, clearly set apart from the country east of his dividing meridian. However, he then went on to admit that all of the technical innovations in his region were mass-produced and marketed by easterners as part of what he called the “Industrial Revolution.” It was through this dependence, he feared, that westerners had eventually come into bondage to eastern, metropolitan centers of capita. Their predicament, he pointed out, had been precisely the fate of the South: it too was an outlying region brought under domination, in this case by the cotton gin and the textile factory invented in the North.

Both kingdoms [West and South] became tributary to the masters of the Industrial Revolution. Both kingdoms produced what promised to be a distinctive civilization, a thing apart in American life. Both kingdoms were pioneers in their character, the first occupants and users of the soil. And in time both were completely altered by the force that had developed them.

The analogy between the two regions, Webb knew, broke down at points, but he never quite realized how badly it broke down. For one thing, the West was from its beginning far more adept than the South at learning the
methods of the modern technological domination of nature. In its condition of aridity, it had a powerful environmental force to make those lessons compelling. Hence it would not remain for long in a state of subordination, would not fight a losing, dispiriting war for independence; it would discover how to compel the rest of the nation to help finance its environmental conquest, and thus would emerge as a far more serious rival to the northeastern hegemony than the South had ever been. Had Webb looked closely at California as well as at backwoods Texas, had he focused on the dams and canals of the West rather than on windmills, had he seen the entire region as an emergent hydraulic society, his interpretation might have stood up better over time.

What Webb was getting at was a view of the West as a colony of the American Empire, an empire centered in eastern metropolises. What he wanted was a regional declaration of independence from that empire. Already when he wrote, the idea of the West as a colony was a well-established one, having its roots in the Populist revolt against bankers and railroads in the 1890s, and it continued to draw support for a long while thereafter, so much so that it has become, along with Turner’s theory, a major generalization for dealing with the western experience. In 1934, for example, just three years after Webb’s work on the plains, Bernard DeVoto described the region as “a plundered province,” and the plunderers he had in mind were easterners. More recently, the colonial image of the West has resurfaced in the so-called Sagebrush Rebellion, in which many westerners have complained that the federal government imperiously controls their destiny through ownership of the public lands—the implication generally being that the government should turn over those lands to western entrepreneurs to exploit as rapidly as possible. A more thoughtful expression of that stance has appeared in the book The Angry West, written by the Colorado governor Richard Lamm and the historian Michael McCarthy. In their words, “the dark riders are at the gates,” once more threatening western freedom. Those riders are all outsiders, all vaguely easterners—the private energy companies mining coal and oil shale, the Defense Department looking for missile sites, the Bureau of Land Management, the environmentalists, and President Carter, who, far away in Washington, wanted to cut back on western water projects.

The trouble with such nationalist arguments, from Webb on down, is not that they are wholly false; they do point to a certain reality that has long been familiar to many westerners, particularly those living in the hinterland of the plains and Rockies. But they leave much out of the discussion, and what they leave out is the larger, more comprehensive truth about the region. The American West is not so much a colony as it is an empire; for a long time it was an empire in intention only, then after World War Two it became one in fact. Indeed, since the war it has become a principal seat of the world-circling American Empire. That is the interpretation I intend to develop here. How that imperial West arose out of the desert and near-desert, what it had to do with the command over nature there, what it has meant for Thoreau’s mythic search for freedom—these are the leading themes of this book. And they all begin and end with water.
TWO

TAXONOMY

The Flow of Power in History

All thinking worthy of the name must now be ecological.


There once were men capable of inhabiting a river without disrupting the harmony of its life.

—Aldo Leopold, "Song of the Cavan" (1940)
Earth has been variously called the planet of water and the planet of life, the connection between the two attributes being by no means casual. Without water, there simply can be no life. Water flows in the veins and roots of all living organisms, as precious to them as the air they breathe and the food they eat. It is the lifeblood of their collective body.

Water has been critical to the making of human history. It has shaped institutions, destroyed cities, set limits to expansion, brought feast and famine, carried goods to market, washed away sickness, divided nations, inspired the worship and beseeching of gods, given philosophers a metaphor for existence, and disposed of garbage. To write history without putting any water in it is to leave out a large part of the story. Human experience has not been so dry as that.

The power of water over history is a very old discovery. The earliest map of the Middle East, dating from the eighteenth century B.C., shows the River Euphrates dividing the lands of the earth into two islands. Around the perimeter of the map flows the vast circling sea, Oceanus, the ultimate river from which all lesser rivers come, at once the source and the destination of Euphrates. Human existence must be carried on, the map indicates, within that watery loop and along its pathways. It is easy to see how such a view of the earth could lead to the Bible story of a great deluge, leaving Noah, his family, and the animals resting precariously on a mountaintop in the aftermath. Too much water, that story tells us, has been one of the oldest plagues visited on the human species, wiping out life and property with such completeness that it has seemed like divine retribution for some monumental evil people have committed.

In other situations, however, it was the scarcity of water, not its excess, the potential to desiccate and shrivel, not the potential to surround and flood, that made people aware of the significance this element holds for living. "Water is important to people who do not have it," writes Joan Didion, "and the same is true of control." The fear of going dry has driven many communities to extraordinary efforts, provoking in them the deepest
anxiety, the sorriest desperation, forcing them to make radical changes in their behavior and institutions. It has stirred them out of lethargy to undertake the most difficult labors: building enormous engineering works to bring water from distant places and stave off their thirst. That reaching out to establish control over a river, often driven by the raw instinct to survive, has had profound implications for the course of history. In light of such human endeavor, history has become no longer a matter of Euphrates dominating people, but of people governing the Euphrates.

Control over water has again and again provided an effective means of consolidating power within human groups—led, that is, to the assertion by some people of power over others. Sometimes that outcome was unforeseen, a result no one really sought but dire necessity seemed to require. In other places and times, the concentration of power within human society that comes from controlling water was a deliberate goal of ambitious individuals, one they pursued even in the face of protest and resistance.

The history of providing protection for humans against rampaging floods undoubtedly furnishes some examples of how this process of power consolidation works. It is the nature of floods, however, to be sporadic and unpredictable; therefore, flood protection by itself has usually had a limited, ambiguous impact on the structure of society and power. Irrigation, on the other hand, is a type of water control that is constant, pervasive, and more socially demanding. Unlike flood protection, it leads in all cases to communal reorganization, to new patterns of human interaction, to new forms of discipline and authority. The difference is between holding an umbrella over your head when it rains and making the rain go somewhere else. The first is a momentary defense, the second a concerted attempt to control and defeat a threat once and for all. Consequently, nothing suggests more clearly than the story of irrigation in history how dependent societies may become, not merely on water, but on their manipulations of its flow. And nothing makes more clear the link between water control and the social orders humans have created than irrigation history.

The American West is only the latest in a long series of experiments in building an irrigation society. Unfortunately it has never been studied in the context of that larger world experience. As a result, the connections between aridity, human thirst, water control, and social power have not been obvious to the region or its historians. To remedy that failure—and it is an immense one, with immense implications—we must make a long, wide-ranging excursion outside the borders of the United States to the farthest points of the earth, wherever other people have also encountered dry places and tried to overcome their natural limits. We must ask what have been the main modes of water control that have evolved in those places, where the case of the West fits into that taxonomy, and where it compares to and where it differs from the other modes. Then we may be able to say more precisely what the western manipulation of rivers has produced in social terms—what the flow of power in this region has been and is today.

Much more is needed, however, than a mere catalogue of the varieties of river manipulation in history. By itself that would lead to a few superficial conclusions about the American West and its differences from other irrigation societies. It would not lead us into deeper waters. It would not tell us much about questions that transcend the region and its idiosyncrasies, that have to do with fundamental issues facing humans in their dealings with technology and the environment everywhere. The West offers that larger resonance. In particular it has much to tell us about the social implications embedded in our various ways of dealing with nature. But to catch those larger tones the historian must move beyond typology to the realm of theory, beyond making comparisons to drawing out general ideas. A history of water use without any theory in it becomes a mere massing of details—specifics without conclusions, data without consequences.

The theory that underlies the specific problem of water and society in history comes out of the interdisciplinary study of culture and ecology. This chapter will undertake to tap some of that ecological work, lying as it does for the historian like a great hidden, unutilized aquifer, concealing in its depths many important suggestions for understanding the relationship humans have worked out with nature, in the past and today, and the consequences of that relationship. The man who first began pumping in earnest from that aquifer was a German immigrant to America, the historian Karl Wittfogel, a sometime student of Karl Marx. It is to his work, therefore, that we must first turn to gain some larger understanding of the issues involved in irrigation. Then it will be time to look at those several modes of water-controlling societies and to find a place among them for the western American experience.
WITTFOGEL, MARX, AND THE ECOLOGY OF POWER

The idea that nature has had something to do with the shaping of cultures and history is an idea that is both obviously true and persistently neglected. Maybe that is because there have been so many absurd versions of it, so many laughable claims: for instance, hot weather has been supposed to make peoples passionate and volatile like the Italians—or is it metaphysical and speculative like Plato and the Hindus? The fatal temptation in this line of thinking has always been to fasten on a single factor of nature, like climate, and proceed to discover its influence everywhere. A more credible strategy would be to regard nature as participating in an unfolding dialectic with human history, seeing the two, that is, as intertwined in an ongoing spiral of challenge-response-challenge, where neither nature nor humanity ever achieves absolute sovereign authority, but both continue to make and remake each other.

That is the more complex perspective suggested by modern ecology, which describes nature as an exquisite interacting of diverse species, a circle of interdependence and mutuality. Bring humans into the picture, and the circle of life broadens to include diverse cultures as well as biological species, all of them working to reshape one another. Nothing is ever finished in that dialectic between history and natural history. Nothing can be abstracted altogether from its context or be said to have made itself in splendid isolation.

In the case of irrigation, an ecological view of history would hold that aridity has been a crucial, though not rigidly deterministic experience for people to deal with. Whenever they attempted to overcome that condition, they gave a new shape to the environment, creating artificial rivers with dams, aqueducts, and the like. But it was not simply a one-way process of humans re-creating nature. Society, even in its so-called triumphs, inescapably came to bear the mark of the desert and of its own effort to overcome the environmental exigencies there.

Such in essence is the argument made by Karl Wittfogel, a twentieth-century scholar of Chinese civilization and architect of the controversial "hydraulic society" thesis. Where the scale of water control escalated in the ancient desert world, he maintained, where larger and larger dams and more and more elaborate canal networks were built, political power came to rest in the hands of an elite, typically a ruling class of bureaucrats. Those were the "hydraulic societies," and in their most extreme forms they became despotic regimes in which one or a few supreme individuals wielded absolute control over the common people as they did over the rivers that coursed through their territory.

Wittfogel's ecological interpretation of ancient irrigation societies has come to have a certain familiarity—though it has often been more a notoriety—among historians and anthropologists, particularly those who style themselves cultural ecologists or cultural materialists. But his theory, though it exemplifies to a remarkable degree the ecological approach to history, has older origins than the recently popular science of ecology. It had its prototype in the work of Karl Marx and his dialectical approach to history, more specifically, in those ideas of Marx, though he addressed them only fragmentarily, about the role of nature in social change and how that role might account for the peculiarities of many Asian cultures. And Marx was not the only source for Wittfogel's theorizing; it owes a great deal also to the intellectual milieu of Weimar Germany, to the sociology of Max Weber, and to the nascent Frankfurt School of radical social thought, which took as one of its main themes the study of power and domination, including the domination of the earth which derives from modern technology. What all these various influences converged to say to Wittfogel was that the most telling history is not to be found in the chronicles of kings, generals, wars, and politics; it is written in the book of nature.

