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Traditional Ecological Knowledge Policy Considerations for Abandoned Uranium Mines on Navajo Nation

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Abstract

Environmental justice is a prominent issue for Native American Nations within the United States. One example is the abandoned uranium mines on the Navajo Nation that were left unremediated since the Cold War. Often, environmental policy is developed for issues facing Native American Nations that do not include input from those Nations. Instead, Native American Nations should have the opportunity to address environmental issues using their traditional ecological knowledge (TEK). TEK has ties to natural laws long respected by tribal communities; these laws provide the foundation for addressing the complex relationship between nature and humans. Often, policy development addressing environmental concerns is determined by non-Native American stakeholders, which can have negative effects on the Native American communities. These policies harm Native Americans rather than ultimately helping them. The focus of this discussion is how TEK can play a role in environmental policy development for the Navajo Nation surrounding abandoned uranium mines.

Keywords

TRADITIONAL ECOLOGICAL KNOWLEDGE; NAVAJO FUNDAMENTAL LAWS; ABANDONED URANIUM MINES; ENVIRONMENTAL JUSTICE; TRADITIONAL KNOWLEDGE HOLDERS

Background on Uranium Mining on the Navajo Nation

Uranium was first mined on the Navajo Nation in Cove, AZ in the late 1940's and eventually throughout the Navajo Reservation (Brugge and Goble, 2002). Uranium mining operations were established on the Colorado Plateau in many locations, including some in the Four Corners: Arizona (the Carrizo Mountains, Cameron, Blue Gap), New Mexico (Church Rock, Crownpoint, Ambrosia Lake), Colorado (Naturita, Slick Rock, Durango, and Grand Junction), and in Utah (Monument Valley, Moab, and Monticello) (Quartaroli, 2002). There are over 521 abandoned uranium mines on the Navajo Nation (AUM NN, 2018).

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The past uranium mining on the Navajo Nation is an environmental justice issue, which is defined as a minority or a socio-economic community burdened with environmental contamination (Cutter, 1995). For the Navajo Nation, the environmental justice stems from the abandoned uranium mining legacy. The uranium mining on the Colorado Plateau, particularly on the Navajo Nation, has exposed people living near the mines to a carcinogenic contaminant (Brugge & Goble, 2002). Uranium mining is a socioeconomic issue that disproportionately affects poor and disadvantaged minorities: uranium mining brings jobs to communities struggling to find work, despite hazardous exposure to uranium (Eichstaedt, 1994). The high unemployment rate on the Navajo Nation in the 1940's demonstrated this tradeoff (Brugge, Benally, & Yazzie-Lewis, 2007). The exploitation is not restricted to the Navajo Nation, minorities around the world share a share a similar history (Marbury, 1995). Inevitably, poor, ethnic minorities experience firsthand the health issues associated with environmental contaminant exposures.

It is important to know the extent of harm caused by uranium mining. In the past 40 years, numerous illnesses on the Navajo Reservation have been attributed, at least in part, to uranium mining activities such as kidney disease and a variety of cancers. The former miners, along with their family were not aware that there were long-term health related issues associated with uranium mining (Brugge & Goble, 2002) illustrating the difficult legacy of uranium mining left on the Navajo Reservation.

Five federal United States agencies are involved in the uranium mine cleanup effort on the Navajo Nation; they are the Department of Energy (DOE), the Nuclear Regulatory Commission (NRC), the Bureau of Indian Affairs (BIA), the United States Environmental Protection Agency (US EPA), and the Indian Health Service (IHS). The Five Federal Agencies are responsible for resolving the abandoned uranium mine issues on the Navajo Reservation. Historically, the Navajo Nation distrust of federal agencies has been justified. For example, Jesse Johnson, the director of the Atomic Energy Commission (AEC) Raw Materials Division, ordered Ralph Batie, an official in the AEC's Division of Raw Materials, responsible for health and safety, to withhold information from state officials about the health dangers of unventilated uranium mining (Ball, 1993). Judge Aldon Anderson, U.S. District Court, Utah, wrote that the "AEC's concerns about national security influenced the decision not to warn. The AEC feared that informed miners would flee the mines and thereby threaten the nation's uranium supply" (Ball, 1993). This demonstrates that apparent threat to national security was more important than the health threat to miners.

