AN ABSTRACT OF THE THESIS OF

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A natural resource science education program for members of the Warm Springs Indian Reservation was designed and developed in partnership with tribal members. The intent of the project was to create a culturally relevant program supported by culturally reflective educational materials which met local needs. The goal of the project was to provide an on-reservation, partnership-based natural resource education program for the purpose of developing understanding between Indians and non-Indians about natural resource education, science, and management strategies. The program was taught on-reservation. Respect and understanding of some cultural differences between Indians and Euro-Americans occurred, and tribal members gained an understanding of the Euro-American view of the science behind natural resource management.

The program was considered a success in both short-, and long-term gains. Short-term gains included a 16.30% increase in short-term knowledge gained in coursework sessions where this was measured. Long-term gains included providing a guideline for the design of the 1991 OSU/Warm Springs Memorandum of Understanding, the on-reservation application of coursework knowledge gained, an increase in tribal member's interest in natural resource science education, and the design of an exportable model for university/reservation natural resource science education programs.

# A Culturally Appropriate, Partnership-Based Natural Resource Education Program on the Warm Springs Indian Reservation.

by

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# PREFACE

The term "Native American" has been designated by the dominant culture to be the politically correct term to use for the people who inhabited North America prior to European colonization. This is a concern of many Indians (DeLoria 1992). "Native Americans" in the United States often call themselves "Indians", in Canada, "Native Canadians" and in Alaska, "Native Alaskans". Some Indian groups refuse the term Native American because there have been too many cases in which the term native has been used interchangeably with the term savage. At Oregon State University (OSU), we have a newly formed Office of Indian Education, named by "Native Americans." Jody Calica, General Manager of Natural Resources on the Warm Springs Reservation in Oregon has reminded us that the many members prefer to be called Indians. I am comfortable with the term "Indian" and will use it throughout this dissertation.

Also, the term "primitive societies" will be used at times, although the definition implies that this is an early stage in the evolution of human culture. I agree with Capra (1982), Mander (1991) and DeLoria (1991), who argue that primitive cultures were and are highly evolved.

References to primitive or traditional societies often will be made in the past tense. The use of past tense does not suggest that Indian people are not a part of today's society. The history of Indian people is often separated from current activities and achievements. Movies, television, and most textbooks lead us to associate Indians exclusively with the past. However, Indian culture is a living tradition, not a thing of the past, and continues to play an important role in contemporary society. According to the 1990 Census, Oregon's Indian population was estimated at 38,496.

# A Culturally Appropriate, Partner-Based Natural Resource Education Program on the Warm Springs Indian Reservation

## Chapter 1

## INTRODUCTION

Warm Springs Indians observed that over a period of several decades, there had been a steady decline of some of the natural resources on the reservation. These included vegetational changes, from perennial native grasses to invading annual grasses and forbs, loss of habitat and forage for wildlife and domestic grazing animals, erosion, and increased water velocities and sediment in streams. In addition, there were some appreciable changes in riparian zones which resulted in the loss of fish habitat. Thus, they were alerted to the need for more effective management of their resources and were seeking information that would help achieve their goals.

According to the Warm Springs Range/Ag Coordinator (Racine, personal communication), over at least the past two decades, natural resource specialists had been invited to make recommendations for improved management strategies, but there had been little or no utilization of the recommendations made by the specialists. Indians on the reservation stated that the people receiving the information did not understand it completely and that there had been no follow-through by the specialists to help tribal members understand, apply, and maintain the suggested strategies. Furthermore, the cultural needs and traditional ways of the Indian people had not been taken into consideration nor had they been included in the design of the suggested management strategies.

The OSU/Warm Springs Natural Resource Education Program was initiated for the purpose of investigating the concept that a culturally sensitive education program would be effective in attaining effective communication and understanding of natural resource

issues. A culturally sensitive approach simply included basic principles of respectful human interactions. These were basic assumptions of equality, curiosity and interest in another's views or perceptions, and acceptance of the concept that different realities exist simultaneously. Therefore, the program was designed in partnership with tribal members and included the following:

The goal of the project was to provide an on-reservation, partnership-based natural resource education program for the purpose of developing understanding between Indians and non-Indians about natural resource education, science, and management strategies.

Specific objectives were:

1. To develop a culturally appropriate model for teaching and communicating natural resource science and management strategies in partnership with Indians on the Warm Springs reservation.

2. To identify differences between traditional Indian and Euro-American perceptions of natural resources.

3. To identify differences between traditional Indian and non-Indian views of education.

4. To increase educational opportunities for members of the Warm Springs reservation by providing an on-site, community-based program of natural resource science and management strategies.

5. To focus on the Warm Springs reservation natural resources as the basis for the natural resource science coursework, and to emphasize the importance of the approximately 640,000 acre reservation as a manageable, conservable, ecologically diverse, sustainable, and renewable resource.

6. To encourage participants to apply knowledge acquired in the program in their management strategies and land-use practices on the Warm Springs reservation.

It was assumed that the understanding of cultural differences would enrich the information-base of both Indians and non-Indians, and provide a model for future program designs. The curriculum for the program was strongly influenced by information presented in the Introductory Rangeland Resources course at OSU, and the principles of Landscape Ecology (Naveh and Lieberman, 1990). An attempt was made to provide an educational atmosphere on the reservation that was sensitive to the culture and traditions of Warm Springs Indians. The following sections describe the project and present some of the knowledge gained:

Chapter 2 is the literature review. It is a discussion of indigenous peoples, Oregon Indians, and the Warm Springs Indian Reservation. In addition, non-Indian concepts of landscape ecology, the new paradigm in quantum physics, and the traditional Indian view of Mother Earth are compared. Also, traditional Indian and Euro-American views of education are compared and contrasted.

Chapter 3 describes the origin, design, and implementation of the OSU/Warm Springs Natural Resource Education Program. Chapter 4 is a quantitative evaluation of short-term gains in the program. Pre-, and post-coursework questionnaires were used to measure knowledge acquired and to show whether or not participants' knowledge increased as a result of the coursework offered.

Chapter 5 is a report of the qualitative, long-term impacts of the program. Questionnaires were distributed approximately three years post-program, and information gathered by the researcher, in a participant-observer role, provided cultural insight for partnership-based designs of on-reservation natural resource education programs.

Chapter 6 combines conclusions and recommendations which arose from the whole project. Important aspects of the Memorandum of Understanding between OSU and the Confederated Tribes of Warm Springs are presented in this section.

# Chapter 2

# LITERATURE REVIEW

## Indigenous Cultures

Historical records show that nomadic people have been forced out of their traditional migration routes by agriculturists, and most recently, the advancement of technology. According to Barrett (1989), Stowell (1987), and Mander (1991), whenever a culture is restrained or closed out of traditional migration routes and confined to a location with specific boundaries, the people, the land resource, and the culture usually suffer. Sahlins (1972), described the hunter-gatherer communities as societies in which there was a balance of work and leisure, and an environmental ethic of taking only what was necessary from the natural resource base, and not accumulating surpluses. A common misconception, according to McCarthy (1960), is that primitive societies survived at only the bare minimum of existence, yet their research with the Arnhem Land Hunters in Australia proved otherwise. The Arnhem enjoyed a diversity of food which provided adequate nutritional value according to today's standards of the National Research Council of America. Similarly, The Aborigines and the Dobe Bushman (Mander, 1991) enjoyed a varied diet with a caloric intake of more than 2,100 calories per day.

According to Sahlins (1972), the Western assumption is that nomadic hunter-gatherers, especially those who are still functional today (numbering in the tens of millions), would love to be free of their "subsistence" economy. Sahlins argues to the contrary, that this is a lifestyle that is clearly chosen and enjoyed, even though viewed by many outside the communities as poor and barely survivable. Sahlins does not argue that stone-age cultures are invulnerable to food shortages, but he does argue that hunter-gatherers are no more vulnerable than any other society and notes that in the world today one-third to one-

half of humanity is said to go to bed hungry every night. Mander (1991), stated that there are approximately twenty million undernourished and underfed people in the United States alone.

Davidson (1974), stated that modern economic systems have helped create poverty among indigenous people, such as the Yupik people of Alaska. Davidson stated that poverty has only recently been introduced to Native communities. For thousands of years, people subsisted from the land and ocean along the west coast of Alaska. It was a hard life, but it had none of the frustrations and stigmas of poverty because the people were not poor. Living from the land sustained life and evolved the Yupik culture, a culture in which wealth was the common wealth of the people as provided by the earth. This sharing created a bond between people that helped insure survival. With the first Russian traders came the idea of wealth and poverty. These new people added to the process of living the purpose of accumulation. Whether it was furs, money, land, or the souls of converts, lines were drawn between people on the basis of what they had accumulated. The new economic system began replacing food and furs with cash, cooperation with competition, sharing with accumulating, according to Davidson (1974).

Similarly, Sahlins (1972) and Freeman (1984) agree that in American Indian communities, when fortuitous circumstances resulted in a surprise surplus of food, the favored manner of dealing with it was not to store it or trade it. Instead, it was consumed as a feast. Widespread sharing and community feasting was a characteristic feature of all hunting and fishing societies. According to Freeman (1984) there were values and sanctions to expressly guard against individual accumulation or hoarding of resources, and such societies have elaborate systems of kinship and social relationships that prescribe the channels along which the resources shall flow so that equanimity prevails in the face of the threat posed by unequal access to valued resources. Unlike technological societies, where the primary purpose of economic activity is to maximize profit, the purpose of nearly all economic activity in such foraging societies is directed toward the reproduction of the social

group (Freeman 1984). Where capitalist management systems emphasize numbers and individual gain, argues Mander (1991), native management emphasized relationships among humans and animals, believing that balance is what feeds people and helps animals thrive. Mander (1991), LaDuke (1990), DeLoria (1991) and others agreed that there is no such thing as maximum sustainable yield in the native economic outlook. Freeman (1984) suggested that if native societies adopt the Western conceptual processes, the effect could cause grave injury to the continued vitality of native culture and tradition, since their economic well-being is inexorably linked to their religious, social, and cultural practices. DeLoria (1991) argued that this is exactly what has happened in American Indian communities, to varying degrees, although there has been tremendous resistance to it for the past 500 years. Campbell (1991) and Mander (1991) suggested that Western conceptual processes in current Euro-American education which allege superiority of natural resource management, among other things, will never be appropriate for Indian children.

**Oregon Indians**

For approximately eleven thousand years, Indians migrated seasonally throughout ten million acres in what is now Oregon, in response to the availability of fruits, root crops, herbivores, fish, hides and trade. Presettlement descriptions suggest that the native people were generous, accomodating and friendly, and welcomed non-Indians as well as other Indians to their land. The climate was reported as moderate, fish and game were plentiful, and there was an abundance of nutritious plants. (Stowell, 1987). According to Zucker (1983), prior to Euro-American settlement, there were over 100 tribes and bands in Oregon, each with its own pattern of social organization, political system and language. Each tribe had a different history of contact with non-Indians, some signed treaties and accepted reservations, others did not.

## The Warm Springs Indian Reservation

### History

The Treaty of 1855 between the U. S. Government and the Indians set aside the approximately 640,000 acres in north central Oregon in exchange for title to ten million acres given to the U. S. Government. The 640,000 acres became known as the Warm Springs Indian Reservation. According to Stowell (1987), the purpose of the treaty, stated by the U. S. Government, was "to protect the Indians from the whites". She suggests that the real reason was to make Indian land available to the settler, and that this changed the Indian way of life, taking a "giant step away from culture and traditions".

Elders report that there was great unhappiness among Indians at the treaty council meeting (Springs, 1986), but that there was an awareness that they had little alternative but to sign the agreement on June 25, 1855. The bands of Walla Wallas, who became known as the Warm Springs Tribe and the Wascoes were all settled on the reservation before Congress ratified the treaty in 1859. The Paiutes joined the reservation in 1879.

Indians reported that those early years on the reservation were difficult. Even though the treaty guaranteed fishing, hunting, gathering and grazing rights off the reservation, non-Indians strongly objected and Indians were forced to stay on the reservation. There was an effort to combine a fishing economy with an agricultural economy. It was not successful, according to Stowell (1987), because of broken treaty promises and unfamiliarity with a land resource base, which was suffering from the impacts of eighteenth century overgrazing and climatic impacts. This resulted in poverty for many of the Indians (Springs, 1986 and Stowell, 1987).

The tribes became incorporated in 1938, under the Indian Reorganization Act. This meant that the tribes became a self-government, retaining the Bureau of Indian Affairs in a trust responsibility and advisory capacity. Soon thereafter, World War II brought a demand for timber. The Confederated Tribes entered into their first contract for timber sales in 1942. In 1943, they began making small per capita payments to tribal members. The

timber, mostly along the western boundary of the reservation, became a source on comparative affluence. Per capita payments climbed to $720 a year by 1985 (Springs, 1986).

### The Warm Springs Reservation Today

Management of the Warm Springs reservation is in the hands of the Tribal Council. There are eight elected members and the hereditary chiefs of the three tribes. Tribal policies are initiated through fourteen tribal council committees. These committees meet on a regular basis and serve as advisory boards to the council and other tribal operations bodies in matters relating to policy, procedure, reporting and research evaluation (Zucker, 1983). They have developed an effective blend of self-government and enterprise endeavors including apparel manufacturing, hydroelectric projects, KWSI and KWSO Radio Stations, and Kah-nee-ta, a vacation resort. The Warm Springs Museum which opened in March 1993, was created to preserve the traditions of the Confederated Tribes of Warm Springs (Wasco, Warm Springs, and Paiute), and to keep their legacy alive. The new Early Childhood Education Center and the new Health Clinic provide support for the approximately 3,400 tribal members .

## Traditional Indian and Euro-American Views of Natural Systems

### Mother Earth - Traditional Indian View

Traditional Indians perceive the universe as a participatory interaction among all things. It is essentially non-material and composed of energy fields which come from one underlying, unmanifest field (Chopra 1990, Mander 1991).

The space/time continuum is part of this field (Chopra 1990, Deloria 1991). Human beings (two-leggeds), animals (four-leggeds), insects (six-, and eight-leggeds) and all things in the universe are in the same field (Deloria 1991). This field, experienced subjectively, is the mind, the wisdom of the universe. The same field, experienced

objectively, is the world of material objects (Deloria 1991, Chopra 1990, Mander 1991). According to Deloria (1991) and Chopra (1990), the whole universe is a field of intelligence. It is alive, and when it thinks and interprets to itself, the whole world comes out as its expression. In this perception, human beings are not self-contained, but can be focal points in a field of inseparable, interconnected energies in the cosmos.

Chopra (1990) stated that human beings are energies in a set of relationships with the energies of all other things. In this view of the universe, there are no well-defined edges to the physical bodies which are part of a changing pulsating pattern. Also, in this view, time does not exist as an absolute, only eternity does (Chopra 1990, Capra 1982). Time is a perception of change, an experience of change (Peat 1987, Chopra 1990).

Euro-American View

Many Euro-Americans view the universe as objective and completely independent of the perceiver. According to Mander (1991), this is a material world, seen as clumps of matter, separated from each other in space and time. Chopra (1990) stated that mind and matter are independent and separate entities. He continued that in this view, the mind is in the brain, intelligence is localized in the nevous system, or at most, in the body. Human beings are self-contained, independent entities, separate and on a level above animals, insects, and other things, and have dominion over these other things. Peat (1987), Chopra (1990), Mander (1991) agree that this view accepts that time exists as an absolute. According to Mander (1991), in this view, human bodies have well-defined edges, are separate from the natural system, and have separate needs. The perception of separateness also implies that humans do not automatically impact the system because they are not part of it.

Some Convergent Views

Mother Earth

According to McGaa (1990), Albert Einstein's concepts of relativity and interrelateness were similar to the traditional Indian views. McGaa stated that many Indians understood what Einstein meant when he said:

> "The more knowledge we acquire, the more mystery we find. A human being is part of the whole, called by us the Universe, a part limited in time and space. He experiences himself, his thoughts and feelings as something separate from the rest - a kind of optical illusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty. Nobody is able to achieve this completely, but the striving for such achievement is in itself a part of the liberation and a foundation for inner security." (Einstein, 1934)

Mander (1991) stated that if you have ever spent time with Indians, you have noticed that their resistance to resource development is expressed as an effort to protect "Mother Earth." It is not only American Indians who use the phrase. So do Aborigines of the Australian desert, natives of the Pacific Islands, Indians of the Ecuadorian jungles, Inuit from Artic Canada, and other native groups. According to Mander (1991), "mother" is meant literally. Plants, animals, all life as we know it is nurtured at her breast. Mander (1991) continued, "We have germinated within her, we are part of her, we burst into life from her, and we dissolve back into her to become new life."

Every culture that maintains this attitude about Mother Earth also has restrictions against any individual owning land, or mining it, or selling it. This fundamental difference in viewpoint between technological cultures and land-based native peoples - whether the

planet is alive or isn't - is the root of many conflicts between the two groups (Capra 1982, Mander 1991). In the traditional Indian model of stewardship, there is no separation between people and nature (Martinez, 1993). There is no separation, as in the Christian world view, between spirit and matter. Stewardship is a concept which does not imply superiority from the indigenous point of view. It implies equal partnership (DeLoria, 1991) with all things and all people.