Karl August Wittfogel was born in 1896 in the Hanoverian village of Woltersdorf, Germany. He grew to maturity during the most tumultuous period in modern times, the era of the two world wars, the Russian Revolution, the fascist madness, and the rise of totalitarianism. In 1920 he joined the German Communist party, subsequently becoming one of the leading Marxist scholars in the Weimar Republic. But he was also, in this chaotic swirling of ideas, a student of the writings of that other seminal thinker in Germany, Max Weber. It was Weber who first introduced him to the peculiar "hydraulic-bureaucratic official-state" in China and India, and as a student of those states, Wittfogel soon made his reputation by attempting to discover how their bureaucratic apparatus had come into being and what impact it had had on their social structures. In his first major work, *Economy and Society in China*, published in 1931, he attempted the difficult task of merging Weber's emphasis on the influence of bureaucracy on thought and power with Marx's analysis of economic class relations and politics. That significant early work was written at the Institute for Social Research.
—popularly known as the Frankfurt School—which Wittfogel had joined in 1925.²

Just as he was launching himself on his career as an Asia scholar, however, Wittfogel’s world fell apart. In 1933 Adolf Hitler took command of Germany, and immediately the young scholar found his life in danger, for he had been an outspoken critic of fascism, assailing it from the public platform in city after city. While attempting to flee the country, he was picked up by the police and thrown into a concentration camp. A vigorous outpouring of protest from English and American intellectuals persuaded the Gestapo to release him after several months, and thereafter he migrated to the United States, first to Columbia University, then to the University of Washington, where he taught Chinese history until his retirement in 1966. By that point, he had long since forsaken his early communist enthusiasms—in fact, he had become rigidly anticommunist, attacking the Russians as vigorously as he once had the fascists. His was a wild, heady life, one that was always in the thick of momentous issues.

The core idea that remained constant throughout Wittfogel’s long intellectual odyssey was that Asian societies had taken a different evolutionary path than those in the Occident. Much earlier, before Max Weber even, Marx had made the same observation, speaking as he did of an “Asiatic mode of production” that did not follow the European stages of development (the progression from classical slavery to feudalism to capitalism and finally to communism).³ Marx, who in turn took the notion of a divergent Orient from James and John Stuart Mill and from several eighteenth-century thinkers before them, found it to be a troublesome aberration. How could one identify a dependable, scientific law of progress if it applied only to one small continent? Among Marx’s followers, the problem of Asia became even more pressing after the long-awaited first communist revolution, for as many have noted, it occurred in the wrong place—in Russia, a country that had not yet experienced the capitalist stage, a country that was suspiciously close to those backward Asian regimes lying beyond the pale of scientific progress. Was the new Soviet order of 1918 a true harbinger of the future, or was it a betrayal of the dream, a society perniciously using Marxist rhetorical trappings to conceal another antiprogressive Oriental state? That was the big question that came to intrigue the young Wittfogel. Finding an answer to it, strange as it may seem, led him not only to China and Asia but also to irrigation and water.

Germany in the Weimar period of the 1920s was buzzing with radical, cosmopolitan inquiry. In Berlin and Frankfurt cafés, intellectuals and activists argued over the new Soviet Union, the meaning of the late war, the colonial struggle against European imperialism, and the promise of an awakening communist East. Hundreds of Chinese students were enrolled at the universities, most of them followers of Sun Yat-sen and Chiang Kai-shek, both of whom were setting up what was seen then as a new revolutionary state in China. (Actually, it was far more bourgeois.) Wittfogel, son of a village schoolmaster though he was, threw himself with passionate concern into this international dialogue. Early on, he decided China was to become the archetypal society of his time and that it would be his mission to help westerners understand it. Just as Marx in the preceding century had chosen England as the clearest exemplar of capitalist society, so Wittfogel would explain to people what China had been and what it represented for the twentieth century. It foreshadowed, he soon concluded, a scary future for humankind. Like Marx, Wittfogel did not select his country of study for its romantic, ideal qualities; rather, he found in China an unrelievably repressive past—the China of a thousand years’ stagnation and slavery—and the threat of a spreading, sinister modern influence. In the place of Marx’s British capitalist, Wittfogel put the Chinese bureaucrat and his state apparatus: here was the old, and now very new, specter of domination facing the planet.

It was unclear to Wittfogel himself in the first phase of his China studies that he was headed in what might be regarded as an unpopular direction. He had found an academic and political interest perfectly consonant with the global imagination of Marxism, but ultimately these studies would lead him where most mainstream, straitlaced Marxists (not to mention typical café revolutionaries) would not want to go: to an indictment of centralized state regimes, of bureaucratic authoritarianism, and above all of those new social orders proudly bearing the label “communist.”

Wittfogel remained more loyal to the Marxist cause in his dedication to promoting the scientific, materialist analysis of society. It is important, he believed, to move beneath surface details and to reveal the underlying structure of social patterns, for only changes at that basic level can produce genuine, permanent progress. That is also, of course, the theory of historical materialism as Karl Marx enunciated it. For Marx, the underlying base of any society is its “mode of production” (Produktionsweise), the process by which people extract from nature their subsistence and accumulate their wealth. It is, in simplest terms, the human interaction with the earth, but there is nothing really simple about it. The mode of production involves a complex mix of ecological factors, technology, and social relations—this last including, for instance, the relations between workers and capitalists in the capitalistic mode, which has dominated recent history. All social wealth
comes from those elements working in concert, coming in part as the gift of nature (in the form of soil, water, coal, forests, and the like) and in part as the product of human labor.\(^5\)

Up to this point, Marx’s historical dialectic closely resembles the modern ecological perspective on culture and history. But as nature increasingly bears the impress of human energy and technique, Marx claimed, as it becomes a “second nature” of artifice, the effective terms of the dialectic change. The original conversation between a powerful, independent world of nature and a smaller, struggling world of human communities eventually gives way to one between technology and society. Hence history appears almost always in Marx—certainly European history does—as a struggle between one class of people and another, as a matter of laborers extracting a surplus from a passive physical world of “resources” lying before them like an open mine, then watching that surplus get taken away from them by those who own the tools. Nature as a real, intrinsically significant, autonomous entity gets obliterated, by workers and owners alike, in Marx’s onward march of social progress.\(^6\)

The progress of history then involved leaving nature behind as a key formative element, supplanting it with the productive apparatus and class structure contrived by humans. Marx well understood that there were psychic costs paid in that liberation, including the alienation it entailed from the rest of the natural world. Capitalism, he wrote in Grundrisse, has freed humans from the age-old, localized dependence on the earth and the “nature idolatry” with which it was associated.

For the first time, nature becomes purely an object for humankind, purely a matter of utility; ceases to be recognized as a power for itself, and the theoretical discovery of its autonomous laws appears merely as a means so as to subjugate it under human needs, whether as an object of consumption or as a means of production.\(^7\)

However, for Marx the alienation from nature introduced by capitalism and its technological mastery was a price worth paying, for it made possible a higher level of civilization, a fuller realization of humanity. That confidence was embedded firmly in his materialist theory of history.

Wittfogel learned much from this historical materialism of Marx, but, once again, he sidled off onto his own path, rescuing the ecological factor from Marx’s neglect and placing it at the very center of his own scientific history. The natural environment and the technology used to produce wealth from it—together constituting the “means of production”—became for him more primary throughout history than Marx’s social relations and forms of property ownership. In 1928 Wittfogel published his essay “Geopolitik, Geographischer, Materialismus und Marxismus,” wherein he wrote: “Man and his work on one side, nature and its material on the other—this is the fundamental relation, the eternal natural condition of human life upon which every form of this life, and above all its social form, is dependent.”\(^8\) As societies try to remake nature, they remake themselves, without ever really escaping natural influences. In this spiral of history the people are by no means like helpless passengers of a boat that is being tossed this way and that in a storm; there are options open to them at every point. But always they must respond to nature, then fit themselves to their response.\(^9\)

Having restored nature to a more pivotal role in historical materialism, Wittfogel was ready to tackle the problem of Asia and its peculiar development. What had been the mode of production in that part of the world, he asked, and what ecological forces had been involved in the emergence of that mode? In two key works he undertook to lay out some answers. The first was an essay, “The Theory of Oriental Society,” which appeared in 1938 after he made a trip to China; it served as a trial run for the second and larger work, his magnum opus of twenty years later, Oriental Despotism: A Comparative Study of Total Power (1957). The thread connecting the two writings was running water. The Oriental mode of production, he explained, “first arises when waterworks must be undertaken on a larger scale (for purposes of protection and irrigation).”\(^10\) During the four thousand years before Christ, in the great river valleys of Egypt, Mesopotamia, India, and China, the state took on the function of building grand hydraulic works, which in turn required centralized managerial bureaucracies to operate. Whoever controlled those means of production—in such cases it was a group of agromanagerial experts—became the effective ruling class. The common techno-environmental basis in all those ancient Oriental civilizations, giving rise to similar social structures in them, was water control, mainly a program of irrigation made necessary by inadequate or unseasonal or dependable rainfall. In the case of China, there were both irrigation for its rice paddies and flood-control works to tame the Huang Ho raging down from the soft, eroding loess highlands. Together these forms of water manipulation made that country, along with its neighbors, very different from Marx’s Europe.

After he emigrated from Europe and came to know his New World home better, Wittfogel realized that large-scale irrigated agriculture had been an ancient American as well as an Asian phenomenon. Consequently, by 1957 he was usually substituting the phrase “hydraulic society” for “Oriental
society” to indicate that water-controlling mode of production and its attendant social order. Wherever it was found, its outcome was always a repressive use of power and the defeat of all change. Crises, whether brought on by overexpansion or by invasion, might come and go in such systems, but so long as irrigation continued, no real movement, no revolution, could occur in the social system. Whereas in a more fortunate Europe, Wittfogel believed, a decentralized agriculture under feudalism and abundant rainfall had allowed the commencement of capital accumulation and the rise of modern industrial capitalism, “the centralized structure of the highly productive Oriental agrarian order worked in the opposite direction, namely towards the reproduction of the existing order, towards its stagnation.” Big irrigation thus created a bondage of inertia.

At the time of the 1938 essay, Wittfogel was still a communist, but by the time Oriental Despotism came out, he had thoroughly forsaken the faith. The mutual tolerance pact signed by Stalin and Hitler in 1939 was the final, decisive event. Henceforth he was an implacable foe of the Soviet Union. When the Chinese followed Moscow’s revolutionary lead in 1949, Wittfogel began to see more clearly than ever the face of the demon haunting his historical imagination. It was “total power,” or totalitarianism: an inordinately strong government that controlled the economy, the political sector, even the thoughts of its citizens. Ironically, it was not the Nazi regime of his native Germany that he began to attack with vehemence, though he had suffered more at its hands than at any other’s. It was instead a deadly virus spreading out of Asia, threatening to infect and destroy western civilization, that he perceived. The ancient hydraulic societies now became for him the precursors of the modern socialist dictatorships. Russia, he claimed, had long been a “marginal” version of Oriental despotism, a country infected by the conquering Mongol hordes. Now Joseph Stalin had brought about, not a communist utopia, but an “Asian restoration.”

