Water, Culture, and Power

Local Struggles in a Global Context

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CHAPTER 2

The Use and Abuse of Aquifers

Can the Hopi Indians Survive Multinational Mining?

Peter Whiteley and Vernon Masayesva

Author Summary

Three actors play significant roles in water use in northeastern Arizona: the Hopi, the Navajo, and the Peabody Western Coal Company. The Hopi cultural and religious understanding of springs (*paavahu*) is contrasted with Peabody's use of water to transport its coal to Nevada by slurry. The company's wells are depleting the springs, and the springs are drying up. Hopi religious concerns with springs and *paanaqso'a* (deathly thirst) are metaphorical of larger issues of global development and natural resource management.

A very long time ago there was nothing but water. In the east Hurúing Wuhti, the deity of all hard substances, lived in the ocean. . . . The Sun also existed at that time. . . . By and by these two deities caused some dry land to appear in the midst of the water, the waters receding eastward and westward.

("Origin Myth" recorded by H. R. Voth [1905b])

This is . . . one of the most arid countries in the world, and we need that water. That is why we do Kachina dances in the summer, just to get a drop of rain. And to us, this water is worth more than gold, or the money. Maybe we cannot stop the mining of the coal, but we sure would like to stop the use of water.

(Dennis Tewa, Munqapi village)[1]

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Hopi Society and Environmental Adaptation

The Hopi Indians of northeastern Arizona are an epitome of human endurance: they are farmers without water. According to their genesis narrative, the Hopi emerged from a layer under the earth into this, the fourth, world by climbing up inside a reed. On their arrival, they met a deity, Maasaw, who presented them with a philosophy of life based on three elements: maize seeds, a planting stick, and a gourd full of water. *Qa'ö*, maize, was the soul of the Hopi people, representing their very identity. *Sooya*, the planting stick, represented the simple technology they should depend on: there was an explicit warning against over-dependency on technology, which had taken on a life of its own in the third world below, producing destruction through materialism, greed, and egotism. *Wikoro*, the gourd filled with water, represented the environment—the land and all its life-forms—as well as the sign of the Creator's blessing, if the Hopis would uphold Maasaw's covenant and live right. Maasaw told them that life in this place would be arduous and daunting, but through resolute perseverance and industry, they would live long and be spiritually rich.[2]

The twelve Hopi villages lie on a generally southeast-northwest axis stretching roughly one hundred kilometers (sixty-two miles) as the crow flies (see figure 2.1).[3] The villages cluster in groups around the tips of three fingerlike promontories, known as the Hopi mesas, that form the southwesternmost extensions of Black Mesa, an upthrust plate of the Colorado Plateau (see figure 2.2 on page 20). Black Mesa is bisected by four principal southwest-trending washes, Moenkopi, Dinnebito, Oraibi, and Polacca; all but Moenkopi are ephemeral and flow only after significant precipitation. Smaller washes, Jeddito and Wepo, near First Mesa, are also locally important. The Wepo and Oraibi Washes separate the Hopi mesas from one another, cutting arroyo channels in valleys some 90 to 120 meters (300 to 400 feet) below the mesa tops, on which the villages perch. The washes and their tributary fans are main areas of Hopi floodwater farming. Only the Moenkopi Wash (far removed from the central area of Hopi villages) supports irrigation, in farmlands below the villages of Upper and Lower Munqapi, which remain the most productive areas for Hopi crops (the name *Munqapi*, anglicized to *Moenkopi*, means "continuously flowing water place"—an index of its social importance). The Moenkopi Wash is fed by tributary stream flows and springs but also is fed directly by an aquifer in a layer of sandstone called "Navajo" that sits below the surface of Black Mesa within the hydrological province known as the Black Mesa Basin.[4]

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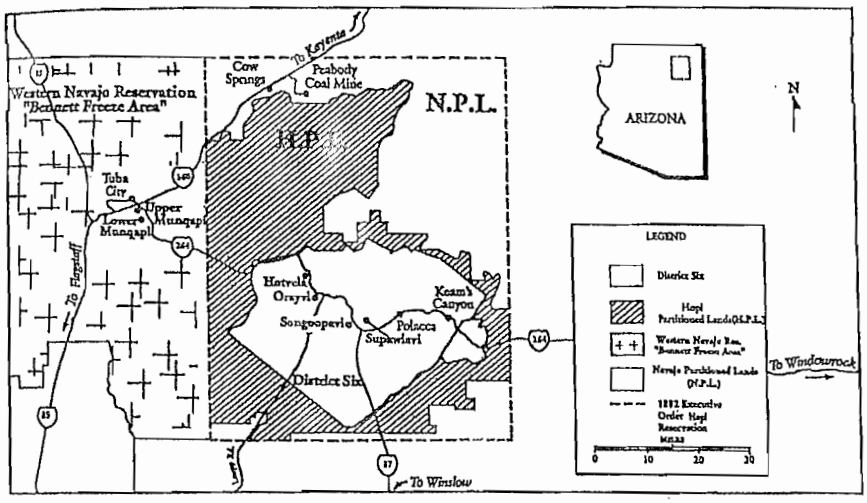

FIGURE 2.1. NAVAJO AND HOPI RESERVATIONS RELATIVE TO THE PEABODY WESTERN COAL COMPANY MINE

The 1882 Executive Order Hopi Reservation encompassed District Six, originally a grazing district, which included most of the Hopi village sites; the Hopi Partitioned Lands (HPL); and the Navajo Partitioned Lands (NPL), which were created as a result of the Navajo-Hopi Indian Land Settlement Act of 1974. The Black Mesa mine straddles the north-central border of the HPL and the NPL. The villages of Upper and Lower Munqapi fall within the Western Navajo Reservation "Bennett Freeze Area," which currently is also in process of partition between the Hopi Tribe and the Navajo Nation. Courtesy of the University of Arizona Press (modified from Whiteley 1988b).

The Hopi's principal supply of drinking water is traditionally found in springs—indeed, Hopi history, which focuses on centripetal migrations by independent clans from all points of the compass, specifically remarks on the abundance and reliability of the springs that stud the walls of First, Second, and Third Mesas.[5] The springs have determined Hopi settlement patterns and uses of natural resources. As geologist Herbert Gregory, an early visitor to the Navajo and Hopi Indian Reservations, pointed out:

> One of the surprises . . . is the large number of springs widely distributed over the reservation. Tucked away in alcoves in the high mesa walls or issuing from crevices in the canyon sides or bubbling up through the sands in the long wash floors, these tiny supplies of water appear to be distributed in haphazard fashion. . . . The ancient cliff dweller was well aware of the desirability of these small permanent supplies as

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> centers for settlement, and many of the present-day Indian trails owe their position to the location of springs rather than to topography or to length of route.
> (Gregory 1916, 132)

Insofar as the archaeological record confirms traditional history, the period between 1300 and 1500 C.E. saw a concentric contraction of more widespread villages—from Mesa Verde, Navajo Mountain, Tsegi Canyon, the Little Colorado River, and the Hopi Buttes—into such centers as are still populated by the Hopi today.[6]

Hopi presence in the region and engagement with its particular environmental exigencies is thus ancient. The Hopi are a Puebloan people, direct descendants of the Anasazi (an archaeologist's term from the Navajo word meaning "ancestors of the enemy"; the Hopi, not surprisingly, prefer *Hisatsinom*, meaning simply "ancestors"), who between 800 and 1300 C.E. built some of the most impressive architectural structures in prehistoric North America. Chaco Canyon to the east figures in some Hopi migration legends, as do Mesa Verde to the northeast, Betatakin and Keet Seel to the north, Homol'ovi to the south, Wupatki to the southwest, and numerous other ruins throughout the greater Southwest.[7] The common refrain of southwestern archaeologists, "What happened to the Anasazi?," is unequivocally answered by the Hopi and other modern Pueblos: "Nothing; we are still here." In Hopi country itself, there is evidence of continuous occupation by sedentary agriculturalists for a good 1,500 years, and the Third Mesa town of Orayvi—the oldest continuously inhabited village in North America—has been dated to at least 1150 C.E. In sum, the Hopi have learned to live by farming in this semiarid environment over the course of a long presence.