McGaa (1990) argued that what Indians have known for centuries, environmentalists are now discovering: that we are not living on a dead earth. McGaa (1990) stated the Indian philosophy that "Mother Earth is alive, our most intimate relation. A person depends every moment of every day upon Mother Earth. We breathe her air into our lungs, we drink her waters, we eat her nutrients. Our cells are dying and are constantly being replaced. The flow between nature and ourselves is always in process." Black Elk recognized that the philosophy of today's ecology is built in accordance with Indian spiritual tradition (Morrow, 1961). He argued that if the trillions of cells in our bodies can run amazingly complex functions without our conscious effort, then we can only imagine the wisdom of Mother Earth that we have not yet learned.

According to DeLoria (1992), the common knowledge of Indian tribes, when discovered by non-Indian scientists, is seen as an exciting breakthrough. But from the Indian perspective, it is information which traditional people expected youngsters to acquire as a matter of course. It is spiritually-based. Black Elk suggested that people must adapt spiritually, not physically in order to meet the great challenge to save the planet. It cannot be met without the soul power of the spirit (Morrow, 1961). Martinez (1993) suggested that Euro-Americans need to become native to this land. He stated that few conquering people have lasted long by totally ignoring the culture they replaced. Those that have been able to adapt themselves to cultures already there, and to the land, have tended to last a long time. He further suggested that there is a need to adapt, to sink roots into this land by working together.

Landscape Ecology

The notion of landscape ecology as an interdisciplinary science dealing with the interrelation between human society and its living space - its open and built-up landscapes - is a relatively recent one for non-Indians. This notion was described by geographers and ecologists in Central Europe following World War II (Naveh and Lieberman, 1990). According to I. S. Zonneveld (1982), landscape ecology is both a formal bio-, geo-, and human science and a holistic approach, attitude, and state of mind. He stated that it includes both biotic and abiotic values as a coherent system, as a kind of whole that cannot be really understood from its separate components only.

In the former West Germany, the Institute for Landscape Care and Nature Protection of the Technical University of Hannover was instrumental in introducing landscape ecology as a scientific tool for landscape management and planning. Buchwald (1963), the head of this institute, defined the landscape as the total living space, a multi-layered interacting system of both the geosphere and the biosphere, and he designated to landscape ecology the important task of helping to overcome the tensions between modern society and its landscapes resulting from the increasing demands of the industrial society and the natural land potentials.

However, it was Egler (1964), who coined the phrase "total human ecosystem" to define the highest level of integration of "man-plus-his-total-environment". Egler was one of the first North American plant ecologists to realize the holistic nature of vegetation and the active role of humans (Egler, 1942) as an integral part of the higher ecosystem level operating in the landscape.

Odum (1971), in his classical textbook on ecosystem ecology, pointed out that there has been a dangerous assumption that humans, through scientific and technological skills, can put themselves above natural laws and are capable of living in a completely artificial

world. One of the central features in the theory of landscape ecology is the recognition of the dynamic role of humans in the landscape (Naveh and Lieberman, 1990) and the quest for the systematic and unbiased study of its ecological implications.

It is an interesting parallel that the European concept of landscape ecology is similar to the traditional Indian philosophy of the land. According to Naveh and Lieberman, (1990), landscape ecology has overstepped the purely natural realm of classical bioecological sciences. It has entered the realm of human-centered fields of knowledge and the sociological, psychological, economic, historical, cultural, and other aspects involved in modern land uses. Therefore, landscape ecology has itself become an interdisciplinary human ecosystem science.

Parallels - Add Quantum Physics

Ironically, the most reductionist of western science, Quantum Physics, has become the voice of the shaman in western culture, emphasizing the essential wholeness of things. According to Peat (1987), quantum physicists have been probing the unknown and pointing to the deeper mystery of interconnectedness. Things can be divided for intellectual analysis, but are fundamentally an unbroken whole. He stated that material reality is giving way to subtle energies and hidden connections. Peat and Bohm (1987), and Talbot (1991) agreed that science tends to define the unknown as random, when it does not know the answer, but Peat describes it as, "as sort of non-classical wholeness." Deloria (1991) stated that western science often discards the bit of statistical information that does not fit with the larger grouping. Traditional Indian culture tends to be more interested in how the "random" bit of information relates to the larger group, than what can be stated about the larger group. What western science throws out of the statistical analysis, is often the point of interest for traditional Indians. According to Peat and Bohm (1987), there is communication among

all things. Deloria (1991) stated that to remove one thing from the whole, changes the communication and relationship of every other thing in the whole. In this sense, western statistical design ignores an important communicator and changes the whole, artificially.

However, quantum physicists, traditional Indians, landscape ecologists, and many others, share similar views of natural systems. They are experiencing the wisdom of the universe as interconnectness, as energies relating and communicating continuously. There is growing acceptance in the Euro-American community that human beings are part of, not apart from, natural systems. Some Indians wonder why it has taken so long. (Capra 1982, Mander 1991, and Deloria, 1992).

**Learning Theory**

Learning theories were reviewed in an attempt to discover similarities between Euro-American and Traditional Indian views of learning. Traditional Indian theory is applied theory, and is organismic rather than mechanicanistic. There are many Euro-American theories, but seemingly few practical applications of those theories, and there are many conflicting views among learning theorists. One difference among viewpoints is a matter of defining the same things in different ways. For example, Pavlov (Malone, 1990 ), defines reinforcement as following a learned cue or stimulus by cue to which the organism is innately programmed to respond. Skinner (1991), on the other hand, defines it as whatever increases the probability of a reoccurrence of the response which occurred just before the reinforcement event. Tolman (Kimble, 1991), suggests that exploration is an example of a basic need, while Watson (1992), limits basic needs to biological necessities such as food, water, and sex.

Theorists also interpret the same objective event in different ways. A rat can learn to alternate between going left and going right in a T-shaped simple maze. The cognitive theorists would maintain that the rat has a concept about the relationship of trials and directions to turn. The behaviorists acknowledge that the rat has learned a series of internal

stimulus-response connections . According to Swenson (1980), over time, theories tend to lose the special clear insight of their developers and become diffuse and complex. The result of this process is that theories tend to become more and more like one another while retaining their specialized systems, languages, or jargons.

To paraphrase Greenfield (1979), the concern with theory is that it restricts one another's thinking by writing or searching for universal truths that fit within a framework that is narrower than the reality is trying to represent. Beare, et al (1989), states that our perception of reality is the result of our own myths and legends revealed in the selection of the language we use to describe that reality. Bates (1982), makes the point that any adequate theory or practice of educational administration must necessarily be concerned with the nature and myths that guide the schools and with the characteristics of interpersonal life through which such myths are perpetuated and negotiated. Deloria (1992), says that one must be acutely aware of exactly which situationally unique reality is the focus. This requires the acknowledgement and understanding that many realities exist concurrently. He further suggests that learning is a matter of strengthening the relationship between environmental stimuli and traditional/cultural beliefs.

According to Knowles (1973), Euro-American education is progressively regressive. The best education takes place in the nursery school and kindergarten, and it tends to get progressively worse on climbing up the educational ladder, reaching its nadir in college. This is because the forces at work on learners from about the second grade on have very little to do with learning. Most of them have to do with achieving - passing tests, scoring high on SATs, getting into college or graduate school, or qualifying for a job. DeLoria (1992), states that high attrition rates of American Indians in Euro-American systems can be traced to this focus on achieving, rather than learning. Knowles (1973), states that the cultural lag in education can be explained by the fact that , "we got hemmed in from the beginning of the deveolpment of our educational system by the assumptions about learning that were made when the education of children became organized in the Middle Ages. Earlier

traditions of teaching and learning were aborted and lost with the fall of Rome; for all the great teachers of ancient history - Lao Tse, Confucious, the Hebrew prophets, Jesus, Socrates, Plato, and Aristotle, were chiefly teachers of adults, not children. And they made assumptions about learning (such as that learning is a process of discovery by the learner) and used procedures (dialogue and "learning by doing") that came to be labelled "pagan" and were forbidden when monastic schools started being organized in the seventh century. The teaching monks based their instruction on assumptions about what would be required to control the development of these children into obedient, faithful, and efficient servants of the church."

Deloria (1991), suggests that the Euro-American concept of controlling the development of children is contrary to the child's need and capacity to be self-directing. The view is supported by Erikson (1959), who states that as an individual matures, his/her need and capacity to be self-directing, to utilize his experience in learning, to identify his/her own readinesses to learn, and to organize learning around life problems, increases steadily from infancy to pre-adolescence, and then increases rapidly during adolescence. According to Knowles (1973), and Deloria (1992), Euro-American culture does not nurture the development of the abilities required for self-direction, while the need to be increasingly self-directing continues to develop organically. The result is a growing gap between the need and ability to be self-directing, and this produces tension, resistance, resentment, and often rebellion in the individual. Deloria (1992), suggests that for American Indian students, the result of this gap is failure in mainstream schools.

Reese and Overton (1970), state that most learning theories seem to fit into two conceptual models:

1. Mechanistic - the basic metaphor of which is the machine.

    a) The "model" is composed of discrete pieces operating in a temporal field.

    b) These pieces and their relationships form a basic reality to which all other, more complex phenomena are reducible.

c) This machine is eminently susceptible to quantification.

d) According to Reese and Overton (1970), this view supports theories based on mechanism which have been developed by Skinner, Pavlov, Thorndike, Hull, Watson, Guthrie.

2. Organismic - the basic metaphor of which is the organism, a living, organized system presented to experience in multiple forms.

a) Organismic views hold that the universe is a unitary, interactive, developing organism.

b) In this view, the essence of substance is activity.

c) Unity is found in multiplicity, being is found in becoming, constancy is found in change.

d) According to Reese and Overton (1970), theories based on organism are exemplified by the works of Dewey, Gestalt, Lewin, Piaget, and Bruner.

Deloria (1991), describes Euro-American educational systems as mechanistic, where basic assumptions are: the truth is known, creative citizens develop from passive learners, and the aim of education is to accumulate factual knowledge. He correlates Traditional Indian educational systems with the organismic view, where basic assumptions are: there is no single truth known, significant learning is acquired through doing, and the most socially useful thing to learning is the process of learning.

Knowles (1973), developed a process model for education which is similar to the Traditional Indian method, but there is little evidence of its application in Euro-American mainstream schools. The applied Montessori model of education reflects the Traditional Indian model more than most others in Euro-American childhood education by allowing the student to be self-directing (Montessori, 1963). Mander (1991), Capra (1982), and Gore (1993), suggest that changes now underway in Euro-American culture reflect the Traditional Indian concept of the interrelationship of all things, particularly in relationships between humankind, the environment, and other organismic process such as learning and

education. Peat (1987), and Deloria (1992), agree that this is a time when we, as a global society, are reconsidering our beliefs and mindsets. They suggest that we may be coming closer to the time that learning, theory, and its application will take on a shared meaning.

**Differences Between Traditional Indian and Euro-American Views of Education**

According to a 1989 special report by the American Indian Science and Engineering Society (AISES) and the College Board (EQ), much has been written about school reform in America, but very little attention has been given to American Indian students. What little attention has been given to Indian communities has, for the most part, met with failure or limited success because the approval of tribal leaders and parents was not secured and Indian cultural values and agendas were not taken into consideration.

The 1989 report noted that Indian people wanted their children to value their culture and traditions, but they also wanted their children to have basic academic competencies and subject-matter knowledge when they emerged from the educational pipeline. The report noted that the issue for American Indians was how to reconcile Indian spiritual values and formal education.

Traditional spirituality and cultural attitudes are reflected in the Indian concept of education. Similarly, religion and culture are reflected in Euro-American concepts of education. Deloria (1991), Mander (1991) and Campbell (1991) have identified differences between American Indian and Euro-American views of education. They are summarized in the following list:

•Responsibility and Behavior

Traditional Indian View

> It is the responsibility of the child/student to learn how to fit into the whole, to identify her/his own unique place in the community as a contributor. This place is not determined by anyone else in the community, only the

individual can determine this. This view includes, in fact, endorses, the concept that there may be a new place developed by an individual...something not yet identified by another or others. This view also realizes that it takes time to do such a thing, and allows for it. This is a patient view. The patience extends to unusual behavior - maybe someone is learning something that others know nothing about.

Euro-American View

It is the school teacher's responsibility to educate the child according to the standards developed by the system. Most of the time, the student is expected to follow someone else's design and to fit into acceptable group behavioral patterns. There is not much time for patience which would allow the student to perform outside of the "norm" because of the time frames and expectations included in the design of the system.

•Time Constraints and Achievement Levels

Traditional Indian View

The child/student moves at his/her own pace. There are no pre-determined schedules or achievement levels set for someone to achieve or accomplish.

Euro-American View

Students are expected to perform at a certain rate and progress with the class. They are expected to perform according to a prescribed achievement levels in a predetermined amount of time.

•Age Groups and Length of Education

Traditional Indian View

Education is multi-aged and multi-generational. There is no definable beginning or end and it is part of life. All people are expected to continue the learning process throughout their lifetimes.

Euro-American View

Students are grouped by age in classrooms, mostly isolated from students of other ages in classrooms. Schooling begins at the kindergarten level, or perhaps, pre-school, and is required through 12th grade. Many students finish college, or continue through the graduate school level, and maybe participate in an internship opportunity. Education in this system is usually defined as kindergarten through college.

•Responsibility for Education

Traditional Indian View

Education is an ongoing responsibility of the whole community, therefore, there is an individual and personal responsibility of each member of the community to the others.

Euro-American View

It is considered the school's responsibility to educate students. Individuals, especially those who are not parents, are not held responsible for educating the students.

•How Children are Expected to Learn

Traditional Indian View

Children are expected to learn by listening, observing and participating in whole community activities.

Euro-American View

Children are taught to read and write and to learn from books and a written language.

•Locations for Learning

Traditional Indian View

Education takes place in the home and in the community through daily interactions and practices.

Euro-American View

Education mostly takes place in school buildings.

•Truth

Traditional Indian View

There is no one truth that everybody should know. Truth is individual and personal and exists for each person in his/her own way. This is undisputed.

Euro-American View

There is a universal body of knowledge that everybody should learn.

•Standards

Traditional Indian View

Students are not judged by a predetermined set of standards that correspond with class levels and age groups. Performance of tasks, awareness of the lessons of Mother Earth, Father Sky and all things and concepts of interrelatedness are valued, but not judged. There are no written exams.

Euro-American View

There are definite standards by which students are judged. Written exams are a form of the judging process. Acceptable test scores are relative to other's test scores. Levels of acceptable accomplishment are pre-determined, and pre-established.

•Punitive Actions

Traditional Indian View

The concept of controlling the student doesn't exist. There are no punishments for "underachieving".

Euro-American View

Control is exerted by teachers and administrators. Issues of control, rewards and punishments play a key role in this system. Underachievers are identified.

•Educational Progress

Traditional Indian View

Progress is multi-directional. The students participate in the community at all levels. They may move upward, downward, laterally, etc., at any time. There are no predetermined tests or levels of achievement to reach.

Euro-American View

Progress through the system is linear. Each grade follows the next and students are expected to move forward to the next highest level or grade. Advancement depends on achievement test scores.

## Implications

### Traditional Indian View

These differing views create a disparity between the traditional American Indian and Euro-American views of education. Indian students, brought up in a traditional atmosphere, are rightfully confused when they enter the non-Indian system. Written testing, unfamiliar social settings, formal educational buildings and requirements for advancement to be met within a specified time frame are often overwhelming for Indian students (Campbell, 1991).

In addition, the non-Indian curriculum lacks culturally appropriate information and educational materials for Indian students. This tends to alienate the Indian students and community (Campbell, 1991). Also, there are very few Indian educators, and this creates an unusual situation for the Indian students who have learned by observing and by the example of their own people (Deloria, 1991).

### Euro-American View

On the other hand, Euro-American educators often have been frustrated in their attempts to educate Indian students (Campbell, 1991). Historically, there has been little communication between tribal members and non-Indian educators (Martinez, 1993). Communication is limited, also, because Indian students are taught to listen, to be quiet and to not draw attention to themselves by speaking out in a classroom setting. This makes it difficult for the Euro-American educator to interact with the students or to determine the level of understanding achieved by the Indian students (Campbell 1991). With so little opportunity for communication, it is difficult to help Indian students.

It is important that educators and parents recognize the value of a child's language and culture. Educators must learn how to respectfully incorporate learning within a Native context, and how to incorporate the Native context within the learning structure. Most

American Indian and Alaskan Native children are forced to grow up experiencing two different, and usually conflicting, views of the world (Deloria, 1991). Cultural and linguistic conflicts that Indian students undergo as they attend schools of the dominant society are often difficult and traumatic. Because of the incongruity of the conflicting cultures, educators often fail to address children's needs adequately or appropriately (Campbell, 1991). This commonly results in students' suffering from insecurity, ambiguity, and alienation. Alienation leads to failure, anger, hopelessness, confusion, and often to dropping out of school altogether (Harvey, 1992).

