

**A Review of Health Impact Assessment Literature  
Concerning Tribal Communities and Solar Energy Projects  
Conducted by the National Indian Justice Center  
Summer 2014**

**Introduction**

The purpose of this paper is part of a larger study funded by the Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and the Pew Charitable Trusts to examine literature concerning how Native American Health may be impacted by the renewable energy project anticipated at Fort Irwin, located near Barstow, California. Renewable energy projects have the potential to alter the cultural landscape and natural resources of importance to the Native peoples of the Mojave Desert. “Cultural-natural resources” and sacred sites/landscapes are significant health aspects for Native peoples for cultural continuity because their identities and primary health factors, are inextricably tied to the land, its features and its resources.

These health dimensions have not been adequately explored or discussed in relation to renewable energy project development in California. The HIA will describe the following: the protective factors of the cultural-natural resources and sacred sites/landscapes that may be impacted by the renewable energy project; the process for tribal community participation in the environmental assessment; and recommend creative mitigations to maintain the health of Native peoples should they be adversely impacted by the project development. Additionally, the project will analyze social, physical and mental health risks associated with such impacts including diabetes, cardiovascular disease, alcohol and substance abuse, depression, and suicide. The HIA will be used to explore the effect of such projects on Native American communities that have traditional cultural ties to project sites.

The goal of this HIA is to increase decision makers’ and stakeholders’ understanding of the unique health risk factors Native Americans may experience as a result of project impacts to cultural-natural resources and sacred sites/landscapes with the hope of developing communication strategies and protocols between the Tribes, project stakeholders, and decision makers. The project will also identify, as relevant, protective health factors associated with the solar energy project upon tribal communities such as new opportunities for employment and improved energy efficiency and reduced impacts upon the environment.

The available literature review evaluates risk and protective factors of Native American populations with connections to the Mojave Desert’s (and specifically Fort Irwin’s) cultural-natural resources and sacred sites/landscapes, as well as how those factors may be impacted by

a renewable energy project. However, determination of shared characteristics between the HIA target population and those subject to study in relevant research is difficult. Tribal communities are culturally, socially and economically distinct from one another. Comparisons between Tribes within the Mojave Desert and U.S. Indian tribes, other tribal, ethnic or racial groups inside or outside the United States often results in more differences than similarities. The table below shows the characteristics of concern to NIJC’s study and the similar characteristics of other groups found in the available research:

<b>Characteristics of Target Tribal Population(s):</b>	<b>Characteristics most likely shared with groups in relevant research:</b>
Are members of an indigenous community	uniform cultural heritage or ethnic group
Reside on tribal lands within tribal socio-economic construct and/or under tribal jurisdiction	socioeconomic poverty, high rates of violent crime, alcohol and substance abuse, poor school performance among youth, high rates of depression, attempted or completed suicide within Indian families, limited resources for socioeconomic issues, limited opportunities for employment, geographic isolation
Eligible or receiving services provided by the tribe	Connectivity to family, peer group, culture and community
Demographic ties to Mojave Desert (proximity, cultural or historical ties to the area)	Connection to Cultural-natural resources and sites/landscapes.

**The Purpose**

This review is guided by the following goals/objectives:

- To examine the health risk and protective factors for Native American communities associated with the Mojave Desert.
- To identify potential health impacts associated with changes in access to resources that are part of tribal cultural practices, including traditional foods, as well as changes in substance abuse and mental health.

- To identify potential health benefits tied to the renewable energy project, including improved air quality from reduced emissions and opportunities for employment with health insurance.
- To recognize environmental risk and protective factors for Native American communities associated with the Fort Irwin Project.

### **The Problem**

Indigenous communities are connected to the land, environment and animals that live in it. “A tribe’s natural resource base is a source of cultural identity and religion, a nutritional and medicinal buffer against poverty, and a reservoir of environmental knowledge and biodiversity” (Harris and Harper, 1999). For thousands of years, the Mojave Desert has been sacred to the indigenous populations living in and near it. The Mojave Desert has been affected by numerous projects. According to the Sacred Natural Sites: Guidelines for Protected Area Managers report, in the 1990s, Ward Valley was used as a nuclear waste storage area, which “Not only would a nuclear waste facility disrupt the untouched landscape, but it could potentially threaten the water supply of local residents, and the habitat of the endangered desert tortoise” (Wild & Mcleod, 2008). Fortunately, the Native tribes and outside community members were able to prevent the government from moving forward with plans that would have been detrimental to these important cultural-natural resources.