The persistent occupation of the Hopi mesas for more than a millennium is both remarkable and paradoxical. Unlike the other Pueblos, the Hopi, with no streams or rivers to support their subsistence economy's dependence on maize, beans, and squash, must seek their water elsewhere. The ways in which the Hopi get and use water are a major part of identity, religious beliefs, ritual practices, and daily engagements and concerns. Much of the complex Hopi religious system is devoted, in one way or another, to securing necessary blessings of water—in the form of rainfall, snow, spring replenishment, and so forth—to sustain living beings, whether humans, animals, or plants.

A calendar of elaborate ritual performances is divided into the kachina season—roughly from December to July—and, from August to December, a season of more esoteric practices by higher-order religious sodalities—the Snake, Flute, *Wuwtsim* (Manhood), and *Maraw*

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(Womanhood) societies and the great *Soyalangw* society festival at the winter solstice. All these concentrate in some measure on ensuring beneficial environmental conditions, on keeping the world in balance. The Hopi regard ritual, if performed properly—the cardinal values being pure intentions and good hearts in harmony with one another, sentiments that translate into the philosophical concept of *namit-hangwu*—as instrumentally efficacious ipso facto, not as mere symbolic embroidery on a techno-rationalist means of production.

The phrase *Hopi environmentalism* is practically a redundancy.[8] So much of Hopi culture and thought, both religious and secular, revolves around an attention to balance and harmony in the forces of nature that environmental ethics are in many ways critical to the very meaning of the word *Hopi*.[9] Hopi society is organized into clans, the majority of which are named after, and have specific associations with, natural species and elements—Bear, Sun, Spider, Parrot, Badger, Corn, Butterfly, Greasewood, Tobacco, Cloud—indicating the utter centrality of environmental forms and ecological relationships in Hopi thought. Myriad usages of natural species and agents in Hopi religious ritual express the depth and detail of this ecological awareness and concern. A kachina, for example, in appearance, song, and performance, typically embodies and encapsulates key vital principles of the natural world. Even a casual observation of a *Hemis* kachina at *Niman* (the Home Dance, in July), to just take one case, discloses a being festooned with spruce branches, wild wheat, clouds, butterflies, tadpoles, seashells, and so on. The bringing together of these natural symbols is in many instances designed to both evoke and celebrate the life-giving force of water in the world.

Springs, Water, and Rain in Hopi Secular and Religious Philosophy

Paahu, "natural water" or "spring," is absolutely central in Hopi social and environmental thought. Indeed, the identity of the term points to the significance springs hold: they are the prototypical water sources. Supplemented by wells dug by the Bureau of Indian Affairs Agency over the past century, springs supply drinking water and water for livestock. They also feed a series of irrigated terraced gardens on the slopes below the mesa tops, which form another basic site of crop production; the gardens include chilis, beans, a little corn, onions, radishes, and fruit trees (see photo 2.1). The areas around the larger springs are also the only significant wetlands in much of the region. For this reason, they, too, are objects of religious veneration.

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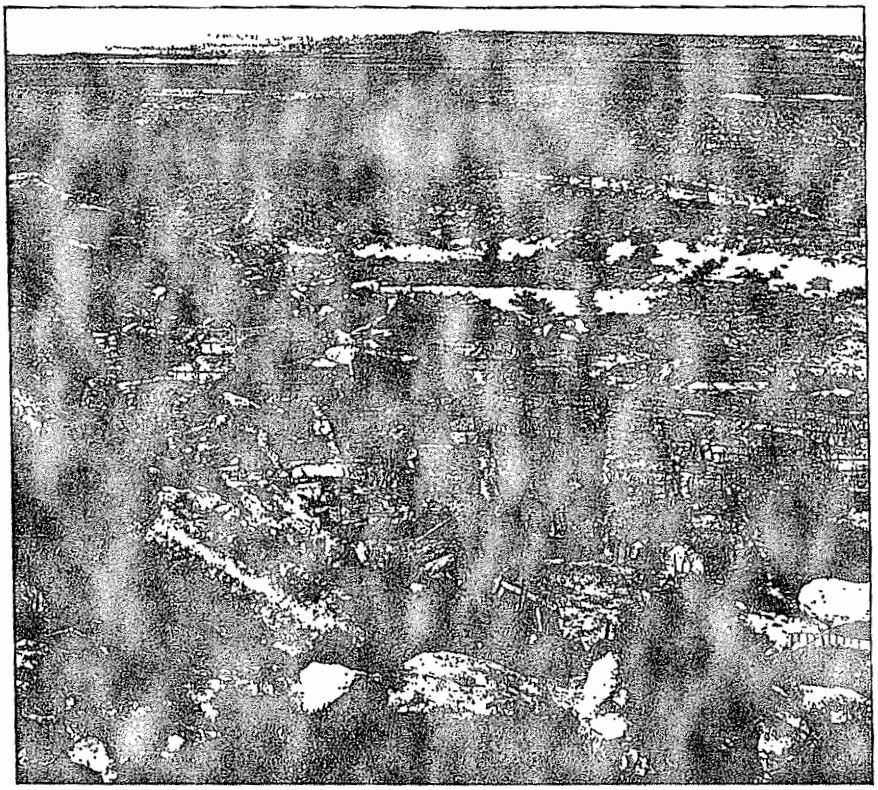

PHOTO 2.1. HOPI GARDENS

These terraced gardens below the Third Mesa village of Hotvela are irrigated with water brought by surface pipes and carried by hand from the Hotvela Spring, on the slope below the mesa's edge. Courtesy of the Arizona State Museum, Tuscon.

Even with the introduction of piped water (for the most part, only within the past thirty years), springs remain critical in Hopi philosophy and practice. Springs and their immediate pond life environs serve as the ideal model of life and growth. Such places attract denser presences of life-forms than are found elsewhere in the semiarid landscape. Doves, dragonflies, ducks, cranes, frogs, sand-grass, cattails, reeds, cottonwoods, willows, and numerous other species concentrate at these locations—simultaneously the index and the manifestation of abundant, water-charged life. Such species serve as key symbols of the life-giving force of water in Hopi secular and religious philosophy.

It is hard to imagine anything more sacred—as substance or as symbol—than water in Hopi religious thought and practice. To be sure, some elements may appear more prominent: corn, the staff of life,

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which is ubiquitous in Hopi religious imagery; rattlesnakes in the spectacular Snake Dance; or performances by masked kachina spirits. But intrinsic to these, and underlying much other symbolism in the panoply of Hopi ritual, is the concern with water. Springs, water, and rain are focal themes in ritual costumes, kiva iconography, mythological narratives, personal names, and many, many songs that call the cloud chiefs from the varicolored directions to bear their fructifying essence back into the cycle of human, animal, and vegetal life. That essence—as clouds, rain, and other water forms—manifests the spirits of the dead. When people die, in part they become clouds; songs call to the clouds as ascendant relatives. Arriving clouds are returning ancestors, their rain both communion with and blessing of the living. The waters of the earth (where kachina spirits live) are, then, transubstantiated human life.