Curricula about American Indian cultures should be developed in partnership with Indians and non-Indians. The resulting materials should be tribally specific, nonstereotypical, authentic, and free of cultural bias (Deloria, 1991 and Harvey, 1992). The Oregon State University/Warm Springs Natural Resource Education Program was designed with a sensitivity to culture and tradition on the reservation. Some of the information in this literature review was not available when the OSU/Warm Springs program began, therefore, the program design was not determined by available literature, but by communication with tribal members. An attempt was made by the researcher to keep current on the literature, as it became available throughout the program .

Chapter 3

# THE OSU/WARM SPRINGS NATURAL RESOURCE EDUCATION PROGRAM DESCRIPTION

## Design and Implementation

### Origin of the Program

This program was initiated because of a need for successful communication and understanding of natural resource management strategies between Indians and non-Indians. Natural resource specialists from OSU had been asked to make recommendations for improved management of the natural resources on the reservation. The recommended strategies often were not applied. This project was based on the researcher's notion that an education program offered on the Warm Springs reservation would provide understanding of the principles of natural resource science and management strategies. There was an assumption that by exploring the cultural differences that drive Indian and non-Indian communities, respect and appreciation for the differences along with an understanding of commonalities would emerge. From this information, it was hoped that an exportable model for on-reservation natural resource science education would be developed. It was hoped, also, that this model, designed in partnership with members of Warm Springs, would assist in the understanding and application of natural resource management strategies on other Indian reservations.

### Designing the Program

Initially, the researcher, and the Warm Springs Range and Ag Coordinator discussed options for program design during phone conversations and written communications. In 1988, a meeting with the Warm Springs General Manager of Natural Resources,

Range and Ag Coordinator, OSU Extension Agent and the Researcher was held and the following needs identified:

1. There was a need for respect and understanding of differences between Indian and non-Indian cultures.

2. There was a need for a culturally appropriate, locationally specific, natural resource science education program to be offered on the reservation.

3. Input from members of the Warm Springs reservation was needed to design an appropriate program.

Dialogue continued between the researcher and Warm Springs Range and Ag Coordinator, and the following plan emerged:

1. A series of natural resource science education and management seminars would be offered on the reservation.

2. Tribal members would be asked to contribute to the design of the Natural Resource Education Program by identifying interests at the conclusion of the seminars.

3. Coursework would be designed by the coordinators after identifying the interests and needs of the pre-coursework seminar participants.

4. The seminars and subsequent coursework would be offered on-reservation to all members and employees.

Pre-Coursework Seminars

Eight seminars were presented from February through May, 1989:

3 February - "Reading the Land", Hugh Barrett, Rangeland Specialist, State of Oregon Soil Conservation Service (SCS). "Nutritional Needs of a Cow/Calf Pair Throughout the Year", Dr. Martin Vavra, Eastern Oregon Agricultural Research Station (EOARC).

1 March - "Bull Selection", Dr. William Zollinger, OSU Department of Animal Science

"The Importance of a Healthy Watershed", John Buckhouse, OSU Department of Rangeland Resouces.

17 March - "Grazing Management", Byron Cheney, Holistic Range Management

"Riparian Management", John Hielmeyer and Joe Wichman, Holistic Range Management

13 April - "Goals Setting", Naseem Rakha, Holistic Range Management

17 May - "Grazing Animals in the Forested Areas", Dr. William Krueger, OSU Department of Rangeland Resources

Advertising the Pre-Coursework Seminars

Seminars were advertised on KWST-FM 96.5, the Warm Springs radio station, on flyers posted on the reservation, the Warm Springs weekly newspaper - Spilyay Tymoo (Appendix), and by oral communication. Oral communication is known as "Moccasin Telegraph" in Indian Country, and is the fastest way to circulate information on the reservation.

Coursework Design

The Natural Resource Educational Program, offered on the reservation from October 1989 through April 1990, consisted of nine coursework sessions which were three to four hours long. The coursework was designed by the two coordinators (Indian/non-Indian) after reviewing the responses and identifying the needs of the participants in the pre-coursework seminars. The April through October time period included wintertime on the reservation which, traditionally, was the time of year for storytelling and preparing for the following spring and summer. Outside activities slowed on the Warm Springs reservation during this time and it was a culturally appropriate time for learning to take

place. Coursework in this pilot project focused primarily on rangeland ecosystems. It was hoped that expanded, future natural resource education programs would include coursework about forestry, fisheries, and wildlife.

The sessions were scheduled between 1 pm and 4 pm weekdays which allowed the instructors (researcher and resource specialists) the morning hours for travel time to the reservation. Presentations included lectures, slides, use of overhead projector, hands-on labs, and discussions. Pre- and post-class questionnaires (Appendix) were circulated and completed by the participants during four sessions. This was an attempt to measure knowledge learned in the coursework and is discussed in more detail in Chapter 4.

Participants chose to receive a certificate of achievement from Oregon State University College of Agricultural Sciences for their successful completion of the program.

**Program Coursework Offered**

The following is a list and description of the coursework designed from tribal member's responses to the seminars:

10-19-89 OVERVIEW OF RANGELANDS

11-30-89 NATURAL GEOLOGY OF THE RESERVATION

12-14-89 SOILS OF THE RESERVATION

01-26-90 FIRE ECOLOGY

02-09-90 PLANT MORPHOLOGY, PHYSIOLOGY, AND IDENTIFICATION

03-09-90 WATERSHED

03-30-90 BASIC LIVESTOCK MANAGEMENT GRAZING SYSTEMS

04-13-90 ECONOMICS

04-23-90 FOREST GRAZING

**Coursework Description**

The content of the coursework and presentation approach for the Indian audience focused on the Warm Springs resource base and included a 30-minute break mid-way through each of the three- to four-hour sessions. Refreshments were served during the breaks and participants and presentors visited. This time served as the question and answer period since Inidans listen, rather than speak (ask questions) during class.

Overview - The overview provided a description of the 640,000 acre Warm Springs reservation in terms of geology, climate, vegetation, fish, wildlife and grazing animals. Pie-charts and maps were included to show relative amounts and locations of land-use acreage on-reservation versus off-reservation.

Natural Geology of Warm Springs - This presentation discussed how the area in north central Oregon, which included the reservation, was formed over geologic time, including volcanic and ice-age influences.

Soils - The lecture included information about how soils were formed, plant/soil/water relationships, climatic effects such as freezing and thawing, and animal impacts. An hour-long lab was included using the soil texture triangle from the OSU Department of Soil Science for hands-on interaction and discussion.

Fire Ecology - This was a discussion of the ecology of fire in rangelands, historical and current contexts. Concepts of the role of fire as a natural part of the environment were presented with some discussion about the Indian use of fire as a management tool.

Plant Physiology and Plant ID - The life processes and functions of plants were presented by describing and comparing plants that are native to the reservation and those that are considered non-native in the reservation ecosystem. Included was information

about photosynthesis, plant/soil/water relationships, transpiration, responses and special adaptations to high temperature and water stress, and plant response to the impacts of grazing animals on the reservation. Plant ID consisted of learning and recognizing plant parts, morhpology and functions, scientific, common and Indian names, and locating the plants on maps of the reservation.

Watershed - This presentation began with an Indian story about the raven and water. The overhead projector and visuals were used to illustrate the story. A definition of a watershed followed and examples of watersheds were located on maps of the reservation. Also, the overhead projector was used to illustrate the following concepts: moisture regimes throughout the year, seasonal influences, riparian zones, the hydrologic cycle on the reservation, the safe capture, store and release of moisture in the system, and runoff and erosion. The impacts of grazing animals and wildlife on the watershed were noted and issues of water quality and quantity were addressed, which included discussions about water infiltration rates in the different reservation soils, water management, and impacts on fish habitat from grazing animals.

Basic Livestock Management and Grazing Systems - This was a discussion about grazing management strategies and different types of grazing systems. The overhead projector was used to show diagrams of different grazing systems.

Economics of Range Livestock Production - Basic economic principles were discussed along with the reproductive efficiency of livestock, nutritive needs and impacts of poisonous plants in the diet.

Forest Grazing - The principles of livestock management in a forested ecosystem were presented. Impacts of grazing animals, relative palatability of forest ecosystem forbs, grasses, shrubs and trees, and recommendations for proper management and grazing strategies were introduced along with the general principles of balanced ecosystems.

**People Involved in the Program**

Classes were offered to:

1. All members of the Confederated Tribes of Warm Springs, children and adults, with special invitations to elders
2. The non-Indian staff and employees on the reservation, including resource managers and Bureau of Indian Affairs (BIA) representatives

**Ages of the Participants**

Ages of participants ranged from high school students through elders, sixteen through seventy years old, approximately. The ages of the individuals who chose to participate in the certificate of achievement program ranged from twenty to seventy. Students who were enrolled in K-12 schools rarely attended due to conflicts with regular class times, although one Madras High School Indian student acquired special permission to attend two different sessions: Plant Physiology and Identification, and Forest Grazing.

**Staff and Others Involved in the Program**

The program had two coordinators, Ross Racine (Blackfeet), Warm Springs Range and Ag Coordinator, and Judith Vergun, Researcher, OSU, College of Agricultural Sciences. The two coordinators worked in partnership to schedule and advertise classes, to arrange for natural resource specialists, and to present classes.

Natural resource specialists had expertise in geology, fire ecology, livestock management, and silvicultural grazing practices. Five sessions, three-hours in length, were taught by the specialists. The researcher was the instructor for four sessions. The Warm Springs Rangeland Management Handbook (Appendix), which was used as a textbook/ workbook, was written and illustrated by the researcher.

Chapter 4

# EVALUATION OF THE OSU/WARM SPRINGS NATURAL RESOURCE EDUCATION PROJECT: SHORT-TERM GAINS IN KNOWLEDGE


## Abstract

A natural resource education program for members of the Warm Springs Indian Reservation was designed and developed in-partnership with tribal members. The intent of the project was to create a culturally relevant program supported by culturally reflective educational materials which met local needs. The program was taught on-reservation. Respect and understanding of some cultural differences between Indians and Euro-Americans occurred, and tribal members gained an understanding of the Euro-American view of the science behind natural resource management. There was a 16.30% increase in the short-term knowledge gained in four coursework sessions where this was measured. Participants who contributed to the design of the program completed the program successfully and earned a certificate of achievement from the OSU College of Agricultural Sciences. The program, overall, was considered a success in enhancing short-term knowledge.


## Introduction and Literature Review

When Euro-Americans entered the lands of the Indian peoples of Oregon, they encountered many independent Indian nations. The cultures and histories of these tribes reflected centuries of intimate interaction with the land and its resources. As Euro-Americans settled in Oregon, Indians were displaced. By the mid 1800's, many Indians were assigned to reservations, thus, closing them out of their migration routes which provided resources to share. This was devastating to the stability of the Indian communally based way of life which relied on sharing natural resources (Mander, 1991).

On June 25, 1855, a treaty was signed between the U. S. Government and the Confederated Tribes of Warm Springs to establish the reservation in north central Oregon. By being confined to the reservation, an area of specific boundaries, the members of Warm Springs have been closed out of their traditional lifestyle (Stowell, 1987). Traditionally, Pacific Northwest Indians migrated with the seasons and lived in balance with Mother Earth. This was a steady-state economic system with no concept of economic growth (Mander, 1991). Since 1855, it has been necessary for Warm Springs Indians to "manage their lands" (a Euro-American concept), and during the last two to three decades, members of the Warm Springs have asked natural resource specialists to make management recommendations. However, the Euro-American approach has not been effective.

This research was initiated because of a need for successful cross-cultural communication of natural resource science and management strategies. Interviews by the researcher with members of the Warm Springs revealed that over the past two to three decades, specialists have been asked to make recommendations, but there has been little or no utilization of the information. Further investigation revealed that most specialists had little or no comprehension of native cultural practices, the people receiving the information did not understand it completely, and there was not enough follow-through by the specialists to implement the application and maintenance of the suggested management.

Tribal members felt that if they could understand the science behind the recommendations, the reasons for application of those strategies might make sense. The purpose of this research was to develop a natural resource education program that would provide a basis for this understanding. Specifically, the hypothesis was that a culturally appropriate educational program would increase knowledge of the participants in nine different areas of natural resource science and management strategies.

## Study Area

The Warm Springs Reservation is located on 641,035 acres in north-central Oregon. It lies in the lee of the Cascades, therefore, is in the rainshadow of the mountain range. Elevation begins at about 1200 feet with a rise to over 4800 feet, with corresponding annual precipitation ranging from 8 to 110 inches. Moisture distribution is concentrated mostly in the late fall and winter months in the form of rain and snow. Summer brings some thundershowers, but the vegetation relies upon stored moisture. Watersheds drain into the Deschutes River.

The soils vary from clays and silty clays over sedimentary rock (very old) to loams: silt, clay, silty-clay over basalt (old), or the same types of loams over glacial outwash (recent) to sandy-loams and loamy-sands over andesite (recent). The soils of the high desert, easterly part of the reservation, are mostly clay and exhibit high shrink/swell capacity (USDA Soil Conservation Service, 1993).

The vegetation regions are: bunchgrass, sagebrush-grassland, pinyon-juniper, and coniferous forests. Many rangelands on the reservation are in poor condition, as are many of the western rangelands outside the reservation. Overgrazing by domestic livestock and climatic conditions during the 1800's, are credited with the downward spiral in condition of the rangelands. The members of the Confederated Tribes of Warm Springs inherited the problem, which has not been reversed (Stowell, 1987).

## Materials and Methods Used

The educational curriculum consisted of nine, three-hour coursework sessions. Topics covered were: Rangelands Overview; Natural Geology of the Reservation; Soils of the Reservation; Fire Ecology; Plant Physiology and Identification; Watershed; Basic Livestock Management; Economics; and Forest Grazing. Four of the nine coursework session were chosen at random and pre-, and post-class questionnaires were used to measure knowledge gained in classes (Appendix). The four coursework sessions evaluated

were: Fire Ecology; Watershed; Plant Physiology and Identification; and Forest Grazing. There were fifty-six completed pre-, and post-class questionnaires from the combined classes. Also, the program was advertised reservation-wide to invite all tribal members. It was an "educational program without tests", so that no one would fear being challenged in class. For reservation application, the term "questionaire" is less threatening than "test".

The questionnaire design consisted of structured-, and free-response questions (Fink and Kosecoff, 1978). There were one hundred points possible on each questionnaire with bonus points awarded for additional written, expanded answers. Internal validity may have been threatened by participants taking the pretest and familiarizing themselves with the posttest questions, since the same questions were asked in each case (Morris, et al, 1987). Time allotted for questionnaire answering was fifteen to twenty minutes. Most participants finished in five to ten minutes.

**Data Analysis**

A paired t-test was selected to measure the difference between pre-, and posttest scores (Devore and Peck, 1986). Differences were measured in five ways: each of the four classes separately, then, the differences for all classes were assessed. A significance level of $p < .05$ was used for all tests.

| catagory | n | t calc | t-table | significance |
|---|---|---|---|---|
| Fire | 30 | 3.03 | 2.05 | .0052 |
| Water | 13 | 3.87 | 2.18 | .0022 |
| Plant | 6 | 3.99 | 2.57 | .0104 |
| Forest | 7 | 4.15 | 2.45 | .0060 |

Table 4.1 t-table Results

**Results and Discussion**

For both the analysis of individual topics and combined scores for all classes, a significant increase in short-term response was shown (Table 4.1). These results, indicated that the education program was successful in increasing knowledge of the participants.

In addition, it is interesting to note the relative increase in knowledge for each of the categories examined. Figure 4.1 depicts the pre and post means for each category. It was possible to earn 100 points on each questionnaire. Bonus points were given for expanded, written answers. Therefore, a group mean of over 100 was possible, as in the Watershed class (figure 4.1).

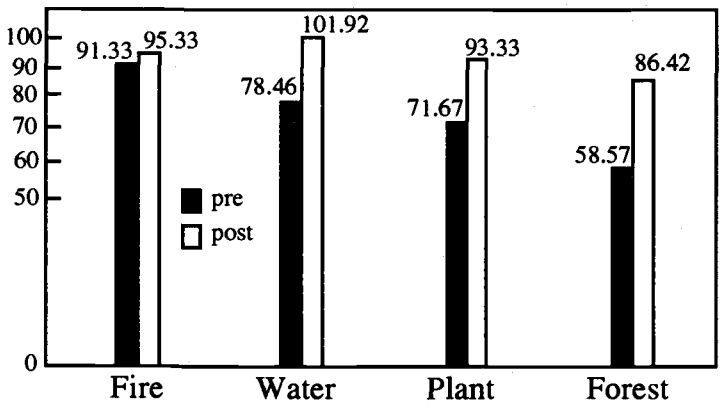


Figure 4.1 Pre and Post Means

The fire session had the smallest increase in knowledge (4.4%), while the forest grazing session had the largest (47.6%). The water and plant curriculum each showed about a 30% increase in knowledge gained.