Since 2009 there has been an influx of solar energy development in the Mojave Desert on state, tribal and federal lands. This influx was in part due to passage of the American Recovery and Reinvestment Act of 2009 (ARRA), wherein \$80 billion was made available under the act for clean energy investments. To facilitate green energy development in California, the Department of the Interior began “fast-tracking” solar energy projects to meet the ARRA timelines. (Press Release 11/05/2009) This effort was part of President Obama’s green energy initiative. With respect to lands on BLM public lands within the Mojave Desert, green energy projects have been “fast-tracked.” This fast-tracking meant that many of the established means of communication, collaboration and consultation with Tribes were bypassed or skipped. The fast-tracking process itself creates a situation that exacerbates historical trauma by removing a means that Tribes and tribal communities have to protect their cultural interests and have input into projects developed within their ancestral homelands.

During the project permitting process Native access to cultural-natural resources and sacred sites/landscapes and the adverse impacts of renewable energy projects on these resources are typically broached as cultural-natural resources management issues and not as health issues. Cultural-natural resources and sacred sites/landscapes are significant health assets for California Native peoples who consider maintenance of their cultural identities to be a primary

health protective factor. These health dimensions have not been adequately explored or discussed in relation to renewable energy project development in California. The special connection indigenous peoples have to cultural-natural resources and sites/landscapes that have been deteriorated or destroyed threaten their existence. The Mojave Desert remains a significant location for solar energy development and thus the potential impact to community health remains.

### **Cultural-Natural Resources and Sacred Sites/Landscapes and Health**

For indigenous peoples, cultural-natural resources and sacred sites/ landscapes, land or water, have special spiritual connection and significance to them, a connection to the greater universe and well-being (Wild and Mcleod, 2008). Cultural-natural resources and sacred sites/ landscapes are considered the home and heart of indigenous communities, where their nature spirits, ancestors, and deities. Sacred sites/ landscapes are often used for sacred ceremonies, prayer and meditation. Indigenous people's cultural identity is often rooted in the cultural-natural resources and sacred site/landscape (Wild and Mcleod, 2008). Cultural-natural resources and sacred sites/landscapes occur at a variety of scales. They can be as small as a single tree or rock formation, or can extend to an entire mountain range. In some cases, whole landscapes are regarded by a community as sacred, containing within them areas of more special sacred focus (Wild and Mcleod, 2008).

Additionally, maintenance of a cultural-natural resources and sacred sites/landscapes are associated with cultural identity. Among the many markers of indigenous cultural identity, the attachment to land and the use of an indigenous language are two of the most significant (DESA, 2009). The survival and development of indigenous peoples' particular ways of life, their traditional knowledge, their handicrafts and other cultural expressions have, since time immemorial, depended on their access and rights to their traditional lands, territories and cultural-natural resources and sacred sites/landscapes. Yet, the land base is not only part of the indigenous economy; it also has a deep spiritual relationship with the land. For example, indigenous peoples feel responsible for the healthy maintenance of their ancestral land—its waters and soils, its plants and animals—for both themselves and future generations (DESA, 2009). Land is where their ancestors are buried and where sacred places are visited and revered as indicated by some that often name the place to show the connection (DESA, 2009).

Land is the basis for the lives, cultures and identities of indigenous peoples. Since the colonial period, indigenous peoples have been dispossessed of their lands or faced the threat of dispossession and forced removal, leading to increased poverty, erosion of cultures and even outright extinction or complete assimilation (Wild and Mcleod, 2008). In recent years, there

has been some progress but in reality, indigenous peoples today continue to face the threat of dispossession of lands and the associated health risk factors.

Wilson (2003) conducted 17 in-depth interviews with Anishinabek (Ojibway and Odawa) in Ontario, Canada, to show that the land, as place, is an integral part of First Nations people's identity and health. Wilson used a cultural approach in her research to understand the link between health and place. Interviews described a strong connection between Anishinabek and earth, which showed positive emotional and mental health.

