



THE HOPI

A Companion Guide
for
High School Teachers
(Grades 9-12)

By
Dr. Edie Weinthal



TABLE OF CONTENTS

Handout Credits *page 3*

Educator Information *page 4*

Overview *page 4*

What You Will Find *page 4*

What's in Each Lesson *page 5*

How You Can Help *page 5*

Lessons

1. The Creation Narrative As Geographical Explanation *page 6*

2. Where In The World...? Hopi Land And Supawlavi
Village *page 13*

3. What If The Water Disappears? *page 18*

Handouts *page 24*

HANDOUT CREDITS

1. **“The Hopi Emergence Story” handout.** Excerpted from Ferrell Secakuku’s “Origins” essay, 2004.
2. **“A Hopi Place” handout.** Excerpted from Ferrell Secakuku’s “Place” essay, 2004.
3. **“A Hopi Kiva” handout.** Excerpted from Ferrell Secakuku’s “Ritual” essay, 2004.
4. **“A Hopi Village” handout.** Excerpted from Ferrell Secakuku’s “Community” essay, 2004.
5. **“Map of Hopi Reservation” activity sheet.** Map used with permission courtesy of The Hopi Tribe/Hopi Cultural Preservation Office website: <http://www.hopi.nsn.us/visitors.asp>.
6. **“2001 World Water Day Speech by Klaus Toepfer” handout.** Article reprinted courtesy of the United Nations Environment Programme (UNEP). UNEP News Release 01/40.
7. **“Contamination Threatens Moenkopi Water Source” handout.** Article courtesy of the Hopi Tribe/Hopi Cultural Preservation Office website: <http://www.nau.edu/~hcopo-p/current/pressreleases/archive/moenkopi.htm>.
8. **“The Hopi Water Crisis” handout.** Excerpt permission courtesy of the Hopi Tribe/Hopi Cultural Preservation Office website: <http://www.hopi.nsn.us>.
9. **“Black Mesa Water Coalition meets with first Arizona Navajo Congressional candidate Derrick Watchman” handout.** Article reprinted courtesy of the Hopi Tutuveni newspaper, January 19, 2002



EDUCATOR INFORMATION

Overview

This curriculum/study guide has been prepared as an educational tool to accompany the Hopi Community component of the Smithsonian Institution National Museum of the American Indian's Internet-based **Indigenous Geography Project**. *The Hopi: A Companion Guide For High School Teachers* has been designed to help educators in grades 9-12 teach about one American Indian community today: The Hopi. While Hopi lifeways have changed much in the past centuries, they still continue to maintain and celebrate their histories, traditions, and ceremonies while becoming an integral part of contemporary American society.

Three lessons have been developed that more deeply explore selected topics addressed by the Hopi community in the Indigenous Geography Project. These topics include the roles geography, culture, religion, and agriculture have played in shaping the Hopi way of life; understanding the geographic location of the Hopi villages in proximity to major cities in the state; and the Hopi water crisis. While preparing these lessons, efforts were made to reveal the complexity and interdependency of these various topics and to target particular National Geography Standards and National English Language Arts Standards. These standards provide direction for helping students become geographically and historically informed and further understanding and appreciation of the complex web of relationships between people, places, and the environment through time.

What You Will Find

This Guide contains three lesson plans.

Lesson 1

The Creation Narrative as Geological Explanation explores the close interdependence that exists between corn agriculture, the environment where corn is grown, the symbolic aspect of corn, and the ceremonial life of the Hopi people of northern Arizona. Students examine several Hopi emergence stories to understand the central roles geography and corn play in sustaining Hopi livelihood and their rich and elaborate ceremonial and spiritual life. Students build a kiva using the description of a *kiva* from the Indigenous Geography website. Students then participate in a larger dialogue that addresses an exploration of Hopi villages and communities and the interrelationships among the environment, religion, students and agriculture, and conclude with an exploration of this topic in both a historical and contemporary context.

Lesson 2

Where In The World...? Hopiland and Supawlavi Village examines the use of a variety of maps and map sources to develop a thorough understanding of the layout and design of Hopi villages and the surrounding geography. Throughout the examination of assorted material, students improve their skills in map analysis and ability to use spoken, written and visual language to communicate this information. Finally, students are asked to use the available information to design a travel brochure of the Hopi reservation.

Lesson 3

What if the water disappears? challenges students' understanding of the importance of water through the review of articles that explain the global use of this valuable resource and the significance of water to the Hopi and their environment. Students work in groups to evaluate issues and alternatives to the Hopi water crisis and present their ideas for classroom discussion.

What's In Each Lesson

Each lesson consists of thirteen sections. **Lesson Objective** highlights what the lesson is designed to achieve. **Estimated Time** provides an average estimate of lesson length. **Materials Required** lists the materials that will be needed to carry out the lesson. **Connections to the Curriculum** lists which curriculum areas the lesson touches on, for example, social sciences, geography, history, language arts, and/or language. **Connections to the National Geography Standards** lists what standards the lesson explores. **Connections to Students' Geographic Skills** describes what kinds of abilities students will acquire or develop further as a result of doing the lesson. **Connections to the National English Language Arts Standards** points out what standards this lesson examines. **Background** provides information that enhances understanding of the lesson topic and may be reproduced for classroom use, if needed. **Setting the Stage** serves as an icebreaker to introduce students to different themes. The **Student Assessment** activities allow students to integrate what they have learned and communicate it to others. They also provide educators with ways to evaluate students' understandings of the topic. **Extension** suggests ways students can explore a similar topic in their own community. **Additional Lesson Resources** offers the educator additional sources of material to support the lesson. Finally, **Sources Consulted For Content** points out what bibliographical references were used to develop the lesson content.

How You Can Help

Let us hear from you! Email your comments to NMAI-IndGeog@si.edu.

Indigenous Geography Website:
www.IndigenousGeography.si.edu

LESSON 1

THE CREATION NARRATIVE AS GEOGRAPHICAL EXPLANATION

GRADE LEVEL: 9-12

Lesson Objective

At the completion of this lesson, students will be able to:

- Retell the Hopi emergence narrative orally or paraphrase the story in writing.
- Identify the elements of the emergence narrative which describe land features of the Hopi experience.
- Examine certain elements of the emergence narrative which are reflected in the Hopi way of life.
- Understand the importance of corn to Hopi agriculture and to Hopi traditional culture.

Notes to the teacher:

The emergence story is the center of Hopi traditional knowledge and a starting point for understanding Hopi culture. This narrative can be found in multiple sources including books on Native Americans, in the reading on this web page, and on many websites devoted to Native Americans. (See additional lesson resources below.) Since the original method for transmittal was orally, it is most powerful when students can hear the story for the first time either on tape or simply read by you. Students should be reminded that creation stories not only explain origin but also most often provide blueprints for living and making one's way in the present world.

Estimated Time

Three to four 45-minute sessions

Materials Required

- “Hopi Emergence Story,” Handout A, from Ferrell Secakuku’s “Origins” essay
- “A Hopi Place,” Handout B, from Ferrell Secakuku’s “Place” essay
- “A Hopi Kiva,” Handout C, from Ferrell Secakuku’s “Ritual” essay
- “A Hopi Village,” Handout D, from Ferrell Secakuku’s “Community” essay
- Pens and pencils

- Chalkboard or whiteboard
- Tape recorder helpful

Connections to the Curriculum

- Geography
- History
- Social Studies
- Art
- Language Arts

Connections to the National Geography Standards

Standard #4: The physical and human characteristics of places.

Standard #5: The people create regions to interpret the earth's complexity.

Standard #6: How culture and experience influence people's perceptions of places and regions.

Standard #12: The processes, patterns, and functions of human settlement.

Connections to Students' Geographic Skills

- Identify ways culture influences people's perceptions of places and regions: the meaning and significance of place; how relationships between humans and the physical environment lead to the formation of places and to a sense of personal and community identity.
- Explain factors that contribute to the dynamic nature of regions.
- Explain why places and regions serve as symbols for individuals and society.

Connections to National English Language Arts Standards

Standard #1: Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, and classic contemporary works.

Standard #3: Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

Standard #5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Standard #7: Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a

variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

Standard #8: Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

Standard #9: Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.

Background

The ancestors of modern Pueblo peoples have lived in the Four Corners and Rio Grande region in Southwestern United States for at least 10,000 years. The Anasazi people were an ancient culture that developed from Paleoindian lifeways but disappeared. Modern Pueblo peoples today carry on many legacies of the Hisatsenom culture. The Hisatsenom, or Ancient People, are those who migrated throughout the four corners area in the Southwestern United States, building villages before coming to Hopi. Here, in the heartland of the canyons, mountains, and valleys of the Colorado Plateau, Pueblo peoples have created, through time, a unique fabric of community life based on farming, worship, and life in adobe and masonry villages, later called pueblos by the Spaniards. For Hopi people, this place has always been their homeland.

Hopítu or “peaceful ones,” as Hopi people call themselves, have always been profoundly rooted in their land through their ancient agricultural practices and the celebration of their spirituality in religious ceremonies held throughout the year. The archaeological record shows that agriculture was introduced to the southwestern United States from Mexico around 3,500 years ago. Pueblo people have been successful farmers for more than 2,000 years.

The Hopi view of agriculture is told in their emergence story. According to their oral tradition, Hopi emerged from the Third World into this current Fourth World. When the Hopi came to this world, Maasawu offered them an ear of corn. Other people grabbed the biggest ears of corn, leaving the Hopi with a short ear of corn. The Hopi knew that this Fourth World would put them closer to the earth and that by inhabiting this desolate and rugged region, they would learn to be humble, respectful, and cooperative. Hopi accepted the responsibility to be stewards of the land.

Hopi Agricultural Methods

Agriculture in the arid region of northern Arizona is a serious and challenging endeavor. Human ingenuity and technological skill have been two key components of Hopi farming success for at least 1,000 years. Faced with harsh climatic conditions including a short growing season of 120-160 days, drying winds, high summer temperatures, lack of surface water, and low and variable annual precipitation (8"-12"/20cm-30cm per year), have forced the Hopi to develop their own farming methods and their own varieties of crops.

Hopi agriculture includes different methods. Dry farming, which depends completely on natural precipitation, relies on water produced during winter snow melts, early spring rains and summer monsoons. This method is used for planting crops of corn, squash,

and melons in the fields located along the major washes and valleys between the mesas. *Akchin* farming is used for growing crops of corn, squash, and melons in areas where floodwater spreads out at the mouth of a gully. Irrigated gardening of melon and squash crops is practiced on the stepped, rock-walled terraces on the sides of the mesas and irrigated by ditches or by hand buckets. Sand dunes are good fields for growing beans. To ensure sufficient harvests, most farmers have several small fields in different locations.