The following are several possible reasons for the variations in relative increases in knowledge:

•Indians have used fire prescriptions for thousands of years, therefore, have vast knowledge and experience with fire in natural systems. According to Pyne (1982), anthropogenic use of fire has influenced ecosystem design since hominids first discovered

it, therefore, humans and fire continue to be a natural part of natural systems. It is not surprising that Pre-class scores were very high (mean = 91.33), leaving not much room for improvement. Interestingly, the Fire Ecology class had more than forty participants, making it the largest of nine classes offered. This seemed to indicate a great interest in the continuing use of fire by Indians.

•Pre-class scores were low (mean = 58.57) for the forest grazing session. This silvicultural approach to grazing is currently gaining favor with both Indians and non-Indians, as a positive objective of forest management (Doescher, et al, 1987). Since this is a relatively new concept for Indians and non-Indians, it is not surprising that the greatest increase in knowledge occurred in this session. According to the post-program evaluation and observations of current land management activities on the reservation, this is the area of management design where the most change has occurred.

•Fairly high pre-class scores in both the watershed (mean = 78.46) and plant (mean = 71.67) classes indicated that Indians were knowledgable in these areas, but benefitted by some new information. The Plant Physiology coursework stimulated continuing discussions about the use of native and cultural plants on the reservation. One positive result of this is noted in 1991 OSU/Warm Springs Memorandum of Understanding, where there is agreement between OSU and Warm Springs to continue research, demonstration, and education about the cultural plants.

One of the problems of the assessment used in this research centered on the evaluation design and the testing effect of pre-, and posttests. Pretests can give students practice and make them so familiar with the tests that their performance on the posttests could have improved even without the benefit of instruction (Fink and Kosecoff, 1978). Alternatively, pretests may alert students to important points to be presented in the coursework, therefore, they listen carefully to learn. The researcher feels that the pretest heightened students' interest in the subject matter. An increase in knowledge occurred from

pre-, to post-test, in classes where this was measured, and information stimulated change in natural resource management practices such as forest grazing. It appears that the pre/ post test format assessed learning response.

**Conclusions and Recommendations**

The Warm Springs Natural Resource Education Program was successful in increasing the knowledge of participants. The forest grazing session promoted communication and increased understanding between the branches of Forestry and Range/Ag on the reservation. Both the watershed and plant sessions helped Indians to remember what they already knew about these subjects, and introduced some new information. The fire session introduced very little new information, but stimulated an interest in re-establishing the traditional art of prescribed burning.

Recommendations for future programs include the following:

1. Set up a small forest grazing research and demonstration plot with Indians taking the lead in research design, management, and demonstration. Evaluation and results of the project should be presented in a seminar for all tribal members by Indians involved in the research.

2. Coursework should be expanded to include more information about native and cultural plants and their uses. The Warm Springs Culture and Heritage Committee should be included in designing the coursework.

3. Instructors for the coursework sessions should include elders, storytellers, and others in Indian community, who could provide traditional information about natural systems, including the uses of fire.

Chapter 5

# EVALUATION OF THE OSU/WARM SPRINGS PROGRAM: A QUALITATIVE ASSESSMENT OF LONG-TERM IMPACTS


## Abstract

A natural resource education program for members of the Warm Springs Indian Reservation was designed and developed in-partnership with tribal members. The intent of the project was to create a culturally relevant program supported by culturally reflective educational materials which met local needs. The program was taught on-reservation. Respect and understanding of some cultural differences between Indians and Euro-Americans occurred, and tribal members gained an understanding of the Euro-American view of the science behind natural resource management.

Long-term gains included (1) a contribution to the design of the 1991 OSU/Warm Springs Memorandum of Understanding, (2) on-reservation application of knowledge gained, (3) an increase in tribal member's interest in natural resource science education, and the (4) design of an exportable model for university/reservation natural resource science education programs.


## Introduction

In 1989, a partnership-based education program was developed on the Warm Springs Indian Reservation for the purpose of enhancing understanding between Indians and non-Indians about natural resource education, science, and management strategies. The idea in this project was the notion that a university-level, natural resource education program, taught on-reservation, and designed in partnership with tribal members would be effective. It was expected that knowledge learned in the program would provide information for tribal members to assist in their management of a sustainable resource base, and

provide information for non-Indian educators and natural resource specialists to develop culturally appropriate programs. This idea had the potential of becoming a model for partnership-based educational programs between universities and reservations.

Evaluation of the program involved several approaches:

1. For short-term gains, pre-, and post-class questionnaires were used to measure knowledge gained in four of the nine coursework sessions.
2. The long-term evaluation was done with questionnaires distributed to participants approximately three years post-program.
3. Antecdotal occurrences were reported by the researcher in a participant-observer role.

This chapter reports on the results of the qualitative portion of the study.

**Methods**

A summative evaluation was used approximately three years post-program to determine long-term effectiveness. According to Morris, et al (1987), a summative evaluation determines whether an idea is, or is not, effective, and whether or not the idea has the potential of being generalizable to other situations. In this case, the idea being evaluated was the Warm Springs Natural Resource Education Program, and the program model had the potential of being used on other reservations. Patton (1982), stated that when working with a group of people in an evaluation process, the situation can be defined as partly a training exercise aimed at empowering participants to assert greater control over program implementation and outcomes through their increased knowledge about understanding of both program and evaluation processes. The summative evaluation provided a situationally appropriate method which included tribal members in the evaluation process. Patton (1982), argued that involving key people who have a stake in the evaluation can assist in focusing on meaningful and appropriate issues, thereby, enhancing the

likelihood of utilization. The evaluation questions and program model evolved with the program, in an effort to focus on meaningful and appropriate issues, enhance the learning process, and encourage application of knowledge gained.

**Discarded Design**

The first research design included the idea of measuring and comparing improvements in the six grazing districts on the reservation one year post-program. This idea was discarded for several reasons:

1. In traditional Indian cultures, comparing one with another for the purpose of evaluation or judgement, is not appropriate.
2. Threats to the validity of measuring improvements in the grazing districts were:
    a) not all users of the grazing districts were attending the OSU/Warm Springs classes. Measurements would include results of management strategies that may not have been discussed in class.
    b) Other organizations and management recommendations were influencing the users of the grazing districts.

**Basic Evaluation Questions**

The following questions, from discussions with tribal members, were formulated by the two program coordinators, to assess long-term effectiveness, and were correlated with the goals and objectives of the program (Morris, et al, 1987). See Appendix.

1. Was a culturally appropriate model for teaching and communicating natural resource science and managment strategies developed in partnership with the Native American community on the Warm Springs reservation? Describe and discuss.
2. Were differences in concepts of natural resources identified? List and discuss.
3. Were differences in views of education identified?

4. Were differences in communication between the Indian and non-Indian community identified? Discuss.

5. Was traditional and cultural appropriateness included in classroom sessions and educational materials? How?

6. Were educational opportunities increased for members of the Warm Springs reservation by providing an on-site, community-based program of natural resource science and management strategies? Why is this important?

7. Did participants reach their goals and objectives?

8. Were concepts of natural resource science and management strategies learned in the program applied on thereservation?

9. Did participants earn a certificate of achievement for their participation in the program? How? What is the value of this?

10. Was there an opportunity for university-level achievement? Why is this important?

11. Was the coursework offered in the program appropriate?

12. Was the Warm Springs Rangeland Management Handbook useful?

13. Did participants gain knowledge in individual classes?

**Information Gathering**

Prior to developing the post-program questionnaire (Appendix), dialogues between the researcher and tribal members revealed several important points, which are also noted by Deloria (1991):

1. Indians are tired of being studied and reported on by non-Indians.
2. Researchers are more effective in a participant- observer/interviewer role.
3. Program evaluation is more useful if the design is partnership-based.

Therefore, tribal members were interested in being equal partners in a study that would contribute something to the knowledge of both Indians and non-Indians. In addition, the researcher's participant-observer/interviewer role (Patton, 1982), facilitated a friendship-based information exchange about a shared project. The post-program questionnaire (Appendix) was a partnership-based design which evolved with the development of the program model. The post-program questionnaires were mailed approximately three years after the completion of the coursework to participants who had attended three or more coursework sessions. Thirty participants fit this category. Twenty-two of the thirty questionnaires (73%) were completed and used for evaluation purposes. Of the twenty-two that were completed, nine were returned by the participants in written form and thirteen were completed by the researcher (participant-interviewer) in telephone interviews with the participants.

**Results and Discussion**

Twenty-two participants provided answers and insight into the effectiveness of the educational program and development of future programs. Answers to specific questions are discussed in this section, and results are reported on the basis of percent response to the questions. Basic evaluation questions represented below, with a narrative of participant response following each question.

**1. Was a culturally appropriate model for teaching and communicating natural resource science and managment strategies developed in partnership with the Native American community on the Warm Springs reservation?**

The graphic representation of the educational model, on the next page, was developed in partnership with tribal members.

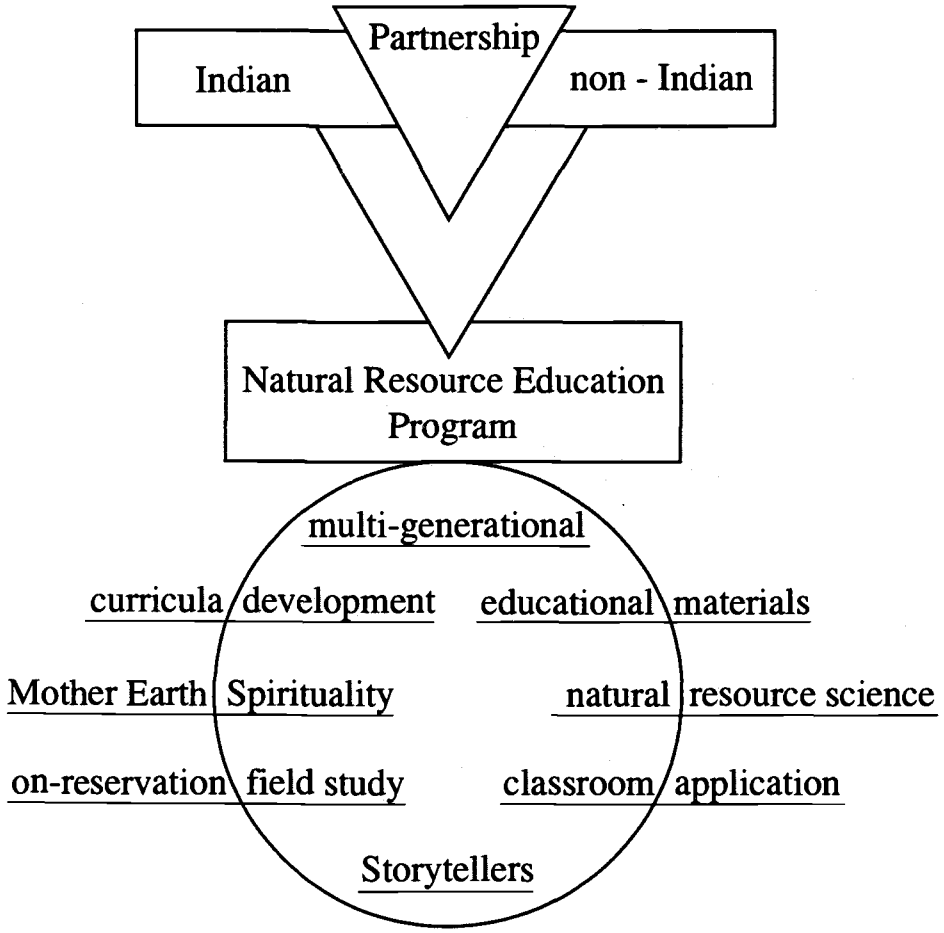


Figure 5.1 The Vergun / Warm Springs Model

One hundred percent of the questionnaire respondents stated that the key to an appropriate educational model was a partnership-based design. They noted that post-settlement, it has been the tendency of well-meaning Euro-Americans to design programs for Indians. The assumption, they argued, was that Euro-Americans knew what was best for Indians. This was done without collaboration with Indians. The respondents stated that the partnership-based design of the OSU/Warm Springs Natural Resource Education Program was different from historical approaches, and it accomplished the following:

1. cultural understanding and appreciation between Indians and non-Indians.
2. a sense of ownership of the program by Indians.
3. an opportunity for an equal power relationship between Indians and non-Indians.

One hundred percent of the respondents stated that the model should include:

1. A partnership-based design.
2. Tribal members of all ages in a multi-aged and multi-generational approach.
3. Tribal members at all stages of program design and implementation.
4. Mother Earth spirituality in cousework materials, curriculum, and presentations. Tribal elders should provide and teach this information.
5. On-reservation field studies with tribal member's input and memory about particular sites.
6. Storytelling by a recognized storyteller in Indian community. These stories teach values and ethics about natural resources and the wisdom of the universe.
7. Partnership-based educational materials and curriculum development which include cultural appropriateness, correlations between traditional Indian understanding of natural systems and Euro-American science.
8. Classroom application with lots of visuals and the use of native languages.
9. Classroom settings where students are not expected to answer questions asked by the instructor during class - Traditional Indians are taught to listen in class and are not always comfortable interjecting their own ideas during class time. They prefer not drawing attention to themselves.

**2. Were differences in concepts of natural resources identified?**

One hundred percent of the respondents stated that the basic difference in concepts is in the perception of aliveness (everything has spirit) of all things and communication among all things in the universe. They also noted that traditional Indians see themselves as an equal part of the system with responsibility to allow the system to function and to not interfere with the natural balance of the system. They felt that Euro-Americans tend to want to control natural systems, see human beings as separate and outside the system, and more intelligent than other things.

One hundred percent of the respondents also stated that Euro-Americans attempt to push systems to ultimate production for the purpose of accumulating surpluses. They stated that traditional Indians are taught to take no more than they need for personal, family, and community use.

**3. Were differences in views of education identified?**

One hundred percent of the respondents stated that children in the traditional Indian system were allowed to learn at their own pace and were not expected to acquire a pre-determined amount of knowledge by a specified time. In this system, rates of learning in children were not compared. They noted, also, that learning took place in the community with tribal members as role models.

Also, one hundred percent of the respondents stated that in the Euro-American system, children are expected to learn at the same rate. They noted that this system uses standardized tests and makes comparisons among children. According to the respondents, learning in the Euro-American system, takes place in buildings with students grouped by age where they are isolated from the rest of the community.

**4. Were differences in communication between the Indian and non-Indian community identified?**

Respondents commented in several areas of communication:

Speaking - One hundred percent of the respondents felt that non-Indians often use "big" words for simple concepts, and speak at a fast, sometimes anxious, rate of speed. This gives the impression that non-Indians are always in a hurry and have little time for careful communication, using many hurried words rather than fewer, carefully chosen words.

Body Language - Several of the respondents mentioned that many non-Indians seem to be in motion when speaking and listening, often gesticulating constantly with hands. They noted that many Indians hold still when talking and listening.

Writing - One hundred percent of the respondents stated that non-Indians use the written form of communicating more often than many Indians, who have an oral tradition of information transfer. The respondents noted that most Indians prefer storytelling, demonstrations and visuals to lectures and written lessons. They stated that culturally, Indians have communicated social and spriritual values, as well as work ethics, through storytelling and actions.

Use of Visuals - Eighty-two percent of the respondents felt that Indians put more value on the use of visuals for information transfer than non-Indians.

Listening - Ninety-one percent of the the respondents stated that Indians are more careful listeners than non-Indians seem to be. They noted that non-Indians seem to be thinking about what they, themselves, are going to say next, rather than listening to the person speaking and then formulating a response.

Equality - Fifty-nine percent of the respondents said that many non-Indians, especially Euro-Americans, "speak down" to Indians. The respondents stated that most often they have experienced paternalistic attitudes when in conversation with Euro-Americans. They cited this unfortunate, often-heard statement, "Maybe we can help you people." The respondents felt that Euro-Americans have created a natural resource disaster since settlement of north America and are not good examples. They stated that they are not interested in that kind of "help" and unequal exchange.

Time Before Answering - All of the respondents stated that Indians give thoughtful answers to questions and offered this insight: An Indian is often silent and contempletive before answering a question. Most non-Indians are uncomfortable with "long" silences. Indians are not. Silence often means that the question is very important and deserves a careful, considerate answer. Silence is often a sign of respect for the question. Also, traditional Indians give others equal time to talk. In group situations, it is culturally appropriate for Indians to take only a fair share of time for talking, leaving time for input of others.

**5. Was traditional and cultural appropriateness included in classroom sessions and educational materials?**

One hundred percent of the respondents felt that the program was culturally appropriate for the following reasons:

1. The amount of writing and in-class speaking required of the participants was limited.
2. All lessons were designed to be site-specific for the Warm Springs reservation.
3. The extensive use of visuals, especially on the overhead projector, was effective. However, additional visuals and "show me" field demonstrations would have improved the program.
4. The Warm Springs Rangeland Management Handbook was designed specifically for the reservation resource base. Uncomplicated language was used and many illustrations were included. Many of the illustrations were meant to be humorous for the purpose of fitting with the warm, Indian sense of humor.