Federal Policy on Abandoned Uranium Mine Clean Up

The initial effort by U.S. government to address the uranium mill tailings problem came in 1971, when hearings were held on the use of mill tailings in construction projects (92nd Cong., 1st Sess., 1971; Collins, 1996). The most extensive reuse of uranium occurred in Grand Junction, Colorado, where uranium tailings were used for concrete, mortar, backfill around foundations, and street pavements (Rael, et al., 2000). In the mid1970s leukemia rates in Grand Junction were twice the average for the state, which was the driver for legislation that resulted in both the Uranium Mill Tailing Radiation Control Act of 1978 (UMTRCA) and the Comprehensive Environmental Response, Compensation, and Liability

Act of 1980 (CERCLA, commonly referred to as the Superfund). UMTRCA was the first federal policy to deal with environmental contamination and remedial action (Lowenthal, 1997). It was established by the Atomic Energy Commission (AEC), which was later abolished under the Energy Reorganization Act of 1974 when the AEC was split into two parts: the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC; Jones, 2005). The ERDA was responsible for nuclear research that involved not only nuclear bombs, but also energy; it was combined in 1977 with the Federal Energy Administration to make the U.S. Department of Energy (DOE).

The UMTRCA of 1978 Act guides remediation of the uranium tailings on the Navajo Reservation. The UMTRCA was established to clean up mill tailings and other contaminants at 24 inactive uranium processing sites as well as approximately 8,000 vicinity properties within the designated contaminated boundaries (Portillo, 1993). Both uranium mining and mill tailing are defined as waste byproduct from uranium ore processed primarily for its source material content under 42 U.S.C. § 2014 (e)(2)a (Lowenthal, 1997). The UMTRCA also influence the creation of the Uranium Mill Tailings Remedial Action (UMTRA). Under the UMTRA, abandoned uranium processing sites around the United States are required to be cleaned up. This act also allows the cleanup of abandoned uranium mine sites throughout the United States. The majority of these sites are in the western states specifically around the Four Corners area—Arizona, Utah, New Mexico, and Colorado—the Colorado Plateau. Under the UMTRA there are two titles: Title 1 and Title 2. Title 1 remedial action program addresses the cleanup and disposal of hazardous materials (mostly uranium mill tailings) at 24 abandoned uranium processing sites around the United States (Portillo, 1993). The UMTRA program helps to remediate the effected sites. Title 2's goal is to clean up and instill proper management of tailings at processing sites for which commercial operators are still responsible (Portillo, 1993). Under Title 2 of the UMTRA program, companies that produce hazardous materials are taxed in order to clean up the contaminated sites. Some of the companies that were involved are still in operation, the Kerr-McGee Corporation and the Vanadium Corporation of America, whereas other smaller uranium companies dissolved or were bought out by bigger companies.

The UMTRA also established a priority list of areas that need to be cleaned up. The list was not based on levels of contamination or quantity of materials involved; it was based on proximity of the material to populated areas (Portillo, 1993). Under this priority system, there are 24 designated areas; five are on the Navajo Reservation. More than 521 abandoned uranium mineshafts are now estimated to lie on Navajo land (Brugge and Goble, 2002). Unfortunately, some areas were cleaned better than other areas, and today, only a small portion of these abandoned uranium mines have been remediated.

The similarity between UMTRCA and UMTRA is that they both address uranium milling. The difference is that UMTRCA also address uranium mines while working with three federal agencies, US EPA, NRC, and DOE, while the UMTRA program is mostly only under DOE. The UMTRA focuses on ten states while UMTRCA addresses the entire United States.

The UMTRCA concentrates only on the vicinity of the actual area of the former mill sites and abandoned uranium mines. The Secretary of Energy and the NRC define site boundaries. The duration of cleanup of these contaminated sites is 30 years from the end of mining operations. Uranium is highly mobile via wind and water; thus, the overall contaminated areas are considerably larger compared to the original designated boundaries. In addition, the designated boundaries usually contain the tailing piles and former mill areas, but do not include all of the contamination resulting from the presence of the tailings (Portillo, 1993). The boundaries of the contaminated areas are still not fenced off from the public and wildlife.

An example of this is in Cameron, Arizona in the southwestern region of the Navajo Reservation, where there were numerous open pit mines. All had reclamation work but only within the boundaries that were determined to be contaminated by the uranium mines. However, the ore that was mined in Cameron was transported by truck to Tuba City approximately 30 miles north, in northern Arizona, on the Navajo Reservation. The surrounding environment, specifically the road that was utilized to transport the uranium ore to the uranium mill site—the road from Cameron to Tuba City—is not addressed under the law.