When the Hopi emerged into the Fourth World, Maasawu gave them a wooden planting stick and a bag of corn. This long wooden planting stick is still used among Hopi farmers. The implement is useful to place seeds deep in the soil without opening large holes; a method employed to avoid the reduction of ground moisture. In addition to the traditional stick, they combine the use of modern equipment such as tractors, discs, and hoes. To bring rain for the crops, Hopi farmers sing and pound the earth. Ferrell Secakuku describes how the singing and pounding is done: “My dad used to tell me that when you plant, you always pound on something and you always sing. Because the plants, the ground and the earth provide happiness: ‘They made me feel good this morning!’ But the other reason why we sing and pound is to agitate the air, because there’s always moisture in it. The way to support plants is to provide moisture. So the Hopis are always singing or pounding something as loud as they can when they’re tending the crops.”

Ownership of the land and agricultural activities are still performed according to tradition. In Hopi society, women own the farm and garden lands, but tasks are shared between the sexes. Men’s activities include clearing the fields, and planting, maintaining, and harvesting the corn. Women’s tasks involve caring for the crop seeds and the distribution of harvest products, planting and gathering vegetables and fruits from the terraces, and assisting men in the field.

Diversity Is The Key

Unlike modern Western agricultural methods, which encourage planting one species of one crop, Hopi agriculture favors a diversity approach, that is, growing different varieties of the same crop. Growing a variety of species of the same crop is beneficial because various species of one crop are more or less resistant to climatic and pest conditions. There are also many uses that come from a variety of species for cultural and traditional activities. If one species fails, the others may succeed. This ancient practice has proven crucial to obtaining harvests in an arid terrain subjected to the unpredictability of climatic conditions. Hopi farmers produce seventeen varieties of corn, including yellow, blue, red, white, speckled, and purple corn; bean varieties, and different types of squash. White corn represents the most important crop in the reservation and is used for flour (meal), hominy, and prayer offerings. Blue corn follows second in importance and is used mainly in wedding breads and sauces. Red corn is used for parched corn. Yellow corn is often substituted for white corn in both cooking and ceremonies. In addition to their own developed varieties, the Hopi have adapted crops from Europe, Asia, and Africa, such as orchard fruit and watermelons from the Spanish.

The Symbolic Meaning of Corn

Corn and human life are intertwined in Hopi worldview. The Hopi believe that when they adopted a human form, the creator took some human flesh and made it into corn, so they could feed themselves. Corn, as the Hopi say, is human flesh and nourishment for

the human. And because of that, Hopi think that corn is a part of them and that they are a part of it. When a baby is born, the baby stays in a dark room with the mother for twenty days. On the 21st day, the baby sees the Sun for the first time and the mother offers the Sun a gift of cornmeal. The baby receives an ear of corn made into a fetish and keeps it for life, because when crops fail, its seeds hold the promise of a new crop cycle. This fetish corn is referred to as Mother corn or corn mother.

Caring for a corn plant requires the same type of care as for a baby. Ferrell Secakuku best describes this unique relationship when he says: “The plant is just like your child, like a baby. You take really good care of it so nothing would go wrong. They get to know you, and they’re really happy when you come, especially when you sing. And then you clean out the weeds to keep your plants healthy.” This type of special caring entails good agricultural practices and strategies like planting in different locations, doing multiple plantings during the growing season, carefully selecting the seed corns, maintaining the separation of different varieties of corn, and diverting water to crops when needed, and ensures the productive growth of corn.

The different colors of corn hold special meanings to the Hopi. The four cardinal directions and the bottom and upper worlds are signified by the different colors of corn as well as by various colorful birds. North is represented by yellow corn, *takuni*, and by a yellow bird, finch or *sikyats’i* and by another bird *tawamanawu’*. West is represented by blue corn, *sakwapu*, and by any bird that is blue, for example, *tsooro*, a bluebird, or *sa’in*, a blue jay. South is represented by red corn, *palaqa’ö* and a Central American parrot, *knyra*. East is represented by white corn, *gotsa’qa ö*, and by the bird *poosinnu*. The Upper World is signified by the color of dark purple corn, *kokoma* and by a black bird, *tokotska*. The Bottom World is grey and is signified by a mixture of all the colors of corn together, *tawaktsi* (sweet corn variety) and the bird *tiposkwa*.

Hopi ceremonial life serves as a guide for the performance of their agricultural cycle. The timing of the different agricultural activities is marked in Hopi ritual calendar, following the phases of the moon and the solstices of the sun. From February through July, Hopi hold different night and day *katsina* ceremonies and various non-katsina ceremonies during the remaining part of the year. While these ceremonies are celebrated, Hopi people participate in different agricultural activities, including: clearing the fields; planting crops; weeding, hoeing, and thinning plants; and harvesting.

Setting the Stage

Have students sit in a circle. Ask them to close their eyes and listen as the emergence story is read to them (or have them listen to a tape recording). After the reading, write the following on the board for student journal response: “Write down the three mental images which formed most clearly in your mind as you heard this story.” After about five minutes, have students share their responses with the rest of the class. Ask students if this story brought to mind any other stories they know.

Procedure

- Hopis believe that the place of emergence into this Fourth World was “somewhere down in the Grand Canyon.” Have the students read the “Hopi Emer-

gence Story,” Handout A, from Ferrell Secakuku’s “Origins” essay on the Indigenous Geography website. Have students find pictures of the Grand Canyon on the Internet and then have them locate it on a U.S. map. Next, have them research how the Grand Canyon was formed.

- Have students read Ferrell Secakuku’s “Place” essay, Handout B. Ask them to explain how this story provides a rationale for the locale of Hopi settlement. Have students respond to the following questions: What about the Grand Canyon do you think makes it a holy place? Based on the emergence narrative, why do you think the Hopi Nation considers the Grand Canyon the “center of the universe?”
- Next, in Ferrell Secakuku’s “Ritual” essay on this website, have students read the section titled “*Kiva*,” Handout C. Have students, in pairs, create a physical representation of a kiva based upon the paragraph description.
- Ask students to label the parts of the kiva which relate to the emergence/creation narrative.
- Next, ask students to read the section which is titled, “Village,” Handout D, from the “Community” essay, and consider the accompanying map; have them answer the following questions based upon their reading of the “Kiva” and “Village” paragraphs. Student responses should be shared with the entire class.

Critical thinking questions:

- Why do you think each village has a square?
- Why do the Hopi people avoid building circles?
- How does each village symbolize the center of the universe?
- Being humble is an important element in Hopi culture. Why is being humble an important element in their culture? How does the geography and climate of the Hopi land reflect the idea of being humble?
- Have students explain how the Hopi creation narrative reflects the Hopi world-view.
- Make students aware of the portion of the emergence story which explains that when the Hopi clans emerged into this Fourth World they were offered, along with other peoples, ears of corn by Maasawu, a superior holy being. Since the other clans were far more aggressive than the Hopi, the Hopi received the smallest remaining ears of corn.

Suggested Student Assessment

Students can be assessed on their answers shared in groups or pairs; students can be evaluated on their kiva maps and village diagrams.

Extending the Lesson

These lessons may be extended in a number of directions:

1. Have students compare and contrast urban areas closest to the Hopi reservation with life on Second Mesa.
2. Have students read a number of emergence/creation narratives and analyze the similarities and differences in them. The Official Hopi website at <http://www.hopi.nsn.us> contains a more extended version of the Emergence Story for the students to review.
3. Have students compare the Hopi understanding of the importance of corn

with the “history” of maize from an archaeologist’s approach. Have students explain how corn was brought to America.

4. Divide students into groups and have them research the following methods of farming important to the Hopi: flood-water farming; Akchin farming; irrigated gardening; sand dune fields of beans; growing fruit trees. Students should present findings to the class and be able to explain how the geographical features of the Hopi reservation make these types of farming logical choices. Students might also research other areas of the world where these types of farming methods are utilized.
5. Students should be divided into pairs. One person should be given the assignment to research the Hopi “division of labor” with regard to farming. The other should research how other early settlers divided up the male/female labor tasks with regard to agriculture. Student pairs should make up charts and compare with the findings of the others in the class.
6. Students can research weather patterns of northern Arizona over a period of 25 years. They should create weather maps and charts which reflect their findings. Students should discuss how weather conditions (arid climate, floods, drought, etc.) make farming difficult for the Hopi.

Additional Lesson Resources

You might begin at www.nativeculture.com/lisamitten/indians.html to find background information on the Hopi emergence narrative. Additionally, website www.dickshovel.com “First Nations Histories” has a huge bibliography and detailed discussions of the histories of many tribes. An extremely helpful website can be found at www.intrepidsoftware.com/other/create.html. There are extremely helpful background notes by Ted E. Tollefson, 1989 titled, “What Does a Creation Myth Do?” These notes can be invaluable if you ask students to do any type of comparison among other creation/emergence narratives.

Sources Consulted for Content

- Ferrell Secakuku’s content material.
- Mañosa, Cecilia. 2004. Background section excerpted from *Hopi Education Guide for Elementary and Middle School Teachers*. NMAI Indigenous Geography website.
- The Official Hopi Cultural Preservation Office Home Page at: <http://www.nau.edu/~hcopo-p/>.
- The Official Website of Hopi Tribe/Hopi Cultural Preservation Office at: <http://www.hopi.nsn.us>.

LESSON 2

WHERE IN THE WORLD...? HOPI LAND AND SUPAWLAVI VILLAGE

GRADE LEVEL: 9-12

Lesson Objective

At the completion of this lesson, students will be able to:

- Utilize data to develop maps showing locale of Hopi Reservation sites in relation to one another and to the states of Arizona and New Mexico.
- Use maps to represent spatial relationships within and between regions and to report this information using visual and print media.
- Create travel brochures which will demonstrate knowledge of the landmarks and important geographical sites near the Hopi Reservation.

Estimated Time

Two hours (more for extended lessons and research)

Materials Required

- “Map of the Hopi Reservation,” Activity Sheet A, from the Hopi Tribe/Hopi Cultural Preservation Office website: www.hopi.nsn.us/
- Internet access or Atlas materials
- Markers or highlighters
- Travel brochures (free from any travel agency or on the Internet)

Connections to the Curriculum

- Geography
- History
- Social Studies

- Art
- Language Arts

Connections to the National Geography Standards

Standard #1: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.

Connections to Students' Geographic Skills

- Ability to map, analyze, report, research, and synthesize geographic data.

Connections to National English Language Arts Standards

Standard #1: Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.

Standard #5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Standard #7: Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

Standard #9: Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.