Indigenous spirituality is intimately linked to the environment in which the people live. For indigenous peoples, the land is the core of all spirituality and this relationship to the spirit of the earth is central to all the issues that are important to indigenous peoples today (Wild and Mcleod, 2008, p. 59). For many indigenous peoples, having a healthy sense of spirituality is just as important as other aspects of mental, emotional and physical health. Indigenous peoples believe that the land is alive with spirits which provide a positive mental and emotional health (Wilson, 2003, p. 90). It is important to realize that a healthy spirit is essential for indigenous people to live a healthy life. Mainstream society is beginning to realize that spirituality is an element that must be taken into serious consideration when dealing with indigenous communities (DESA, 2009, p. 61)

### **Impacts to Cultural-Natural Resources**

“Indigenous individual and collective health is derived from membership in a healthy community that has access to ancestral lands and traditional resources, and from having the ability to participate in traditional community activities that help maintain the spiritual quality and continuity of the resources” (Harris and Harper, 1999). The connection between colonization (cultural losses, cultural resources, cultural alienation, and environmental degradation) and poor health have been documented in various areas nationwide and internationally with relation to cultural connectivity as a protective factor for the health of indigenous populations.

For generations, indigenous populations in the United States have been the target of federal and state policies and services that have effectively devastated healthy Tribal communities and families (Weaver, 2010). The aftermath of these policies can be seen in high rates of chronic disease, alcoholism, suicide, cancer, injuries and family violence (CDC, 2012). According to U.S. Department of Health and Human Services, National Center for Health Statistics, Centers for Disease Control, 2010, American Indian and Alaska Natives have long experienced lower health

status when compared with other Americans (Weaver, 2010). For example, alarming statistics are found in the following:

- *Diabetes.* American Indian/Alaska Native adults are twice as likely to have diagnosed type 2 diabetes than non-Hispanic whites.
- *Cardiovascular disease.* Heart disease is the leading cause of death among American Indians and Alaska Natives. American Indian/Alaska Native adults are twice as likely as White adults to be diagnosed with heart disease.
- *Alcohol and Substance Abuse.*
- *Depression.*
- *Suicide.* The second leading cause of death for American Indian/Alaska Natives between the ages of 10 and 34 (2009).

**Baseline Health Conditions** (See later work)

**Risk Factors**

There is no specific literature examining the health risk factors of solar energy development for Native American populations. We turned to literature reviewing risk and protective factors among Native American and indigenous populations based on access to cultural-natural resources and sacred site/landscapes. Much of the risk factors experience by indigenous populations are also associated factors that make Native American communities vulnerable populations, including: cancer, poverty and unemployment, alcohol and drug use, lack of cultural connectivity, lack of effective response to cultural-natural resources, sacred site/landscape degradation. Geographic isolation, cultural barriers, economic factors, suspicion toward traditional spiritual beliefs, and inadequate sewage disposal are some of the other reasons why health among Native Americans is poorer than other groups (Donatuto et al., 2011).

Using the public health model, risk factors may be categorized into individual, relationship, community and societal factors.

<b>Factors increasing adverse health impacts</b>			
<b>(Table 1)</b>			
<b>Individual</b>	<b>Relationship</b>	<b>Community</b>	<b>Societal</b>
Poverty and unemployment; Alcohol and drug abuse Lack of cultural	Economic stressors; Social isolation and depression; Early aggression; and Lack of cultural	Community wide poverty and unemployment; Geographic and Social isolation;	Policies that create and sustain economic and social inequality; Poor rule of law; Limited

identity	connectivity	Limited access to traditional foods and medicines	influence/input in projects impacting cultural-natural resources and sacred sites/landscapes
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**Early Aggression/Violence in the Household/ Juvenile Delinquency**