Comunist China was even more obviously a case of that incurable disease reasserting itself.

What had begun in the twenties as a search for scientific truth and positive laws of society had by the fifties become an elaborate web of inconsistencies, demonology, and ethnocentrism. Wittfogel’s early brilliant insight into the connection between irrigation ecology and social power lay in the Soviet Union was totalitarian, he supposed, because it had long ago been influenced by people who themselves had merely come into contact with Asian hydraulic systems. This was his new theme, and with it historical theorizing began to run wild. How could a bureaucratic power elite migrate or diffuse across the landscape without taking its base along—without reconstructing the mode of production that had created it? Stalin’s power, it was obvious to most observers, had not been established on irrigation. Aware of this embarrassment, Wittfogel abruptly chose to abandon his theory altogether. Oriental society, he began to argue, “cannot be explained in purely ecological or economic terms; and the spread of Oriental despotism to areas lacking a hydraulic agriculture underlies the limitations of such an explanation.” But what then was left of his theory, after such an admission, except for the flagrantly ethnocentric argument that the Chinese and Russians were, by nature, incapable of achieving the progressive levels of European capitalism and freedom? That only in western cultures could one expect to see a more humane future evolve, one committed to democratic values? The fact that Wittfogel never addressed the emergence of totalitarianism within modern Occidental society, as in the case of Germany, made his shifting logic all the more suspect.

But it would be a serious mistake for Wittfogel’s readers to overreact to his excesses, throwing out his genuine insights along with his logichopping. Though the theory of Oriental despotism may have become farfetched and prejudicial when stretched to account for the twentieth-century failure of socialism, though no mode of production can ever explain the full essence of a society, all of Wittfogel’s thinking does not deserve to be tossed onto the rubbish heap. There are profoundly important questions to raise, as he did, about the link between water and power, not in a spirit of scientism or ethnocentrism or demonism, but simply in the hope of understanding more fully the consequences of our behavior toward nature.

Even as he was wandering off into anticomunist tendentiousness, Wittfogel began to acquire a following among a new group of scholars, the cultural ecologists in anthropology. They were less interested in either his new or his old politics than in his theory of irrigation and society. In 1953 Julian Steward, an anthropologist at Columbia and later the University of Illinois, asked Wittfogel to join a symposium on irrigation assembling in Tucson, Arizona, where he would meet experts on Mesopotamia and Mesocuacua, intensely attracted to his hydraulic ideas. Steward, who had himself been deeply impressed by the “Theory of Oriental Society” essay and the promise it held out for cross-cultural irrigation research, had begun to construct an ecologically based anthropology that would demonstrate how cultures evolve as they adapt to their environments. Underlying every culture, he suggested, there is a “core” (more or less equivalent to Wittfogel’s “mode of production”) that includes a “constellation of features which are most closely related to subsistence activities and economic activities.” Irrigation is one of those cultural cores, and Steward’s symposium was the first of a series of studies to explore its social implications comparatively. From
that meeting on, Karl Wittfogel began to lead a double life: as a defender of the "free world" against Stalin and Mao Tse-tung (Wittfogel I) and as an interdisciplinary authority on the ancient irrigation civilizations (Wittfogel II). Though once again he began to stir up his usual controversy, Wittfogel II would have a more enduring success than Wittfogel I.

Scholars still have not come to a firm consensus about the role that irrigation played in early cultural evolution, but the literature on the subject is now large and ripe for synthesis and criticism. One of the most serious weaknesses in that literature, it must be said straight off, is that the modern experience with irrigation hardly appears in it. Nowhere do the ecological anthropologists—nor does Wittfogel, for that matter—seem to realize that the link between water control and social power might occur in places other than the archaic cradles of civilization nor that the past hundred years have seen more irrigation development than all of previous history.

Karl Wittfogel deserves to be remembered today, not for his Cold War dogmatism or the ultimate stagnation of his ideas, but for those bright, creative years when he raised a profound question: How, in the remaking of nature, do we remake ourselves? It is not a simple question to answer, for as we have seen here, it demands a wide knowledge of history, technology, the forces of nature, and social organization. But if we focus our attention more narrowly on rivers and their manipulation, and on the human consequences of that manipulation, as Wittfogel did, we may make the question more manageable. We may also, if we are inspired by his global imagination and ecological perspective, discover an America that we have not yet clearly seen—an America to put beside China and the other ancient hydraulic societies for comparison. It may be not only the Russians or the Asians we must worry about, as Wittfogel came to believe, but also ourselves.

THE LOCAL SUBSISTENCE MODE

Like the taxonomy of butterflies or liverworts, irrigation societies may be lumped together and split and lumped again, until the essential question of how power evolves in them gets completely lost. The splitters are the ones who do most of the obscuring. Admittedly they are, in their devotion to finding differences, right to a point: no two water systems are exactly alike, either in natural setting or social anatomy. Some develop in narrow mountain valleys pierced by ice-cold torrents, others in broad alluvial plains drenched by monsoon storms, and still others in deserts where the streams evaporate away much of the year. Irrigation may supplement a hunter’s diet with a few tubers, or it may support an agribusinessman’s crop of pistachios traded all over the world. The irrigators may throw their babies into the water in sacrifice to their river gods; then again, they may worship at the altar of modern hydraulic engineering and throw away their money. The quality of uniqueness must be respected, as the splitters insist, but it should not be used to defy all generalization, for generalization is what makes critical inquiry possible. In this case, we first need to do some lumping together, locating a few unities among the varieties of irrigation societies. We can follow several criteria in that lumping: the scale of waterworks involved in each instance, the kind of managerial authority needed to operate them, and the goals pursued by the irrigators. The lumps resulting from that analysis may not suit the most inveterate splitters, but they will help focus our minds on the basic historical issues, especially the issue of how one mode of water control develops into another.

Three broad modes of water control have appeared so far in history. Each of them has had, as we will see, its own set of techniques and apparatus, its own pattern of social relationships, its own arrangement of power. There was the local subsistence mode, the agrarian state mode, and the capitalist state mode, this last found in the modern American West.

In the first and simplest type of irrigation society, based on the local subsistence mode, water control relies on temporary structures and small-scale permanent works that interfere only minimally with the natural flow of streams. The needs served by that simple technology are basic and limited: water is diverted to grow food for direct, personal consumption. Little if any of that food ever leaves the community. It is, in a sense, water flowing directly into the mouths of those who have diverted it from nature—who have dug ditches with their own hands, thrown up their own brush or rock dams, and watched the vital liquid soak into the earth around their plants. In such cases authority over water distribution and management remains completely within the local community, with those who are the users. They have within themselves, which is to say, within their vernacular traditions, all the skill and expertise required to build and maintain their water system. They are self-reliant, self-sufficient, and self-managing as individuals and as a community, though nature still sets in the main the terms on which their lives are lived.

Within this primitive agricultural economy, where production for direct use prevails, the organization of power remains loose and unconsolidated.
To the extent it exists at all, power follows the lines of family and kinship. There is no centralized seat of command, no stratification of people into social and economic classes, no large accumulations of private wealth, no elaborate division of labor, no state. Men may have their separate jobs, women have theirs, and those distinctions may hardly be egalitarian. But the individual, whether male or female, like the community itself retains substantial autonomy. On men and women alike the task of water management sits lightly, demanding little regimentation, involving few orders from above, and proceeding essentially by informal consensus and engrained habit rather than by imposed demands. Where everyone in the community knows roughly as much as anyone else about the process of irrigation, where the work is within everyone's sphere of competence, and where the ends of water use are elemental human nutrition, there is no compelling reason for much hierarchy or discrimination. Power is diffused, elites are inchoate.1

Irrigation at this most fundamental level, it has been suggested, began on dry steppes many thousands of years ago, most likely around water holes where game animals gathered to drink. There they could be easily killed by primitive hunters—too easily killed, in fact. The hunters, when they had exhausted their meat supply in those places, when they began to feel hunger, experimented with a new stratagem, scratching channels in the soil with their digging sticks and leading rainwater off to clumps of wild plants. Though many anthropologists would argue that agriculture appeared long before there was any irrigation, that farmers and not hunters invented it, the origins remain disputed and obscure.2

In the prehistoric Owens Valley of California, the Paiute people apparently did practice just such an irrigation without agriculture. According to Julian Steward, they did not plant, till, or cultivate the earth but cleverly watched how nature waters the grasses and bulbs, then followed suit. Eventually they learned how to throw a temporary dam of boulders, brush, and mud across a creek where it meandered onto the valley floor. Above the dam, they cut shallow ditches to divert water toward their favorite wild food species. Quite possibly this practice was a completely indigenous invention, though duplicated by gatherers living in other parts of the earth. So irrigation may have begun in some places even in advance of horticulture.3

Elsewhere in the American Southwest, the control of water was an idea that journeyed northward from what is now Mexico and adapted itself to local farming needs. The Pueblo societies had long been skilled irrigators when the Spanish conquistadors came in the sixteenth century and found them watering their corn, squash, and melons. The Zuni, for example, had built canals to carry the snowmelt from the mountains to their fields, and they also scattered their crops to take advantage of any springs bubbling to the surface.4 With them, as with the nearby Hopi, decisions about water rested in the hands of the family groups or clans that made up the pueblo. But farther east along the Rio Grande, the pueblos faced a more difficult environmental challenge. The river was too powerful for any small clan, or even single pueblo, acting alone, to tame. Therefore, writes Edward Dozier, extravillage lines of coordination began to emerge, leading eventually to a more centralized system of governance. Many pueblos were united into a broad regional authority that, once perfected, could be turned to the practice of war against foreign peoples as well as to the control of water. When that happens, the local mode begins to disappear.5

The most extraordinary achievement in surviving the arid Southwest belongs to the Papago, the Bean People. They have dwelt for millennia in the Sonoran desert, a land that gets an average rainfall of less than ten inches, where saguaro, paloverde, and the Gila monster are among the flourishing forms of life. It was an unlikely place to take up farming, but they made a stunning success there until the white man's technology entered and destroyed their way of life.6 Papago agriculture, supplemented by hunting and gathering, was a mobile affair, touching the desert lightly. From April to September they collected cholla buds, wild greens, acorns, and fruit from the saguaro and prickly pear. For their protein they killed bighorn sheep, mule deer, peccary, and rabbits. But it was particularly in farming that they showed the most remarkable ingenuity. Whenever and wherever the rain fell, they rushed to get a bean crop raised. The bean on which they thrived was the tepary, a fast germinator. It had to be fast given the short growing season in the desert, where erratic rainfall may cause rivers suddenly to rise only to be followed in a couple of months by soil that is bone-dry again.

The Papago and other Sonoran groups perfected a technique called "floodplain irrigation," which was confined to a few river oxbow and arroyo mouths. Here is how it worked: A flash flood comes roaring down the sandy riverbed on a July day. It surges into a temporary catchment basin, where it immediately soaks into the soil or forms a pond for later diversion. Cottonwoods, willows, and burrobushes, some of them artificially planted by the Indians in fences along the watercourse, slow the current, spreading the water over a broad, flat surface and trapping the suspended silt for fertilizer. Then, in the mud left by the flood, the Papago plant their seeds, expecting to harvest them before the earth turns bricklike again. The fields irrigated in this way are small, irregular patches—two acres here, three or four there. This technique, at which they were so skilled, was also called
The traditional Papago had little margin for error or complacency, yet they can be described as a people of abundance, at least in the sense that everyone among them had enough to eat and enough leisure to spend, when work was done, on stories, games, and tranquility.