Standard #12: Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

Background

Did you know that the Hopi village of Oraibi, located on Third Mesa in northern Arizona, is the oldest continuously human inhabited community in North America? Archaeologists suggest that it was constructed between 1020 and 1100 A.D. The remaining Hopi villages were constructed a few years later on top of First, Second, and Third Mesas. Supawlavi was settled during the 1700s. Sungoopavi Village, also believed to be as old as or even older than Oraibi, was relocated to the Mesa after the Pueblo Revolt of 1680.

At first glance, the arid terrain of northern Arizona may appear inhospitable to human life. Grasslands and desert scrub prosper in the lower elevations while piñon and juniper woodlands thrive on the mesa tops. Sandstone and shale rock, weathered into sand, silt, and clay dominate the soil. Desert temperatures range from 87° F [30° C] in summer to 18° F [-8° C] in winter. Water is scarce and precious in this region. Rainfall from summer rains

and average winter snowfall is 8 inches [20 cm] per year. While natural springs dot the landscape, there are no year-round rivers or streams that can supply a permanent and reliable source of water. Washes abound only after heavy rains. Nonetheless, human life has blossomed in the deserts of northern Arizona for thousands of years. The Hopi people represent a successful farming community that has thrived in a desert environment for at least 1,000 years.

Hopi villages are set in a landscape rich in ancient religious significance. Here different landforms and places hold special meanings to the Hopi. For example, the San Francisco Peaks, located southwest of the mesas, is the Hopi's sacred mountain. This is the spiritual home of the *katsinam*. The Grand Canyon is probably the Hopi's holiest place in the world. This is where humans originated and where Hopi people emerged to this land. Many other ancestral lands and prehistoric villages are important to Hopis. Today, Hopis still remember them by preparing prayer feathers for them. Canyon de Chelly in Arizona was the home of different clans who later migrated to Hopi bringing along with them the domesticated turkey. This is the reason why this canyon is known as "Canyon of the Turkey." Another special place is Mesa Verde in southern Colorado. This was the home of two clans who moved to Hopi. They carried with them the power to heal the sick and to take care of diseases, as well as to ensure the well being of people.

Hopi architecture is characterized by masonry structures: local sandstone and clay mortar coated with clay plaster and painted with whitewash. The villages are composed of room-block houses, with Bear Clan houses facing east, to greet the Sun. Houses may reach up to three stories and are built surrounding a central plaza. Traditionally, each house had one room, which functioned as a kitchen and living/sleeping area. Everyone slept in the middle of the floor. During meals, they all sat on the floor and ate from one pot. Today, some older houses have two rooms. The kitchen is a separate and smaller room whereas the main room is larger and serves as a living/sleeping area. Behind the houses, women have large adobe hornos or bread ovens, where the baking is done. Houses have small buildings placed outside on the edge of the mesa or down to the sides: the bathrooms.

While each family lives in one house, the plazas and *kivas* are communal areas of daily use. Here at the plaza a small shrine represents the Center of the Universe and also the Place of Emergence. If you look closely at the edge of the mesa, you will notice a ladder protruding through a square hole of a subterranean or semi-subterranean structure: this is the kiva.

Setting the Stage

Have students examine multiple travel brochures and discuss the various sites and landmarks highlighting the commonalities and attractions for visitors (religious sites, monuments, historical places, geographical mysteries, natural habitat, etc.). Tell students to jot down five things that might attract them to visit a particular locale. (They will use these five things later in the lesson.)

Procedure

- Working in pairs, have students access a map of the Hopi Indian Reservation, Activity Sheet A (www.hopi.nsn.us).
- Next, have students read map location descriptions of First, Second and Third Mesa; using markers and the map legend, they should highlight described lo-

cales on their maps. Have students develop a color designation to distinguish First, Second, and Third Mesas. Students should locate Supawlavi Village on the map.

- Next, students should find the mileage from the Hopi reservation to the major cities in the state.
- Students should locate the Grand Canyon and trace the Hopi migration trail to their present location.
- Finally, have students find the mileage from the Hopi reservation to: Albuquerque, Denver, Flagstaff, Gallup, Las Vegas, Los Angeles, New York, Phoenix, Salt Lake City.

Suggested Student Assessment

- Students might be given the following “authentic” assessment:
“You are organizing a tour to northern Arizona and have been asked to show tourists the Hopi Reservation. Leaving from _____ (use the closest urban area to your school), plot the following:”
 1. The most scenic route to the reservation
 2. The quickest way to the reservation
 3. The “driving” directions to the reservation
 4. The route to the reservation using a number of different transportation modes
- Students should then design a “travel brochure” including the above routes and highlighting things to see and do along the way or design a virtual “historical” tour using the Internet, which would highlight Indian sites and culminate at the Hopi reservation.
- Students should refer back to the five things they noted that would attract them to Supawlavi Village and include these things in their brochure.
- (Routes and brochures can be done with graphic computer programs or “by hand.” Brochures should be published and displayed for the class.)

Extending the Lesson

This lesson can be extended in the following ways:

1. Have students design “overlay” maps using clear transparencies; overlays can show population in specific areas, transportation routes, geographical formations, or any combinations they choose.
2. Have students investigate ways that technology has (or has not) altered the lifestyle on the Hopi reservation (i.e. paved roadways or superhighways, computers, industrial or agricultural advances) and have them represent these changes via graphs, overlays, charts, or maps. Have students predict the impact of future technology on the Hopi way of life.
3. Have students examine and graph the population density or migration patterns in the state of Arizona; have students speculate on what this means about life on the reservation.
4. Have students examine significant landmarks in Arizona and New Mexico and discuss the symbolic meaning of these sites to the Hopi Nation and to other Americans.

Additional Lesson Resources

- <http://www.nau.edu/~hcpo-p/> (the Hopi Tribe/Hopi Cultural Preservation Office)

Sources Consulted for Content

- Ferrell Secakuku's content material.
- Mañosa, Cecilia. 2004. Background section excerpted from *Hopi Education Guide for Elementary and Middle School Teachers*. NMAI Indigenous Geography website.
- The official Hopi Cultural Preservation Office homepage at: <http://www.nau.edu/~hcpo-p/>.
- The official website of the Hopi Tribe/Hopi Cultural Preservation Office at: <http://www.hopi.nsn.us>.

LESSON 3

WHAT IF THE WATER DISAPPEARS?

GRADE LEVEL: 9-12

Lesson Objective

At the conclusion of this lesson, students will be able to:

- Examine the water resources of the Hopi Nation.
- Understand the issues of water depletion as it affects the Hopi Nation.
- Use primary documents to analyze the arguments between the coal mining company and the Hopi Nation.
- Synthesize information to support a point of view expressed in written and oral forms (skill: asking geographical questions).
- Evaluate the feasibility of solutions to problems (skill: answering geographical questions).
- Use factual knowledge to debate a position of this controversy.
- Write a persuasive letter, editorial, or position paper with supporting documentation to demonstrate understanding of this problem.

Notes to the teacher:

This lesson delves further into the environmental issues of water depletion as a result of the coal mining operation on Black Mesa. Students should be challenged to examine the ongoing controversy from a variety of primary documents and to reflect on the present and future ramifications of water depletion to Hopi society.

Estimated Time

Two to four hours

Materials Required

- “The Hopi Water Crisis,” Handout A
- “Black Mesa Water Coalition meets with first Arizona Navajo Congressional candidate Derrick Watchman” article, Handout B
- “Contamination Threatens Moenkopi Water Source” article, Handout C
- Klaus Toepfer’s 2001 “World Water Day” speech, Handout D

- Class journals (if used) or writing paper
- Pens and pencils
- Classroom blackboard or whiteboard

Connections to the Curriculum

- Geography
- History
- Social Studies
- Art
- Language Arts

Connections to National Geography Standards

Standard #4: The physical and human characteristics of places.

Standard #7: The physical processes that shape the patterns of earth's surface.

Standard #11: The patterns and networks of economic interdependence on earth's surface.

Standard #13: How the forces of cooperation and conflict among people influence the division and control of Earth's surface.

Standard #14: How human actions modify the physical environment.

Standard #18: How to apply geography to interpret the present and plan for the future.

Connections to Students' Geographic Skills

- Identify ways culture influences people's perceptions of places and regions: the meaning and significance of place; how relationships between humans and the physical environment lead to the formation of places and to a sense of personal and community identity.

Connections to National English Language Arts Standards

Standard #1: Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment.

Among these texts are fiction and nonfiction, classic and contemporary works.

Standard #3: Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

Standard #4: Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

Standard #5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Standard #7: Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

Standard #8: Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

Standard #9: Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.

Standard #11: Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.

Standard #12: Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

Background

The unique and arid region of northern Arizona presents serious challenges to the Hopi people. According to Ferrell Secakuku, “The task of taking care of this earth is heavy and will be difficult. Therefore man was made to be strong, alert, and also passionate.” The harsh climate, lack of surface water and low annual precipitation require the Hopi to carefully consider the role water plays in their day-to-day life. Without water, there can be no life for the Hopi.

Today most Hopi live in modern houses with plumbing and they rely heavily on local water sources underneath the Hopi Reservation. These water sources are geological, water bearing formations called aquifers. Underlying the Hopi Reservation are five aquifers, but only the Navajo Aquifer, or N-Aquifer, is accessible enough and of sufficient quality to provide potable water for the Hopi villages. Located on Black Mesa, the N-aquifer is jointly owned by the Hopi and Navajo Nations. Black Mesa derives its name from the sizable seams of low-sulphur coal that lie within this geologic formation, covering over 3,200 square miles of northeastern Arizona.

Following World War II, the increase of energy and rapid development of the United States resulted in dramatic population increases. Rapid growth was soon followed by the need to find sustainable energy sources.

In the 1960s, both the Hopi and the Navajo, urged by the United States government and several energy companies, signed coal leases establishing the largest surface coal mining operation in the nation. The Hopi signed when they were assured by the United States that their reliance on the N-aquifer would not be affected. Regardless of the economic benefits associated with the mining, the significant consumption of N-aquifer water is of great controversy among the Hopi. This limited source of pristine groundwater is the only source of drinking water for the Hopi, and has been used to slurry coal at a rate of 1.3 billion gallons a year, or 3.3 million gallons of water a day, for the past 30 years.

Concerned about the water depletion of the N-aquifer, citizens formed advocacy groups such as the Hopi Water Team and the Black Mesa Water Coalition. The Water Team serves to protect and advance the water rights of the Hopi Nation, to develop a recommended strategy for the negotiations, and to evaluate potential threats to their water sources such as contamination.

Setting the Stage

Write on the board, “How did you use water today?” Have students spend three minutes jotting down in their journals or notebooks their daily use of water (e.g., drinking, washing, indoor plumbing, etc.).