Indian youth between the ages of 18 and 24 suffered a rate of one violent crime for every four persons (the highest rates of violent victimization than any other ethnic group surveyed). Sixty-nine percent (69%) of Indian children report exposure to violence. Seven out 1,000 Indian women are victims of rape or sexual assault (Perry). The exposure of children to intimate partner violence has devastating consequences for the children, victim and the perpetrator. Studies of domestic disturbances in which police intervene have found that children are present in 41% to 55% of the incidents (Rudo citing Hinchey and Gavelek, 1982). Estimates of the number of children who witness violence in their homes range from 3.3 million per year to between 3.8 and 6.6 million per year (Rudo citing Carlson, Westra, 1984). Children may suffer injury by attempting to intervene in the violence as well as other impacts which are subjects of continued research (Rudo, 1996). Harwell et al. (2003) found a correlation between young age and physical violence among American Indian men, and physical violence and IPV among American Indian women. Additionally, research showed that of the men and women reporting physical violence, they were likely to be younger and report more days of physical and health problems during the past month (Harwell et al., 2003). Blum and Ireland (2004) found that rage or early aggression was the strongest risk factor for every health compromising behavior for both genders, and across all age groups in their study of 15,695 schools going adolescent youth from Caribbean countries. The next highest risk factors included skipping school and a history of abuse.

**Alcohol and Drug Use**

Alcohol and substance abuse among Native American adolescents (aged 12 to 17) is higher than any other racial/ethnic groups in the United States (SAMHSA, 2011). The higher incidence of alcohol and drug use among Native American populations increases their incidence of various negative health consequences both physical and societal. Native Americans experience higher incidents of chronic liver disease, alcohol-related automobile crashes, suicide, homicide and fetal alcohol syndrome (Beauvais 1998).

Additionally, alcohol and drug use has been linked to increased incidence of violence within Native American communities. Alcohol consumption prior to or during the commission of any

crime was present in 46% of all convicted American Indians in local jails serving time for conviction of that crime. When only violent crimes are considered, the percentage rises to 70% (Luna-Firebaugh, 2006.) In their research, Malcoe et al. (2004) used the existing Conflict Tactics Scales with an additional question on forced sex. Interestingly, they did not report any correlating data on alcohol or substance use during the incidents of violence. Luna-Firebaugh (2006) states that the STOP VAIW programs reported 85% of the incidents that they handled were alcohol related.

### **Lack of Effective Governmental Response**

There is significant research linking the incidence of violence in Tribal communities and the ability of Tribes to effectively respond to acts of violence within tribal jurisdictions. This is easily tied to the long standing void in the relationship between tribes, states and the federal government concerning jurisdictional authority over crimes within tribal reservation boundaries. Tribes are not part of the state jurisdictional framework. Thus, automated processes for registering state court orders with state law enforcement are not present for tribal court orders including protection orders. In addition, most tribes lack the resources to implement their own process for protection orders within the reservation boundaries. The failure of the state judicial system to afford full faith and credit to tribal court orders must be explored. Additional research indicates that this lack of effective governmental response leads to increased incidents of stress and suicide within Native American populations (First Nations 2002, p. 27). For example, a Canadian study of first nations saw a direct correlation between self-government, land claims and education and reduced rates of youth suicide (First Nations 2002, p. 27). Further research may be needed, but the available literature suggests that lack of governmental response (either through resources or ability) to issues of importance to Native American communities can have a direct link to increased levels of stress, depression, and other risk factors.

## **PROTECTIVE FACTORS**

### **Cultural Landscapes and Holistic Health approaches**

Native American access to and control over their cultural-natural resources and sacred sites/landscapes is a vital component to emotional and physical health. Abraham, Sommerhalder & Abel (2010) presented a literature review that conceptualized landscape as a health resource that promotes physical, mental and social well-being. Physical well-being is promoted through the promotion of physical activity in daily life as well as leisure time and through walkable environments (Abraham, Sommerhalder & Abel, 2010, p.62). Mental well-being is acquired through attention restoration, stress reduction and evocation of positive emotions (Abraham, Sommerhalder & Abel, 2010). Social well-being is promoted through social

integration, social engagement and participation, and through social support and security (Abraham, Sommerhalder & Abel, 2010).