In general, springs and groundwater serve as homes for the deity Paalölöqangw, Plumed Water-Snake, who is a powerful patron of the water sources of the earth and the heavens. Paalölöqangw is appealed to in the Snake and Flute ceremonies, and is religiously portrayed during winter night dances. Springs and their immediate surroundings are places of particular religious worship in some instances, as in the Flute ceremony or during *Powamuy* (the Bean Dance) and *Niman* (the Home Dance). The Flute ceremony is specifically devoted to the consecration and regeneration of major springs; during this ceremony, in an archetypal gesture, the *Lenmongwi*, head of the Flute society, dives to the bottom of a particularly sacred spring to plant prayer sticks for Paalölöqangw.

Resources from spring areas such as water, clay, reeds, and spruce branches are gathered for use in village ceremonies, in which they are deemed to draw in the life-giving power of the springs themselves. Springs as distant as 160 kilometers (100 miles) are visited on a regular basis in order to bring back their sacred water for ceremonies, especially by clan descendants from former settlements adjacent to the springs. Early ethnographers Jesse Walter Fewkes and Walter Hough both remarked on Hopi veneration of springs:

> In a general way every spring is supposed to be sacred and therefore a place for the deposit of prayer sticks and other offerings. . . . Every spring is a place of worship and hence a shrine.
>
> (Fewkes 1906, 370–371)

> No spring in the region is without evidence of many offerings to the deities of water. . . . Sacred Springs may . . . be regarded

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> as altars, and the offerings as sacrifices, whose essence may be carried by the water.
>
> (Hough 1906, 165)

Since time immemorial, the Hopi have offered blessings of cornmeal and prayers at springs, during specific visits for the purpose or simply while passing through the landscape (say, during herding, hunting, or treks to distant cornfields). When blessing a spring, typically a man also scoops up a handful of water and splashes it back toward his village or fields as a way to encourage the water to transfer some of its power to where humans most need it. Springs attract the rain and snow to themselves and thus serve as powerful foci of value in Hopi thought. Indeed, this is why they are sacred places: if much of Hopi religious thought celebrates life, then springs are self-evident indexes of the dynamic process that produces and sustains life. At the winter solstice ceremonies, feathered prayer sticks are placed over major springs around every Hopi village as both protection and supplication.

Among sources of water, there is a quasi-magnetic relationship: the Pacific Ocean, the Colorado River, rain, underground aquifers, springs, and living plants are mutually attractive—"contagious" in the anthropological sense: "The land is a living organ, it breathes . . . the Hopis say that it is the underground water that sucks in, that breathes the rain" (Vernon Masayesva).[10] *Paatuwaqatsi*, literally "the ocean," is simultaneously a central philosophical principle denoting the universally sustaining water of life. To attract the world's powers of moisture, spring names are used frequently in ritual narrative and song: for example, Talakwavi, Dawn Coming-Up Spring; Tsorspa, Bluebird Spring; Kwaava, Eagle Spring; Paatuwi, Spring on the Rock Shelf; Höwiipa, Dove Spring; Hoonawpa, Bear Spring; Konva, Chipmunk Spring; Kookyangwva, Spider Spring; Tsinngava, Water Droplets Splashing Spring; Söhöpva, Cottonwood Spring. Springwater properly placed in one's field, mud from spring bottoms used as body plaster in kachina costumes, and images of tadpoles or dragonflies decorating kachina spirits—all sympathetically entice the rain.

Springs themselves, like maize in fields, were originally "planted" in the earth by deities or gifted individuals. There was even a special instrument, a *paa'u'uypi* ("spring planter"), known to the elect and used for this purpose. (A spring near Munqapi, for example, is said to have been planted in this way by a man named Kwaavaho—for whom the spring is named—in the late nineteenth century.) Pilgrimages to reconsecrate and draw in regenerative power from especially significant springs at distant points are common in the Hopi religious calendar. Villages may be named for springs, as in the mother village, Songoopavi, "Sand-Grass Spring Place." Some clans have exceptional

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responsibilities to springs, as does *Patkingyam*, the Water clan, and some springs are sacred to specific clans or religious societies at the different villages. Clan migration routes from former villages are often retraced—both literally in pilgrimages and figuratively in narratives and songs—at certain times of the year. In many instances, clan associations with springs at their ruins or along the route are mentioned as locations of important historical events. Thus, the Water clan has a series of historic points along its migration route from the south that are frequently marked by springs, such as Isva, Coyote Springs, north of Winslow. Similarly, Kiisiwu, Shady Springs, for the Badger and Butterfly clan; Sa'lako, Shalako (a kachina spirit) Spring, for the Bow clan; and Langyanovi Spring, for the Flute clan, are all memorialized in clan tradition and visited in pilgrimage. In this sense, then, the living springs embody Hopi history: they are cultural landmarks, inscribed with significance, and commemorative reminders of the continuing legitimacy of clan rights and interests in specific areas.

Springs and the life-forms associated with them thus appear in many Hopi stories and sacred traditions, in literary forms such as personal names, and in artistic forms such as basketry, pottery, weaving, and painting. In these intellectual and aesthetic contexts, the substance and forms of springs and wetland life are both described objectively and celebrated with pleasurable appreciation and spiritual gratitude. Personal names, a prime form of Hopi poetic images, often reference springs and water: Paahongva, Water Standing Up (after the tiny columns of water that leap up from raindrops splashing on a pond or puddle); Paanömtiwa, Water Covering Up (perhaps covering a cornfield after a rain); Paatala, Water Light, referring to reflected light on water's surface, particularly in the dark.[11] Many of the species that are totemic emblems of Hopi clans are associated with springs—*paawiki*, the duck; *atoko*, the crane; *paakwa*, the frog; *paaqavi*, reeds; and so on. The celebration of water, its origins or results, forms a major proportion—perhaps half—of all Hopi names. References to flowers—an explicit mark of the Creator's rain blessings—celebrate water as well, such as *Siitala*, "flower light," the reflected sunlight from flowers newly blossomed after a rain, and *Sikyakuku*, literally "yellow foot," which refers to walking along through blossoming flowers while the pollen clings to one's moccasined feet. There are also references to rain, such as Yooyoki "raining," and Yoyvwölö, "rainwater" (there is a priest in one of the ritual orders referred to as the Yoymongwi; "rain chief") as well as lightning, such as Talwiipi, "a single lightning flash," or Talwipta, "lightning in the ongoing process of flashing." Even species that are not so directly associated with water sources are frequently subjects of interest in relation to their behavior toward water.

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One name, Sharp Hearer, given by a Spider clan member, refers to the fact that when rain begins to fall, certain spiders secreted inside houses hear the rain and emerge from their cover, running out to drink from the freshly emerging puddles (Voth 1905a). Even here, then, when the species in question has no explicit conceptual link with water, the Hopi denote its significance by its habitual practices in relation to water. The concern with natural water depicted in this name details a precise knowledge of the behavior of the species as well as an aesthetic and creatural delight in the pleasure and happiness that the presence of water affords all beings of the world.

In short, springs are key in Hopi social life, cultural values, and conceptualization of the landscape, all of which form the ground of deeper religious thought and action. The Hopi smoke for rain, dance for it, sing for it, and offer many other forms of prayer for it. In the cycle of life, rainwater and snowmelt nourish the plants, which feed animals and human beings. Thus, prayers for rain are not abstract; they call the clouds to replenish the waters of the earth so that all life-forms will benefit and "be happy." Here, then, is an environment populated not by Western science's instinct-driven organisms without spirit or consciousness but by intentional, spiritual entities that are part and parcel of the same moral system that encompasses human beings. The Hopi have, so to speak, both a moral ecology and an ecological morality. As one Hopi man put it, "We pray for rain so that all the animals, birds, insects, and other life-forms will have enough to drink too." The prolific complexity of Hopi ritual attends to springs specifically and as sources of blessing and vehicles of prayer in general.