Next, have students take one minute to jot down the answer to the question: “How would you do [the above things on your list] if there were no clean water?”

Procedure

- Discuss/review the water cycle with students. Have students locate on the Internet or in a science book the diagram of the water cycle. Make certain students understand the following vocabulary: evaporation, condensation, precipitation, desalination, groundwater, and aquifer. (Students can work in pairs to define these terms.)
- Critical thinking questions for class discussion or journal entries:
 - How would life on Earth be different if there were no precipitation?
 - Use your knowledge of the water cycle to explain how droughts occur.
 - How have freshwater sources affected the development of human settlements?
 - How could chemical substances buried in the earth or released into rivers or lakes contaminate drinking water?
 - What impact would Peabody’s pumping of 1.3 billion gallons of the N-aquifer have on Hopi drinking water?
- Map Reading/Understanding Location: Have students now locate the Black Mesa on a map of Arizona. Also have them locate Laughlin, Nevada, the locale of the Mohave Generating Station where the mined coal from Black Mesa is transported.
- Next, have students read “The Water Crisis at Hopi” (Handout A or <http://www.hopi.nsn.us/water.asp>).
- Close Reading/Critical Thinking: Issues and Alternatives: Have students now work in groups to do an “ISSUES AND ALTERNATIVES” chart based on the above article. Students should list each of the arguments and the alternatives suggested.
- Next, have students research and read several of the Hopi press releases which can be found on the Internet. In particular, have them read “Black Mesa Water Coalition Meets with Derrick Watchman,” Handout B, and “Contamination Threatens Moenkopi,” Handout C. The Moenkopi site is also listed in the “resource” section below. Ask students to add to their “Issues and Alternatives” chart.
- Making connections with the rest of the world: Have the class read the 2001 “World Water Day” speech, Handout D, by UN Environmental Director Klaus

Toepfer. Have them respond (orally or in their journals) to the question: “How does this article relate to the Hopi water shortage?” Have students share answers with one another.

Suggested Student Assessment

(Authentic Assessment Project)

As a water authority, you have been summoned before a Congressional committee examining the depletion of fresh drinking water for the Hopi Nation. Using the articles you have read, your “issues and alternatives” chart, and Native testimony, explain the problem of water depletion and propose possible alternative solutions for this issue. You may make your presentation orally or in written form. Remember, charts and graphs can help demonstrate the points in your arguments.

OR

Hold an in-class formal debate with one side presenting for the Hopi Nation and the other for the Peabody Coal Company. Have remaining class serve as debate “judges.”

Extending The Lesson

This lesson may be extended in a number of directions:

1. Have groups of students research and report on the coal-mining process in the Western United States.
2. Have groups of students research and report on the importance of coal as a natural resource and economic necessity.
3. Have students follow news stories on the Hopi/Peabody Coal Company issues.
4. Have students research a river or lake in their community and explain how it contributes/contributed to that community’s development. Note: It may be that students may have to connect their community with a distant water source!
5. Have students investigate the ways that salt water might be harvested to provide freshwater sources for life on earth.
6. Have students use the Internet to follow the weather patterns on and around the Black Mesa area of Arizona. Have them chart or graph the resulting information. What conclusions might they draw from this information with regard to the renewal of water resources in the area?
7. Develop pen pals with Hopi students. Discuss the pros and cons of gathering opinions and information. How are they positive or negative?

Additional Lesson Resources

- For detailed information the following resources can be consulted:
<http://www.nau.edu/~hcopo-p/current/pressreleases/archives/mmoenkopi.htm>;
<http://www.hopi.nsn.us/water.asp>;
- Geographical websites regarding Lake Powell;

- www.cnie.org/nae/ is the homepage of “Native Americans and the Environment” and is wonderful for background reading. This site is from the National Council for Science and the Environment and has hundreds of resources on tribal land.
- A documentary titled, “In the Light of Reverence,” is a portrait of land-use conflicts over Native American sacred sites on public and private land in the West. It is a PBS film and could add to students’ understanding of some of these issues.

Sources Consulted for Content

- Ferrell Secakuku’s content material.
- The Hopi Tutuveni, The Official Newspaper of the Hopi Tribe at: <http://tutuveni.hopi.nsn.us>.
- Mañosa, Cecilia. 2004. *Hopi Education Guide for Elementary and Middle School Teachers*. NMAI Indigenous Geography website.
- The Official Hopi Cultural Preservation Office Home Page at: <http://www.nau.edu/~hcpo-p/>.
- The Official Website of the Hopi Tribe at: <http://www.hopi.nsn.us>.
- The United Nations Environmental Programme GRID-Arendal at: <http://www.grida.no/news/>.
- Water Science Glossary of Terms at: <http://ga.water.usgs.gov/edu/dictionary.html>.

THE HOPI EMERGENCE STORY, FROM FERRELL SECAKUKU'S "ORIGINS" ESSAY

The origin of the people who are called Hopitu today (The Peaceful Ones) is re-enacted and told in the spiritual ceremonial chambers of the *kiva*. The ceremony that carries this message is called Wuwutsimuwimi. It is usually told in a story form, without emphasis on the spiritual or ritual practices, that tells the origin of the Hopi worlds.

At the beginning the world was all water. The creators started to make the people from the water creatures so that land can also live. The land started to dry so that people and other things could make life on it. That is what the Hopi believe was the starting time of life; it was to be an eternal life. It was also realized that the men the creator made must eat to survive, because man was a sacred being, although a mortal being, and like the spiritual being, must have nourishment to survive.

The task of taking care of this earth is heavy and will be difficult. Therefore man was made to be strong, alert, and also passionate. The creator took a piece of his flesh to make corn so that he can eat to keep himself alive. Corn then became the main nourishment for the well being of this mortal being.

Life was good, everyone helped one another, worked together, respected everything around, so people were happy. As the land became more viable and developed more opportunities, people began to bicker among themselves. In these first stages of life, when population growth was fast, they did not know how to live together, and life became uneasy for them to continue.

The creator saw this and decided to change them by destroying their world, and starting over again. He brought fire among their world and destroyed their life. Few were spared. He made another one the same way he did before. Again people did not appreciate life and began to fight among themselves. This time he shook the land; earthquake came and it destroyed them.

From the first two destructions, a few righteous people in life were spared to continue this life. This time the life continued in a more advanced way. Finally the third one was better, people learned to help one another because they understood each other as well as other life, the living things and the environment around them. Life was civil. The intent of it was to be a perfect life and the eternal life. The creator taught them more advanced ways to make their life much easier. But the people advanced quickly and started to do things that only the creator was to do. Soon corruption was a way of life again; life became crazy and unstable. The self respect for others as well as for other life around them started to deteriorate. Life began disintegrating, people began to kill each other. Self-worth became nothing to think about and brought about incest, wife swapping, gambling, argument, critical debates. Some of these disputes led to physical fights, even destruction of others and the material of the land.

There was one wise chief whose heart was pure. He was sad, very sad, to see his people in this situation, and he didn't

see a way out. He predicted that life would be destroyed like the previous two worlds. So in order to save his people from the corruption, he gathered his elder advisors one day and told them this life was going nowhere and that it was not going to get better; it was going to get worse. He said he was thinking of going away to another world. And he told them that in his daily and evening prayers, he has been hearing footsteps from up above. He told them, "I have been hearing footsteps, and I think that there is life up above, beyond us. I want to go there, to see what that life or that world has in store for us, what it can offer us. Maybe it is something better than what we have here." He wanted to know who was stomping around up above.

He asked his wise advisors if they could help him find this other world that might be better. "Yes," said the advisors, they would help him reach up above, they would try real hard. So they began their meditation to get answers to who could help them and how they could reach up above them. One of them said they would create several birds to fly up there. They all agreed and they made several birds and asked the birds to find a hole or a way to reach the top and beyond so they could find who ever was stomping above them. They all failed except the very last which was the mockingbird. When he came back he told the chief and the wise advisors that there was a hole up there. He said he went through and found life there but it was different. He also told them he cannot help them to reach up there as it is very far.

The next step was to find the way to get there; again the chief asked his advisors to help him. They meditated again and thought they found a way; they told the chief they would plant a tree that grows the tallest. So they started to look for seeds, look for a tree that would grow tall. They planted the Ponderosa plant and they sang their sacred songs that pushed the tree to grow tall to reach high above. Before it reached the hole it stopped growing. The next was the fir tree and that too did not reach the hole and stopped growing. After the trees that usually grow tall were planted but all failed, the advisors meditated to ask the higher power to grant them answers to find a way to reach the hole up above. Then they thought that they had been given the answer. There was one little animal that might know the magic or a way to grow a tall tree, or grow something else that would grow taller. It was a chipmunk. He was called *koona*, and was considered to know sacred songs and know how to sing them for certain plants to grow tall. This plant was only known to him.

They summoned him to the *kiva* to request him to help them reach the hole up above by his sacred know-how. He came to them and they asked for his help. He said he would help them. They set the date and time there would be a ritual. Chipmunk came to them as planned and brought a seed to them, one seed, and asked them to plant the seed. He began to sing his sacred song, and the plant grew and grew. Mockingbird in the meantime was checking, making sure it was going to reach the hole and going up into the right place to go beyond that hole. Yes, it grew very tall and it reached the hole and went through to go beyond. The chief was very happy because now the life for his people had hope. The chief got busy and summoned all his good and righteous people to get their things together; there was not much time left and they must leave right away. The world around them on which they lived had become even worse; soon the corruption would engulf them. The wise advisors started their sacred songs for departure, and people started to climb through this plant. This plant had a space within like a tube so people could crawl through. Then they started to arrive somewhere else at another world and found that it was different. Soon the song ended. When the song ended people stopped their movement upwards as well. He predicted that the old world was to be destroyed like the earlier two but his people think they finally found a better place to live.

They called this the fourth cycle of life, or the Fourth World. They were very glad to come here. After they arrived they began looking for this being the chief had been hearing up above, stomping around, and they found him. They found a spirit being called Maasawu and asked him if they could live here with him. He said, “Yes, you can live here with me, but this place is rugged. This place has nothing to offer. I don’t have anything that you may have been accustomed to. I only carry the seeds, and the planting stick, to plant my seeds. That’s all I have. The land is dry. The land is a lot of canyons and rocks. But it may provide what you need to survive. If you choose to live here with me, then you must abide by certain covenants, or rules, and promise to do the things that I will show you and tell you. You must abide by the way I live.

“First, before you can live with me, you will have to go about, in your journeys, to the four corners of this world; find other means of physical survival and experiences that exist in this world. And you may choose to live at some of these other places, but if you truly want to survive the negative impacts of the world you ran away from, then you may come back and live here with me under certain terms and conditions, which I will teach you when you return.” Maasawu gave them their language. He also advised them to leave their “footprints”—their rock houses, pottery and rock writing—to show they were adhering to his terms. With that they left to journey all over the world, even to the other continents across the sea.