Guiding floodwater as the Papago did required a communal effort, for no solitary individual could handle the flood torrents. In 1895 an admiring white observer, W. J. McGee, called the system “the economy of solidarity,” adding that no creature, human or otherwise, could get along in the desert without it. Besides cooperation, Papago agriculture demonstrated an intimate knowledge of the desert ecosystem, stream hydraulics, and agronomy. But theirs was not a science devoted to the technical conquest of nature; rather, it aimed more modestly at achieving a secure coexistence and a thrifty subsistence.

Before the Papago and the related Pima Indians appeared in the desert, their Hohokam ancestors (the “finished” or “gone” people) built far more ambitiously, and they suffered for it. Between A.D. 300 and 900, the Hohokam constructed the first large-scale irrigation works in what is now the United States. Excavations carried out from the 1930s on have gradually laid bare an advanced canal network along the Gila River near Chandler, Arizona, as well as on the site of Tempe and Phoenix, threading out from the Salt River. The Hohokam dug those canals over a period of centuries, until at last they had created a spiderlike web that could tap the entire spring runoff, drawing it off upstream and taking it to their fields high above the riverbeds. The largest of their canals was 30 feet across, 7 feet deep, and 8 miles long; it was capable of bringing enough water to irrigate 8,000 acres. Rawhides and baskets hoisted on Indian shoulders were the engines that carried away the dirt dug from that and other trenches. But at last the Hohokam overreached themselves. Intensive irrigation has everywhere led to increasing concentrations of salts in the topsoil, poisoning the farmer’s fields. That nineteenth came to the Hohokam too, and they were forced one day to abandon their agriculture completely, leaving behind them whitened fields and dust-drifted canals. It was their children’s children who then had to learn how to get along in the desert with a lighter touch.

Enter again the Wittefogel theory of irrigation society. The social organization required of the Hohokam was substantially different from that needed for ak-chin farming. The latter was a self-contained village or family operation, where individuals of more or less equal standing came together to do a common job. But with the Hohokam, as among the Rio Grande pueblos, local self-management very soon did not suffice; downstream villages had to establish control over those living upstream if they were to get any water at all. The outcome was a more efficient utilization of rivers—if efficiency means complete, total use—and a more elaborate legal framework to resolve conflicting interests. Pushed far enough along, the big-scale irrigation system, according to Wittefogel’s theory, must replace local community control with a supravillage regime.

The Hohokam did not in fact have the full infrastructural base, nor perhaps did they have the intention, to go that far toward the consolidation of power. We have no firm evidence that they ever set up an elaborate bureaucracy to manage their Salt River waterworks. But were they on their way to concentrated rule when fate cut them down? Lacking supporting written evidence on precisely how the system was governed, reading only from the works themselves, archaeologists have reasoned their way to contradictory conclusions. Emil Haury and Richard Woodbury, two of the leading authorities on the Hohokam, maintain that the system could have been constructed and preserved by spontaneous, informal cooperation sustained over several hundred years. Village elders up and down the river could have worked out their peoples’ differences in times of emergency without yielding local sovereignty to a central command. This reasoning, however, is unconvincing, based as it is on the dubious assumption that the Hohokam were able to work with a single-mindedness and long-term harmony that other societies have not shown. A second and more credible argument comes from Bruce Masse, who has recently looked again at those Hohokam traces and concluded, “Some form of coordination or control was necessary not only within single irrigation systems but among all the systems in the Salt River Valley,” especially for dealing with periods of savage, unpredictable floods or droughts. Another scholar, D. E. Doyel, has gone further to insist that one village must have come to wield economic and social power over all the others. We will never know much about the actual distribution of power in Hohokam times, and what we know will always be uncertain, but that last conclusion has common sense on its side. The Hohokam, then, are an example of what can happen when a people outgrow the local mode: of the political and environmental consequences of bigness.

In other parts of the world there still survive a few examples of the local subsistence mode of irrigation, all of which seem, where details are available, to conform roughly to the lineaments of power described here. The societies trying to hold on to that mode are commonly of very ancient origin, defying the growing pressures of modern states. Unlike the Hohokam, they cause little ecological disturbance, and for that reason they are as stable as the hills from which they take their water. Some of them are found in Bali’s rice-paddy country, where the farmers long ago organized themselves in
subak—a form of "pluralistic collectivism," as Clifford Geertz terms it. Others may be Japanese irrigation cooperatives; there are over 100,000 of them in that nation, posing what some ambitious planners see as outmoded obstacles to a more scientific and profitable water management. Still others are the surviving remnants in Valencia, Spain, of feudal irrigation communities where originally there was only single-canal coordination, a very limited technology, and minimal intervillage consultation. Then, with at least a faint resemblance to these older varieties, there are those scattered communities in the American West made up of Hispanics, Mormons, or Montana ranchers, who continue to hang on to some part of their self-determination in the face of federal bureaucratization and external market pressures. What all those water communities have in common is that their technology, like their economy, is the handwork of the water users themselves; it is an indigenous, not an exogenous, artifact. There is not much need for capital or for specially trained experts in their creation. Typically a river in such communities continues to run largely on its natural way, giving up only a little of its substance to human demands, answering to the need for sustainability more than for efficiency. When such communities fail, and they sometimes do, it is usually the result of bitter, persistent disputes that no one locally can resolve, or it is the result of an invasion by outside armies or progress-makers. Where such communities endure, on the other hand, the water flows and flows through history, as nature and the human community join together in a single circle.

THE AGRARIAN STATE MODE

In the preindustrial world, agriculture dominated human life, and that agriculture was a mosaic of little patches. Here a bit of wheat grew, there a grove of date trees, over there rows and rows of peas. Around those patches of crops developed a parallel mosaic of villages, often standing in sight of one another but each one largely self-contained, like an archipelago at sea. The early Chinese philosopher-poet Lao-tse speaks of hearing the cock crow every morning in the next village but never visiting the place; it was a foreign country to him.

Irrigation on a limited scale did not disturb that insularity. In such cases, a river might flow through a string of villages down to the sea, sustaining and protecting their autonomy to a point. But wherever there was further development of irrigation works, that discreetness could not survive. Newer and bigger canals were built to flow, as it were, uphill to a commanding central authority. Out of such concerted efforts came a second kind of irrigation mode, the chief characteristic of which was that it interfered on a massive scale with the natural flow of the watershed, forcing water miles and miles out of its path of least resistance, running ever more complex risks of environmental degradation, requiring as a result of that danger a constant, intense vigilance. Reorganizing the fundamentals of nature in such a way demanded in turn the consolidation of the loose mosaic of villages into a broader, more powerful instrumentality. That process took place during the four millennia before Christ in some of the great desert landscapes of the world: in Arizona, as we have seen, in China, in India, and above all in the Middle East, where the Tigris, Euphrates, and Nile rivers rolled down from the mountaintops through wide, fertile, but extremely dry valleys.

This second type of irrigation society involved, in social terms, a radically disparate coupling of the humble and the grand. On the one side, there were those older villages where peasant agriculture went on much as before—local subsistence communities still trying to live as tiny worlds apart. On the other side stood a state, incipient or well advanced, with a bureaucratic organization to design and administer the water system. The state provided an adequate and dependable supply of water to the village, and in turn demanded a payment of tribute in the form of money or crops. A new redistributive economy thus appeared, wherein wealth flowed from the outlying village to the capital city and then, as expenditures for water engineering and maintenance, back outward again. Always, however, a large part of the wealth stayed in the capital city, where it paid for luxurious homes for a new ruling class or for standing armies to defend the irrigation society against its enemies, usually marauding nomads. Given enough tribute, which conversely meant given enough water supplied to the villages, the rulers could create an empire. And that is precisely what many of them did. Each time they extended their canals into new territory, they added to their domain, and, in turn, increased their tribute, until at last their domain extended well beyond any conceivable gift of water. In those desert empires, the shape of power, therefore, was like that of some primitive marine animal: a vast amorphous tissue of villages, weak and disorganized, dominated by a more highly evolved central nervous system. Wittfogel called this animal a hydraulic society. But to make matters clearer, since I will argue that hydraulic societies come in more than his one variety, we can call this second type the agrarian state.
The reality of human existence in the agrarian state was that many did the sweaty labor while the few gave directions and took away much of the product. To get a more reliable water supply or better flood protection than their single village could provide, peasants had to pay something besides tribute; they had to perform immense, backbreaking physical labor. They found themselves not only dredging heavy loads of dirt from canal bottoms but also tugging along ornate equipages on which their new masters rode in fine style. The price paid for more intensive, ambitious irrigation, in other words, was loss of autonomy to an entrenched, extrafamily or clan authority, creating a rigid hierarchy based on the division of labor into workers and managers.

Undoubtedly there were practical economic reasons why the mass of people put up with this loss of autonomy, this heavy toil. The chief one was no doubt the need for increased food production. There may, however, have been other kinds of reasons why they were unable to protest vigorously and throw off their chains, reasons having to do with the ecology of irrigation. Both the warm climates typically found in the arid lands where irrigation was invented and the abundance of shallow waterways there created ideal conditions for the proliferation of human parasites. Often the peasant would stand all day long in a flooded rice paddy, exposed continuously to an exploding population of pathogens, and no one was, until recently, aware of the danger. The most serious of these disease organisms associated with irrigation (both in ancient times and today) was the blood fluke. It causes schistosomiasis, a chronic, nasty, debilitating ailment, which today affects as many as 100 million people. The fluke lives part of its life in the snails that thrive in irrigation ditches, the rest of its life in the human body. Adding to the health problems was the use of feces as fertilizer in countries like China. Tapeworms spread from the excrement through the water and into the peasants, until as much as 90 percent of the population was infected. One historian, William McNeill, suspects that “the despotic governments characteristic of societies dependent on irrigation agriculture” owed something to the degenerating effects of these diseases on the common people, who became too listless to resist or revolt.2

The rulers in this more advanced irrigation regime were, for the most part, not owners of the land itself. Land remained the possession of the peasants, acting as individuals or in common, or it was placed in the abstract hands of the state. Nor did the rulers actually claim to own the water they delivered. Instead, their power came from the technological control they exercised over the rivers; they were a managerial elite.3 Better than the peasants, they understood when the river currents would rise and fall, how a ditch could be constructed so it would not silt up with sediment, and what the river gods wanted from humans. This group of rulers, Wittfogel points out, sponsored the first professional studies in hydraulics, astronomy, and mathematics. In fact, much of modern science and engineering has its distant foundations in water-control efforts. Religion too came within the purview of the directing elite, as priests took charge of leading the peasantry in worshipping such river gods as Isis, Osiris, Hapi of the Nile, Ninurta of Mesopotamia, and Ganga, the ancient Hindu deity who sat in Siva’s wavy hair. The priestly branch of the ruling echelon reminded peasants constantly that they were to respect and obey their superiors and be thankful for their benevolent control. The village may still have owned the land, but the mandarins owned authority.