Of Coal Mines and Slurries

The springs, however, are drying up, and with them the essential force of Hopi religious life and culture itself. Flows have been progressively declining over the past three decades. Numerous springs and seeps have ceased to produce enough water to sustain crops planted below them. The Moenkopi Wash no longer "continuously flows," and the only major Hopi farming area that depends on irrigation water is in serious jeopardy. In recent years, the Moenkopi Wash has been down to a trickle by late May; not long ago, Munqapi children plunged into swimming holes long into the summer. Even the trickle that does come is supplied by only two upstream tributaries; much of the water from the mainstream itself is channeled into impoundment ponds by the Peabody Western Coal Company.

Peabody, which operates twenty-seven mines in the United States,

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is the largest private producer of coal in the world. Until recently, the company was part of the British multinational Hanson Industries, which demerged in February 1997. Peabody then became part of a newly formed Hanson spinoff, The Energy Group PLC, but top management remains virtually identical. In 1996, Peabody's total operating profit (including all its mining interests worldwide) was $240 million, and its profit on coal sales was in excess of $2 billion; Hanson's total sales, including its chemical and tobacco interests, exceeded $19 billion, and its total after-tax profit was $2.3 billion (*Hanson Annual Report* 1996). This is no small enterprise.

Peabody's Black Mesa–Kayenta Mine is the only mine in the United States that transports its coal by slurry (see figure 2.2). The strip-mined coal is crushed, mixed with drinking-quality water, and flushed by pipeline to the Mohave Generating Station in Laughlin, Nevada. The cities of Las Vegas and Phoenix—electric oases in the desert—buy some of the power, but most of it goes to the electric toothbrushes, garage door openers, outsize television sets, and other necessities of life in southern California. Most of the slurry water comes directly from the "Navajo" or N-aquifer, 300 to 900 meters (1,000 to 3,000 feet) within the geologic formation of Black Mesa (see figure 2.3).

The pumping, Peabody has claimed, has no effect on the Hopi springs. Those springs, it maintains, are fed not by the N-aquifer but by the overlying "Dakota" or D-aquifer and by snowmelt. The Hopi do not believe Peabody's assertion. But an escalating series of letters from Hopi individuals and officials, both traditional leaders and Tribal Council chairs; petitions signed by several hundred Hopi; protests in public hearings; dissenting interpretations by independent geologists;[12] and repeated refusals by the Tribal Council to sanction the Department of the Interior's renewal of the mining lease have all fallen on deaf ears. Flat rebuttals to Hopi protests continue to be retailed by Peabody and Hanson representatives, and a personal invitation to engage in direct dialogue issued to Lord Hanson, chairman of Hanson PLC, by Tribal Chairman Ferrell Secakuku in June 1994 went ignored. On 30 April 1994, W. Howard Carson, president of Peabody Western Coal Company, voiced the company's party line in a letter to the editor published in the *Los Angeles Times:* "Changes in the flows from their springs may be the result of drought conditions in the region, and perhaps from the increased pumpage from Hopi community wells located near these springs. . . . Peabody Western's pumping from wells that are 2,500–3,000 feet deep does not affect these springs."

Yet Peabody's characterizations of hydrological effects are eminently untrustworthy. Comments and hearings on the U.S. Office of Surface Mining and Reclamation Enforcement's draft environmental

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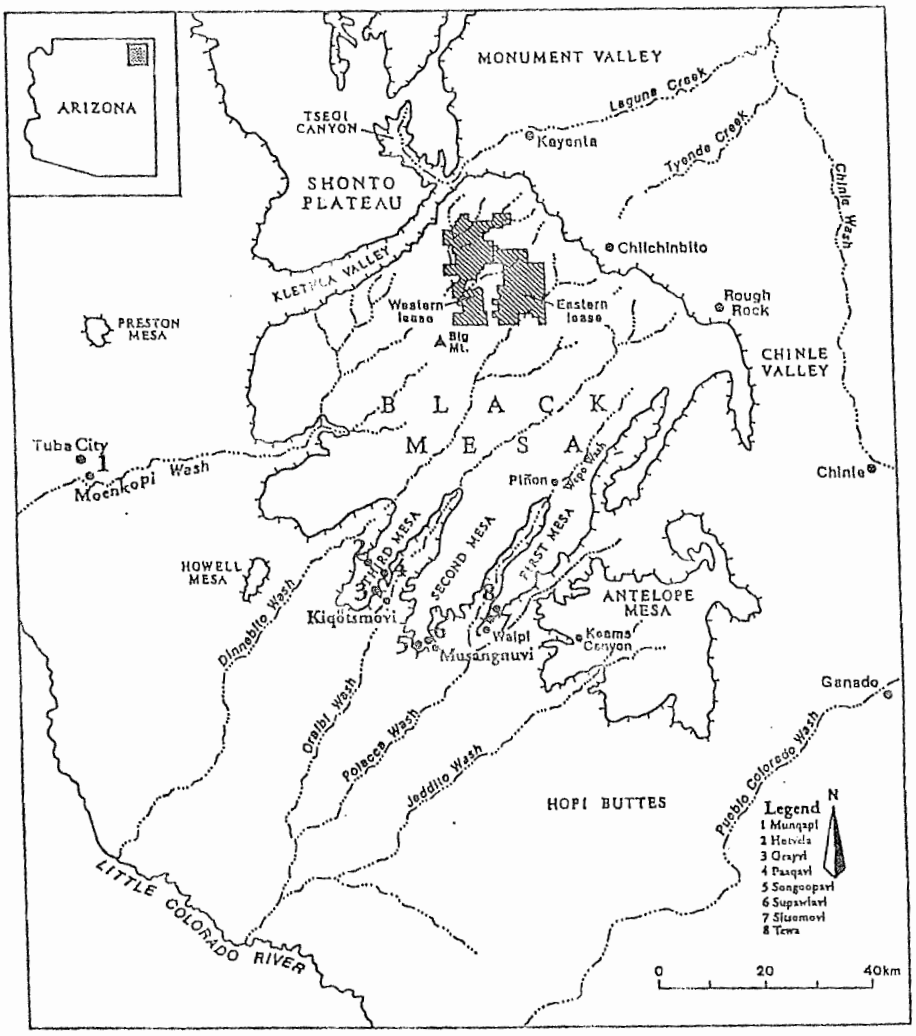

FIGURE 2.2. BLACK MESA AND THE PEABODY COAL COMPANY'S LEASE AREAS

The geological formation of Black Mesa, with the Hopi mesas and principal washes. The Peabody Western Coal company's two lease areas are marked by hatched lines. Black Mesa tilts downward from north to south. The mining lease areas lie on top of its northern, higher end. The Hopi villages are at the lowest, southern extremity, where the aquifers are significantly closer to the surface. Courtesy of the Center for Archaeological Investigations, Southern Illinois University.