The UMTRCA allows EPA to regulate hazardous materials associated with the nuclear industry under several guidelines, such as the Clean Air Act (CAA), the Safe Drinking Water Act (SDWA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; Jones, 2005). The CAA and SDWA regulate the means by which uranium may be ingested by humans. The CAA addresses air quality by establishing certain limits on contaminants in the air set by the EPA. Uranium can be distributed by wind therefore the CAA addresses uranium dust in the air. The SDWA regulates allowable levels of pollutants in drinking water, with the limit set by the EPA. Since uranium can be mobilized by water, humans may ingest uranium through contaminated water.

According to Portillo (1993), the UMTRA program is treating isolated areas in western deserts as dump sites, primarily because the nation’s uranium ore deposits, associated mines, and processing sites are in the arid West. However, the scientific communities are aware that the desert is fragile—the delicate desert has a limited amount of surface water available for all life. Once the surface and ground water become contaminated, the effects can affect the food web of the desert.

Example of Federal Policy Negative Impact on the Navajo Nation

An example of how a federal policy that was intended to improve life for the Navajo actually was detrimental to the Navajo Nation was the livestock reduction of 1933. In 1893, the Commissioner of Indian Affairs office noticed soil erosion in the western United States due to an over population of livestock (Fonaroff, 1963). John Collier, President Franklin Roosevelt’s Commissioner of Indian Affairs, passed specific policies targeting livestock reduction in 1933 (Henderson, 1989). This began with the New Deal Program focused on soil conservation (Fonaroff, 1963). The first policy enacted was the Indian Reorganization Act of 1933 that terminated the General Allotment Act (Dawes Act) of 1887.

Under the Dawes Act, Native Americans lost 90 million acres (Fonaroff, 1963). The Indian Reorganization Act helped establish the tribal governments we see today.

The Navajo Nation fell victim to policy development during the New Deal era. Stemming from a lack of understanding of Navajo culture, John Collier authorized the slaughtering of livestock that belonged to the Navajo People (Henderson, 1989). Collier rationalized the livestock reduction to be beneficial, but it only angered many Navajos and placed families into poverty (Weisiger, 2007). New Deal policies were developed with good intentions; however, these policies were not culturally sensitive to the needs of the Navajo Tribe. Policies that are going to be implemented for the Navajo Nation, or any other tribe, need to understand the tribe culture first. Without any consultation with the tribe, the policy would not be practical when applied. The policy would face resistance and anger from the tribe. The Navajo livestock reduction is a good example of a negative impact because of a lack of cultural considerations.

Cultural Appropriate Approach

The emphasis of this article is to describe a culturally focused policy development using traditional ecological knowledge (TEK). Although TEK has several definitions depending on the context in which it is used (Whyte 2013), TEK can be broadly described as indigenous knowledge that is preserved through oral traditions and cultural expressions; these unwritten laws provide Native Americans an understanding and respect for the environment (Finn 2017). TEK is learning by observation. Native Americans have been observing nature that allowed them to teach their younger generations how to interact with their surroundings (Barnhardt & Angayuqaq, 2005). These observations are specific for each geographical location because the climate, vegetation, and wildlife differ. In this sense, TEK is a process that is learned (Berkes, Colding, & Folke, 2000; Berkes, 2009). This process entails local or traditional practices specific for each geographic location. In this manner, preservation and sustainability is practiced to preserve the environment for future use (Berkes, Folke, & Gadgil, 1995).

Often in western science, TEK is not acknowledged even though Native Americans have been observing nature for generations. One barrier to the utilization of TEK is that it is not written but an oral tradition (Huntington, 2000). This documentation process causes a barrier to applying TEK. Another obstacle is the inconsistent definition on TEK (Usher, 2000). Defining TEK includes knowledge, use, and value on the relationship of the whole environment in a given location. This vague definition of TEK causes communication difficulties when trying to apply it to environmental or other issues of interest to tribal communities (Ellis, 2005; Stevenson, 1996).