In many agrarian states, irrigation helped bring to power not only a bureaucracy buttressed by priests but also a single, autocratic sovereign at the head of things. He might have been called an emperor, a king, or a pharaoh, but in any case to dominate nature was his special personal mission, his proud, egocentric boast. The fabled Assyrian ruler Queen Semiramis reputedly inscribed on her tomb what may stand as the dominant ethos of the advanced hydraulic civilizations: “I constrained the mighty river to flow according to my will and led its water to fertilize lands that had before been barren and without inhabitants.”5

Nowhere in Papago culture do we find so self-inflating an expression, so unabashedly aggressive an attitude toward the earth. It was in the larger water-control systems of the Middle East, not among the Papago, that humans first began to take the world forcefully into their own hands. They did so by setting up a representative person as a god and giving him or her absolute dominion over the desert, to redeem it and make it yield riches where before there was scarcity.

A set of high public officials, a grandiose sovereign, a program of conquest—and there you have the archetype of the ancient irrigation state. Scholars have not yet agreed which came first, the state or the heavy waterworks, and it is likely that they will never resolve the question. Do chickens make eggs, or eggs make chickens? It hardly matters when we sit down to dinner. A massive irrigation apparatus obviously could not appear in advance of the finances, planning, and technical direction of a power complex. At the same time it is clear that all of the early states emerged in arid or semiarid landscapes, all relied on irrigation.6

In Wittfogel’s defense, it must be said that he never claimed that every state emerged initially from the single task of water control, though he did believe that irrigation must always have had a significant consolidating effect on political power.
No matter whether traditionally nonhydraulic leaders initiated or seized the incipient hydraulic "apparatus," or whether the masters of this apparatus became the motive force behind all important functions, there can be no doubt that in all these cases the resulting regime was decisively shaped by the leadership and social control required by hydraulic agriculture.7

He may have been in his early years too narrowly an ecological and technological determinist, but Wittfogel was not simple-minded in thinking about how history is made. Irrigation and the state, he indicates here, grew up synergistically, each supporting the other. And that is where we too must let the issue rest.

Standing before the massifying complex of water control, the ordinary peasant must have felt himself to be very feeble, without organization or arcane knowledge. Back in his own village, however, he lived much of the time as his ancestors had lived, a quasi-master at least of his fate. With his family and neighbors he continued deciding when to plant and harvest, how to raise his children, and what to do about strictly local affairs. The overarching state was only "semimanagerial," which is to say it was far away most of the time, lacked modern communications (canal barges and human runners being its main methods of sending orders and gathering information), and could establish only a very limited control over peasant thinking.8 When the crops were all in, villagers remitted to the capital city the taxes they owed, then withdrew to themselves once more, enjoying their beggar's democracy for the greater part of the year.

The most important challenge to that lingering, remnant individual and community autonomy was the corvée, a drafted army in which unpaid laborers from the peasantry had to serve at the state's demand. In the absence of advanced machinery, central planners relied on drafting human muscle to do the work of constructing and keeping up the waterworks. It was another kind of taxation, imposed in the name of the common good but further enriching the state.9 One of our best accounts of how the corvée operated comes from Julien Barois, a nineteenth-century French hydrologist, who observed the system in Egypt on the eve of its abolition. Every December the government's agents prepared an estimate of labor needed along the Nile: the number of fellahin (peasants) needed, the number of work days required, the irrigation repair jobs to be done. From mid-January to the end of July, men assembled in camps, along with their wives and children, to work under the supervision of trained engineers. Theoretically, all able-bodied males between fifteen and fifty years old, except for the city dwellers who owned no land and the desert Bedouins, who scorned agriculture, had to come along if called. In reality, the few rich farmers with large landholdings got exemption for themselves and their fields hands by paying a sum of money. To build the Mahnudiya Canal for the city of Alexandria's water supply, from 1818 to 1820, about 300,000 men toiled under the broiling sun. Irrigation projects called on similar armies. The workers' only tools were short-handed hoes and baskets made from the stems of palms. They would loosen the earth in the ditches, often working in water up to their ankles, a slippery, miry, steamy chore. Men, and sometimes children, balanced the loaded baskets on their heads and climbed as much as thirty meters up the embankment to dump them. This was, in Barois's words, "a true labor of Sisyphus, because each year this same earth slides to the bottom of the bed in high water and has to be removed with the same trouble and fatigue."10 The standard tool of the supervising state official was the whip, laid hard on the bare backs of lagging peasants. In all of the major irrigated regions of Asia, Africa, and America, the corvée existed for thousands of years, constituting the most vivid experience the common people had of what Barois termed "despotism."

Once conscripted and taught to obey, the hydraulic army could serve the ruling class in a number of ways. Besides keeping the water flowing, it could lay down roads from the provinces to the capital city. It could improve inland water transportation. It could build ornate palaces, surrounded by lush green gardens symbolizing the rulers' command over arid nature. And it could erect pyramids, ziggurats, hilltop temples, and cold marble tombs where the dead elite could be laid out in style. Because irrigated affluence led to envy among outsiders and threats of invasion, strong fortifications had to be built. Though the peasants did not make good warriors—their diseases left them too weak to fight—they could construct the state's defenses. During the Sui dynasty, for instance, over a million workers toiled on the Great Wall of China to defend against invaders coming across the Mongolian plain. The agrarian state thus watered the drylands and raised a crop of gargantuan monuments not only to its self-esteem but also to its fear.11

These are the broad outlines of the ancient irrigation states, a deliberate lumping together of admittedly diverse examples to make their general principles clear. Now, however, we should do a little splitting. Hydraulic societies can be broken down, following Wittfogel again, as either compact or loose, depending on the extent to which irrigation was the norm.12 In the compact subspecies, irrigating fields was the standard practice through-
out the society, occurring on over half of all its cultivated acreage (most commonly it was concentrated in a single major river valley), or at least producing more than half the society’s annual crop. The loose subspecies, in contrast, irrigated only a minor part of its arable land and depended on rainfall for providing most of its food supply. In this latter case the irrigated area, though smaller, became nonetheless a powerful economic center, exercising influence over a broad periphery of rainfall-fed villages. Classic examples of the compact agrarian state are Egypt and the Tigris-Euphrates valley civilizations, ranging from the Sumerians to the Sassanians. For models of the loose type there are most notably China and India, possibly Ceylon. And there are still others, some of them eluding strict classification: Vietnam, Hawaii, Fiji, the African kingdom of Benin, and the Inca empire of Peru, all of them possessing distinctive traits, all of them for the sake of brevity ignored here. Seeing the essential features of the compact and loose variations on the agrarian state is the key. They can be grasped through a representative example of each.

The most famous irrigated agricultural society in world history was the compact system of Egypt, which as far back as five thousand years ago drew on the reddish-brown waters of the Nile River as it flowed northward. “Egypt,” observed Herodotus and millions of schoolchildren after him, “is the gift of the Nile.” Every June, with an almost clockwork regularity, the lower river began to rise, swollen by tropical rains in the African high country. By late September the whole of its floodplain had become a turbid lake. Within another month, the lake had receded back into the main channel, leaving behind an odoriferous residue of silt. Before humans began to plow up that floodplain to grow wheat and lentils, the borders of the upper Nile were a wild green savannah grazed by elephants and gazelles, while the delta was an intricate wetland of papyrus, reeds, and crocodiles. Away from that narrow ribbon of life stretched an awesome desert void. Sometime around 3000 B.C., during the reign of Menes, first of the Old Kingdom potentates, artificial irrigation appeared. Much later the Ptolemies (beginning with Ptolemy I in 305 B.C.) extended and intensified agriculture to a degree unmatched until the nineteenth century. They reorganized the entire water system into standardized administrative subdivisions that answered directly to the central government in Alexandria. For a brief time after that, the Romans took control of the river, making Egypt the chief granary of their empire. Later still, there were the Muslims, the Turks, and the Ottoman conquerors. Out of the water, silt, and strip of green came bread and power for one autocracy after another.

In the modern era, Egypt would build dams at Aswan and other sites that would drastically alter the river’s ecosystem. But for most of its water history a much less intrusive manipulation called basin irrigation was the pattern. Transverse ditches created a series of entrapment basins, averaging 5,000 to 10,000 hectares apiece and imperceptibly stairstepping downstream. High water flowed into those basins via canals, flooding to a depth of three to six feet, wetting the ground thoroughly and depositing suspended mud, then draining into the next lower basin, and finally running off into the Nile and to the Mediterranean. Where gardens and fields stood too high above the river level, the Egyptians employed the swipe, or shaduf, a counterpoised bucket on a beam that pivoted on a pair of uprights, sweeping water up and into a trough, which led it away to the crop rows. With this ingenious tool, a single man could raise 600 gallons a day.

Relying on the swipe and on the river’s own steady rhythms, the Egyptian fellahin never had to face the nemesis of salt accumulation as did the Hohokam; there was enough water in the water-to-land ratio to flush the salts away. And the deposited silt was such a splendid fertilizer that the same fields produced undiminished crops for what seemed like forever. An Egyptian geographer, Gamal Hamdan, calls the basin system “clearly symbiotic,” that is, it was an ecologically compatible, stable adaptation to the environment. But then he adds:

> It was an adaptation to, rather than of, nature. It was a passive adaptation; only a very partial use of the land was made while it let the bulk of the Nile water run to waste in the sea. It limited agriculture to one-third of the year and did not permit any substantial extension of the cultivated area.

Following a similar logic of discontent, Egypt in the nineteenth century converted to a perennial irrigation system that required expensive storage reservoirs, more canals and headgates to regulate the passage of water, artificial fertilizers to replace sediment trapped in the reservoirs, and considerable disruption of rural life. In its favor, the new system made possible several crops a year, including cotton for exporting to the world markets. So Egypt abandoned its time-tested ways and became rich—or at least some of its citizens did. It shipped its products abroad until it no longer raised enough food to feed itself. And step by step it came to confront a mounting ecological backlash: salinity poisoning, degraded fisheries, and higher levels of schistosomiasis than ever before.

Though it was by modern technical standards primitive and relatively benign in its riverine impact, the old Egyptian basin plan still required a high degree of coordinated control. A network of river watchers kept their
eyes on the “nilometers” (depth scales engraved on stone pilings) that measured the water level at Memphis, Cairo, and other settlements. Up and down the Nile other officials stood ready to divert the rising current as it reached them. Laws and regulations to ensure an orderly apportionment of the flood had to be established. A program of water and agricultural planning, including food storage for drought years, helped give the capital city and its long succession of pharaohs a great influence over local people. In their book *Egyptian Irrigation*, William Willcocks and J. J. Craig concluded that “the authority of the Government in an absolutely rainless country like Egypt becomes gradually . . . autocratic,” as dispersed tribunals are more and more “forced to admit its absolute supremacy.” Agreeing with that conclusion, Gamal Hamdan writes: “The efficient running of the basin system depended entirely on a strong, centralized government, for every upstream basin could endanger the riparian rights of those downstream.”