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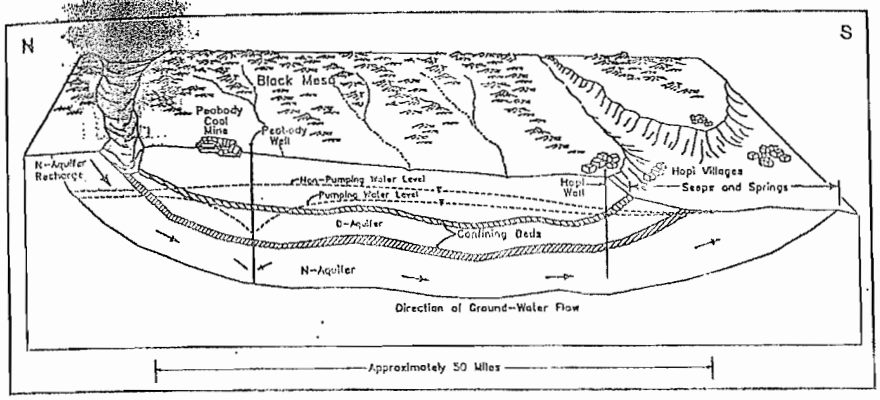

FIGURE 2.3. GROUNDWATER FLOW IN THE N-AQUIFER

The N- or Navajo Aquifer is composed of three layers: from top to bottom, Navajo Sandstone, the Kayenta Formation, and Wingate Sandstone. The N-Aquifer is separated from the overlying D- or Dakota aquifer by the Carmel Formation (indicated by the Confining Beds in the diagram). The D-aquifer also is composed of three layers: from top to bottom, Dakota Sandstone, the Morrison Formation, and Entrada Sandstone. For more on the geologic and hydrological stratigraphy of the aquifers, see Cooley et al. 1969. Courtesy of the Hopi Tribe, Water Resouces Office.

impact statement (DEIS) (U.S. Department of the Interior 1990)[13] produced a welter of objections, both to the sociocultural and environmental effects of the mine and to the shoddy research that produced general ratings of minor or minimal environmental impacts. For example, the Environmental Protection Agency's official response noted:

> We have classified the DEIS as Category EO-2: Environmental Objections—Insufficient Information.[14] . . . We believe the project may result in significant adverse environmental impacts to water resources and air quality that should be avoided. We have also found that the lack of sufficient information on water, air, and biotic resource conditions severely impedes evaluation of impacts, alternatives, and appropriate mitigation measures. We are particularly concerned that the DEIS lacks an alternatives analysis which would enable the Federal agencies and the public to consider less environmentally damaging actions than the preferred alternative [i.e., the slurry]. (U.S. Department of the Interior 1990, 263)

The EPA's more detailed comments on the mine's hydrological compliance with the National Environmental Policy Act noted:

> *Conclusions based on N-aquifer modelling.* While EPA accepts the approach taken in modelling hydrologic baseline conditions and impacts, the conclusiveness of this effort is undermined by lack of data. This limitation, compounded by use of material damage criteria based on thresholds much less sensitive than "significance" under NEPA, leads us to reject the evaluation of hydrologic impacts. EPA believes that the available data do not support statements in the DEIS that the cumulative effects of current and foreseeable mining and related operations (principally the coal transport slurry) are expected to result in only minor hydrological impacts.
>
> (U.S. Department of the Interior 1990, 267)

Six months prior to W. Howard Carson's 1994 statement in the *Los Angeles Times*, top hydrologists with the U.S. Geological Survey (USGS) concluded that Peabody's ongoing analysis of water impacts was based on a wholly inadequate model. Among other shortcomings, "The model is not sufficient to answer the concerns of the Hopi regarding adverse local, short-term impacts on wetlands, riparian wildlife habitat, and spring flow at individual springs" (Nichols 1993). Recent figures (U.S. Geological Survey 1995) suggest that as much as two-thirds of the decline in water level of area wells (ranging from 9.1 to 29.6 meters, or 30 to 97 feet, from 1965 to 1993) is caused by the mine's pumping. Peabody's claim that throughout its thirty-five-year life, the mine would use only one-tenth of 1 percent of N-aquifer water, which would naturally recharge itself, is seriously questioned by a USGS recharge study in 1995 that charted a recharge rate 85 percent less than Peabody's estimate.[15] (It has been suggested that Peabody tried to suppress public release of these discrepant figures because if the figures were verified, the company would be obligated by the terms of the lease to post a bond for aquifer restoration.)

It also seems evident that depletion of the N-aquifer has had serious impacts on the D-aquifer and on the springs themselves; the Moenkopi Wash is directly affected, since it is supplied by N-aquifer seepage and since Peabody impounds surface water at a rate surpassing 2.2 million cubic meters (1,800 acre-feet) per year—water that would otherwise directly supply this wash (U.S. Department of the Interior 1960, 268). Computer simulations by the USGS predict total drying of some major Hopi wells beginning in the year 2011. Upstream Navajo communities are also significantly affected by the drying and by deteriorating water quality; Forest Lake has been particularly hard hit. In recent documents, Peabody has finally acknowledged that it takes water not only

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from the N-aquifer but also from other aquifers, including the D-aquifer. This has come as no surprise to the Hopi. But as Nat Nutongla, head of the Hopi Tribe's Water Resources Office, puts it, "The elders regard all water as sacred. It doesn't matter whether the springs are supplied directly by the D-aquifer or the N-aquifer or whatever; they represent *all* sources of water."

Peabody's position that declines in Hopi springs derive from increased domestic and municipal consumption, reflecting population growth (principally Navajo) and water development by the Navajo Nation and the Hopi Tribe, is not entirely untrue. Tuba City wells and a significant increase in local population since the 1960s directly impinge on Munqapi area springs. Hopi domestic water use has definitely expanded as newer villages have adopted indoor plumbing over the past thirty years. But these changes, the Hopi argue, are all the more reason not to waste the reserves of N-aquifer water. As co-author and former Tribal Chairman Vernon Masayesva has put it elsewhere:

> I believe there is a water crisis. Peabody Mining Company says that if there is a lowering of the water in the wells, it's because of domestic uses and not as a result of their pumping. And to that, I simply said, "All the more reason why you should not be pumping that water, because the domestic users are already having a significant impact on that N-aquifer water." So why throw away the savings? I see aquifers as money in the bank, in a savings account. So why are we dipping into it?
>
> (BBC Television 1995)

A serious, compromising quandary is that 80 percent of the Hopi Tribe's annual operating revenue is supplied by coal royalties and water lease fees from Peabody. The Hopi Tribal Council (or "Tribe"), a creation of the Indian Reorganization Act of 1934, is formally supported by about half the villages, though even traditionalists opposed to the council rely on numerous benefits it administers. Many people believe they were duped by the council's attorneys when the original leases were signed in the 1960s[16] and that some tribal leaders were co-opted by Peabody. But this is scarcely a factional issue. The Hopi directly involved with the council, including the two most recent chairmen, Ferrell Secakuku and Vernon Masayesva, have strongly opposed renewal of the coal leases in lieu of an alternative means of transporting the coal.

Hopi of all factions, from traditionalist *Kikmongwis* (village chiefs) to modernist technocrats, have been unanimous and clear in their

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opposition to the use of pristine groundwater to transport coal and in their disbelief of Peabody's denials that the pumping affects the springs. Two examples will suffice. The first is more traditionally inclined. At a public hearing on the environmental impact of the mine held in Munqapi on 8 August 1989, William Garcia recounted a childhood discussion he and his brothers had engaged in with their grandfather, Kyarsyawma, while out herding sheep. Kyarsyawma had first asked for his grandsons' impressions of the land:

> Our response was, "Well, it is just there. It is just there, you know, and we use it now and then, maybe to farm on and to herd our sheep. There is really nothing to it."
>
> He said, "Look at yourself. Look at your body, what do you have? You got some parts there, it looks pretty simple on the outside, but on the inside, inside of you as a person you have a soul, you have a heart. You have some blood running through your body to keep your vital organs going," and he said, "It is the same thing with the land. The land has a soul, the land that we are on has a soul, it has a heart. It also has its own blood. The blood running through it are the streams to keep it alive, to keep us alive."
>
> I always remember that, so to me, after I kind of learned that concept, it wasn't just there anymore. There was a purpose behind it just like there is a purpose here for each and every one of us. We are not just here. . . .
>
> I guarantee you that if we continue to draw this lifeline from mother Earth, then we will no longer exist, just as if someone stuck a needle in your arm and sucked out all the blood, you would be nothing, you would be dead.
>
> (U.S. Department of the Interior 1990, 374–375)

The second example is a petition presented by Mishongnovi village that same year:

> Be advised that we the undersigned members of the village of Mishongnovi are deeply concerned about the effects the mining of coal, by Peabody Coal Company, has had on our water resources. This is most evident in our springs drying up, our farms not producing crops, and our range wells drying up.
>
> Our village leaders have been and are still opposed to use of our water for mining operations. Our water is our life and we

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stand firm with our leaders in opposition to future use of our water for this purpose.