According to Abraham, Sommerhalder & Abel (2010), the three health dimensions (mental, physical and social well-being) findings were divided into three subsections, which presented the following results:

- *Attention restoration and recovery from mental fatigue.* Natural landscapes (i.e. beaches, forests, mountains) showed more restorative than urban settings. People were able to recover from mental fatigue when exposed to a natural landscape
- *Stress Recovery.* Visual stimulation—as soon as people are exposed to a natural environment, their stress levels reduce because the landscape is perceived as pleasant- negative feelings are replaced by positive feelings such as interest, cheerfulness and calmness. Also, low sound-levels revealed rest and relaxation
- *Positive emotions.* Landscape perceived as pleasant and amount of open space and vegetation.
- *Social integration.* Landscape characteristics include: parks, community gardens, sufficient level of safety, attractive, walkable and rich in vegetation, to name a few.
- *Collectively experiencing nature.* “Wild” nature—nature experience facilitates a sense of equality and community, social decision-making and responsibility, and social bonding and support, and feelings of being protected.

The protective factor of these concepts is seen with respect to indigenous populations through therapeutic medicine and holistic medicine concepts. Therapeutic landscapes encompass both the physical and psychological environments associated with treatment or healing. They have an “enduring reputation for achieving physical, mental and spiritual healing” (Williams, 1998, as quoted in Gesler, 1993, p. 171). Holistic medicine is used in reference to humanistic geography. The following concepts were derived in association to holistic medicine:

- Symbolic landscapes, importance of meaning, value and experience. For example, incorporation of individual and/or cultural belief systems and basic element in therapy (i.e. aboriginal medicine wheel)
- Sense of place. Formation of environments through human networks of care (i.e. aboriginal hospitals and birthing centers).
- Authentic and unauthentic landscapes. Imagery in accessing healing environments (visualization).
- Landscapes of the mind. Interpretation of health conditions (i.e. art therapy).

Further research is needed to examine the connection between landscape and treatment. (Mark, G. T., & Lyons, A. C. (2010).

## **Cultural Connectivity**

Related to cultural landscapes and Native American health is the concept of indigenous identity being linked to cultural-natural resources, sacred sites/landscapes. For example the following foundations of indigenous identity were noted in relation to the health and well-being:

- Values that privilege the interrelationships among the spiritual, the natural, and the self;
- A sacred orientation to place and space;
- A fluidity of knowledge exchange between past, present, and future; and
- An honoring of language and orality as an important means of knowledge transmission.

If these tenets of indigenous identity are accepted, the question that follows is how concepts of cultural identity pertaining to indigenous identity can relate to the health and well-being of peoples and communities (Greenwood & de Leeuw, 2007, p. 50).

Intergenerational education and cultural continuity of indigenous identity is done through story and can be learned from the land and from connections with the land and from the stories that Elders tell us about the land and our relationship to it (Greenwood & de Leeuw, 2007, p.53).

Malcoe et al. (2004) note the unique history of the tribes relocated to Oklahoma in the 1800s including the impact of the General Allotment Act and the Jerome Agreement which dissolved general trust land status of tribes in favor of trust lands for individual Indians. This resulted in a great loss of land to non-Indian settlers and the loss of communal living practices among the families and clans of these tribes. The authors fail to note that these are distinct and unique characteristics of the Oklahoma tribes. Tribal self-identity is often associated with a recognizable and definable tribal community that engages in visible tribally specific practices including cultural, spiritual, governmental and social practices. These aspects of tribal identity are recognized protective factors against violence, but are likely additional factors for protecting against other risk factors.

Hall et al. (2005) found that a strong ethnic identity may lead to positive perceptions not only of one's own ethnic group but also of those outside one's ethnic group. Perceived minority status was negatively associated with sexual aggression among Asian American men suggesting that perceived minority status is a protective factor. Hall et al. (2005) also found that loss of face is a protective factor that is more relevant to Asian Americans. Blum and Ireland (2004) found that school connectedness was the strongest protective factor for every health-compromising behavior for both genders, and across all age groups in their study of 15,695 schools going adolescent youth from Caribbean countries. Protective factors included family connectedness, other adult connectedness, school connectedness, religious attendance, and religiosity.

Indigenous knowledge is embedded in community practices, institutions, relationships and rituals and is inextricably linked to indigenous peoples' identity, their experiences with the natural environment and hence their territorial and cultural rights. Indigenous peoples therefore place a great deal of importance on passing this knowledge on to future generations—not only for the sake of preserving the knowledge, but also for preserving their own cultures and identities (DESA, 2009, p. 65).