Egypt, throughout most of its history, resembled one of its pyramids: there was a lofty pinnacle where the rulers sat and a broad base where an anonymous, voiceless peasantry toiled. Irrigation was the main factor, the means of production, creating that pyramid.21

One of the few dissenters from that consensus view is the American archaeologist Karl Butzer. The basin system, he claims, was naturally compartmentalized, at least in its earliest phase, and could have been operated under completely decentralized management. The rise of the pharaohs, he goes on, must have had other causes than irrigation, though he does not suggest what they might have been.22 But even if one grants his argument, or simply puts it aside as unresolvable with the evidence available, there is plenty in Butzer’s own work to show how the subsequent elaboration of irrigation could have necessitated political centralization in Egypt. When it was lacking and the water or food supply failed, the society collapsed into violent civil war, starvation, rotting corpses in the Nile, cannibalism, roving bands of marauders, and civil chaos that left the country vulnerable to outside aggressors. Governments, no matter how strong, could not always avoid such calamities, but it stands to reason that most of them tried desperately to do so and that they justified their power accumulation on the premise of preventing them.

Where virtually an entire country relied on a single grand river and the irrigation from it, as in Egypt, the flow of power to the center was simple, unambiguous, and straightforward. But in the second subspecies, the loose model of the agrarian state, the connections were more subtle, the Wittfogel theory more problematical. China is the prime test case, and a very complicated one it is, where generalizations are not easy to come by.23 In addition to the familiar bureaucratic apparatus and teeming peasant class, there was from an early point in China’s history a large group of private landowners, the gentry, who, along with city merchants, exercised considerable clout. Much of China, especially in the south, is temperate and well watered. Irrigation was not everywhere a necessity, nor were agronomic bureau- crats. Was China then a hydraulic society or not? Did river control there promote despotism? Was China more like Japan or Europe—a feudal world with diffuse governance? Was its evolution into empire the result of factors other than water management?

“"The Chinese people,” declares Joseph Needham, “have been outstanding among the nations of the world in their control and use of water.”24 Hydraulic engineering, or shui li, was more advanced there than in any other premodern society. Historical records going back to the eighth century B.C. mention irrigation. Like Egypt, China was never an avid builder of dams and reservoirs; its expertise lay more in flood-control works and in elegant canals, carrying both taxes to the capital city (mainly in the form of rice) and, especially in the semiarid north, water for crops. Its early triumphs include the Cheng State Canal (completed in 560 B.C.), the Cheng- kuo Canal (246 B.C.), and the Grand Canal (begun in 581 B.C.), which eventually ran the full 1,100 miles from Peking to the port of Hangchou. The rise of Imperial China, commencing with the Han dynasty of the third century B.C., owes much to some forty major water projects carried out to control “China’s Sorrow,” the Huang Ho, or Yellow River, which has wreaked more havoc on humankind than any other.25 Clearly, this agrarian state did practice large-scale water manipulation and can accurately be called a hydraulic civilization. But it was not necessarily, as Wittfogel would have it, a totalitarian one.

Water became in China the profoundest symbol for understanding nature, human affairs, and the right principles for governing both. In contrast to the modern mind-controlling regimes Wittfogel knew, in China some diversity of opinion was allowed on these matters. The two most important schools of water thought were the Confucians, who dominated official circles, and the Taoists, a dissentient group. In the Tao Te Ching, from which the philosophy of Taoism primarily derives, water appears as the essence of nature and a model for human conduct. It is a substance that does not strive or resist, yielding easily as it does to any obstacles in its path, yet in the end it wears down the most determined opposition. A great river, it was said, runs lower than any of its tributaries, receiving into itself “all things under heaven.” From this model, in nature Taoists drew lessons for their rulers. They should govern with the least show of force, seeking to protect their people from violent passions and acquisitive urges; they should
not become arrogant or seek to impose their will on village affairs; they
should abolish the brutal corvée. The philosophy of naturalism, quietism,
and humility behind such moral lessons for leaders had implications also
for water engineering. *Wu wei*, the idea of moving with the flow of a stream
and doing nothing contrary to nature, meant opposing structures that too
rigidly confined rivers or wholly diverted them from their course.
The connection between engineering and political strategies was put concisely
by the Taoist engineer Chia Jang, of the Han period: "Those who are good
at controlling water give it the best opportunity to flow away, those who are
good at controlling the people give them plenty of chance to talk."²⁶

Confucianism, in contrast, taught a more domineering stance toward
water and the common people alike. Rivers must be disciplined—a favorite
word of this school—by constructing strong, high dikes to pinch the water in,
forcing it to move more rapidly toward the sea. Rivers too must be made
to do hard work for the common good, as defined by sages and rulers.
Though Confucian scholars could also talk enthusiastically about living a
contemplative life on the banks of a stream, typically they advocated a more
active, commanding attitude toward the natural environment. Pursuit of
virtue and social welfare, respect for status, and reverence for one's elders
were higher principles than following, with the Taoists, the way of nature.
Operating mainly by this Confucian point of view, China's leaders
transformed their country into a wealthy, powerful, hierarchically organized
empire, one of history's greatest.

The Chinese landscape and society, however, were both too large and too
complex ever to be brought under an unreliably despotic rule, whether
one instructed by Confucianism or not. Wittfogel realized as much when he
described China as a loose type. Undeniably there was despotism there, so
that from time to time emperors compelled men to kneel and kiss their feet,
mandarins may have held life-and-death sway over local populations,
and peasants on irrigation projects may often have felt the lash stinging
their backs and legs. But in contrast to Egypt, China’s ruling class was a diverse,
divided, multcentered agglomeration. The emperor had constantly to mobili-
ize support from a wide spectrum of the population in order to stay in
power; coercion alone could not work in the face of the centrifugal tенден-
cies among the country’s far-flung regions and the internal bureaucratic
disputes over social goals. As S. N. Eisenstadt points out, the Chinese
emperors, at times finding themselves caught between rival Confucian and
Taoist forces, tried to recruit allies among both groups to play one off
against the other. And through all the cycles of dynastic rise and fall, the
landed gentry maintained a position of some independence. China was,

Eisenstadt admits, a centralized state, but there was not an altogether
unchecked, simple power complex running it.²⁷

But if Wittfogel was wrong in seeing too much of Brave New World in
Old China, in finding "total power" where there was only a powerful center,
he was right to this extent: water control did enable the state partially to
overcome diffusionary tendencies. By developing an irrigation economy in
a critical geographical area, the state could dominate a wider territory than
before, strengthening its hand against other internal forces. Intensification
of agriculture in that core area produced grain tribute for the emperor and
his underlings, the bureaucrats and army officers. Ch’ao-t’ing Chi shows how
such "key economic areas" have appeared again and again in Chinese
history, becoming instruments of control over surrounding, subordinate
lands where rainfall farming persisted, much as setting up a string of forts
can secure a claim to a frontier. Thus irrigation development repeatedly
became "a powerful weapon in social and political struggles."²⁸ By extend-
ing this mode of production, the central government waxed stronger, though
in a relative, shifting, not absolute, sense.

Taken together, the compact and the loose agrarian states created, with
the aid of irrigation, one of the most distinctive relationships humans have
ever worked out with nature. It was not always a sustainable relationship
—in most places not nearly so ecologically stable as the local subsistence
mode. It took a monstrous toll in human life and dignity, though it was less
repressive than Wittfogel’s tarbrush allusions to Stalinism represent. One
does not have to read into that hydraulic past the totalitarian tendencies of
our own time to recognize the terrible costs paid by the peasants.

Scanted by Wittfogel, and most other scholars, because it is so difficult
to determine, is the more fundamental question why societies chose to pay
so stiff a price to get more water. In every case there was a critical moment
when they might have refused to do so, when they might have rejected
large-scale irrigation and its social consequences. Once that moment had
passed, however, and a decision to go ahead had been made, they found
they had forged for themselves a fate they could not easily undo. It was not
the desert or drylands around them which made that decision to intensify
water control, though in some places a change in climate, a siege of drought,
the threat of impending starvation may have left people with few alter-
 natives. More frequently, the explanation must be that too many groups were
struggling to use a limited resource, a situation that led them to require and
give power to an adjudicator. In still other cases the decisive impulse
undoubtedly was more a matter of ideas than hunger, of ambitions more
than survival, of a thirst for power more than for water. It could also have
been the outcome of ideology, whether that ideology came from commonly shared beliefs and attitudes or from manipulations by a conniving few—ideology in the form of religion, philosophy, dreams, and rationalizations of conquest.⁵⁹ That ideological force, so clearly present in modern examples of irrigation development, must have been far more pervasive in ancient times than we have any way of proving. In any case, whatever the driving motive may have been, the outcome in Egypt, China, and elsewhere was that societies began the long, laborious, and dangerous task of bending the rivers of earth to human will.

THE CAPITALIST STATE MODE

Only fragments remain today of those intricate Old World hydraulic complexes that had such decisive consequences. Today, most of the systems lie in ruins, buried in “the lone and level sands” like Shelley’s statue of Ozymandias, all but vanished on the ground and visible only from the air. Water may still gurgle through a stone-embanked Chinese ditch dug over a thousand years ago, and village farmers in Madras may still wait for the annual monsoon to fill a tank hollowed out by a legendary maharajah, but fragments do not make systems. Where water control is carried out comprehensively these days, it is by means of modern technology—electric pumps that can lift an entire river over a mountain range or mammoth concrete dams that create artificial lakes over a hundred miles long. The early hydraulic societies, organized along agrarian state lines, have now all disappeared along with the apparatus they operated. In their place stand the new modern hydraulic societies, the most developed of them sprawling in the arid American West, and these societies express the reigning mind of the marketplace men, the technological wizards, and the ubiquitous state planners.

Karl Wittfogel refused to gather up his ideas about water and power and make an imaginative leap with them into that water modernity. Doing so would have required him to examine critically his new home, the United States, and he was not prepared for that inquiry. In fact, his split with the Marxists had made him an increasingly stubborn apologist for America and other western capitalist countries as promoters of freedom and progress. On several occasions he inspected the newest achievements in water engineer-

ing and always came away complacent about modern hydraulics. He insisted that the approach to social organization behind them differed from both the archaic despotsms and their recent communist descendants. In 1946, he and his wife, Esther Goldfrank, visited the Tennessee Valley Authority works, which were among the most ambitious water-control enterprises in the world. Fifteen years later the Wittfogels toured the Snowy Mountains irrigation scheme in Australia. “What I have been saying about traditional China,” he wrote, “is not valid for multicentered societies.” Those new “free world” projects could not be despotic because private property was now the norm, and there was no single, overpowering state in control; rather, there was in cases like the United States and Australia a balance among many countervailing forces. One found not a “ruling” but a “controlled” bureaucracy. So once more Wittfogel had to scrap his original ecological argument about history. It was not, after all, the interaction of nature and technology that had made Egypt what it was, but prior social “organization.” And for some reason social organization in the old desert empires had been despotic, while in the modern western countries it was open and democratic.