**6. Were educational opportunities increased for members of the Warm Springs reservation by providing an on-site, community-based program of natural resource science and management strategies?**

One hundred percent of the respondents stated that educational opportunities were increased. Eighty-two percent of the respondents stated that many tribal members are not able, or choose not to go off the reservation for educational classes for these reasons:

1. Some Indians feel uncomfortable in a non-Indian classroom setting and they prefer not to be called upon to answer questions in class.
2. They feel that the coursework offered is not sensitive to Indian culture, therefore, information provided is not appropriate for their applications.
3. Some of the college-aged tribal members have family responsibilities. They are married and/or have children. This makes it very difficult socially and economically to move away from the reservation for education.

One hundred percent of the respondents felt that the site-specific educational design provided a unique opportunity to learn about their own resource base. One respondent stated that teaching units expanded the knowledge of animal and environmental impacts and interactions, providing an overall awareness of the resource base, therefore, creating an awareness of the need for appropriate management. It is interesting to note that sixty-seven percent of the participants worked in fields related to natural resources on the reservation.

**7. Did participants reach their goals and objectives?**

Eighty-six percent of the respondents reached all of their goals, five percent reached some, and nine percent had no particular goals.

The eighty-six percent of the respondents who achieved their goals and objectives, listed them as:

1. To receive new information for application in management on the reservation.
2. To refresh memory about things already learned.
3. To understand the resource base of the reservation.

The nine percent who had no specific goals and objectives stated that they had discussed the program with others on the reservation and decided to attend because it sounded interesting.

Five percent of the respondents who accomplished the three goals above, also had hoped for more on-the-ground improvement to have taken place than has occurred post-program. They noted that some of the planned management strategies, based on knowledge learned in the program, have not proceeded because of other funding priorities.

**8. Were concepts of natural resource science and management strategies learned in the program applied on the reservation?**

Ninety-six percent of the respondents stated that application of the concepts had occurred in resource planning committees and decision-making bodies. While four percent didn't know whether or not concepts had been applied, the other respondents stated that the management strategies learned assisted in the development of the Integrated Resource Management Plan (IRMP) for forested areas. They also stated that the Warm Springs Rangeland Management Handbook (Appendix), is being used to assist in educational efforts with the summer youth internship program on the reservation.

Respondents stated that future programs should include on-reservation field trips, more labs, observation and/or participation in on-reservation research and demonstrations, with a focus on soils and vegetation in the six range districts. Conversations with class participants and other Warm Springs tribal members indicated that more than half of the individuals would like to see this program expanded into a 12-month educational opportunity for the purpose of developing broad-based support for appropriate on-reservation management practices.

**9. Did participants earn a certificate of achievement for their participation in the program?**

Nine participants enrolled in the Certificate of Achievement plan. All nine finished the requirements successfully and earned the certificate.

Those who earned certificates credited participant ownership of the program for the success.

Requirements for earning the certificate were:

1. Attend at least 85% of the classes
2. Participate in all labs
3. Complete all questionnaires
4. Contribute to discussions, if possible
5. Make suggestions for program improvement if desireable

It is significant that one hundred percent of the participants who earned the certificate of achievement:

1. Were contributors to the design of the OSU/Warm Springs Natural Resource Education Program.
2. Completed it successfully.
3. Were instrumental in post-program application of knowledge learned.

**10 a) Was there an opportunity for OSU/Warm Springs program participants to accomplish university-level work?**

Yes. The natural resource information in the coursework design was based on undergraduate level university courses offered at Oregon State University through the College of Agricultural Sciences.

**10 b) Should university-level achievement and credit for on-reservation internships or coursework be offered to Warm Springs students who are enrolled as students at Oregon State University?**

One-hundred percent of the respondents answered, "Yes" and gave the following reasons:

1. To relieve the pressure of too many studies and homework during the school year at the university.
2. To understand the application of knowledge in Indian homeland.
3. To alleviate culture shock when students move away from home and into a university system.

Ninety-one percent of the respondents added that classes for university students on the reservation would help create understanding and ownership in management of the resources. Seventy-three percent of the respondents felt that university-level classes could serve as refresher courses for those individuals who have an educational background in natural resources.

**10 c) Should high school students get university credit for classes offered on the reservation?**

Seventy-seven percent of respondents suggested that this was a good idea because "it would help the high school students get started in college" and "improve their view of higher education".

**11 a) Was the coursework offered in the program appropriate?**

One hundred percent of the respondents stated that the coursework was appropriate. Table 5.1 provides relative response in percents of how participants felt about the usefulness of the topic areas.

| | | not at all useful | a little bit useful | OK | better than OK | great | no comment |
|---|---|---|---|---|---|---|---|
| too technical | OVERVIEW OF RANGELANDS | | | 25 | 75 | | |
| 44* | NATURAL GEOLOGY OF WARM SPRINGS | | | 25 | 25 | 1 | 44 |
| | SOILS | | | 77 | 23 | | |
| | PLANT PHYSIOLOGY AND PLANT ID | | | | 33 | 67 | |
| | FIRE | | | 23 | 33 | 13 | 31 |
| | WATERSHED | | | 36 | 64 | | |
| | LIVESTOCK MANAGEMENT AND GRAZING SYSTEMS | | | 67 | 33 | | |
| 44* | ECONOMICS | | | 100 | | | |
| | FOREST GRAZING | | | | 100 | | |

Mark a star (*) in front of the subjects that were too technical

Table 5.1 Participant Rating of Classes

**11 b) Nine classes, two to three hours in length were offered in the OSU/Warm Springs Education Program. Was the number of classes about right?**

All nine participants who earned the Certificate of Achievement felt that the number of classes was satisfactory. The remaining thirteen respondents felt that they could not respond to the question with credibility because they did not attempt to attend all of the classes.

**11 c) The classes were taught on weekdays, between 1 and 4 p.m. Was the time of day for the classes OK?**

One hundred percent of the respondents stated that the time of day was acceptable. Eighty-two percent felt that their employers should view employee participation in classes during the work day as on-the-job training.

**11 d) The coursework was offered from October 1989 through April 1990. Was the time of year OK?**

Ninety-one percent of the respondents stated that October through April was acceptable. The remaining nine percent felt that winter months only were the best time for presentation-type classes, noting that if more "in-the-field" demonstrations were included, the time should be extended to include springtime months. They suggested a January through May or June schedule. One hundred percent of the respondents added that more "in-the-field" classes would provide better understanding of the information presented in the classroom.

**11 e) Should the program be offered again? If yes, to whom? If no, please explain.**

One hundred percent of the respondents stated that the program should be offered again and should include:

1. K-12 students
2. high school students
3. elders
4. other tribal members
5. non-Indians who work on the reservation

other: begin as early as possible, perhaps in the Head Start Program

**11 f) If yes to the above question, on what basis should people be involved in the program?**

One hundred percent of the respondents stated that tribal members should help design the program and attend classes as students or observers. Eighty-two percent said that tribal members should act as facilitators, and fifty-nine percent felt that tribal members should act as program facilitators.

**11 g) Why should the above-named individuals be involved?**

One hundred percent of the respondents agreed that the individuals, listed in 11e above, should be involved in the program for these reasons:

1. Creates ownership of the program.
2. Builds self-esteem.
3. Contributes to understanding of the natural resource base of the homeland.
4. Creates understanding between Indians and non-Indians.

**12. Was the Warm Springs Rangeland Management Handbook useful?**

Of the respondents, twenty-eight percent marked "Great," forty-six percent marked "Quite Useful", twenty-six percent marked "OK", and no one marked "Sort of Useful", or "Just Awful".

One hundred percent of the respondents stated that they have been using the handbook as a reference in their work. According to twenty-seven percent the respondents, some of the chapters are being used to teach youth groups on the Warm Springs Reservation and other reservations. (The specific chapters being used were not identified.)

**Conclusions and Recommendations**

Based on responses from program participants, the OSU/Warm Springs Natural Resource Education Program appeared to be a successful educational program. Participants, in general, perceived that the program benefitted their understanding of natural resource management.

The program appeared to be culturally appropriate for these reasons:

1. Tribal members were included in the design and application of the program.
2. The program was locationally specific. Coursework and educational materials focused on the Warm Springs reservation natural resources.
3. Traditional Indian views about natural resources were included in most of the presentations.
4. Indians were not asked to respond to questions asked during class sessions, but enjoyed coursework-related conservations before and after class and during the breaks where refreshments were served.

Based on discussions with tribal members, responses from the program participants, and the researcher's experience in the project, the following recommendations for future programs are made:

1. An effort should be made to understand, appreciate, and respect cultural differences between Indians and Euro-Americans.
2. Program development should be partnership based.
3. Tribal members should be asked to take responsibilities in teaching roles and in development of educational materials and curriculum. These responsibilities should be shared equally by Indians and non-Indians

4. Traditional Indian views of Mother Earth spirituality and the wisdom of the universe should be incorporated into the program and correlated with, not justified by, Euro-American science. Elders should be asked to play major roles. It is inappropriate for non-Indians to be telling Indians about themselves. Indians are capable of telling their own story.

5. Coursework information should be locationally specific, and should include:

a) on-reservation field work to correlate with classroom lessons.

b) on-reservation research projects which include tribal members of all ages in the projects.

6. A permanent, on-reservation, research and demonstration office should be established and staffed by Indians and non-Indians.

7. Reservation-wide educational opportunities should be increased to include all tribal members and to create acceptance of higher education on the reservation. This should provide community-based support for Indian youths to continue along the pathway of higher education.

Chapter 6

# CONCLUSIONS AND RECOMMENDATIONS

## Conclusions

The OSU/Warm Springs Natural Resource Education Program was considered a success in both short-term and long-term gains. The short-term gains included a 16% overall increase in knowledge gained in the coursework sessions where this was measured. The long-term gains were as follows:

1. The 1989-90 program served as a guideline for the Memorandum of Understanding (MOU) between the Confederated Tribes of Warm Springs and Oregon State University (Appendix). The MOU was signed on March 29, 1991, by Zane Jackson, Chairman, Warm Springs Tribal Council, Ken Smith, CEO, Warm Springs Reservation, and Oregon State University President, John Byrne. The following plans for the future were made, based on the OSU/Warm Springs model:

a) To continue a multi-level, on-reservation, natural resource education program for tribal youths and adults.

b) To establish other cooperative university / reservation programs which include, but are not limited to science, math, engineering, and liberal arts.

c) To provide a permanent, on-reservation structure to house demonstration, research, and education projects.

d) To develop a long-term plan for research, demonstrations, and education on the Warm Springs reservation to involve tribal members at all levels.

e) To provide research, demonstrations, and education to include a strong emphasis on cultural uses of natural resources.

f) To invite tribal members of all age groups to participate, contribute, and enhance all levels of the partnership-based projects and programs.

g) To include cost-sharing and shared staffing responsibilities.

h) To provide a natural resource education model for other reservations and Indian education programs.

2. There was on-reservation application of some knowledge gained in coursework. Knowledge gained (1) guided new designs for natural resource management plans, and (2) was applied in management, especially in forest grazing on the reservation.

3. The program provided an insight into Traditional Indian and Euro-American views of natural systems, and education. This cultural understanding served to enrich the information base of both Indians and non-Indians, and should assist in successful future communication and collaboration efforts.

**What Did Not Work**

The program was a first-of-its-kind with no prior, appropriate model for university/ reservation partnership-based natural resource science education available. Some mistakes were made. They are as follows:

1. A few specialists used complicated language, complex words, and statistical information in their presentations. This served to confuse some participants and put others to sleep. Statistical graphs, especially those showing exclusion of outliers, are mostly useless on Indian reservations. The statistical method describes an aspect of a whole, but leaves out the important interrelationships of the whole. Indian tradition recognizes the outlier as a communicator in the whole.

2. The researcher told an Indian story about the raven and the water in the Watershed class. It would have been culturally appropriate for the Storyteller from the reservation to tell the story. Historically, non-Indians have told Indians about themselves. Indians know the real stories and can tell them better than anyone else. They also know the appropriate season of the year to tell the stories.

3. To enhance the coursework, more time and money were needed to produce the Warm Springs Rangeland Management Handbook (Appendix), to provide field trips to on-reservation demonstration sites, and to provide hands-on lab opportunities.

**What Did Work**

The most important aspect of this program was that it was partnership-based. Two coordinators, an Indian from the reservation and a researcher from the university, worked together to design the program based on input from tribal members. Historically, programs have been designed for Indians by Euro-Americans, well-meaning perhaps, but paternalistic in reality. Paternalism was, of course, demeaning, and the programs were based on a power difference from the very beginning. The obvious recommendation here, is that for programs to be successful, they must be established with a level of respect and equality, and must be partnership-based.

It is important that non-Indian educators recognize the value of a student's language and culture, learn from Indians how to respectfully incorporate learning within an Indian context, and how to incorporate the Indian context within the learning structure. Most American Indians are forced to grow up experiencing two different, and usually conflicting, views of the world. Many Indians speak English as a second language. Cultural and linguistic conflicts that Indian students undergo as they attend schools of the dominant society are often difficult and traumatic. Because of the incongruity of the conflicting cultures, educators often fail to address student's needs adequately or appropriately. This commonly results in students' suffering from insecurity, ambiguity, and alienation.

Alienation leads to failure, anger, hopelessness, confusion, and often to dropping out of school altogether. The attrition rate of American Indian students in mainstream schools is higher than in any other disadvantaged minority group.

Successful on-reservation programs using tribally specific educational materials, authentic and free of cultural bias, will serve to improve the Indian view of dominant culture education. This will stimulate an interest in persuing goals in higher education. Culturally appropriate educational materials included in curriculum of educational systems both on- and off-reservations, will help in the recruitment and retention of Indian students.

**Recommendations**

Recommendations for future cooperative education efforts between Indians and non-Indians include the following steps:

1. Create an environment for understanding and an atmosphere for learning by:
    a) accepting that differing realities exist simultaneously
    b) having no rigid, preconceived notions about the design of a project
2. Have a sincere interest in a partnership-based effort, well-grounded in respect for each other, and in equality among groups.
3. Identify and have a clear understanding of the partners, coordinators, and cooperators to be involved, the tasks to be accomplished, the differences in views which exist, and the commonalities of the group.
4. Look at the whole, then identify the parts of the task to be accomplished. For American Indian communities, this is a culturally appropriate approach. In the case of the OSU/Warm Springs Program, the whole was the declining resource base. The parts were (1) culture and traditions which had historically been truncated and often lost, (2) natural resource science which had not been well understood, and (3) no application of appropriate land management strategies. The circumstances which existed on the Warm Springs

reservation could be depicted as the "Circle of the Problem" (figure 6.1). The Euro-American approach has been to see "no appropriate land management", as the whole problem, then make recommendations for management strategies to "solve the problem."

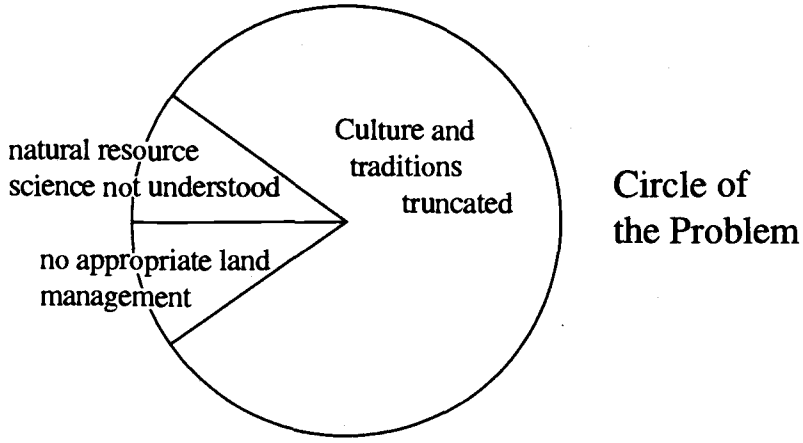


Figure 6.1. Whole = Declining Resource Base

In contrast, figure 6.2, represents the recommended approach where the whole directs efforts towards the parts, which were (1) culture and traditions relearned (2) appropriate natural resource education program offered, and (3) appropriate management. This could be depicted as the "Circle of the Resolution." The approach was based on the assumption that appropriate land management would follow the relearning of culture and traditions. Once culture and traditions were established as the basis for sound land management, this could be coupled with a partnership-based natural resource science educational program.