When it comes to contamination of communities such as Native American reservations, a risk assessment provides a better understanding of contaminant exposures from the environment. Typically, risk assessment policies do not take into account Native American lifestyles and culture, which can be much different from that of the majority population. To define a risk assessment from a Native American worldview, it must encompass the community in the environment that includes, land, plant, water, and air (Pierotti &

Wildcat, 2000). Community, from a Native American perspective, is the interconnection of each biota, land, and human in a specific geographic location. The main concept is the interconnection of each community from a holistic view (Johannes, 1993); the human and natural world are not considered apart from one another. The need for a holistic approach in risk assessment should be acknowledged in Native American communities (Arquette et al. 2002). The utilization of TEK to determine risk assessment and therefore influence policy development related to environmental contamination in Native American communities will more accurately affect their exposure to the environmental contaminants. The use of TEK for Alaskan Native communities in dealing with uranium issues has also been documented (Wiles 1999).

Navajo Fundamental Laws

In the case of the Navajo Nation, TEK is represented in the Navajo Fundamental Laws, which are a set of traditional laws that have been passed down from generation to generation from time immemorial. Historically, these Laws consisted of an oral tradition and until recently, none of the teachings was written down.

The Fundamental Laws serve as a guide for the Navajo People. They are guiding principles in the Navajo's relation to Mother Earth (The Fundamental Laws of Dine'- Dine' is the term Navajo people use to describe themselves). These fundamental laws not only address the Navajo's relationship with the environment but with other living beings as well. This includes the Navajo's relationship with people, animals, insects, animals that fly, and animals that live in the water (Markstrom & Charley, 2003). There are four laws that address the relationship with the land, people, natural environmental, and animals. These laws are Natural Law, Traditional Law, Customary Law, and Common Law (Austin 2009; Lee & Lee, 2012). These laws were given to the Navajo by the Holy People to live by after going through some adversity in the Four Worlds. A summary of the laws are provided in Table 1 (Bobroff 2007).

The Natural Law touches on the four sacred elements; air, fire/light, water, and earth/pollen. These four elements must be respected because they sustain life and therefore must be honored and protected (The Fundamental Laws of the Dine'). Mother Earth and Father Sky in addition to all the animals in between these entities, have a right to exist (Lee, 2011), what western society might refer to as "intrinsic value". The Navajo Nation was designated as stewards of these relatives, as they are a gift from the Creator. Navajo's must never disrespect Mother Earth and Father Sky because they do not own their mother or father. This is a traditional teaching that came from many generations that is communicated through oral traditions; it often contradicts policies of western nations of dominion.

The Traditional Law teaches how the people choose Navajo leaders. Navajo leaders must protect and uphold their duties to protect the Navajo Nation. Initially, Medicine People were leaders, since they know about the natural laws and how to restore one's self to others and to nature (Furnish, 2008; Lee & Lee, 2012). This law is important in implementing policies that help the Navajo Tribe. From the Traditional Law comes the responsibilities of

the three branches of Navajo government (executive, judicial, and legislative). Lastly, this law maintains that Navajo people protect and honor Navajo elders and medicine people.

Customary Law declares that the Navajo People live in balance with all creation. When an imbalance happens between man and nature, harm befalls everyone including the animals, insects, and vegetation (Markstrom & Charley, 2003). The environmental contamination of Navajo Lands as a result of uranium mining is an example of breaking the Customary Law. The law addresses a connection with community values (Rosser, 2008). The Navajo People must also keep the sacred tradition of k'e (linear fluid relationship such as adopting children), based on the four clans, while descendants are taught the clan system in order to preserve the clan system. In Navajo culture, one's clan is based on a maternal system. That means the child first will have the mother clan. The second clan is the father's clan, third is the maternal grandfather's clan, and lastly the paternal grandfather's clan. The Customary Law touches on the sacred bound of marriage and family. Navajo must maintain the Navajo Language that is taught to the children in order to be preserved. This law states that there should be no abuse of children and elders.

Lastly, the Common Law addresses that the knowledge along with practices must be in harmony with the Traditional Law. Everything in nature, including all of its inhabitants are connected and therefore must treat Mother Earth and its inhabitants with respect and not take them for granted (Markstrom & Charley, 2003; Austin, 2009). The world is always changing, nothing remains static, and that is why the Navajo must change to compete in the ever-changing world, but must still follow the Navajo Fundamental Laws. These laws acknowledge that the Navajo People learn from other people, but the knowledge be intertwined with Dine' (or Navajo) knowledge.