A few of Wittfogel’s critics have completely overlooked the distinction he made between capitalist and command economies and have mistakenly accused him of branding all irrigation regimes as tyrannical. They sometimes seize on the American West as an exception to what they take to be his grim generalizations. For instance, Lon Fuller, a Harvard law professor who grew up in the Imperial Valley of California and rosily remembers that world as just and communal, has lambasted Wittfogel for casting a shadow over all irrigation. But in the course of his rambling critique of the Oriental-despotism argument, he actually ends up restating Wittfogel’s own discriminations. He accepts completely the idea that water control may have led to despotism in early hydraulic societies, adding only that their problem was they “took on too difficult a social task too soon.” With the invention of the marketplace, however, more benign mechanisms for sorting out conflicting interests came into being. Now we have the invisible hand of rational self-interest, Fuller believes, to resolve water disputes peacefully and achieve a fair distribution of benefits. We don’t even need the courts, for individuals can now solve their own conflicts without external interference, regaining the autonomy they once enjoyed in developing river resources. All of this progress has been made possible, so Fuller implies, by the rise of capitalism. Its emergence has dispersed concentrated power, put negotiation and contract in the place of repressive authority, and assured that democracy will flourish in the desert.²

Unfortunately, it just isn’t so. Another, closer look at modern examples
of water control, as in the American West, does not support either Fuller’s or Wittfogel’s comforting notion of progressive liberation of humans from their tools of desert conquest. Quite the contrary: capitalism has created over the past hundred years a new, distinctive type of hydraulic-society, one that demonstrates once more how the domination of nature can lead to the domination of some people over others. Recognizing this, certain important questions must be addressed. What does this latest mode of water control have in common with its predecessors? What are its unique qualities and tendencies? How has it approached that essential substance of life, water? What path of cultural evolution has brought it to its present condition of mastery over the drylands? What inner and outer forces have driven it to achieve mastery? In what ways has that ecological domination expressed in the new water systems shaped the social order of places like the American West, creating new structures of power there, reconcentrating wealth and authority?

Interestingly, free-market liberals like Fuller and anticomunist ideologues like Wittfogel, along with some technocratically inclined radicals, have all refused to acknowledge how the fate of humans is inextricably linked to that of nature—in the present and in the past. However, like many of the most important facts in our lives, this cannot be easily proved or dismissed in the way we would handle a scientific proposition—one which says, for instance, that heating a candle will cause it to melt. Instead, we must strive to find and test a historical truth that has consistent, observable, and demonstrable expressions. When that very wise Englishman C. S. Lewis wrote, “What we call Man’s power over Nature turns out to be a power exercised by some men over other men with Nature as its instrument,” he had that kind of truth in mind. And when the contemporary French social theorist André Gorz declares, “The total domination of nature inevitably entails a domination of people by the techniques of domination,” the question of historical truth, not a chemical reaction, is raised. A historical truth cannot be nicely calibrated or made exactly predictive without being reduced to triviality. In the case of the human implications of intensified water control, it is not possible to argue that this particular dam or that aqueduct will have precisely and in every place the same social impact. Establishing historical truths involves a looser, though still demanding, kind of analysis. It is not a strict determinism of cause-and-effect but rather an imaginative grasp of subtly interacting relationships. Only by that higher approach to historical explanation can we determine, Wittfogel and Fuller to the contrary notwithstanding, whether the fate of the hydraulic cycle in the ancient desert regimes has any modern echoes.

Another contemporary social philosopher, Lewis Mumford, has made much the same point as C. S. Lewis and André Gorz. In his *Technics and Human Development* Mumford has argued that the Age of the Pyramids has reappeared in spirit and purpose, bent as before on establishing “absolute centralized control over both nature and man.” He calls that restoration “Megamachine.” The challenge for historians is not to whittle away his observation with positivistic knives, but to test it in specific examples, and if it seems valid, to make it as clear and coherent as possible. The best place to carry out that investigation, I believe, is in the arid American West, through a study of the history of its water-control efforts.

This third and latest mode of water control (it may not be the last, of course) is one created by the modern capitalist state. In this mode there are two roughly equivalent centers of power: a private sector of agriculturists and a public sector made up of bureaucratic planners and elected representatives. Neither group is autonomous. Both need each other, reinforce each other’s values, compete for the upper hand without lasting success, and finally agree to work together to achieve a control over nature that is unprecedentedly thorough.

The agriculturists who constitute the private sector have become in recent times too rich and well organized, when compared with the archaic peasant class, to be cowed into submission by any state. Instead of serving in an involuntary corvée, they pay taxes to the state, often complaining of the high, extortionate rates, or they succeed in compelling others to pay the taxes for them to build and maintain their waterworks. In the world’s labor markets they hire an anonymous human army, which they use to turn the arid spaces into green fields. In the West, those workers have come from Mexico, China, Japan, the Philippines, and India, as well as Oklahoma, Texas, and Mississippi. Those hired field hands, not their landowning employers, are the men and women who have constituted the wage-based answer to the corvée, sweating every bit as much as the Egyptian fellahin did. They also have felt the lash of an overseer or the club of a policeman, but they have had no land or village of their own to which they could escape when the season was ended. Consequently, they have been perpetual movers, with a tent or automobile in some cases serving as their only home, a city welfare office their only off-season means of support. With these wage employees, the modern domination of water becomes most vividly and unmistakably translated into hierarchy. Those who rule in that situation are not only those who hire and pay but also all those who take part in designing and controlling the hydraulic means of production. Workers serve as instruments of environmental manipulation; rivers, in turn, become means of control over workers.

The other power center emerging from this mode is the state, which
furnishes as it did in archaic times the capital for big-scale engineering and the technical know-how to make it run smoothly. One of the most familiar laws of power is that he who has the capital commands. In the American West, the federal government through its Bureau of Reclamation has put up most of the capital. It therefore exerts enormous leverage over local destinies. When that same government also came to supply most of the hydraulic expertise, it gathered into its hands another means of control, one that has taken on increasing significance as the scale and complexity of water manipulation has grown. Furthermore, the state has asserted, through its various levels and agencies, the authority to settle conflicting claims, to decide which users can tap public resources, and to define what projects are worth undertaking. There is no pharaoh in that arrangement of power—no single despotic ruler who personifies human control over the environment. In the new mode, power becomes faceless and impersonal, so much so in fact that many are unaware it exists.

The most fundamental characteristic of the latest irrigation mode is its behavior toward nature and the underlying attitudes on which it is based. Water in the capitalist state has no intrinsic value, no integrity that must be respected. Water is no longer valued as a divinely appointed means for survival, for producing and reproducing human life, as it was in local subsistence communities. Nor is it an awe-inspiring, animistic ally in a quest for political empire, as it was in the agrarian states. It has now become a commodity that is bought and sold and used to make other commodities that can be bought and sold and carried to the marketplace. It is, in other words, purely and abstractly a commercial instrument. All mystery disappears from its depths, all gods depart, all contemplation of its flow ceases. It becomes so many "acre-feet" bailed in a reservoir, so many "kilowatt-hours" of generating capacity to be spent, so many bales of cotton or carloads of oranges to be sold around the globe. And in that new language of market calculation lies an assertion of ultimate power over nature—a domination that is absolute, total, and free from all restraint.

The behavior that follows making water into a commodity is aggressively manipulative beyond any previous historical experience. Science and technology are given a place of honor in the capitalist state and put to work devising ways to extract from every river whatever cash it can produce. Where nature seemingly puts limits on human wealth, engineering presumes to bring unlimited plenty. Even in the desert, where men and women confront scarcity in its oldest form—not the deprivation of a particular industrial resource, which is always a cultural contrivance, but the lack of a basic biological necessity—every form of growth is considered possible. Undaunted by any deficiency, unwilling to concede any landscape as unin-

The American development of that new mode of water control provides the chief substance then of the chapters that follow. To understand more thoroughly the broad theoretical issues involved, however, we might briefly do here what Wittfogel failed to do: go back to his original post-World War One milieu in Germany and to some of the social philosophers with whom he was early associated. In particular, we can find much that is relevant to understanding water and the capitalist state in the work of the Frankfurt School of critical theory. Wittfogel had been one of its first members, then drifted away; had he remained in touch with his Frankfurt colleagues, they might have opened his eyes to the contemporary relevance of his irrigation work. The common theme of those critical theorists was that domination, not the freedom promised by progress boosters, is the lot of twentieth-century humans, in the so-called democracies as well as in the unmistakably totalitarian nations. Furthermore, human domination derives from the incessant modern drive to remake nature.

The Frankfurt School, officially known as the Institute for Social Research, was established in 1923 with funds provided by a wealthy benefactor. Its first director, Carl Grünberg, who served from 1923 to 1929 and was the first avowed Marxist to hold a chair in a German university, invited Wittfogel to join the institute and contribute to its orthodox Marxist studies. Then in 1929 Grünberg was replaced by the brilliant young social thinker Max Horkheimer, son of a Stuttgart manufacturer. As director, he would be anything but orthodox. With his intellectual soul mate Theodor Adorno, he soon gave the institute a new tone and direction, one that would have profound impact on twentieth-century radical thought around the world. Others who became part of the Frankfurt group included Leo Löwenthal, Erich Fromm, Friedrich Pollock, Herbert Marcuse, and much later, Jürgen Habermas, a distinct branch unto himself. There was no firm party line followed in that group, but they did share some common themes. All of them rejected, to one extent or another, what was becoming a doctrinaire kind of Marxism, one which in their view denied free inquiry, reduced cultural analysis to a sterile economic materialism, and encouraged political
repression. The young Marx, the romantic idealist of the famous 1844 Manuscripts, was their kind of radical: a rebel, a humanist, a defender of the untrammeled individual spirit. Following that model, not the older Marx of Capital or his overly loyal disciples, they took a stand against whatever threatened critical inquiry, beginning with the bourgeois class of profit maximizers but also including the positivists, the industrial organizers, the architects of mass culture, and the bureaucracy—in sum, as Horkheimer and Adorno put it, all those responsible for creating “the world of the administered life.” At that point Wittfogel, despite an obvious overlapping of his concerns with theirs, walked out. He wanted a science of society, not a philosophy of values. Only much later in his life, after his main work was finished, did he renew those ties.

Perhaps the most important contribution made by Horkheimer and the others was to bring radical discussion back to the “superstructure,” the realm of ideas, ideologies, and philosophies, and to treat these as decisive historical forces in their own right. They were not to be regarded merely as reflexes of a society’s mode of production but as movers and shapers. Nowhere is this more true than in the modern period of the past two hundred years, when books, schooling, and mass media have enabled people to articulate their ideas and manipulate those of others on a wider scale than ever before. Ideas under those conditions may change the very basis of existence, or they may delay changes, rationalize the status quo, and protect vested interests. The study of the capitalist state irritation mode, Horkheimer would have said, must give particular attention to the ideological matrix that has surrounded it, especially to those ideas that concern nature.