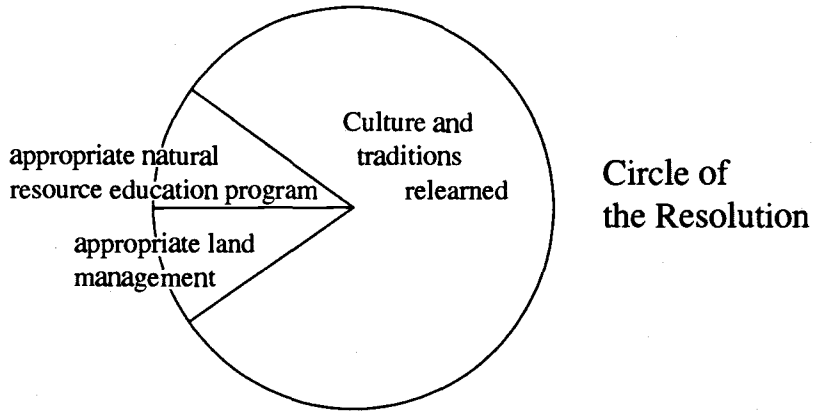


Figure 6.2. Whole = Improving Resource Base

5. Create culturally appropriate curricula and educational materials in partnership with tribal members, and allow students to be self-directed, rather than controlled.

6. Use uncomplicated language in teaching and in educational materials. English is a second language to many Indians.

7. Avoid the use of statistics in teaching, especially quantitative methods which ignore an outlier. Indians see outliers as communicators in the whole. To ignore the outlier is to describe a false, or incomplete, whole. The Traditional Indian view of the the interrelatedness of all things, correlates with the quantum physics perspective, where all things interrelate, and are constantly communicating with each other to make the whole.

8. Share teaching responsibilities with Indians, especially, elders and storytellers.

9. Create "hands on" activities and interactive programs. Most Indians and many non-Indians learn best by example and in participatory roles.

10. Design in-class time to include a 30-minute or longer break, and provide refreshments. This will serve as the question and answer period. Most Indians will not ask questions in class. Indian tradition teaches that speaking out interrupts the speaker and is disrespectful.

11. Be an attentive listener, and be comfortable with silences. Indians listen carefully, <u>then</u> formulate responses to the speaker, unlike many non-Indians, who formulate responses as the speaker is speaking. From the Indian perspective, silence before answering is the thoughtful time during which an appropriate response is formulated. A long silence during this period often shows respect to the speaker by giving extra thought to the reponse.

12. Do not teach Indians about themselves. Euro-Americans, often, have learned a little bit about Indians, then have taught those things to others, including to Indians. For an appropriate perspective, Indians should teach about Indians.

13. Keep your promises. Trust is necessary for a successful program. There have been approximately 320 treaties signed between the U. S. Government and Indian nations, and about 320 have been broken by non-Indians. In addition, most treaty rights are not honored, today.

**Summary**

Partnership-based educational programs will provide culturally appropriate information for innovative curricula and educational materials; identify differences and common interests among Indians and non-Indians; stimulate interest in education; provide links for recruitment and retention of American Indian students in schools; and establish culturally appropriate natural resource management strategies for sustainability of Indian lands.

Some global societal changes, now underway, are focusing on the relationship between humankind and the environment. Quantum physicists, Traditional Indians, landscape ecologists, and many others, share a similar view of natural systems - the interrelationship and intercommunication among all things. Educational programs about natural systems designed in a partnership-based effort between American Indians and non-Indians will provide opportunities to identify commonalities which help to describe and understand the interconnectedness of the universe as energies continously communicate and relate. Including this information in new curricula will increase appreciation for the way that Indians lived in harmony with natural systems for thousands of years before settlement. In addition, culturally appropriate curricula will contribute to the education of our global society, and perhaps provide insight to sustainable biosphere lifestyles.

A sustainable global biosphere will include the human dimension as a co-evolving component. Traditional Indian views of Mother Earth and natural systems provide insight into how this was accomplished presettlement. Technological advancements and the use

of fossil fuels have allowed humans to override Planet Earth's ecosystem. We seem to have an opportunity in the 1990's to create a better balance in our global biosphere, through appropriate education and less consumptive lifestyles. Norbert Hill, Executive Director of the American Indian Science and Engineering Society (AISES), gave this advice to Indian College students at a 1991 AISES National Conference, Albuquerque, New Mexico, "When you emerge from the educational pipeline, land on your mocassins, not your Gucci's."

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# APPENDIX

Appendix A - Advertising the Program in the Spilyay Tymoo, Warm Springs weekly newspaper

WARM SPRINGS, OREGON

SPILYAY TYMOO January 1989

# Workshops scheduled

Five workshops. sponsored by Oregon State University. are scheduled to be held in Warm Springs. The workshops will cover every phase of reservation natural resources including soil. water. timber. grazing. agriculture. livestock and minerals.

The first workshop. scheduled for Friday. February 3. 1989. will be an overall introduction to all the workshops offered. The workshops will be unique in that all topics covered will be right from the reservation. not how the grasslands in Wyoming or Montana are being managed. Topics discussed. including wildlife. grazing. crops and forests. will relate directly to Warm Springs. All these workshops can be beneficial to anyone and all are encouraged to attend. whether you are a cattle rancher. farmer. contractor. logger or outdoorsman. There will be something for everyone.

Feedback is very important from each area covered from each attendee to see if further workshops are necessary. So. plan to attend these workshops which will feature speakers from all types of backgrounds including forestry. fish and wildlife. logging and representatives from the BLM and other organizations.

More information will be available and passed on as it is announced. There will be fliers as well as further announcements in Spilyay. One can also contact Ross Racine. Natural Resources. or Clay Penhollow of the Extension Service.

# Spil

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## Appendix B

## POST-SEMINAR QUESTIONNAIRE, information used to design coursework

Do you think today's presentations can be applied to management of Reservation Resources? ☐ Yes ☐ No

Why/Why Not _____

_____

_____

Will today's presentations help you in your management? ☐ Yes ☐ No

Why/Why Not _____

_____

_____

Do you think future presentations should be more technical and more indepth?

☐ Yes ☐ No

Why/Why Not _____

_____

_____

What topics would you like to see presented to the future? Check your chosen topics:

- ☐ Soils/Mineral Cycling
- ☐ Water Cycle & Watershed Management
- ☐ Erosion, How To Heal
- ☐ Fire As A Range Tool
- ☐ Herd Health
- ☐ Beneficial Forest Grazing
- ☐ Grazing Systems/Practices
- ☐ Farm/Ranch Business Management
- ☐ Forage Production
- ☐ Juniper/Range Weed Control
- ☐ Other _____

_____

_____

_____

Are you interestd in attending future sessions to obtain a certificate or credits? ☐ Yes

☐ No

## Appendix C

## PRE-, POST-CLASS QUESTIONNAIRE, example from Fire Ecology class

NAME.....EMPLOYMENT.....

QUESTIONNAIRE - to be filled in AFTER presentation (note: same for before & after class)

THE ROLE OF FIRE ON THE WARM SPRINGS RESERVATION

Please CIRCLE your answer

1. Fires should be prevented. true false

2. Fires are unnatural and dangerous. true false

3. Grazing animals usually cause damage to new plants that grow after a site is burned.
true false

4. Fire improves wildlife habitat.
always sometimes never

5. Thick bark helps some trees to survive low intensity fires in the understory in forests.
usually sometimes never

6. Fire stimulates flowering in some plants.
true false you must be kidding

PLEASE TURN TO THE NEXT PAGE!

# PRE-, POST-CLASS QUESTIONNAIRE, page 2

page 2 - fire questionnaire continued

7. Fire facilitates the germination of some seeds.

true false what's germination?

8. Prescribed fires that burn in the fall have the same effect on vegetation as prescribed fires that burn in the spring.

true probably not 'what does prescribed mean?'

9. Specialists know almost everything about plant and animal responses to fire.

true nope this time you're really kidding

10. Frequent fires have encouraged juniper trees and sagebrush to invade our grasslands.

true false

THANK YOU!

Note: Extra credit for expanding answers with written comments :

Appendix D

POST-PROGRAM QUESTIONNAIRE - circulated approximately three years after completion

QUESTIONNAIRE FOR PARTICIPANTS IN THE WARM SPRINGS/OSU '89-90 NATURAL RESOURCE EDUCATION PROGRAM

DATE_____JOB TITLE_____

NAME_____

ADDRESS_____

PHONE_____

QUESTIONS:

1a. If you wanted to draw a diagram to graphically represent a successful model for the teaching and communicating natural resource science and management strategies on the Warm Springs Indian Reservation, what would it look like? (Please use the following space to design your model, or feel free to use the back of this sheet of paper, or your own paper.)

1b. Are there differences in communication styles between Indians and non-Indians? Yes No

If yes, in what area?

- ☐ speaking
- ☐ body language
- ☐ writing
- ☐ other:

Please list or explain the differences in the space below.

# POST-PROGRAM QUESTIONNAIRE - page 2

2a. Do you feel that your educational opportunities were increased by having an on-reservation university program?
Yes No

If yes, how were they increased?

If no, please explain why not and how they could be increased in the future, if desirable.

2b. Have you applied or influenced the application of any information presented in the program in management strategies on the reservation or in your job?
Yes No

If yes, please describe:

If no, why not?

2c What would be more helpful in the future?

- ☐ on-reservation field trips
- ☐ labs
- ☐ observing on-reservation research and demonstrations
- ☐ participation in on-reservation research
- ☐ other:

POST-PROGRAM QUESTIONNAIRE - page 3

2d. Did this program stimulate an interest in furthering your studies and/or involvement in natural resource education? Yes No

If yes, how?

Are you interested in: (OK to check more than one)

- ☐ further study
- ☐ participating in natural resource research on the reservation
- ☐ teaching and/or explaining the research to others
- ☐ participating in the design of culturally appropriate curriculum and/or educational materials to be use in the schools and/or on the reservation.

  What form should the educational materials be in?

  - ☐ brochures
  - ☐ videos
  - ☐ other:

If you are not interested in furthering your studies, why not?

2d. Should university level achievement and credit for on-reservation internships or coursework be offered to Warm Springs students who are enrolled as students at Oregon State University?

If yes, why?

POST-PROGRAM QUESTIONNAIRE - page 4

If no, why not?

should high school students get university credit?

Yes No Please explain:

3a. The classes taught in the program are listed below. Please rate them by marking the appropriate box.

| | not at all useful | a little bit useful | OK | better than OK | great |
|---|---|---|---|---|---|
| OVERVIEW OF RANGELANDS | | | | | |
| NATURAL GEOLOGY OF WARM SPRINGS | | | | | |
| SOILS | | | | | |
| PLANT PHYSIOLOGY AND PLANT ID | | | | | |
| FIRE | | | | | |
| WATERSHED | | | | | |
| LIVESTOCK MANAGEMENT AND GRAZING SYSTEMS | | | | | |
| ECONOMICS | | | | | |
| FOREST GRAZING | | | | | |

Mark a star ( * ) in front of the subjects that were too technical

3b. Was the number of classes about right?
Yes No Suggestions:

3c. Was the time of day OK? Yes No Comments:

POST-PROGRAM QUESTIONNAIRE - page 5

3d. Time of year OK? (Oct-Apr) Yes No Suggestions:

3e. Should the program be offered again? Yes No
Why/why not?

If yes, to whom?

- ☐ K-12 students
- ☐ high school students
- ☐ elders
- ☐ other tribal members
- ☐ non-Indians (please explain below)
- ☐ other suggestions:

3f. If you answered yes to question 3e (above), on what basis should people be involved in the program?

- ☐ help design the program
- ☐ attend class as students or observers
- ☐ act as instructors or guest speakers
- ☐ act as facilitators
- ☐ other:

Why should they be involved?

4. Was the Warm Springs Rangeland Management Handbook:
(circle one)

Great Quite Useful OK Sort of Useful Just Awful

POST-PROGRAM QUESTIONNAIRE - page 6

Do you have any suggestions for improvement of the handbook or for the design of a new one:

5. What were your goals, objectives and expectations of the program before we started? Please list:

Did you reach any of your goals and objectives? Which ones? Please list:

6. If your would like to make any additional comments or suggestions about something that has not been covered in this questionnaire, please do so in the space provided or add your own page. Thank you.

## Appendix E

GUIDE TO RESEARCH EVALUATION QUESTIONS and
Participant questionnaire responses

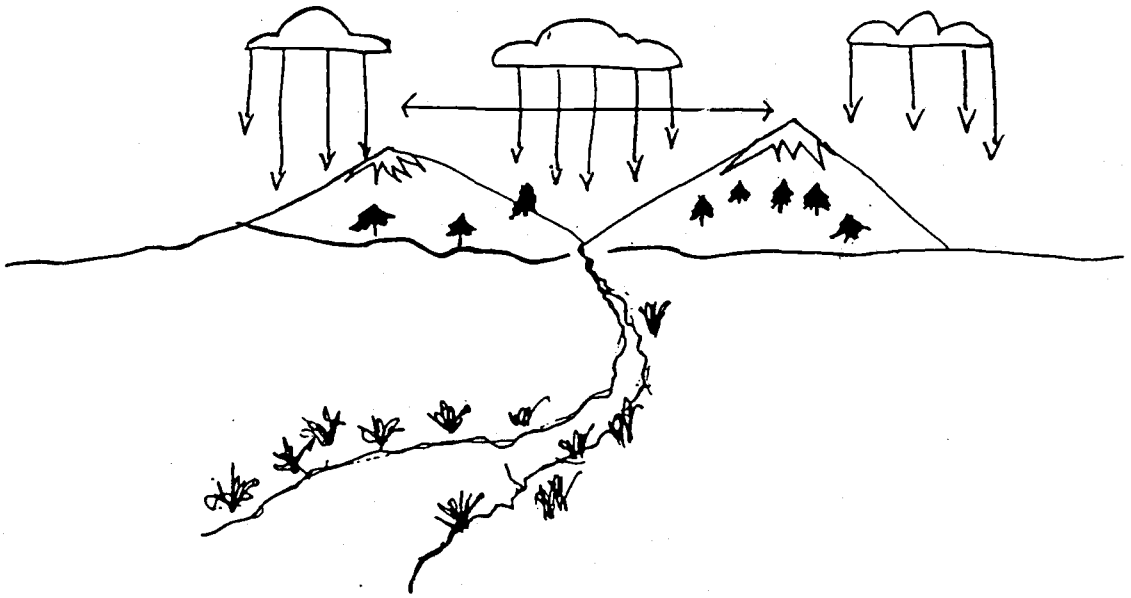
| Evaluation Questions # | Questionnaire | Question # |
|---|---|---|
| 1. Develop model | Post-program | 1, 5, 6, 7, 9, 10, 11. 13 |
| 2. Differences in views natural systems | Post-program | 2, 3 lit. review |
| 3. Differences in of education | Post-program | 6, 7, 13 lit. review |
| 4. Differences in communication | Post-program | 16 |
| 5. Traditionally & culturally appropriate program | Post-program | additional comments |
| 6. Educational opportunities increased | Post-program | 2 |
| 7. Reach goals & objectives | Post-program | 5 |
| 8. Application knowledge gained | Post-program | 2 |
| 9. Certificate of Achievement earned | Racine role book | class records |
| 10. University-level achievement | Post-program | 2 |
| 11. Appropriate coursework | Post-program | 3 |
| 12. Warm Springs Handbook | Post-program | 4 |
| 13. Knowledge gained in coursework | Pre-, post-class | |

Appendix F
EXAMPLE OF CHAPTER IN THE WARM SPRINGS RANGELAND MANAGEMENT HANDBOOK - Watershed chapter

## WATERSHED

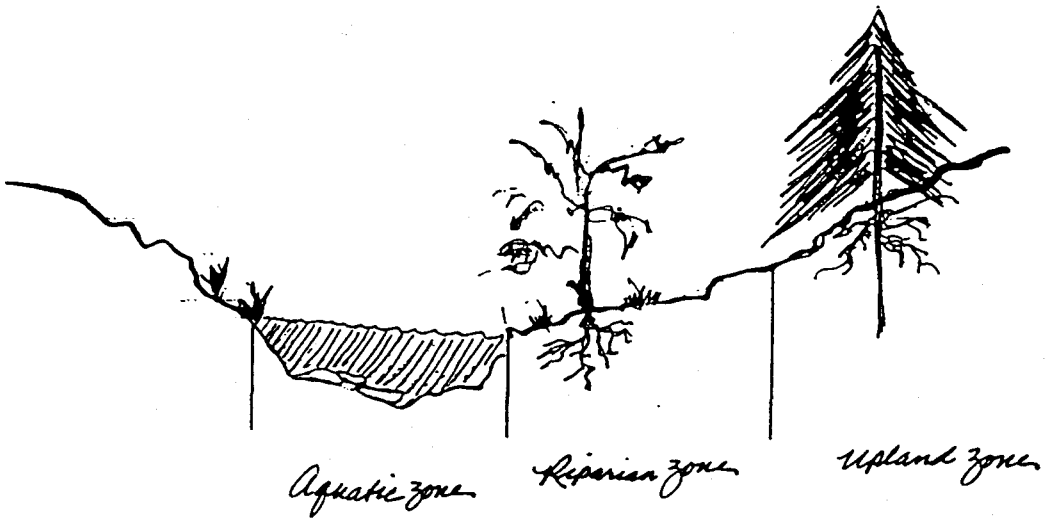
by Judith Vergun

### WHAT IS A WATERSHED?



It is the area between two ridges that is drained by the same river system.