[U.S. Department of the Interior 1990, 296]

The Tribal Council favors economic development and does not oppose the mine as such (although some traditionalists do): part of the allure of the mine in the first place was the promise of Hopi employment. But the Hopi say Peabody has aligned itself with the Navajo Nation and ignores Hopi interests, a position borne out in employment figures. Of as many as 900 "Native American"—a useful elision in Peabody's public pronouncements—employees, fewer than 20 are Hopi; the great majority are Navajo, represented by the United Mine Workers Union, which enjoys a special relationship with the Navajo Labor Relations Board.[17] The original leases guaranteed 50 percent of local employment to the Hopi. And Peabody's overall attitude seems to be flagrant disdain for Hopi concerns. In W. Howard Carson's words, "We wouldn't [stop pumping] just to get the Hopi off our backs, because it could create another nightmare. These things snowball" (*Gallup (New Mexico) Independent* 1993).

Several alternatives to the slurrying of aquifer water have been proposed, and progress has been made on one: the construction of another pipeline from Lake Powell, which would provide domestic water for the Hopi and the Navajo and water for industrial use by Peabody. But Peabody, ever mindful of the bottom line, is evidently using delaying tactics, suspending negotiations and playing the tribes against each other despite support for the project by Secretary of the Interior Bruce Babbitt. Like most negotiations involving the Hopi and the Navajo, the pipeline proposal is subject to the cumulative politics of major land disputes between the tribes, and the Navajo Nation has sought concessions from the Hopi Tribe that it has been unable to gain otherwise. Such disputes affect Hopi interests in other ways, including the Hopi's freedom to conduct religious pilgrimages to some springs. A major sacred spring, Kiisiwu, is on land that was partitioned to the Navajo Nation by Congress in 1974. This spring, associated with principal kachina ceremonies, is visited by ritual-society pilgrims, especially during *Powamuy* (the Bean Dance) and *Niman* (the Home Dance). Formerly, local Navajo maintained a respectful distance, but younger generations are impressed less by the ceremonies' religious purpose and more by secular conflict. Recently, there have been physical assaults. If Kiisiwu dries up, this may solve some temporal problems between the Hopi and the Navajo, but at what spiritual cost?

Meanwhile, the Hopi are deeply anxious about all spring declines,

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for both obvious reasons and deeper metaphysical ones. The Hopi moral philosophy, following a covenant entered into with the deity Maasaw on their emergence into the present world, charges them with the responsibility of taking care of the earth and all its resources; indeed, such behavior is a significant measure of whether one is worthy of the name *Hopi* (see note 9). If the Hopi break the covenant, a cataclysm of cosmic proportions threatens. During the early 1980s, when co-author Whiteley began ethnographic research at Third Mesa, Tsakwani'yma, an older Spider clan man, would sometimes tell me of prophecies he had heard from his uncle, Lomayestiwa (an early twentieth-century leader in the so-called "Hostile" faction at Orayvi). He returned to one such prophecy repeatedly: a time would come when Paalölöqangw, the Water Serpent deity, would turn over and lash his tail deep within the waters of the earth and all land life would tumble back down to the bottom of the ocean. "Can you interpret it?" he would challenge. "It means earthquake. But it's also symbolic of the life we are leading today: *koyaanisqatsi*, a life of chaos." In 1987 and 1988, shortly after Tsakwani'yma passed on, there were two earthquakes on Black Mesa (a rarity), which the Arizona Earthquake Information Center connected to the removal of massive quantities of coal and water. The perception of some elders that this is the result of their souls having been sold out from under them—literally, in the link between groundwater and spirits of the dead—causes profound sadness and a sense of intractable religious desecration.

In addition to long-term Hopi interests, regional economic and demographic patterns make the continued pumping of 4 million cubic meters, or more than a billion gallons of potable water every year for a coal slurry incredibly shortsighted. The twenty-first century will undoubtedly see ever more serious problems of water supply for the rapidly growing conurbations in the West. In this light, Hopi religious concerns with springs become metaphorical of larger issues of global development and natural resource management. But although the Hopi are typically attuned to such universal implications, in the immediate term they are concerned with basic physical, cultural, and spiritual survival. If the springs are to be saved, and with them continued Hopi cultural and religious existence, Peabody's relentless drive toward short-term profits, at the expense of stakeholder concerns, needs a dramatic makeover in line with trends toward local global balance pursued by more progressive multinationals.[18] In the meantime, the pumps siphon the essence of life from the water roof of Black Mesa and the Hopi springs are withering on the vine.

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Food for Thought: Stakeholders, Shareholders, and Regulators

At the heart of this conflict over resource use is the confrontation between market capitalism and small-scale subsistence economics, or, in other terms, the opposing interests of shareholder and stakeholder. Much talk of sustainable development practices has been grounded in the inexorable logic of rationalist economics, with scant attention paid to different cultural and religious conceptions of the environment and how these might affect practical engagement with the transformation of nature for production.

Regarding stakeholder and shareholder interests, the powers of government to protect the former and regulate resource use are seriously called into question here. The government has a series of trust responsibilities to Indian tribes that surpass its obligations to most other sectors of American society. Specific provisions, such as the Winters Doctrine, could be invoked to protect Hopi and Navajo water resources and life chances. Vernon Masayesva places some of the blame squarely on the government agencies charged with protecting Hopi interests:

> It's a *tragic* chapter in United States–Hopi relations. *Very tragic.* They put our culture at risk, is the way I put it. The reason why Navajo aquifer water is so important is not only because, according to the Hopis, it's what sucks in the rain, but it also feeds the springs where ceremonies are occurring. It also sits in a bowl: *it's the only source of potable water available to the Hopi people* [his emphasis].
>
> (BBC Television 1995)

As a concatenation of powers, the multiplicity of government branches seems to militate against effective stakeholder representation: what the left hand gives, the right will take away. For example, the EPA has been clear in its opposition to the mine's hydrological practices, but it is overridden by the Office of Surface Mining Reclamation and Enforcement (OSMRE), which, not to put too fine a point on it, has seemed to be largely a regulatory surrogate for Peabody's corporate interests. Throughout the public hearings on the DEIS at the Hopi Tribal Headquarters in Kiqötsmovi in August 1989, for example, OSMRE's representative, Peter Rutledge, seemed interested in speaking only on behalf of Peabody; to the Hopi who were present, the difference between the two entities was not clear. I (Whiteley) was sitting next to Stanley Bahnimptewa, then the *Kikmongwi* of Orayvi,

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who shortly into the hearings grew disgusted, turned to me and said, "Looks like we're going to be here all day," got up, and left.