In capitalist society the prevailing way of perceiving and dealing with the natural environment is through instrumental reason. It is our equivalent for the Taoism of China, the worship of Osiris in ancient Egypt, and the animistic religion of the Papago—once our source of faith, value, ethics, purpose, and analysis. But that comparison can mislead, for the peculiarity of instrumental thought is that it destroys traditional religion and value, denigrates all genuine philosophy, recognizes no transcending purpose, and consequently leaves a deep void in our relationship with nature. “Reason,” writes Horkheimer,

for a long period meant the activity of understanding and assimilating the eternal ideas which were to function as goals for men. Today, on the contrary, it is not only the business but the essential work of reason to find means for the goals one adopts at any given time.\(^7\)

Instrumental reason is thinking carefully and systematically about means while ignoring the problem of ends. Business employs it regularly, for the end of business is assumed to be the obvious one of making money and only the methods for accomplishing that goal are worth bothering about. In technology too, instrumentalism tells the inventor what is needed to make a machine function more effectively, leaving the ends of innovation unexamined. There is nothing new in that way of thinking, nothing except that it has moved from the edges of human awareness, where it dwelt in premodern times, to the very center of consciousness, crowding aside all other activities, giving us increasingly a life of “rationalized irrationality.”\(^8\)

The highest form of reason, according to Horkheimer, involves more than understanding the phenomenal world and how it works and being able to manipulate it to one’s advantage. Reason should deal with ultimate matters; it should define the greatest good, search out the values that inhere in things, contemplate human destiny, and sort out moral truths. By that standard, reason inevitably is the pursuit of what ought to be. But in recent centuries “ought” has been rigidly distanced from “is” and, finally, consigned to a back room. Under the influence of capitalism, science, and technology, facts alone have come to have real meaning. Values appear to be subjective preferences, which is to say they get relegated to a pile marked “private and extraneous.” Like taste, they cannot be disputed, it is said, nor can they be established. An empty space therefore is left in public discussion, and instrumentalism rushes in to fill it with charts, numbers, measurements of efficiency, productivity, profit-making, whatever will divert attention from the awkward silence. “We must conquer the desert.” Why? “So there will be homes and farms for more people.” Why? “So there will be more wealth to go around.” What is the wealth for? “Whatever people like, or come to decide—it’s not a question we can address.” Reason thus surrenders its high calling and settles for a career of calculation. “Having given up autonomy, reason has become an instrument.”\(^9\)

In an age ruled by instrumentalism, nature ceases to have any value in itself. It is no longer seen as the handiwork of God to be admired more than used, nor is it an organic being we are bound to woo and respect. A tree, a mountain, a river, and its edges are meaningless except where they can be turned to some human use by a farmer, a scientist, or a manufacturer. Nature is “degraded to mere material, mere stuff to be dominated, without any other purpose than that of this very domination.” Because it is uncontrollable by any aims set by reason, technological domination is an unlimited ambition. “Man’s boundless imperialism is never satisfied.”\(^10\) Here at bottom is the ideological force driving the capitalist state on and on, leading eventually to a “totalitarian attack of the human race on anything that it
excludes from itself,” whether it be landscapes, ecosystems, or people (Indians, Jews, and women have all at times been among the excluded) who are put outside the pale of humanity and assumed to be part of nature, not of ourselves.

The domination of nature implied in instrumentalism must not be confused with every use of specific resources, or with any and every impact humans have had on the nonhuman sphere. When a man clears a field of trees and plows it up for crops, he has not embarked on a career of technological domination, though he may have given the land a new appearance. Domination, as Horkheimer and Adorno used the term, is a repressive act that is total in intention. It springs from a hostility and an alienation that cannot tolerate the otherness of nature, that can see no worth there or respect any right to exist separate from humans, like the guard in a concentration camp who seeks to crush his prisoner’s very identity. Every being on the earth influences other beings, and some exert far more influence than others. But that is not yet domination—not until the superior being tries to change others beyond all recognition and denies them any meaning outside of reference to himself. Then it becomes clear that domination is an epidemic of blindness. In his raging, uncontrolled drive for self-preservation and self-extension, the dominator loses sight of the very ends of life.11

Karl Marx had described capitalism as an aggressive exploiter of the earth, and the Frankfurt philosophers agreed. In the capitalist culture and its mode of production, they maintained, the domination of nature appears in its most virulent, popular form: there we find the chief expression of the destructive sickness that affects modern societies in their ecological behavior. But Horkheimer and the rest could not agree with Marx that the domination of nature is merely a side-issue to the conflict between the classes, a reflection of the bourgeois exploitation of workers. On the contrary, our relationship with nature is the central problem, the archmalady, the Urgebrechen, of our time. And it has roots going back before the hegemony of capitalism, and manifestations beyond its reach. For an early source, Horkheimer pointed to the Jdeo-Christian tradition, particularly that often-quoted instruction by God in Genesis 1:28 to “multiply, and replenish the earth, and subdue it.” (Horkheimer might have added to his indictment those other desert religions of the Near and Far East and their water-control programs.) But always, until the modern period, nature still carried some intrinsic meaning. The more immediate and decisive source of domination was the Enlightenment of eighteenth-century Europe and its “disenchantment of the world; the dissolution of myths and the substitution of knowledge for fancy.”12 The Enlightenment, though on one side devoted to the same critical reason the Frankfurt School believed in, had a darker aspect, a more influential side, which stripped value from the world, made it ephemeral and subjective, and opened wide the door to positivistic, utilitarian mindlessness. Capitalism was a key part of that ominous side—it constituted the “bourgeois Enlightenment”—but by no means was it the only part. There was also science and its imperial project to reduce nature to facts and master it, and there was industrialism, the large-scale, centralized production of goods, and its indefatigable machines, furnishing the very metaphors by which science came to understand the world. Marx, therefore, was only halfway right in focusing exclusively on capitalism and class conflict. Worse, he was, despite a romantic youth, at last too close in his own thinking to that darker Enlightenment, too close to instrumental reason, to be a wholly reliable guide.13

The social consequences that follow from the modern commitment to instrumental reason and the disenchantment of nature have been antideocratic and antihuman. “The more devices we invent for dominating nature,” declared Horkheimer, “the more must we serve them if we are to survive.” Serving means putting ourselves in the hands of those who are especially adept at instrumental analysis: capitalists, of course, big or small and aspiring; but also a new class of experts and technocrats, whose job it is to tell us how the dominating is to be done. The contemporary engineer is the best exemplar of that power of expertise. Though not himself necessarily concerned with profit-making, he reinforces directly and indirectly the rule of instrumentalism and unending economic growth.

The engineer is not interested in understanding things for their own sake or for the sake of insight, but in accordance with their being fitted into a scheme, no matter how alien to their own inner structure; this holds for living beings as well as for inanimate things. The engineer’s mind is that of industrialism in its streamlined form. His purposeful rule would make men an agglomeration of instruments without a purpose of their own.

Democracy cannot survive where technical expertise, accumulated capital, or their combination is allowed to take command.14

Accepting the authority of engineers, scientists, economists, and bureaucrats along with the power of capital, the common people become a herd. They live as “docile masses governed by clocks.” More and more of their needs are attended to by others, even their leisure time is organized for them. Someone decides what they should want, what will keep them amused and uncomplaining, and what they must accept as reality. Instead of matur-
ing into autonomous, rational individuals capable of deciding ultimate issues, as one side of the Enlightenment promised they would all do in the modern age, they instead become lifelong wards of the corporation and the state. Sensing their own impotence in the midst of so much general power, they may feel anger welling up inside them; but they do not know whom or what to blame, so thoroughly have they absorbed and internalized the ruling ideas, so completely have they lost the capacity for critical thought. Genuine freedom is for the average citizen an unknown ideal. His spontaneity atrophies. The memory of alternatives dries up. The private interior is invaded by hucksters and planners. Material life alone flourishes, and for the manipulated mass man that seems to be enough: an iron cage with all the amenities will do nicely in the absence of other possibilities. "Even though the individual disappears before the apparatus which he serves, that apparatus provides for him as never before."

What is to be done about this slide into "the administered life," with its frightening potential for authoritarianism and infantile regression? The remedy must begin with the root problem: the modern drive to dominate external and internal nature. No one in the Frankfurt School ever proposed that nature be liberated from every demand humans place on it or that civilizations should revert to a primitive existence. Rather, they saw reconciliation and transcendence as the rational alternative to domination. Humans must liberate reason from its instrumental straitjacket and use it to work out a new cultural perception of the earth and a new behavior. Liberated reason can reveal what a river or a valley needs for its own realization, what values it may have beyond serving as a means to profit or amusement, what moral claims it makes on humans. When set free from its bondage to money and power, reason can determine which uses of the earth are worthy and truly necessary, and which are not. It can show us how to escape the limits of nature, not by dominating with machines or dams, but by transcending through the development of human imagination and virtue. Then, these philosophers argued, that new ecology will make possible a more democratic and humanly fulfilling social order.

That history reflects nature and its fate has been the overriding theme of this chapter from its beginning. In the Frankfurt School, especially in the writings of Max Horkheimer, that argument takes on a profundity of meaning that is several levels beyond what Wittfogel, Marx, or the ecological anthropologists had in mind. More's the pity, then, that Horkheimer and the others did not apply their general analysis to the specific case of water control in the American West. They would have found it as clear and illuminating a test of the cultural implications in the rule of instrumental reason and the domination of nature as any in the world. And they had the chance to make that inquiry. For the career of the Frankfurt School became, for a brief while, directly part of the intellectual history of the West.

One month after Hitler became head of the German state, the Institute for Social Research and its staff left their native country. First they journeyed to Geneva, then in 1933 to New York City and Columbia University. Eventually, in 1941, Horkheimer and Adorno, for reasons of health, migrated to Pacific Palisades, California. They lived there as part of an expatriate colony until 1948, when Horkheimer was invited back to Frankfurt to lecture and, finally, to relocate there as rector of the university. The years spent on the edges of the desert West were only an interlude in their lives, but it was an interlude filled with opportunities to see their ideas illustrated in concrete ditches and whirring dynamos. Hydraulic society in California, Arizona, and other arid states, built on the industrial urge to dominate and repress all that is natural in nature and people, stared the two Germans émigrés in the face, but they were looking another way—at Europe, at fascism, and at the older industrial capitalist centers.

By the 1940s, the American West could boast of managing water better than any other region on the planet. Its showpiece was Hoover Dam, completed on the Colorado River in 1935, immediately ranking as one of the engineering wonders of the twentieth century. Under construction were even more ambitious projects in the Central Valley of California and at the Grand Coulee in the state of Washington. In praise of those works, J. Kip Finch, dean emeritus of Columbia University's engineering college, hailed "the increasing mastery of man over nature which has made possible our continuing progress toward a better life." "Nature," he went on, "has been harnessed to meet man's needs on a scale that not so long ago would have been regarded as completely visionary and impossible." What the Frankfurt critics would have pointed out to the dean, had they not been thinking about other matters, is that such projects like the greater project of dominating nature of which they are a part, always carry a human cost, no matter how sweet the virtuously or how sunny the motives of the dominators.

The history of water control in the American West is a subject of much more than local interest. Out of the region's sand and sagebrush has emerged a technological complex that raises issues of world historical significance. Not to see the region in those terms is to substitute the illusion of uniqueness for the reality of continuity. It is also to fracture the integrity of both nature and history. After all, the water flowing through that dry land mingles with the common sea Oceanus, which takes into itself as well the water of China, India, Egypt, and Peru. Water is like that: it unites as well as divides, brings distant points together and gives them a common issue, transports soil from remote mountains to fertilize our homeland. It mean-
ders across many different terrains, joining all of them into a single loop of watershed. The history of water and water control cannot, if it seeks to be true to its subject, do otherwise than follow that course. It has taken us here into famous and obscure valleys of the earth, into diverse cultures on every continent, into a labyrinth of ideas. But now it is time to leave those other rivers of history and to follow the streaming of the American West, from its wilder, freer past to its possessed and managed present.

THREE

INCIPIENCE

A Poor Man’s Paradise

Oh faith rewarded! Now no idle dream,
The long-sought Canaan before him lies;
He floods the desert with the mountain stream,
And lo! it leaps transformed to paradise.

—Traditional Mormon hymn (nineteenth century)