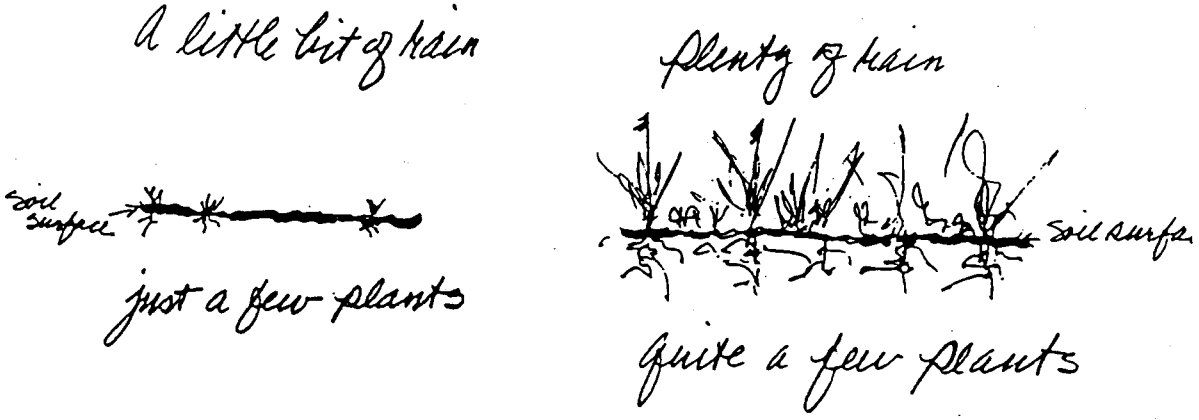
A riparian area includes the narrow strips of land that border creeks, rivers, and other bodies of water.



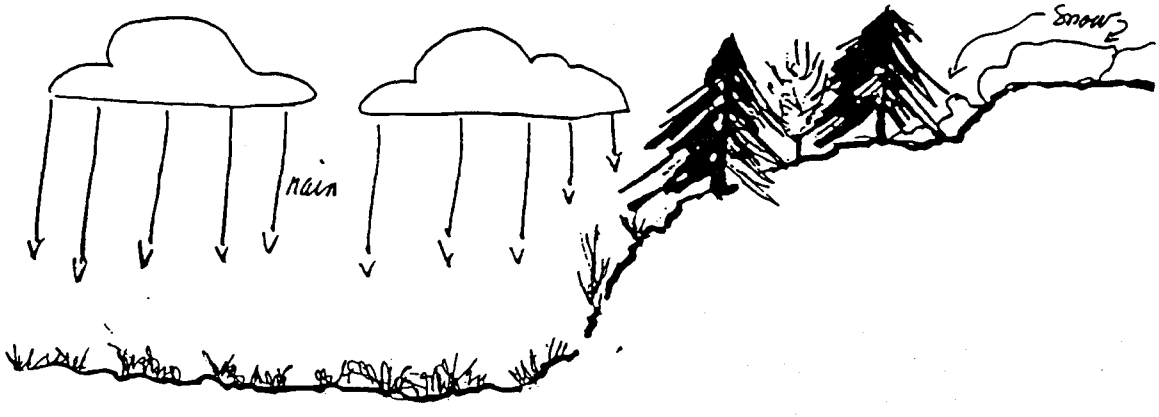
WATERSHED - page 2

WATER ON RANGELANDS

The amount of water on rangelands is the factor that mostly determines the amount of plant production on the site.

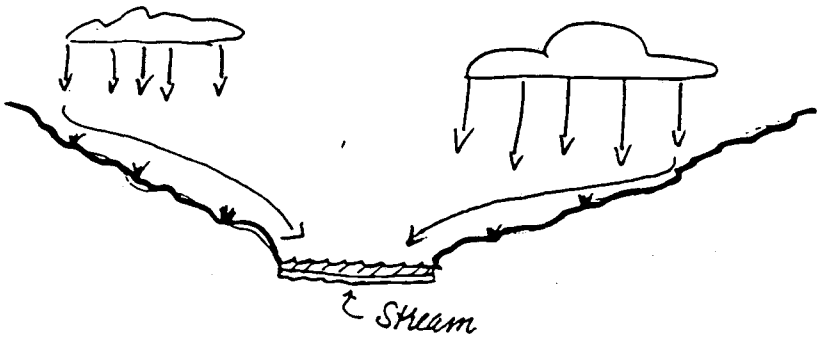



Water on the rangelands comes from mostly rain and sometimes from snow and snowmelt.



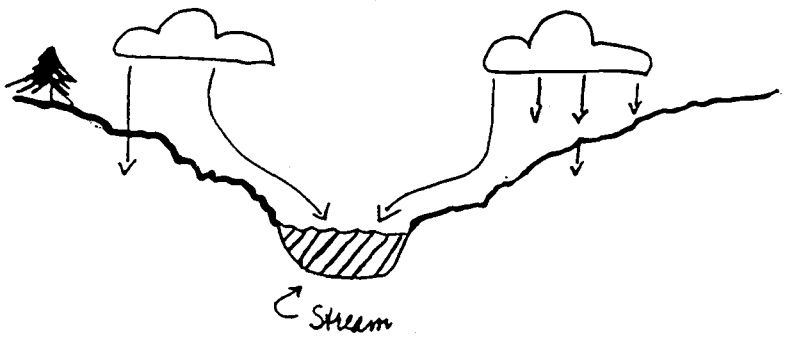
WATERSHED - page 3

Some of the rain or snowmelt moves across the land into streams, ponds and lakes - from higher to lower areas.

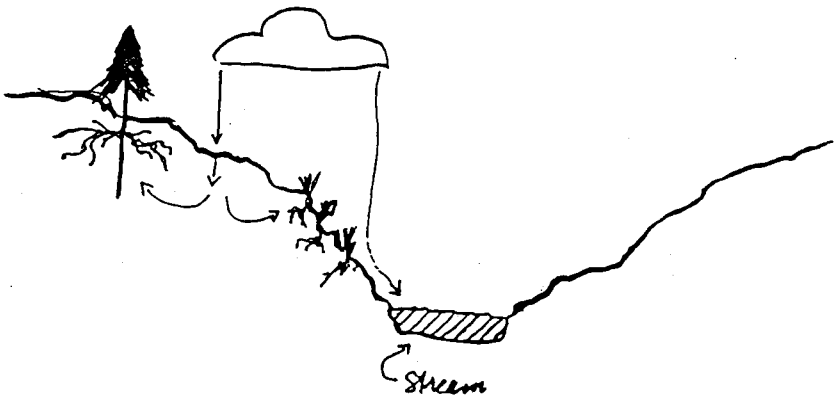



This is called surface runoff.

And, some of the water goes into the ground:



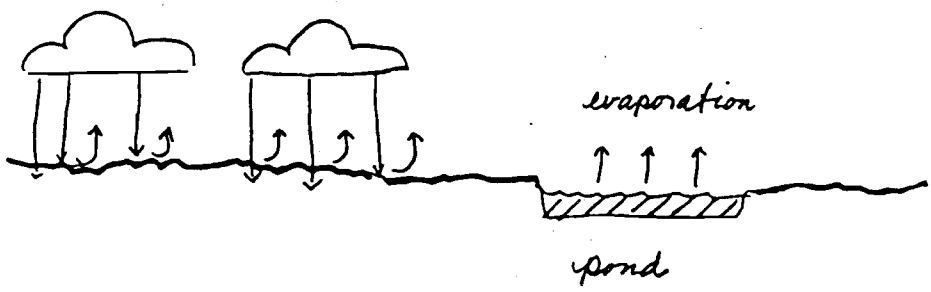

The water that goes into the ground is usually available for plant growth and is taken up by roots:



WATERSHED - page 4

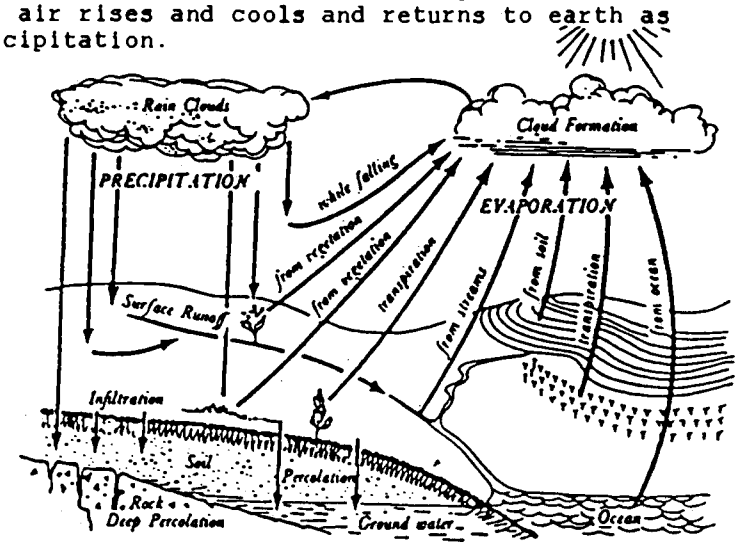
Part of the moisture goes deep below the soil surface and recharges underground water supplies which serves as a source for wells, seeps, springs, and streams.

The major portion of precipitation (rain or snow) received on rangelands evaporates and returns to the atmosphere as water vapor. Most rangelands are in hot, dry summer climates.




THE HYDROLOGIC CYCLE

Energy from the sun causes water from the land and oceans to vaporize into the atmosphere. This moisture in the air rises and cools and returns to earth as precipitation.



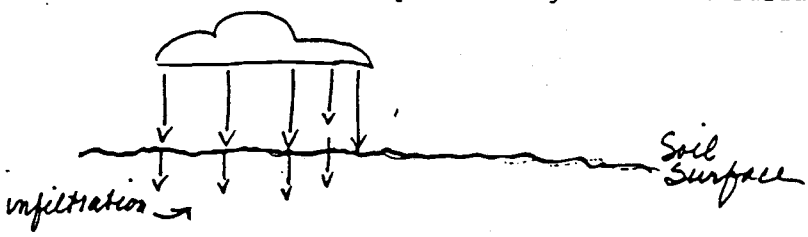

Man can influence the hydrologic cycle by changing the vegetation and soil.

Here is a brief outline about water infiltration in soils. Refer to our chapter on SOILS for more detail.

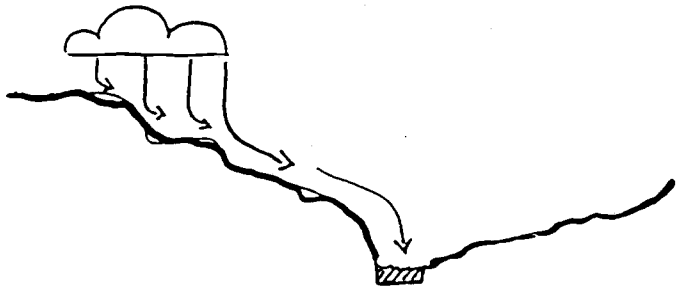
WATERSHED - page 5

INFILTRATION

After a raindrop reaches the soil surface, it can infiltrate the soil (pass through the soil surface).




OR - It can run off:



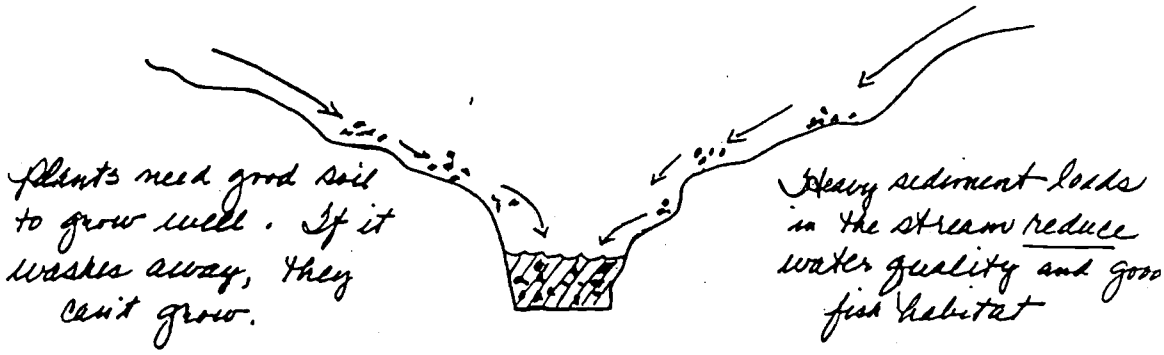
High rates of surface runoff contribute to soil loss and flooding

The primary factors influencing infiltration rate are:

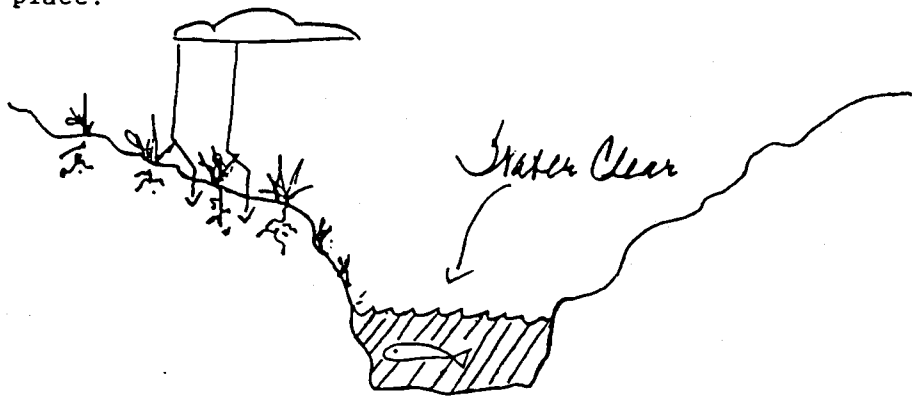
1. Intensity (force, strength, amount) of precipitation.
2. Amount of vegetational cover (how many plants).
3. Soil texture, structure, amount of organic matter.

WATERSHED - page 6

When raindrops fall on soil with no vegetation, they loosen soil particles and remove soil surface:




Vegetation on the land helps rain infultrate the soil surface and the plant's roots help to hold the soil in place:

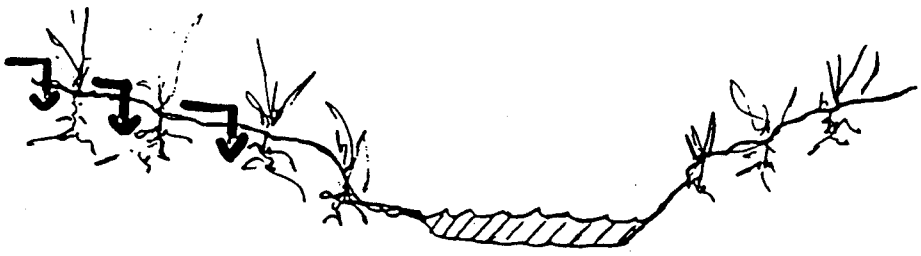



Therefore, it is important for range managers to help keep vegetation (plants) on the land. This means careful management and well-organized grazing plans. Cattle must be moved from place to place to protect the plants.

WATERSHED - page 7

RUNOFF AND EROSION

Surface runoff occurs when the amount of precipitation is more than the soil can hold. . Vegetation reduces water movement over the soil surface - so - runoff decreases with increased plant cover:



Erosion (removing material from the earth's surface) and sediment (suspended soil and mineral particles in water) are major problems caused by excessive runoff.

The erosion process speeds up when man's activities destroy the vegetation cover that reduces soil loss from the forces of water and wind. Disturbances by man include:

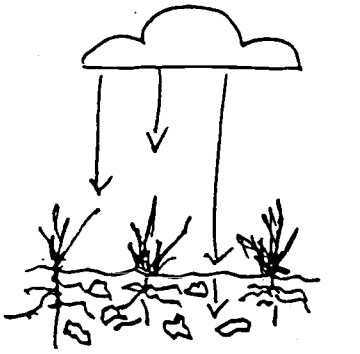
1. OVERGRAZING
2. LOGGING
3. FARMING
4. ROAD CONSTRUCTION

REMEMBER:

Replenishment of soil is a SLOW process. Several hundred years are required to form an inch of soil. This is an inch:

## GRAZING IMPACTS ON WATERSHEDS

Livestock disturb watersheds by removing plant cover with grazing activity and through hoof action. Hoof action often compacts the soil surface. Removal of plants and soil compaction reduces water infiltration rates, increase runoff, and increase erosion.




Good Management


Overgrazed

## INFILTRATION AND GRAZING

Some points to remember:

1. Ungrazed areas have higher infiltration rates than grazed areas.
2. Moderate and light grazing, water infiltration into soils is <u>almost</u> as good as in ungrazed areas.
3. Heavy grazing causes definite reductions water infiltration rates into soil.