These footprints are the potsherds, rock writing, and rock paintings at today’s archaeological sites, which identify the people, their culture and their language. The people came back and started looking for the place where they had emerged from the underworld. There is a specific place of emergence, and it is somewhere in the Grand Canyon. It is called Sipa’puni.

During their search for this place they would live here and there; they would build a small village, sometimes a big village. Different clans and tribes would come, and they would stay at the same place, and join the people that were staying there, making the village or the society bigger, making it into an early trading center. They journeyed and migrated all around the southwestern region for a long time—perhaps using the stars, the moon, or any experiences that they may have encountered—to move to another place. They built many hospitable places but left them, because they were still looking for this center, the place of emergence. Today Hopis call their land the center of the universe, Tuwanasavi, and home.

The Bear people were the first to arrive, and they met the spiritual being who was waiting here. He is called Maasawu by the Hopis. He is the one that welcomed the Bear Clan and other societies. There were several primary clans that came here.

When they came here, Maasawu gave them the name “Hopi” because they chose the original way of life where they become closer to the earth by surviving in the most rugged and most desolate area. Maasawu said, “You must be humble, and being humble is going to bring strength to you. You must live by prayer and by all the rituals (*wumi*) that I have taught you.” Maasawu reminded the people that this land is hard to survive on and repeated the conditions. “This is a harsh land, so you must have water, and know how to use the seeds and planting stick in order to survive. You must abide by the conditions given to you.”

For years to come, Maasawu also provided the ways to live prosperously. Unfortunately, the corrupted way of life had

already been brought here when they came up from the Third World. So Hopis knew that this Fourth World would also turn into a negative world, with corruption and a disrespectful way of life. That is the reason why Maasawu provided the Hopi people with rituals and prophecies to fight evil and also how to take care of this world. Hopis have the wisdom, ritual and perseverance to proceed to the next, which will be the Fifth World, to again escape corruption.

This is the belief and origin story of our people. The Hopi have been in this area for thousands of years, and believe that we are the original people of this earth. Our religion, traditions and rituals explain that there was no one here except a spirit being, Maasawu, when the Hopi first arrived here at the center of the universe from the underworld.

This briefly explains the Hopi story of our origins, here on this earth.

A HOPI PLACE, FROM FERRELL SECAKUKU'S "PLACE" ESSAY

Long ago, before our mesas were formed, all the earth was under water. The earth was a big ocean. The water receded, and carried away some of the land; today some rocks are half a mile away. Most remained and became beautiful and spectacular ledges. *Paatunagatsi* means the water world, the ocean.

Boundaries developed after the people of Supawlavi, the Sunforehead people, first arrived here, following the Pueblo Revolt, likely in the early 1700s. They came from Homolovi, the Place of the Knoll, stopping at various places where springs are located before making their home at Supawlavi.

The climate was good in those days; it rained a lot, and the washes (dry channels) ran with water regularly. The rainy weather created these natural sloping areas where terrace gardens were developed. The Sunforehead people prepared the soil and planted the whole valley in the west with corn, beans and squash the following spring season.

People from Songoopavi (Shongopavi) saw what the Supawlavi people were doing and didn't like it. The Songoopavi people rebelled the following year by going to the valley ahead of the Supawlavi people, and planted the slopes early. The chief from Supawlavi initiated a meeting with his brother (the chief of Songoopavi) to draw a line. Both chiefs went a few miles north of the valley to the top of a rock and looked south. From there they decided and delineated the boundaries of the Supawlavi/Pikyanivi and Songoopavi villages to stop the squabble over land.

Before the arrival of the Navajo and the white man (U.S. government), Hopiland covered all of northeastern Arizona and some parts of New Mexico, Colorado and Utah. The ancestral lands of the Hopi are where the Navajo Indian Reservation boundaries are today. It's just the opposite now—Hopis have a little spot in northeastern Arizona (instead of this great land area): Hopiland.

STORIED PLACES

Hisatsimuy tutsqwa um pu' piy kukum

"Land and Footprints of the Ancients Ancestors"

Tokonave (Navajo Mountain)

Tokonave is Navajo Mountain, located approximately six miles north of the border from northern Arizona. There are approximately 200 archaeological sites belonging to the Hopi culture in this vicinity. *Tokonave* means the origination, or the birth, of the rain cloud. *Toko* means the mist, *navi* means forming of. There's a hole on top of the mountain where the mist comes out and forms into a cloud, then moves throughout the Hopi country bringing moisture. The mountain is used by the Snake people to bring rain to the desert.

Ungtuvga (The Grand Canyon or Salt Canyon)

To a Hopi, Ungtuvga is one of the holiest places in the world. The reason why it is so special to the Hopi is because the canyon symbolizes the origination of the human race, and it accepts the human spirit after death occurs. In the Canyon is a special place where Hopi mine *unga* (salt). This place is called Ungtuvga, the Salt Canyon. As part of the special initiation process, young Hopi men hike into the Canyon to fetch salt. They do this for two reasons. One is to purify the body they have acquired through the initiation process and the new clothing they have been given by their godfathers. The other reason is practical: to bring special salt for their aunts. This is an additional nutrient and for added strength during the year.

Sipa'puni (Place of the Emergence)

This knoll looks like a simple pile of minerals which could be washed away anytime by the rush of the Little Colorado River, but it has not. The Hopi call it Sipa'puni. Sipa'puni is a term for the origination of life or the origination of being. Sipa'puni is a place of emergence. The hole that is on top of Sipa'puni represents the emergence of the people coming up to this world. The hole is approximately two feet [0.6 meters] in circumference. The knoll is about twelve to fifteen feet [3.6 to 4.6 meters] high, and the circumference is about sixty feet [18.3 meters]. It's pretty big. It also represents the womb of a woman, and the womb of the Earth mother. We were born like a baby. So we call this land Mother Earth.

Navatukwiovi (San Francisco Peaks)

The San Francisco peaks are the spiritual home of the *katsinam*. They are very sacred to the Hopi. There are several archaeological sites, springs and shrines that belong to various clans. Bear Clan has the most important one. The societies have shrines. The Two Horn Priests Society has an ice cave there. We all use the area together. Mountains were a landmark during the Hopi migrations to the mesas, but are not a boundary for Hopiland. Many Hopis refer to the mountains as a plaza, *küisonvi*.

Homolotatuqwi, Nanivokuwi (Rainbow Bridge)—“The rock that is round and is braced on both sides.”

This is very important to the Deer people, the Snake people, the Badger people, and the Bear people. A boy, Tiyo, was getting ready to travel the Colorado River, called Pisisvayu in Hopi, he began his training by running first to the north. The next morning he ran to the west. When he came to Rainbow Bridge, he ran as hard as he could and he jumped over it. The third morning he ran to the south, and on the fourth morning to the east. He ran in all four directions, and in each he met his father for that direction. To the north, it's the Bear deity; to the west it's the Deer; to the south it's the Black Panther; and to the east it's the Badger. These deities are the four fatherly symbols that provided his strength so that he could travel the Pisisvayu by raft. His destination was unknown, but somewhere to the south, where he hoped to find a brighter future to bring back to his people and improve their lives. Today, my uncles tell me he went to the territory of the serpents (snakes) in the area of Lima, Peru.

Koyongtuvka (Canyon of the Turkey)

The *Katsina*, Crow, Rabbit, Tobacco and Eagle clans lived there. The reason why its called Koyungtuvka is because these clans domesticated the wild turkey, which they brought along with them when they migrated to the Hopi mesas. Koyongtuvka is called Canyon de Chelley today.

Tawatuyka (House of the Sun or Cliff of the Sun)

This is a special place in Mesa Verde, one of the cliff dwellings. Tawatuyka is the home of the Badger Clan, who lived there along with the Bear Clan. The Badger Clan can recite the song, they heal the sick by dispelling diseases and promoting health and hygiene for the people. Bear Clan are the ones that create life, support life, nurture life, maintain life. Tawatuyka was a place where special songs were made (composed) and sung.

Yuvqövavi (Beyond the Horizon)

Yuvqövavi means beyond the horizon. Today it is called Chaco Canyon. Some Hopi refer to this as Palangwu. It's a mysterious place, a place where sorcerers and spiritual Hopis were in connection with their spiritual world and the cosmos of the universe. Many Hopi clans came from Yuvqövavi. Some may have gone to Rio Grande Pueblo, some to Acoma, Laguna and Zuni Pueblos.

Homolovi (Place of the Knoll)

This is a place where the Sunforehead and other Hopi clan people lived for a long time before coming to Hopi. One day, the Sunforehead people saw a sign (smoke from the north) to move on, and their leader sent out two young warriors to investigate where they would go. They came back and told their chief they'd found a settlement and the best route leading to it. The people took this route and journeyed several miles that day. But when they settled for the evening to rest, they found that one woman was missing. The chief sent two warriors back to look for this woman. They went all the way back to the village to her house and looked from room to room. Way in the back, they found her. They found out that the reason why she didn't go with the rest of the people was that she was about to have a baby. The warriors said to her, "We came to get you. We'll take you with us." And she said "No, you go on, because we're here for a purpose." She was having twins. She said, "We will be here to watch over this place and hold it for you in case something ever happens and you have to return. We will be here for you to come back to." With that information they went back and told their chief what she said. To this day the Sunforehead people of Supawlavi have a spiritual connection to Homolovi, which is still home for them, in case they need to return. (Homolovi is a ruin near Winslow and now an Arizona State Park.)

A HOPI KIVA, FROM FERRELL SECAKUKU'S "RITUAL" ESSAY

KIVA

A *kiva* is a spiritual place. It's a three level chamber, and it represents the emergence. It also represents the womb. It is a ceremonial place, a sacred place. The first level is spiritual emergence, like a womb of a lady. The second level is a sacred level for the male initiates. The third level is open to everyone else. From within the kiva, a ladder emerges through a square hole to the world above, which is symbolic of the opening to the Fourth World (life).

Everything is made in the shape of a square at Hopi. At one point in Hopi life, kivas were round. When the Hopis first came to the mesas, it was strictly enforced by superiors that kivas could not be round, because evil travels in circular form. Hopis believe that the good spirit travels in a straight beam from above, so only a square kiva will admit the good force, because evil cannot go through a rectangular opening.

The Hopi also believe that the kiva resembles the center of the universe where the great kivas or great spiritual homes are square. When they say that, I always think of places in Meso-America where the pyramids are square on top. I understand that these pyramids were special places in harnessing spiritual forces.