Recently, the OSMRE renewed Peabody's Black Mesa–Kayenta mine permit. The Kayenta mine itself transports coal by railroad, but the two mines (Black Mesa and Kayenta) are linked administratively and are geographically close, so the renewal demonstrates tacit support (or, at least, benign neglect) of the Black Mesa mine operation, despite widespread public knowledge of the information contained in this chapter.[19] At the annual meeting of Hanson Industries in February 1996, Hopi and Navajo protestors, along with supporters from various environmental groups, succeeded in shutting down the meeting (*Private Eye* 1996). That OSMRE would override the many Hopi protests and renew the mine permit suggests that the rules of the market and the market's control by multinational capital are so entrenched in the thinking of government and industry that even in such a flagrant case, local constructions of environmental interest will not be heard and possible government uses of legal tools to protect stakeholders will go by the board.

If the imbrication of government and corporate interests in water uses seems Orwellian, the bureaucratic labyrinth overseeing regulation is positively Kafkaesque. A series of government agencies have made appearances in this chapter as involved at one level or another with the issues in question, and additional agencies are also involved. All told, the following are included: The Hopi Tribal Council (and various departmental agencies); the Navajo Nation (and various departmental agencies); the U.S. Secretary of the Interior; the U.S. Geological Survey, Water Resources Division; the U.S. Environmental Protection Agency; the U.S. Office of Surface Mining Reclamation and Enforcement; the U.S. Army Corps of Engineers; the U.S. Fish and Wildlife Service; the U.S. Bureau of Land Management; the U.S. Bureau of Indian Affairs; the U.S. Department of Health and Human Services (Indian Health Service); the U.S. Department of Justice; the State of Arizona; the Arizona Department of Health and Human Services; the Arizona Game and Fish Department; and the Arizona Department of Mines and Mineral Resources. This list does not include the municipal interests party to Little Colorado basin water rights adjudications. Multilateral negotiations over the water rights in question—involving the Hopi, the Navajo, Peabody, and municipalities in northern Arizona, and overseen by the U.S. Department of Justice—are ongoing as of this writing. The possibility, say, that the Hopi Tribe could sue Peabody over environmental damage is held in abeyance by these negotiations (in which Peabody is the major player, with most of the

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wealth) and their attachment to a web of bureaucratic strings. From this governmental quagmire, some Hopi have recently turned to the environmental group the National Resources Defense Council, which is supplying a hydrologist to conduct independent tests of the aquifer.

The key question for the future—how local communities can ensure basic resource needs vis-à-vis the demands of the metropolitan economy—will be played out in many contexts in the American West and in other regions where conflict over resource rights is exacerbated by demographic shifts, increasing urbanization, and absorption of small communities by ever more encompassing forces of market production. Global climate change will be another major factor in the capacity of small-scale indigenous societies to retain control of their environments and resources. It is quite likely that dislocations from climatically marginal areas will produce a significant tide of environmental refugees (see, e.g., Intergovernmental Report on Global Climate Change 1995). In locales like the Hopi Indian Reservation, where water supply is so limited, the threat posed by industrial exploitation of the present sort may well tip the balance prior to changes produced by longer-term impacts.

If we are genuinely committed to sustainability, it is time to expand our understanding of it by listening to members of communities—for example, some Native American communities—that have practiced it for a very long time. If, to be realistic, we do not see an end to global markets as the mainspring of future economic frameworks, the key issue will be how to balance short-term profitability with long-term sustainability. The crux of that, surely, is empowering local stakeholders in the decision-making processes of companies themselves—but that will require corporate willingness to be inclusive, which may be anathema to the current ethos and praxis of the market. Without that will, the only hope for stakeholders is the intervention of government regulatory agencies, but if the actions of the OSMRE and the bureaucratic labyrinth in which decision making is currently trapped in the case presented here are anything to go by, that glimmer of hope offers precious little comfort. During his first campaign for the U.S. presidency, Bill Clinton announced that he would be the "environment president." Perhaps, in the apparent failure of the secretary of the interior to step in here, what is needed to cut through the bureaucracy is an "environment czar" who could respond to stakeholder situations like the Hopi water crisis more effectively. One Hopi commentator, Rebekah Masayesva, summed up the situation with admirable conciseness: "The pumping of pure underground water for slurrying of coal is unconscionable and must stop" (U.S. Department of the Interior

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1990:416). Yet eight years after the public hearings, the slurrying persists, and there is still no indication that it will stop soon, no matter how environmentally damaging, socioculturally destructive, economically shortsighted, or, indeed, unconscionable it may be. If we can summon the courage to recognize that in the long term we are all stakeholders, the question for both industry and government is "Why not?"

RESOURCES

The following bibliographic references and internet sites are useful for further study of Hopi and Native American water rights issues.

Lloyd Burton. 1991. *American Indian Water Rights and the Limits of the Law.* Lawrence: University Press of Kansas.

Richard O. Clemmer. 1978. "Black Mesa and the Hopi," in *Native Americans and Energy Development,* edited by Joseph Jorgenson. Boston: Anthropology Resource Center. (Very useful for earlier phases of Hopi resistance to mine.)

Richard O. Clemmer. 1984. "The Effects of the Energy Economy on Pueblo Peoples," in *Native Americans and Energy Development,* Vol. 2, edited by Joseph Jorgenson. Boston: Anthropology Resource Center and the Seventh Generation Fund.

Gallup Independent, 12-20-1993, "Coal Mining May Threaten Hopi Water, Culture." Gallup, NM.

Al Gedicks. 1993. *The New Resource Wars: Native and Environmental Struggles against Multinational Corporations.* Boston: South End Press.

Marianna Guerrero. 1992. "American Indian Water Rights: The Blood of Life in Native North America," in *The State of Native America: Genocide, Colonization, and Resistance,* edited by M. Annette Jaimes. Boston: South End Press. (Includes useful bibliographic references to Native American water issues and conflicts more generally.)

Los Angeles Times, 4-30-1994, "Coal Mining and Hopi Water." Letter to the editor by W. Howard Carson, president, Peabody Western Coal Company.

William D. Nichols (Western Region Groundwater Specialist, U.S.G.S.), 10-28-1993, letter to William M. Alley, chief, Office of Groundwater, Water Resources Division, U.S.G.S.

U.S. Dept. of the Interior, 1990, Proposed Permit Application, "Black Mesa–Kayenta Mine, Navajo and Hopi Indian Reservations, Arizona," 2 vols. Final Environmental Impact Statement OSM-EIS-25. Denver: Office of Surface Mining Reclamation and Enforcement. (Vol. 2, Comments and Responses, includes the full text of numerous Hopi letters, petitions, and oral testimony.)

U.S. Geological Survey. 1995. Results of Groundwater, Surfacewater, and Water-Quality Monitoring, Black Mesa Area, Northeastern Arizona.

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1992–93. *Water Resources Investigations Report* 95-4156. No. 95-4156. Tucson: U.S.G.S.

Charles F. Wilkinson. 1996. "Home Dance, the Hopi, and Black Mesa Coal: Conquest and Endurance in the American Southwest." *Brigham Young University Law Review*, 1996, no. 2. (A detailed account of the original lease negotiation for the mine, in which Hopi tribal attorney, John Boyden, is clearly shown to have also been working on behalf of the energy companies.)