The interconnectivity of Indigenous people, their cultures, and ways of life with the land, and the health of Indigenous peoples is linked to the connection to the land. Indigenous people's culture grows stronger from this connection. This connection is argued to be a connection and may potentially be related to a holistic understanding of health. The health and well-being of Indigenous children, their communities, and ultimately their nations arises from this connection with the land and from strength of culture that grows from this connectivity (Greenwood & de Leeuw, 2007).

### **Environmental Components**

In addition to the health risks associated with impacts to cultural natural resources and sacred sites/landscapes there are also the environmental impacts and associated health risks. Both in the literature and this HIA it is important to distinguish between environmental components and the more overarching cultural-natural resources and sacred sites/landscapes. Literature is available regarding health risks and benefits associated with solar energy production. However, the environmental factors identified flora, fauna, air, water, soil, etc. are not in themselves cultural-natural resources without the appropriate cultural relevance. Likewise there are additional relevance and important to some environmental components that will only be available through interviews and discussions with tribal representatives. Much of the literature pertaining to environmental components addresses similar solar energy projects, or other projects within the Mojave Desert. There are various environmental risks that could impact health including:

- Soils
- Water resources
- Desert ecosystems
- Air quality
- Significant species
- Corridors
- Important bird areas
- Visual and sound pollution

- Project footprint

Since there are various Tribes who consider the entire Mojave Desert as culturally important any disturbance within the bounds can be considered an impact to the landscape. Additional concerns are due to limited research, there is a level of uncertainty regarding the long term effects of some solar energy production on deserts like the Mojave (Allen & McHughen, 2011). There is also significant research dealing with the potential benefits of solar energy specifically related to climate change and air quality improvement resulting from reduced use of fossil fuels.

In addition, to the environmental components above there is the related risks posed to Native American communities in North America, who are vulnerable to environmental injustices (Goldtooth 1995; Weaver 1996) due to contamination of the natural resources on which many community members continue to depend (Harris and Harper 2001; USEPA 2002; van Oostdam et al. 2005).

### **Native American Tribes of the Mojave Desert**

There are numerous projects within the Mojave Desert near or on Native American Homelands. Many of these projects have necessitated suits and comments addressing the real and potential impacts associated with Solar Energy Projects. These concerns are varied and incorporate issues with what are often characterized as either or both Natural/environmental/biological resources and/or Cultural connectivity/cultural resources/ sacred sites. There are underlying themes that are included in voiced concerns that are consistent throughout development of Solar energy projects within the Mojave Desert. First, the entire Mojave Desert is considered sacred for many tribes. That is in part because, many of the Tribes within the region did not have generalized cremation or burial sites, so tribal ancestors are buried throughout the Mojave Desert. (Fisher-Holt, 2014) In addition to burial sites, there are petroglyphs and rock art, and trails throughout the region that hold special significance to cultural continuity. (Musser-Lopez & Klasky) Cultural resources could also include viewsheds from trails or other significant sites, the sound factor of an area, the olfactory elements of an area. All of these aspects of the Mojave Desert can be considered sacred. They are part of the Tribe's cultural continuity, part of tribal history and creation stories, and remain a part of contemporary cultural identity, teachings, practices, and life ways. (*Id.*, & USFS Sacred Sites report)

## **CONCLUSION**

The available literature address many of the scoping questions posed, however there is nothing specifically addressing the health impacts associated with impacts to cultural natural resources and sacred sites/landscapes. More research exists regarding potential health impacts relating to environmental components, however, long-term research analysis of environmental issues associated with the Mojave Desert is limited. There is significant and informative research on the risk factors associated with Native American populations as a result of their status as a vulnerable population. Additionally, there is growing research on the protective factors associated with cultural-natural resources and sacred sites/landscapes. Relying on this research, Native American populations experience many risk factors and exacerbation of existing risk factors including cancer, early aggressive behavior, juvenile delinquency, alcohol and drug abuse, and a lack of an effective governmental response (Weaver, 2010). The presence of these risk factors has been the norm in many tribal communities since the development of the Rancheria/reservation system. Despite these risk factors, there is potential for improved and reduced health impacts associated with cultural landscapes and promoting cultural connectivity. Likewise, improved communication and tribal self-governance to protect these resources may produce similar health benefits. The issue that needs to be addressed is the potency of protective factors, with specific attention to the protective factor of cultural connectivity.

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Mojave Desert

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