Supawlavi village has three kivas: one for the Wuwutsimu Society, one for the Two Horn Society, and one for the One Horn Society.

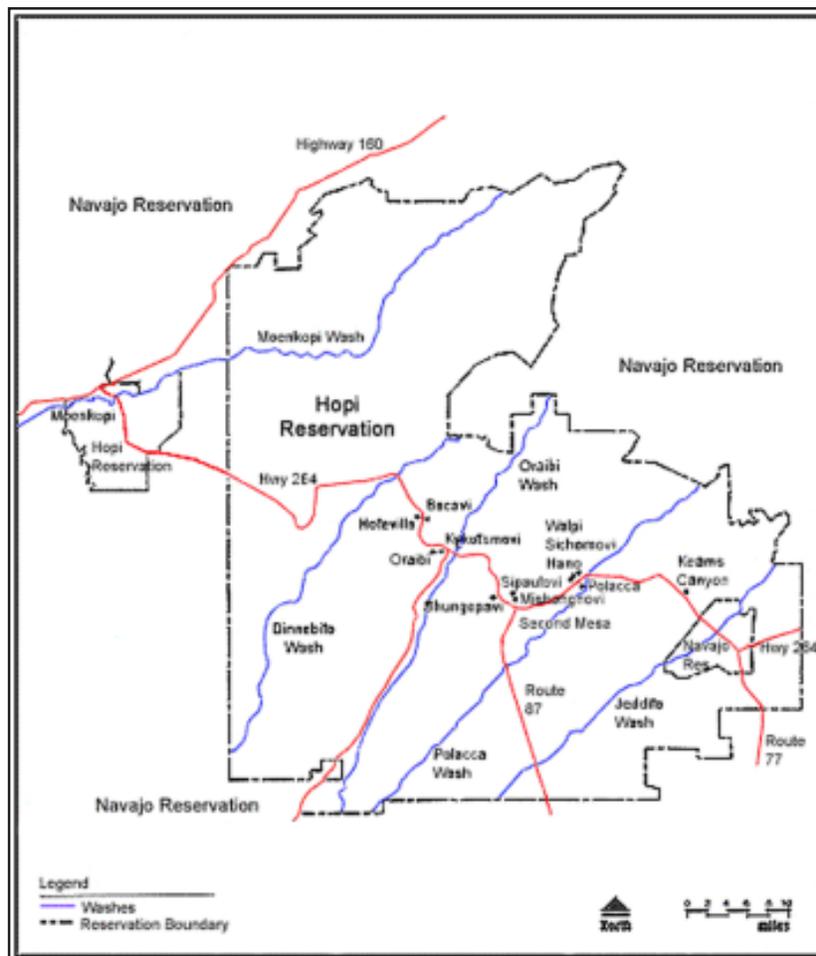
A HOPI VILLAGE, FROM FERRELL SECAKUKU'S "COMMUNITY" ESSAY

VILLAGE

Each village has a plaza, called a *kiisonvi*, which is used for the ceremonial dances. In the plaza is a small shrine that represents the center of the universe and a symbol of emergence. There is an entrance to the plaza at each of the four corners, opening onto the four directions. Around and outside the square are houses. Outhouses (bathrooms) were built away from the village, towards the edge of the mesa. Today, most houses are modern and have indoor plumbing and electricity.

Most villages have at least three *kivas*, sacred ceremonial buildings for men and women to hold their ceremonies. Some kivas are located on the edge of the villages, some inside the village squares. At Supawlaví village there are three kivas for the religious societies. They are called Wuwutsimu, or Wuwutsim kiva (an ancient ritual practice represented in the Fourth World by corn); Kwanitaka or Kwan kiva (One Horn); and Aalay'taka or Aal kiva (Two Horn). Kwan kiva is isolated from the other kivas. Some Hopi villages have a fourth kiva, Taatawkya (Singer). Most of the year, men use the kivas for various religious practices. Women can enter the kivas when open ceremonies are ongoing; women also use the kivas for their ritual and dance ceremonies during their specific seasonal time. All villages have a *katsina* resting place, which is usually away from the village below the mesa, where the *katsinam* can rest out of sight during ceremonial dances. During ceremonies, rest areas are off limits to outsiders.

MAP OF HOPI RESERVATION



- Moenkopi to Hotevilla: 48 miles
- Hotevilla/Bacavi to Kykotsmovi: 6 miles
- Kykotsmovi to Cultural Center: 6 miles
- Second Mesa to Polacca: 15 miles
- Polacca to Keams Canyon: 8 miles

From the Hopi Tribe/Hopi Cultural Preservation Office website: <http://www.hopi.nsn.us/visitors.asp>

THE HOPI WATER CRISIS

The Water Crisis

The Hopi Water Team

The Team's mission is to protect and advance the water rights of the Hopi Tribe. The Team represents the Hopi Tribal Council in the Little Colorado River Adjudication/Negotiations. The Team develops recommended strategy and settlement positions for the negotiations. The Team also recommends policy and ordinances designed to protect Hopi water rights and water quality.

The Water Crisis - An Overview

The *Water Crisis Questions and Answers* [see below] explains why the proposed Lake Powell pipeline is important to the future of the Hopi people, what steps are being taken to address the Hopi water crises, and what impacts to the Hopi must be considered in arriving at a long-term solution. Without water, there can be no Hopi homeland. The Hopi's Black Mesa is a geologic formation stretching over 3,200 square miles in northeastern Arizona.

Most of the mesa is distinguished by colorful layered sandstone with numerous formations laid down over millions of years. Sizable seams of low-sulphur coal lie within the Wepo formation at depths ranging from 35 to 250 feet. Since World War II, rapid development in the western United States has resulted in a dramatic population increase of approximately 350%. This makes coal deposits located on the adjoining Hopi and Navajo Reservations extremely valuable to this energy hungry region. In the mid 1960's, the Hopi and Navajo, joint owners of the coal, at the urging of the United States and various energy companies, signed coal leases establishing the largest surface coal mining operation in the nation.

The Hopi signed only after being assured by the United States that Hopi reliance on the N-aquifer would not be effected. However, despite its economic benefits, the coal mine is not without controversy among the Hopi, primarily because of its significant consumption of N-Aquifer water. The Hopi oppose the mine's industrial use of this pristine and limited supply of groundwater, the only source of drinking water for the Hopi – and support an alternative supply of water for Hopi. While the Hopi continue to insist on an end to Peabody's pumping, they also realize that this is not the only threat to the N-Aquifer.

To learn more about the crisis, view the *Water Crisis Questions and Answers* [below].

The Water Crisis - Questions and Answers

1. What is the Navajo (N) Aquifer?

N-Aquifer is the Navajo sandstone geological formation containing water that underlies the Hopi and Navajo Reservations. Of the five aquifers underlying the Hopi Reservation, only the N-Aquifer is of sufficient quality and accessibility to supply drinking water reliably – it is the only source of potable water for Hopi villages. The age of the water in the N-Aquifer was scientifically dated to be between 16,000 and 39,000 years old.

2. Why is the proposed Lake Powell pipeline critical for Hopi people?

For four very important reasons. To stop Peabody Coal Company from pumping water from the N-Aquifer to slurry coal. To ensure our future survival and prosperity here on our homeland by securing an alternative source of water to replace our rapidly diminishing supply of groundwater. To conserve the limited supply of groundwater on our reservation through a management plan that will limit future Navajo and Hopi withdrawals from the N-Aquifer. And, to protect culturally significant springs, seeps and washes.

3. If we stop Peabody from pumping water from the N-Aquifer, will the water crises end?

No. Today, the problem cannot simply be addressed by ending pumping of the N-Aquifer. The N-Aquifer is not fully recharged each year and it is in the heart of an arid area. Water use from the N-Aquifer has increased because the Navajo/Hopi/Paiute populations are growing. According to the 1990 census, the combined Indian population living in the Little Colorado River watershed — Hopi, Navajo and San Juan Paiute — was 68,750. This figure, which will only continue to increase, makes the Little Colorado watershed the homeland of the largest concentrated Indian population in the country. There are also greater water demands because tribal standards of living have risen. All three tribes depend extensively on the N-Aquifer to supply water for domestic use, irrigation, wetland habitats and the needs of wildlife and domestic animals.

Groundwater use by the tribes and Peabody has increased fairly steadily since 1985. It is increasingly clear that as the area's tribal populations continue to grow, the N-Aquifer will not be able to sustain the pressures put upon it. As new housing is constructed and a higher standard of living is achieved, Indian water use will increase to nearer the average water consumption of non-Indian users in the area. Withdrawal of water from the N-Aquifer is not likely to lessen in the future and the needs of growing populations make it inevitable that new sources of water must be found.

4. What economic impacts will the Hopi people face if coal mining were to stop?

Over the years an absence of other economic opportunities has made the Hopi dependent on revenues generated from coal mining royalties. These revenues are used to fund essential governmental services and programs provided by the tribal government including health care, education and law enforcement. The revenues from the mine comprise 80% of the annual budget of the Hopi Tribe, which employs over 400 people, most of whom are tribal members.

According to the 1990 census, the annual median household income on the Hopi Reservation was just over \$14,300. In contrast, median annual income for the United States as a whole was approximately \$30,000. Arizona's non-Indian households average annual median income was approximately \$27,500.

In 1995, the unemployment rate on the Hopi Reservation was estimated at just over 30% while the rates in the United States and the State of Arizona were 5.1% and 5.6% respectively.

Tribal revenues from the coalmine help to offset these discouraging economic indicators, but are by no means the complete answer. A halt to the revenue stream from coal mining would have devastating and long-term effects on Hopi families and severely compound their economic and social wellbeing.

5. When did Peabody Coal Company first begin using water from the N-Aquifer?

In 1969, Peabody Coal Company began using water from the N-Aquifer to transport coal in a slurry pipeline from the Black Mesa Coal Mine in Arizona, 273 miles to the Mohave Generating Station in Laughlin, Nevada. The coal at the Black Mesa mine is strip mined, ground into powder, mixed with N-Aquifer water and pumped through the slurry line to Laughlin. At the generating plant most of the water is removed from the coal slurry by centrifuge and is used in the generating process. The coal is burned to generate electricity, which supplies power to homes and businesses in Arizona, Nevada and California.

6. How much N-Aquifer water is being used?

Over two thirds of the water currently withdrawn from the N-Aquifer for all purposes — domestic and industrial — is used to transport coal for generating electricity. The Peabody slurry operation consumes 4,000 acre-feet, or over 1.3 billion gallons, of N-Aquifer water per year and is the only long distance slurry line in the United States.