WATERSHED - page 9

THE FOLLOWING CHART SHOWS AN EXAMPLE OF THE RATE OF WATER INTAKE IN SOILS UNDER DIFFERENT GRAZING MANAGEMENT:

| grazing intensity | Total plants lbs/acre | Mulch (lbs/acre) | Water Intake Rate (inches/hour) |
|---|---|---|---|
| Heavy | 900 | 399 | 1.05 |
| Moderate | 1345 | 456 | 1.69 |
| Light | 1869 | 1100 | 2.95 |

RUNOFF AND GRAZING

Increased surface runoff due to heavy grazing usually affects water quality with:

1. increase in sediment
2. increase in animal wastes
3. possible increase in chemical pollutants (examples: herbicide sprays, and/or fertilizers wash into the water supply)

Under moderate to light grazing the above listed problems are less likely to occur.

WATER QUALITY AND GRAZING

Bacteria from fecal wastes (manure) from livestock grazing can cause a pollution problem in water. The extent of bacterial pollution depends largely on:

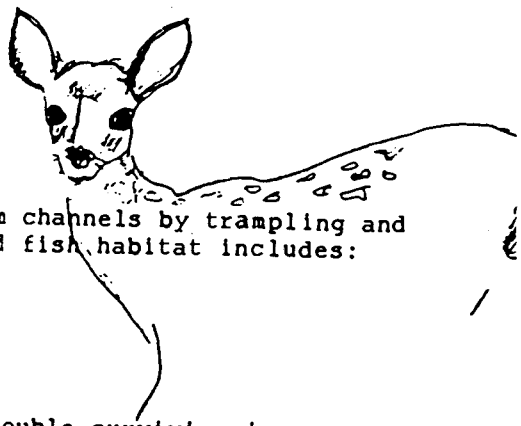
1. livestock numbers (how many animals)
2. time of grazing (spring, summer, fall, winter)
3. frequency of grazing (how often in same place)
4. access (ease of entering) to stream by animals

Also, studies have shown that bacteria can live in soil and streambeds for many months after the animals have been removed from the area.

Grazing strategies (plans or designs) that move animals away from streamwaters help to protect water quality.

**FISH HABITAT AND GRAZING**

Although riparian zones cover a small protion of rangelands, they are vitally important to rangeland health and fish and wildlife.



Heavy grazing widens stream channels by trampling and destruction of vegetation. Good fish habitat includes:

1. undercut banks.
2. overhanging vegetation
3. deeper water
4. cool water temperatures

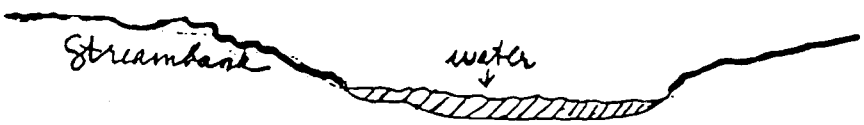
Trout, for example, have trouble surviving in temperatures over 65° F.

These things contribute to unfavorable fish habitat:

1. high sediment loads in streams
2. low oxygen content in water
3. reduced cover
4. high water temperatures
5. less food for fish (trampled banks)

Stream channel lightly grazed, or not grazed at all:


Stream channel: Heavy grazing



MANAGEMENT OF WATER YIELD

Mechanical rangeland treatments may:

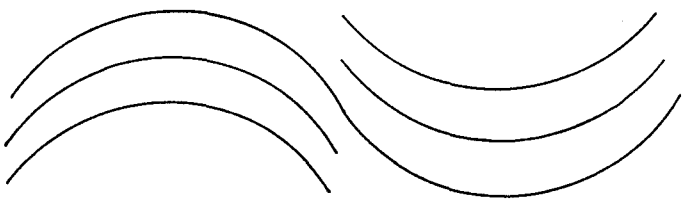
1. increase amount of vegetation
2. increase moisture storage in soil
3. reduce soil erosion

Factors to consider when determining type of treatment to use:

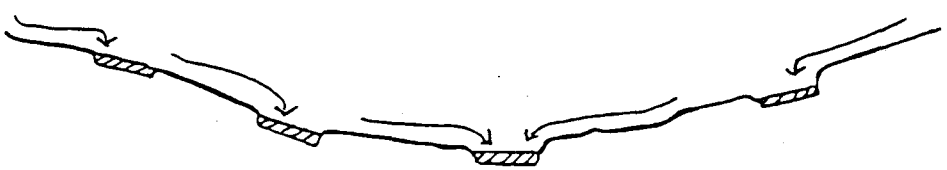
1. soil characteristics
2. climate
3. type of vegetation
4. equipment used

Types of treatment:

1. Contour trenches and furrows
   purpose: to retain water on site where precipitation occurs. This prevents overland flow, erosion and sediment problems.



2. Pitting - Make small basins or pits in the soil to catch and hold precipitation and runoff water.



3. Ripping - This is a heavy-duty process that is used to shatter the surface of the hard soil from about 15 to 45 inches.

WATERSHED - page 12

4. Water Harvesting - Collecting and storing precipation used to provide drinking water for livestock and wildlife, and to create wildlife habitat on rangelands. Examples of water structures:

1. rain traps
2. catchment basins
3. paved drainage basins

WATERSPREADING

This treatment has three main functions:

1. increasing forage production by spreading floodwater.

2. reducing erosion in drainages

3. reducing downstream flooding and sediments

(Water for this treatment is usually taken from streams)

RANGE WATER DEVELOPMENTS

Remember: Maximum livestock gains can be obtained only when both the forage and the water supply are adequate.

INDICATIONS OF PROBLEMS:

1. when there are too few watering places
2. when water yield or storage, or both, are inadequate

3. when water sources are poorly distributed
4. when water developments are wasteful because of leakage or high evaporation
5. when there are erosion problems at present facilities

WATER DEVELOPMENT AND GRAZING DISTRIBUTION

The locations of water developments on rangelands are important in controlling the movement, distribution, and concentration of livestock. Improper distribution of grazing animals often is caused by improper distribution of watering places. It is not unusual for cattle to graze an area close to water again and again rather than going farther away where there is better forage. This results in deterioration of plants near the water supply and wastes forage that is a longer distance away.

SUGGESTION:

Steep or Rough Land: Cattle should not have to travel more than 1/4 or 1/2 mile from forage to water.

Level or Gentle Land: 1 mile between water and forage

WATER QUANTITY AND QUALITY

Water should be available 'free choice' to grazing animals with no attempts to limit water intake.

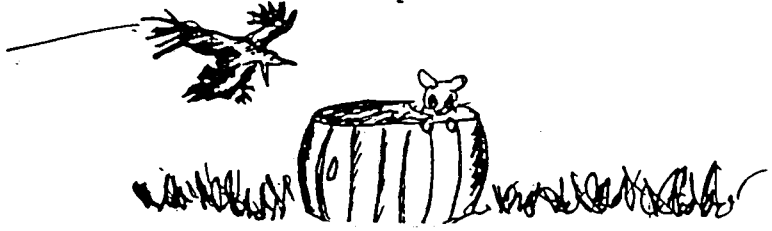
CATTLE AND HORSES: 12 to 15 gallons per day per animal

ELK AND DEER: 1 gallon per day (because usually they eat plants that contain a lot of water)

Animals drink more water during hot weather, and when forage is really dry.

STOCKWATER IS GOOD QUALITY WHEN IT IS CLEAR AND ODORLESS.

Stockwater should be free of debris (trash) and should not contain dead animals. Birds often fall into the water troughs and drown. A flat board floating on the water sometimes helps to keep birds from falling in. Rodents sometimes crawl into water troughs and then can't get out. Tying a piece of canvas or leather on the side of the tank and hanging into the water will allow rodents a place to crawl out and escape.



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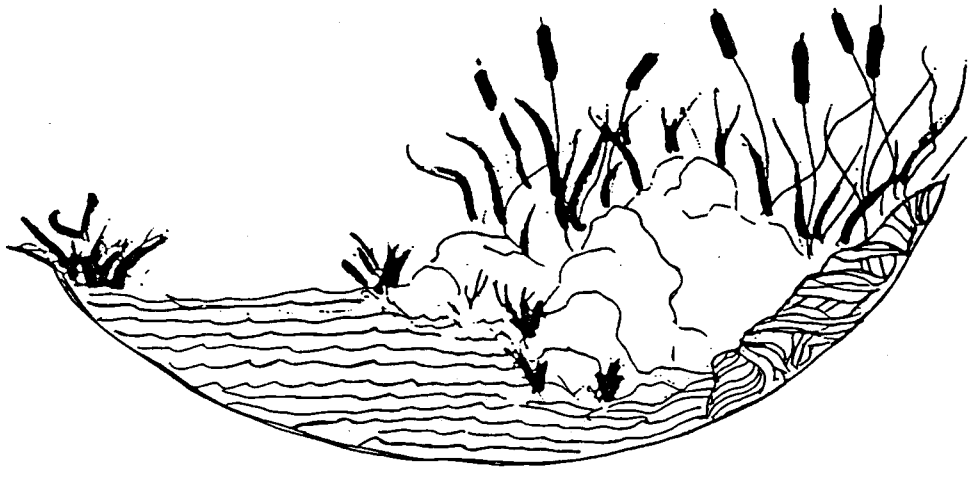
Some blue-green algae will "bloom" on the water - this is poisonous and deadly to animals. Copper sulfate used as directed on the package can kill this kind of algae. Some green algae and mosses are not toxic, just nuisances.

Salt in water can be toxic and usually comes from seeps and dugouts - from groundwater, not from runoff. Animals will not drink salty, toxic water if there is a source of good, clean water available.



Appendix G
The OSU/Warm Springs Natural Resource Education Program Model served as a guidline for this agreement

# GENERAL MEMORANDUM OF UNDERSTANDING

between

The Confederated Tribes of the Warm Springs Indian Reservation

and

Oregon State University

Dated March 27, 1991

The Confederated Tribes of the Warm Springs Indian Reservation and Oregon State University, the land grant institution of the State of Oregon, historically have enjoyed a mutually beneficial relationship. The University, through the Oregon State University Extension Service, maintains a continued presence at the Warm Springs Indian Reservation in the form of its Warm Springs Office, offering educational opportunities and information to Tribal youth and adults. Since the late 1950s, the University has, at the request of and in cooperation with Tribal Government and individuals, conducted additional continuing education and both basic and applied research programs on site at the Warm Springs Indian Reservation. These cooperative outreach programs have encompassed most of the major groupings of University disciplines, including Agricultural Sciences, Forestry, Business, Pharmacy, Liberal Arts, Engineering, Science, Education, Veterinary Medicine, and Home Economics.

Several cooperative programs involving various divisions of the University and Tribal Government or related organizations currently are underway. These include, but are not limited to, a continuing education program in rangeland and natural resource management conducted for Tribal adults on the Reservation with possibilities for further extension; a juniper management and control demonstration project with an on-Reservation field site; and a successful "Science and Mathematics Investigative Learning Experience" (SMILE) program with Tribal youth as the beneficiaries that has strong expansion possibilities. Other joint activities currently in the planning stage include a prescribed fire program for huckleberry enhancement and various projects related to increased efficiency in the on-Reservation production and processing of wood products.

Building on these successful experiences and cooperative endeavors, it is the desire of both Tribal and University leadership, acting on behalf of Tribal members and the faculty and staff of the University, to enter into a long standing commitment of mutual support and interest whereby, on a continuing basis, Oregon State University will maintain an expanded presence and integrated scope of programming at the Warm Springs Indian Reservation. That agreement of mutual commitment is formalized in this

General Memorandum of Understanding between the Confederated Tribes of the Warm Springs Indian Reservation and Oregon State University. The items of agreement are as follow:

1. The Confederated Tribes of Warm Springs and Oregon State University agree to collaborate in the evaluation and implementation of an integrated long term resource management plan for the Reservation with initial emphasis on the forest management portion of that Plan and with subsequent emphasis on the development, evaluation, and implementation of the range and agriculture portion of the Plan.

2. The Confederated Tribes of Warm Springs and Oregon State University agree to collaborate in the organization and delivery of a multi-level natural resource education program for Tribal youth and adults.

3. The Confederated Tribes of Warm Springs and Oregon State University agree to collaborate and to seek the collaboration of the County Court of Jefferson County, Oregon, in the development of a regional input-output model for the Reservation vis-a-vis the remainder of Jefferson County.

4. The Confederated Tribes of Warm Springs and Oregon State University agree to initiate when practical programs of long term research, demonstration, and education as specific needs are clarified.

It is understood by both the Confederated Tribes of Warm Springs and Oregon State University that all of these items of general agreement are subject to the availability of sufficient financial resources, University expertise, and Tribal support. It is further understood that all written reports, research and demonstration results, and educational materials developed by or through Oregon State University under the auspices of this General Memorandum of Understanding are public knowledge available to any citizen, regardless of his or her standing as a Tribal member.

| | | |
|---|---|---|
| *Ken Smith, Chief Executive Officer*<br>*Confederated Tribes of the*<br>*Warm Springs Indian Reservation* | *John V. Byrne, President*<br>*Oregon State University* | *Zane Jackson, Chairman*<br>*Tribal Council* |
| *March 27, 1991* | *March 27, 1991* | *March 27, 1991* |

Appendix H

LETTER ACKNOWLEDGING THE OSU/WARM SPRINGS NATURAL RESOURCE EDUCATION PROGRAM - to Oregon State University President John Byrne from Ross Racine and Charles Calica

March 1991

Warm Springs, Oregon 97761 / 503 553-1161

John V. Byrne, President
Oregon State University
Administration Building
Corvallis, Oregon 97331

Dear President Byrne;

As we look forward to signing the Memorandum of Understanding between the Confederated Tribes of Warm Springs and Oregon State University, we would like to acknowledge the contributions made by the Warm Springs Rangeland Education Project, designed and coordinated by Members of the Warm Springs Confederated Tribes, Jody Calica, Ross Racine and Judith Vergun, doctoral student in the College of Agriculture at O.S.U. We understand that this education project is Ms. Vergun's PhD project and will be described in her dissertation.

As part of the joint effort, a model for education has been developed and will serve as a guideline in the design of the MOU. This model includes:

* A multi-level natural resource education program for Tribal youths and adults

* Other cooperative University/Reservation programs to include, but not limited to: Science, Math, Engineering and Liberal Arts

* A permanent, on-Reservation structure to house demonstration, research and education projects

* A long-term plan for research, demonstrations, and education on the Warm Springs Reservation to involve Tribal Members at all levels

* Research/demonstrations/education to include a strong emphasis on enhancement and production of native and cultural plants, (juniper, huckleberry and prescribed burning projects presently being designed)

* Tribal members of all age groups to participate, contribute and enhance the projects and programs.

* Proposed Cost-sharing and staffing
* This model may serve as an example for other reservations and Indian education programs

We are pleased to see these efforts realized in the signing of the MOU.

Sincerely,

Charles Calica
Natural Resource
General Manager

Ross R. Racine
Range & Ag Coordinator

cc: Roy Arnold, Dean of Agriculture
George Brown, Dean of Forestry
Fred Horne, Dean of Science
Mimi Orzech, Vice Pres. Academic Affairs

Appendix I

LOCAL NEWSPAPER ARTICLE ANNOUNCING THE SIGNING OF THE MEMORANDUM OF UNDERSTANDING BETWEEN OREGON STATE UNIVERSITY AND THE CONFEDERATED TRIBES OF WARM SPRINGS

Corvallis Gazette-Times Corvallis Ore., Friday, March 29, 1991

# Confederated Tribes, OSU sign agreement

The Confederated Tribes of Warm Springs and Oregon State University signed an agreement Thursday outlining long-term cooperative work on research and education projects.

The memorandum of understanding calls for OSU and Warm Springs to develop and implement a long-range natural resource management plan for the reservation, to collaborate on a natural resource education program for tribal youth and adults, and to develop an economic input-output model for the reservation.

The agreement calls for more research and education programs when specific needs are identified.

"We've worked together for a long time, and I'm really pleased we have something in writing to assure that it continues," said Ken Smith, chief executive officer of the tribes, in an OSU press release. "I see where Oregon State can assist us with many of the challenges we face in the future."

OSU has worked with the Confederated Tribes since the 1950s, when the Warm Springs office of the OSU Extension Service was established under an agreement with the tribes and the federal Bureau of Indian Affairs. The Extension office offers educational opportunities and information to tribal youth and adults.

> "We've worked together for a long time, and I'm really pleased we have something in writing to assure that it continues."
>
> **— Ken Smith**

OSU also has conducted other continuing education and basic and applied research programs. According to OSU President John Byrne, those have involved many disciplines, including agricultural sciences, forestry, business, pharmacy, liberal arts, engineering, science, education, veterinary medicine and home economics.

In the 1960s, the Confederated Tribes and OSU conducted the first comprehensive inventory of human and natural resources on the reservation. Such work helped set directions for economic enterprises such as KAH-NEE-TA resort and Warm Springs Forest Products Industries.

Appendix J - Educational model developed during the OSU/Warm Springs Natural Resource Education Program

The Vergun / Warm Springs Model