Hopi Information Network:
http://www.infomagic.com/~abyte/hopi.html

Native Americans and the Environment:
http://conbio.rice.edu/nae/

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NOTES

1. Comments at public hearing on the environmental impact of the Black Mesa–Kayenta Mine, Kykotsmovi, Hopi Indian Reservation, Arizona, 9 August 1989, reprinted in U.S. Department of the Interior 1990, 418
2. See, for example, the accounts of Hopi emergence narratives in H. R. Voth's *Traditions of the Hopi* (1905b) or Armin Geertz's "A Reed Pierced the Sky" (1984). Edmund Nequatewa's *Truth of a Hopi* (1936) contains additional Hopi traditional narratives. Frank Waters's *Book of the Hopi* (1963), the most popular work ever published on the Hopi, is best avoided, however, for its confabulation of the imaginary with the ethnographically accurate.
3. From east to west, the mesa-top villages are arranged as follows:

   First Mesa: Walpi, Sitsomovi, Tewa

   Second Mesa: Songoopavi, Supawlavi, Musangnuvi

   Third Mesa: Orayvi, Kiqötsmovi, Paaqavi, Hotvela

   Seventy-two kilometers (forty-five miles) by highway to the west of Third Mesa lie the two villages of Upper and Lower Munqapi, which trace their principal heritage to their mother village, Orayvi. These spellings of village names follow current orthographic conventions established for the Hopi language, which are, as yet, not much used locally—hence the

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variations between, for example, Munqapi and Moenkopi, Songoopavi and Shungopavi, Hotvela and Hotevilla. Good general accounts of Hopi society, economy, and religion appear in Ortiz 1979.

4. For a description of the area's hydrogeology, see Cooley et al. 1969; Gregory 1916 and Hack 1942 provide more detailed local observations of the Hopi environment.
5. The most comprehensive accounts of these migrations, contested by later generations of archaeologists but still systematically articulated by Hopi clan historians, are found in Mindeleff 1891 and Fewkes 1900.
6. See, for example, Brew 1979, Upham 1982, and Cordell 1989; for more general accounts of Puebloan prehistory, in addition to Ortiz 1979, see Cordell 1984 and Cordell and Gumerman 1989.
7. The other Pueblos—Zuni, Laguna, Acoma, and the Rio Grande Tewa, Tiwa, Towa, and Keres villages—also chart their migrations from some of these ancestral stone and adobe ruins.
8. Hopi attitudes toward the environment accord well with J. Baird Callicott's general meditations on Native American environmental ethics (e.g., 1982, 1996), as contrasted with European conceptions of environment. Amid often uncritical projections of the "ecologically noble savage" by some Western environmentalists, more careful statements on Native American attitudes toward the landscape include Momaday 1974, Vecsey 1980, Brody 1981, White 1984, Brightman 1993, Nelson 1993, and Basso 1996. Although the countervailing position—that Native Americans often despoiled their environments and modified them in major ways (Calvin Martin's well-known *Keepers of the Game* [1978] is an example; see also Redford 1991, Denevan 1992, Alvard 1993, and Buege 1996)—has some validity in specific instances, it must be dismissed in general as motivated by the same tendency toward oppositive projection, but of ecologically ignoble savagery. Any careful ethnographic description of Native American environmental praxis typically discloses fine-grained attention to ecological concerns. For comprehensive discussions of anthropological approaches to environmentalism, see Milton 1993 and Orlove et al. 1996.
9. *Hopi* is more than simply an ethnic identity descriptor; in use, it carries specific implications of ethical engagement—in social action, moral thought, and religious practice. The oft-heard opposite, *qahopi* ("un-Hopi," "badly behaved"), used to chastise transgression of behavioral rules, highlights the ethical dimension of the concept of Hopi-ness.
10. Comments at public hearing on the environmental impact of the Black Mesa–Kayenta Mine, Kykotsmovi, Hopi Indian Reservation, Arizona, 9 August 1989, reprinted in U.S. Department of the Interior 1990, 417. Masayesva, sometime chairman of the Hopi Tribe, elaborated on this perspective in the BBC film *The Hopi Way* (Under the Sun series, 1995), which focuses in part on the Hopi water crisis.
11. For more on the aesthetics, poetics, and natural history aspects of Hopi names, see Whiteley 1992.
12. Examples of all these are found in U.S. Department of the Interior 1990.

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One petition, for example, circulated among several villages in August 1989:

> We the members of the Hopi Tribe hereby strongly protest Peabody Coal Company's use of a valuable natural resource, water, to transport coal. We demand that Peabody Coal Company immediately cease the use of water to deliver coal to the generating plant(s) and further demand that the Hopi Tribal Council, the Office of Surface Mining and the Bureau of Indian Affairs put pressure on Peabody to immediately seek alternative means to transport coal.
>
> Water is among our most precious resources and we feel that the millions of gallons pumped to feed the slurry lines are affecting our springs and thus impacting our cultural way of life.
>
> (U.S. Department of the Interior 1990, 261)

13. The permitting procedure for the mine is complex (see Wilkinson 1996 for the original lease history). The lessors are the Navajo Nation and the Hopi Tribe, but mining permits must be approved by a series of regulatory agencies (U.S. Department of the Interior 1990):
    1. The Bureau of Land Management, for a life-of-mining plan (until the year 2023)
    2. The U.S. Army Corps of Engineers, for a Clean Water Act Section 404 permit
    3. The Office of Surface Mining Reclamation and Enforcement, for a permit package that allows renewal of the mining lease, with five-yearly reviews until 2011
14. A source close to the process of EPA review indicated that the DEIS received the EO-2 rating only by the skin of its teeth, and even then with some backstage arm-twisting: the EPA, the source indicated, wanted to rate the DEIS as EO-3 (Environmental Objections—Inadequate), which would have indicated formal failure of the DEIS to satisfy provisions of the National Environmental Policy Act and may well have led to rejection of the permit application without further study.
15. Peabody modeled the recharge rate at 16 million cubic meters (13,000 acre-feet) per year; the USGS study, conducted by an Arizona office, recorded a recharge rate of 2.5 million cubic meters (2,000 acre-feet) per year (figures provided by the Water Resources Office, Department of Natural Resources, Hopi Tribe).
16. Working with Hopi tribal attorney John Boyden's legal files, which were recently made public at the University of Utah, Charles Wilkinson (1996) describes in impressive detail how Boyden was simultaneously working for both the Tribe and the Peabody Western Coal Company regarding water and mineral rights on Black Mesa.
17. Robbie Honani of Supawlavi, then chairman of the Hopi Tribal Council's Resources Committee, noted at the public hearings on the DEIS:

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> There's less than ten Hopi people working at the Peabody mine and over 300 Navajos. Peabody has built the town of Kayenta for the Navajo and for other employees. They have erected a trailer court for its non-Indian employees and flies their top management people every day from Flagstaff, and then flies them back again. Yet there is no trailer court for the Hopi people. And there is no major road system going up to Peabody.
>
> All taxes in the form of education monies go to the . . . Kayenta Public School District. Does the Hopi get any of these monies? No. . . . The State of Arizona receives twice as much money in taxes than the Hopi Tribe does in actual revenues. The tribe receives approximately $8 million in coal royalty, yet the State of Arizona receives between $18 to $20 million in taxes a year. Only a mere drop of that comes back to the Hopi.
>
> (U.S. Department of the Interior 1990, 409)

18. See, for example, *The Economist*'s focus on stakeholders and multinationals, June 24, 1995. In a veritable tide of discussion on stakeholder questions, see, for example, Altman 1994 and Collins 1995. For excellent discussions of indigenous stakeholder interests in relation to local and multinational economic development in different parts of the world, see any issue of *Cultural Survival Quarterly*.
19. W. Howard Carson marked this event with a two-page letter to the Hopi tribal newspaper, *Hopi Tutuveni*, published on 30 December 1996, detailing the benefits the mine had brought to the community, implying that opposition to the mine was the work of cranks and extremists, and completely ignoring the widespread Hopi opposition to the slurry.

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