7. How much water do the Navajo and Hopi use compared to water use in Arizona?

As of 1991, the combined N-Aquifer use by the Hopi and Navajo Tribes is approximately 2,000 acre-feet per year. This amounts to a per capita domestic water use of only 27 gallons per day. In stark contrast, non-Indian communities in the United States typically consume over 200 gallons of water per capita per day for domestic purposes. Even in Arizona's rural non-Indian communities surrounding Hopi land, daily consumption is a robust 160-gallon per capita per day. However, tribal water use will increase as the standard of living rises.

8. Why is there an urgency surrounding the mine's depletion of the N-Aquifer?

Each year, withdrawals for the coal slurry pipeline lower the water level in the N-Aquifer even further. Projections by the U.S. Geological Survey indicate that the N-Aquifer, the sole source for Hopi drinking water, will be seriously depleted during the life of the coalmine. Water levels are expected to drop over 100 feet by the year 2031 in large areas of the Hopi Reservation. By 2040, N-Aquifer depletion rates are expected to be 15,860 acre-feet per year, increasing to 35,660 acre-feet per year by the year 2090. Although made worse by the coal slurring operation, most of this projected depletion is due to growing Navajo and Hopi populations. Excessive withdrawal from the N-Aquifer could also deteriorate water quality.

If the rocks are dewatered, it will be next to impossible to replace the water and damage to the N-Aquifer would be irreparable. The weight of the mesa could collapse the N-Aquifer if too much water is pumped from beneath the ground.

9. Is the annual recharge of the N-Aquifer from rain and snow adequate?

No. The safe yield of the N-Aquifer, or the point at which water withdrawals exceed natural recharge to the

aquifer, were estimated by the U.S. Geological Survey to be between 6-to-11,000 acre-feet per year. The N-Aquifer cannot support use by the projected Indian populations indefinitely. A source of imported water must be found to nurture the long-term existence of the Hopi on their ancestral homeland. Otherwise, Hopi continuity, traditions, and religion will perhaps be lost.

10. Are there any other aquifers or sources of water the Hopi can tap into?

Several other water bearing aquifers also underlie the mesas. However, their poor quality makes them unfit for human consumption and their extreme depths make the cost of pumping and delivery prohibitive. There are also no lakes and streams on the Hopi Reservation and the N-Aquifer remains the primary source of pristine drinking water in the Black Mesa area. Ironically, only the N-Aquifer is used to slurry the coal.

11. Has the Hopi Tribe objected to the Department of Interior regarding the N-Aquifer?

Yes, time and time again. The Hopi Tribe objected to any renewal of the permit for the Black Mesa Mine unless an alternative supply of water, other than groundwater, is implemented for the coal slurry pipeline. The Hopi also tried to persuade Peabody to ship the coal by rail or truck instead of using the slurry line. Frustrated by the continuous pumping over a 30-year period, the Tribe vowed to stop the mining, even if it means completely closing the mine and losing the revenue.

In the 1960's, the Secretary of Interior first authorized the use of N-Aquifer water for the coal slurry pipeline. The action was criticized at the time as being environmentally unsound. Under the lease terms, the Secretary of Interior may terminate these withdrawals if they endanger the supply of groundwater or damage other uses. The Hopi believe strongly that the Secretary of Interior, by allowing the Tribes' traditional source of drinking water to be used to slurry coal, is damaging the N-Aquifer in violation of the United State's trust responsibility to the Tribes and subjects the United United States to potential liabilities for the damage. In addition to protecting existing water sources, the United States also has a trust responsibility to protect the future of the Hopi by providing an adequate supply of water for the Tribe's homeland. The importation of water from Lake Powell is necessary to do this for the Hopi, San Juan Paiute and the Navajo.

12. What is the solution?

There is no alternative source of municipal water on the Hopi Reservation but there is a major source of water nearby, Lake Powell. The Hopi, Navajo, and San Juan Paiute Tribes jointly proposed that the United States assist the Tribes in importing water from Lake Powell. This proposal is based on data gathered by federal experts and through consultations with persons in industry, State and Federal Government. The request is within the context of settlement efforts in the Little Colorado River water rights lawsuit now working its way through the state court system.

13. If the Lake Powell pipeline is not built, what will happen?

Without an alternative source of water for the Hopi, the water table of the N-Aquifer will begin to drop. The villages of Upper and Lower Moenkopi will be affected first. By 2040, the wells at Moenkopi will be dry. The impact therefore cannot be addressed simply by drilling deeper wells. The cumulative results of N-Aquifer water losses will not only be an environmental catastrophe, they will also be devastating to the Hopi socially, culturally, politically, and economically.

14. In what ways will the Lake Powell Pipeline benefit Hopi people?

The pipeline will allow Peabody to tap into an alternative source of water for its slurry operation. The pipeline will deliver water to Hopi and Navajo communities who depend on the N-Aquifer and thereby facilitate an agreement between the Hopi and Navajo Nations to limit future pumping from the N-Aquifer. The pipeline will enable the Hopi to augment its diminishing supply of domestic water with renewable supplies from the Colorado River. The pipeline water will also enable the Hopi to build a viable and sustainable economy through access to adequate supplies of water and modern water infrastructure. And, the pipeline will allow the Hopi to have the quality of life benefits flowing from a secure supply of water, benefits that most Americans take for granted.

15. Why is the Lake Powell pipeline important to the Little Colorado River Settlement?

The pipeline will facilitate settlement of longstanding, contentious and expensive litigation involving the United States, the Tribes, the State of Arizona, and numerous private parties. In turn, the settlement will bring certainty to the future water rights of all parties involved and will help the United States fulfill its responsibility to protect and promote Hopi land as a productive homeland. The settlement will enable the conservation of limited groundwater resources that supply religiously significant springs.

16. What is the position of Chairman Wayne Taylor and the Hopi Tribal Council regarding the N-Aquifer?

Chairman Taylor and the Council stated that the water, which is wasted in the slurry, cannot be replaced over the course of many lifetimes. The time to act is now. No more studies are needed to prove that the Tribe's natural water resources are now so threatened, so needlessly squandered, and so cavalierly managed. No more studies are needed to prove that only immediate action by the United States to halt the pumping and provide additional water will give the Hopi any reasonable chance of a long term future on their mesas. Apart from any litigation, importing water from Lake Powell is necessary to preserve the environment of the Hopi Reservation as a permanent homeland for the Hopi. No further justification should be needed.

Anyone concerned with the wise management of natural resources as national assets recognizes that the use of N-Aquifer water for the Peabody slurry pipeline should be stopped. There is no excuse for using this sole source of drinking water to slurry coal, particularly when federal studies indicate that it is economically feasible to use Lake Powell water for this purpose. The United States must move vigorously in support of the Lake Powell Pipeline in order to resolve the growing controversy and concern over the use of this limited resource, a resource so vital to the future of the Hopi and their culture.

17. What is the Department of Interior's response thus far?

In 1990, former Secretary of Interior Manuel Lujan refused to issue a new surface mining permit or approve a new mining plan for the Black Mesa Mine. He took this action at the request of the Hopi and in recognition of his responsibility "as trustee for the Tribes." In 1994, Bruce Babbitt, Secretary of the Interior supported the Hopi/Navajo proposal to bring water from Lake Powell to the Black Mesa Mine, replacing the N-Aquifer water now used in the coal slurry and providing a much needed additional supply of domestic water for the two reservations. The Hopi Tribe agreed to contribute a significant part of its revenues towards the cost of constructing the pipeline. If approved by congress the United States will contribute the majority of construction costs.

18. What has the Hopi Tribe done thus far?

The task of achieving consensus among the various parties on the matter of importing water from Lake Powell was not easy. In 1999, the major corporate stakeholders: Peabody Coal Company and Southern California Edison walked away from the Little Colorado River Mediation following the filing of a lawsuit against them and the United States by the Navajo Nation over coal royalties. In 2000, The Hopi Tribe, acting through Chairman Taylor and the Hopi Tribal Council's Water Team, reached an agreement with Peabody Coal Company and Southern California Edison in which the two companies pledged to provide as much as \$50 million toward construction of the Lake Powell Pipeline. In 2001, the Hopi Tribe is ready to introduce legislation to settle the Little Colorado River adjudication and to urge Congress to financially support the construction of the Lake Powell pipeline. However, Senator Kyl has delayed the possibility of the Tribe submitting this legislation by requesting additional studies of the N-Aquifer.

19. What is the cost of the proposed Lake Powell Pipeline?

The Lake Powell Pipeline solution is both practical and affordable. In 1993, economic analyses revealed that importing renewable water from Lake Powell to the Black Mesa Mine through a relatively small pipeline would increase the delivered price of coal by less than \$1.00 per ton. The cost would be a little more today. The project is thus on par with costs for other settlements of Native American water claims, and is comparable with costs for non-Indian projects already benefiting large non-Indian population centers.

In addition, the cost of trial preparation for the federal government has already exceeded \$12 million. The cost to the State and other parties is likely to be the same. The actual trial is only beginning and is predicted to continue for at least ten years. It is estimated that it will cost the federal government another \$25 million and the state and other parties comparable sums.

20. Some Hopis proposed that the Lake Powell pipeline become a stand-alone project apart from the Little Colorado River case. Is this feasible?

No. The Hopi Tribe is ready to move forward with legislation to build the Lake Powell pipeline. Separating the proposed pipeline from the Little Colorado River case at this point will only serve to delay construction of the pipeline for another 15-to-20 years, complicate or completely do away with the proposed pipeline, and reopen the LCR litigation. Fifteen to twenty years will also increase the cost of the pipeline and thereby make it cost prohibitive to Congress and other stakeholders. In addition, legal costs will be very expensive for the Tribe.

BLACK MESA WATER COALITION MEETS WITH FIRST ARIZONA NAVAJO CONGRESSIONAL CANDIDATE DERRICK WATCHMAN

(Flagstaff, Ariz., January 19, 2002)

In their first meeting of the year, Black Mesa Water Coalition a Northern Arizona University-based multicultural student community advocacy group met with Derrick Watchman, the first Navajo man to run for United States Congress from Arizona.

Watchman is seeking the Congressional seat for newly-redrawn District One, which incorporates Flagstaff, Prescott, and the Navajo Reservation.

During the meeting the group of 15 activists discussed N-Aquifer depletion by Peabody Energy water pumping. Questioned about his stance on the issue, Watchman stated that the situation “sensitive,” and he believes “the pros and cons of the situation need to be weighed carefully, because of the revenue generated for both Navajo and Hopi Tribes by Peabody.”

Lillian Hill, the vice president of the group and a Hope NAU student from Kykotsmovi, responded that “money has only existed among our people for a hundred years, but the water has sustained the people since the beginning of time.” Hill also stated that if the aquifer runs dry, “no amount of money will make a difference and the people will be forced to leave their homelands forever.”