The Navajo Fundamental Laws listed above are broad for a reason in this paper. The laws cover much more in depth with the Navajo elders and traditional knowledge holders and stays within the tribe. An example of how this is used in relation to the abandoned uranium mines is by understanding the level of uranium in the water, soil, and plants (Natural Law). This is looking at different pathway of exposure because the Navajo people use the whole environment for ceremonies (Natural, Traditional, Customary, and Common). They use plants for medicine and food as well (Natural, Traditional, and Customary). The Navajo knowledge holders teach their students to recognize the interrelation within an environment (Natural, Traditional, Customary, and Common). All the Navajo Nation Fundamental Laws are applicable in this example. The Navajo respect their environment and recognize the abuse that has occurred with the legacy of abandoned uranium mines. The Navajo Nation has an opportunity to explore the idea of implementing a holistic risk assessment to understand the overall impact on the environment concerning abandoned uranium mines on the Navajo Nation.

Conclusion

Navajo Fundamental Laws are TEK on Navajo Land. In developing policies related to the uranium cleanup efforts, the use of TEK on tribal land benefits the Navajo Nation (Lerma, 2017). Policy development pertaining to Native American environmental contamination

should address the interconnection with nature. Within the Navajo perspective, this would fall under Natural Law within the Navajo Fundamental Laws. The Traditional Knowledge Holders, i.e. Medicine Men, act as instructors on how the Natural Law is interpreted in terms of the interdependence between human and nature to establish policies. Acknowledgement of these Laws along with implementation can help create a culturally appropriate policy on environmental contamination on Navajo Lands. Using Navajo Fundamental Laws would help establish policy that is more reflective of the cultural practices. It provides a more holistic view on what people use when they practice their traditional culture without putting the public health in jeopardy. It would enable Navajo People to continue practicing their cultural traditions including dealing with environmental contamination.

Past actions taken by the Navajo Nation, include the enactment of the Diné Natural Resources Protection Act of 2005 and the Radioactive Materials Transportation Act of 2012. These two pieces of Navajo Nation legislation prohibit the mining and transportation of radioactive material on Navajo land. Recently, the Navajo Nation also opened the first cancer treatment center the Navajo Reservation to address health needs, which are, in part, attributable to past uranium mining activity (Nez 2019). Additionally, the Navajo Nation established the Diné Uranium Remediation Advisory Commission in 2018, which includes Navajo scientists, community members, and tribal leaders. The Commission consults with traditional knowledge holders such as medicine people on issues related to the uranium mining legacy and clean up strategies. In 2016, the Tronox Settlement funds awarded to the Navajo Nation for cleanup of approximately 50 former mines that were operated by the Kerr-McGee Corporation. These funds are being management by the US EPA in collaboration with the Navajo Nation. All these recent actions have empowered the Navajo Nation to influence the policy development related to the uranium mine legacy issues that affect the Navajo. TEK in the form of the Navajo Fundamental Laws have played a role on Navajo for many generations. It is essential that these Laws continue to be used today to provide the basis for Navajo decision-making.

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Table 1.

Navajo Nation Fundamental Laws

Natural Law	• Teachings that focus on the four sacred elements (air, light/fire, water, and earth/pollen). • The six sacred mountains to the Navajo Nation must be respected, honored and protected as the foundation of the Navajo Nation. • The animals, plants, insects, subsurface biota, and living in the water have their own laws and have the right to live; this law acknowledges interdependence of all living beings within the environment.
Traditional Law	• The Navajo people have the right to choose their own leaders. • The leaders chosen based on their wisdom, experience, and communication skills to provide leadership in the best interests of the Navajo Nation. • Navajo elders, medicine men/women, teachers of traditional laws are respected and honored. They provide traditional ceremonies, songs, and prayers that are to be protected and preserved, and taught to future generations.
Customary Law	• Navajo people have a holistic education of values and principles living in balance with the environment. • Teachings of K'e (the kinship system) based on the four clans to younger generations to be preserved. • Use the Navajo language and teaching to future generation for preservation of the Navajo Culture. • The sacred bond of marriage and the unity of family is protected along with respect for Navajo elders and the environment from abuse.
Common Law	• The knowledge, wisdom, and practices of the Navajo people must be developed and exercised in harmony with the values and principles of all the Navajo Fundamental Laws. • The values and principles of this law must be recognized, respected, honored and trusted as the motivational guidance for the Navajo people and their leaders in order to cope with the complexities of the changing world.