Watchman voiced concern about the threat of closing of the mine over the volatile water issue.

However, representatives from Black Mesa Water Coalition made it clear that their goal was not to close the mine but only to end the pumping of the pristine N-aquifer water by Peabody.

Michael Adair-Kriz, an NAU anthropology graduate student, added that the aquifer water is so pure and mineral-rich that using this water to slurry coal is the monetary equivalent of “bathing pulverized coal in Evian [bottled mineral water] the entire 273 miles to Laughlin.

“The aquifer is the sole source of drinking water for Hopi and Navajo People. Peabody Energy and the Black Mesa Pipeline Company pump an average of 4,000 acre-feet of water (over 1.3 billion gallons) from the N-aquifer each year. Each day for the past 30 years, Peabody has pumped 3.3 million gallons a day of the sacred water. This pristine water is mixed with crushed coal for transport to Mojave Generating Station in Nevada. The Natural Resources Defense Council has reported in their study Drawdown: Groundwater Mining on Black Mesa that water levels have decreased by more than 100 feet in some wells and discharge has slackened by more than 50 percent in the majority of monitored

springs.” Watchman, a graduate of the University of Arizona with an MBA from Berkeley, is the current Chief of Staff for the President of the Navajo Nation. During the meeting, he voiced interest in learning more about the issue and meeting with Black Mesa Water Coalition in the future.

Also attending the meeting was Aresta Larusso, a Navajo woman running for Arizona State Representative. For more information about depletion of the N-aquifer, visit www.nrdc.org/water/conservation/draw/drawinx/asp; www.sierraclub.org/chapters/az; or www.blackmesatrust.org.

From the Hopi Tutuveni newspaper, January 19, 2002

CONTAMINATION THREATENS MOENKOPI WATER SOURCE

PRESS RELEASE: THE HOPI TRIBE

Initial Date of Release: June 28, 1999

Contamination Threatens Moenkopi Water Source

Moenkopi, Arizona— A report released on May 11, 1999 by the Hopi Tribe disclosed the existence of high levels of groundwater contamination within the Moenkopi area. The Tuba City Landfill site investigation, conducted by Daniel B. Stephens and Associates of Albuquerque, NM, determined that the dumpsite poses considerable risk to the quality of groundwater used by the Hopi villages of Upper and Lower Moenkopi.

According to the investigation, contaminants, including uranium and radium, exceed the U.S. Environmental Protection Agency maximum contaminant levels. The water contaminants were detected in shallow monitoring wells located along the edge of the landfill. Measurable contaminants were also detected in the deeper aquifer zone, which is part of the extended water system that serves the drinking water needs of the villages.

Geologically, the Navajo aquifer (N-Aquifer) in the Moenkopi area is unconfined due to lack of a bounded bed or aquifer between the Navajo sandstone and Kayenta formations. Being unconfined makes the aquifer vulnerable to contamination since surface spills can migrate directly into the aquifer.

“I am alarmed that the contaminants have been found in such close proximity to our village water supplies. Such high levels of contamination place individuals and communities at risk in terms of their health and economics. The villages of Upper and Lower Moenkopi rely solely on the N-aquifer for drinking water. The dependence on the N-aquifer for safe drinking water makes its protection of crucial importance. In addition, without a safe source of drinking water, community economic development initiatives are jeopardized,” stated Wayne Taylor, Jr., Chairman of the Hopi Tribe.

The 50-year old Tuba City Landfill was set aside by the BIA for solid waste disposal to serve Tuba City and to a lesser extent, the Moenkopi villages. Once located on the Navajo Reservation, the landfill was transferred in 1992 to Hopi ownership as a result of the 1934 Navajo-Hopi Land Case. Over its lifetime, waste from other sources also was disposed of at the uncontrolled landfill, which is located along a major highway in northeastern Arizona. In 1997, the landfill was closed when Coconino County opened a new waste transfer station in Tuba City.

While the groundwater exceeds standards for radioactive materials, it is unclear, based upon existing data, whether these elevated concentrations resulted entirely from the Tuba City Landfill. Groundwater contamination has also occurred at the uranium mill tailings site located 5 miles northeast of the Moenkopi villages on the Navajo reservation. Since the processing plant was still closed, precipitation falling on the old mill tailings pile has dissolved some of the radioactive material, which has migrated into the Navajo sandstone creating an area of contamination migration down-

stream toward the villages through surface and subsurface flows in nearby washes. Contamination problems at the landfill only adds to the water quality problems facing the villages of Moenkopi. For a number of years, the village has been concerned about petro-chemical contamination stemming from the long term release of gasoline leakage from underground storage tanks across the Hopi boundary in Tuba City, despite the replacement of leakage tanks as required by federal law. The gasoline previously released continues to move underground toward the Hopi villages at Moenkopi, where Petro-chemical contaminants have been detected in the springs at the lower village. These springs have long been depended on as a drinking water source for the Hopi people.

Due to the multiple contamination problems facing Upper and Lower Moenkopi, well siting for future village water supplies has become problematic.

The report recommends ways to clean up the landfill contamination problem and to prevent ultimate impact to the domestic water supply. Preparation of a closure plan for the dumpsite will be developed once the Hopi Tribe has reviewed and identified the preferred closure approach. Based on the final closure approach selected, a closure plan for the landfill will be prepared. The closure plan will then be submitted to the EPA for review and comment. Final closure construction activities will be implemented once project funding is established.

From <http://www.nau.edu/~hcopo-p/current/pressreleases/archive/moenkopi.htm>

2001 WORLD WATER DAY SPEECH, BY KLAUS TOEPFER

WORLD WATER DAY 2001: WATER FOR HEALTH

Klaus Toepfer, UNEP Executive Director: “The World’s Water Crisis Is Life Threatening”
Nairobi, 22 March 2001

Today, March 22, is World Water Day, with the theme Water for Health.

According to Klaus Toepfer, Executive Director of the United Nations Environment Programme (UNEP): “The water crisis - unlike the energy crisis - is life threatening. The level of suffering and misery represented by these statistics is almost beyond comprehension. And it is the children and women who suffer most.

As water is an absolutely vital resource, at the centre of life itself, it is a key integrating factor in the environment. Without sustainable water management to ensure that there are sufficient supplies of clean, safe water, the health of ecosystems and those who depend on them, especially people, suffer”.

That the water crisis is the most immediate and serious human health and environmental problem facing the planet is confirmed by the stark statistics. For example, UNEP’s Global Environment Outlook report 2000 included the following statistics:

- Three million people die every year from diarrhoeal diseases (such as cholera and dysentery) caused by contaminated water;
- Polluted water affects the health of 1.2 billion people every year, and contributes to the death of 15 million children under five every year.
- Vector-borne diseases, such as malaria, kill another 1.5 to 2.7 million people per year, with inadequate water management a key cause of such diseases.

The negative impacts of unsustainable water use and pollution of watercourses result in harsh environmental, economic and social costs. Millions of people all around the world are all too aware of this - through outbreaks of diarrhoeal diseases (such as cholera and dysentery) and typhoid caused or transmitted by contaminated water. The failure to properly dispose of human waste is often the cause of such diseases, contaminating essential water supplies such that millions of people die from these diseases every year. These disease outbreaks create widening circles of misery, illness and death with dire economic and social impacts for the people concerned. The environment suffers too, with human waste polluting water and damaging river ecosystems dependent on clean water. When the environment suffers, people suffer, because the aquatic environment is a key human resource.

Other problems arise from indiscriminate deforestation and other poor catchment management practices that reduce

water supplies vital to agriculture and other economic activities. Deforestation leads to increased run-off, and increases the chances of water shortages. It also leads to increased soil erosion and decreased soil fertility that can result in decreased food production. Sedimentation in watercourses and reservoirs decreases the capacity to store water or generate electricity. The chances of serious droughts are increased, without the forest to retain and return water to the atmosphere through transpiration, and sow the seed for future reliable rainfall. Forest, wetland and river ecosystems are all damaged by deforestation and people face increased economic and social costs. These costs reflect water shortages, decreased soil productivity and health problems caused by the decreased availability of clean water. Forests in water catchments play a vital role in maintaining both the quantity and quality of water - there are no clean, sparkling water courses where forests have been cut down and erosion increased.

The negative health impacts of contaminated water and water shortages are well-known - typhoid, cholera, dysentery, etc. But less attention is paid to fact that women and children bear the brunt of the costs of dirty water and water shortages. Children are more likely to become ill, and women have to look after them. Women and children carry out most water collection, and many spend hours doing so. Hours spent collecting water could be spent in more productive activity, such as food production, so that there is a high opportunity cost to the lack of clean water. When people are sick, they and their caregivers cannot carry out other tasks, so there are opportunity costs there as well.

“An unhealthy environment means sick people, thus the essence of sustainable human health is sustainable management of the environment”, said Mr. Toepfer.

What is perhaps the most depressing aspect of this human and environmental health disaster is that the solutions - especially sustainable management of water catchment areas - are well known. Moreover, history provides grim reminders that failure to manage our water resources properly has caused the end of civilizations - in Mesopotamia, but also in other countries, such as Ethiopia, where the ancient civilization of Aksum collapsed, partly because of deforestation and its consequent water related impacts.

The key to solving water problems lies in adopting an integrated water catchment approach - a catchment being that area that encloses all land that feeds into a defined water body. A catchment approach is recommended because land and water use in one part of the basin can affect users and conditions in other parts of the same basin. That is, a water catchment is a natural management and development unit.

And, as UNEP's Water Policy and Strategy points out, having adopted a catchment approach, it is critical to promote an intersectoral approach that recognizes the interlinkages that affect water management - for example between land and water, agriculture and water, technology and water, health and water.

A multi-objective planning approach that bases catchment management decisions on a transparent, systematic and integrated assessment of environmental, economic and social factors is vital. This is because of the interlinkages that exist between these three factors. Environmental degradation inevitably has economic and social consequences for human beings. In the case of catchment degradation, agriculture and energy production are reduced, which imposes direct economic costs. Contaminated water imposes harsh economic and social costs on people.

“On this World Water Day that focuses on water for health we should remember that the basis of human health is a

healthy environment,” said Mr Toepfer, “and that the basis for sustainable economic production is also a healthy environment. Water is the key resource and as we can never create more water, we must act to improve the health of the water we have, in both quantitative and qualitative terms. Sustainable management of water catchment areas is the acknowledged best practice for doing so and its adoption is urged”.

For more information on UNEP, please visit www.unep.org.

UNEP News Release 01/40

From <http://www.grida.no/news/index.cfm?requestedItemId=215>