
Holistic Risk Assessment: A new paradigm for environmental risk management

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Holistic Risk Assessment

A new paradigm for environmental risk management

By Mary Arquette, et al.

Native American Nations have become increasingly concerned about the adverse effects that toxic substances have on human health and the health of the environments on which these communities depend (1-3). In the case of the Mohawk territory of Akwesasne, (a Native American community located along the St. Lawrence River between northern New York and western Quebec / eastern Ontario), local residents, environmental organizations and leaders have mounted a strong response to the environmental degradation of their lands and waters.

Beginning in the 1950s, cheap hydroelectric power provided by the St. Lawrence-FDR Power Project attracted several industries to the area that have since polluted Mohawk waters, land, sediment and air. The community is located immediately adjacent to the General Motors Powertrain Division, and is downwind, downstream and down-gradient from Reynolds Metals and the Aluminum Company of America, all federal or state Superfund sites. Toxicants such as polychlorinated biphenyls (PCBs), dibenzofurans, dioxins, polyaromatic hydrocarbons, fluorides, cyanide, aluminum, arsenic, chromium and styrene have been released into the air and water, and have contaminated the St. Lawrence River, its tributaries, and Mohawk lands, air and water, endangering traditional land usage, subsistence lifestyles and cultural practices.

For over 25 years, the people of Akwesasne have waged a difficult battle to ensure that PCBs and other toxic substances released from neighboring industries are adequately remediated and ecosystems restored to their former health. Despite years of research at Akwesasne, risk assessment methods used by outside investigators remain inadequate. Such methods fail to account for, or include, a holistic approach for assessing the social, cultural, and spiritual values, beliefs and practices that link the Mohawks to their environment.

Need for Change

Risk assessment has traditionally focused on the analysis of biologic, chemical and physical data regarding the effects of hazards, primarily to human physical health (4,5). In 1998, the U.S. Environmental Protection Agency (EPA) released its Final Guidelines for Ecological Risk Assessment, which focus on the evaluation of impacts to ecosystems (6). Risk assessments are performed on a routine basis by government agencies or their contractors, and are used as a foundation for decision-making and management of risk. The basic process entailed in conducting risk assessments of toxic substances involves estimating toxicity (and lack of toxicity), estimating real-world exposure, and comparing potency of toxicity with expected exposure.

However, because the scientific community can never know all the ways that a substance can affect individuals, it's impossible to state with certainty that exposure will cause no or minimal harm. Scientists and activists alike have questioned the purpose of risk assessment, suggesting that it appears to justify harm inflicted on certain people by using the vocabulary of science to draw attention away from the need for action (7-9). Through its community-based research, the Akwesasne Task Force on the Environment has found that traditional risk assessment and management models have not been

effective in defining environmental risk, promoting remediation, decreasing exposure, or restoring community health at Akwesasne (10, 11). Further experiences reflect the use of scientific studies and debates as tools by responsible parties to manipulate situations and impede remediation and restoration, all to the benefit of the polluter (10, 12, 13).

Exposure is only one part of susceptibility to disease, and many toxicologic studies upon which risk assessments are based have been conducted using healthy groups of adult animals. Variations in susceptibility exist within Native communities and are based on a wide variety of factors including age, sex, genetic susceptibility, state of health and many other variables (3, 14, 15). Cultural value systems followed by Native people often mandate special protections and considerations be given for groups of individuals, including elders, unborn generations of children, and sensitive species of wildlife (3, 16, 17, 18). The concern for all people, especially the most vulnerable, may run counter to the processes followed by scientists conducting epidemiologic studies and risk assessments, who tend to focus on identifying average exposures in a given population and providing protection based on the average exposed individual. However, it is those persons in the 95th percentile in exposure scenarios who are the very people that First Nations' decision makers are mandated to protect.

Sociocultural Implications

Impacts and risks to the social, cultural, and spiritual practices of Native peoples must be included in identifying and addressing risks to health (3,10,14,17,19-21,22-24). In the case of the Akwesasne, it has been found that the traditional cultural practices that express and reaffirm identity and culture (i.e. gardening, hunting, fishing, trapping and gathering of plants) may increase exposure (or perception of exposure) of community members to toxic substances. At the same time, however, healthcare providers, community members, researchers, and environmental staff have been quick to note that adverse health effects have resulted when Mohawk people were forced to abandon traditional cultural practices in order to protect their health and the health of future generations (10,16,25,11,26,27).

In Akwesasne, potentially serious adverse health effects can result when people stop traditional cultural practices. When traditional foods such as fish are no longer eaten, alternative diets are consumed that are often high in fat and calories and low in vitamins and nutrients. This type of dietary change has been linked to health problems such as type 2 diabetes, heart disease, stroke, high blood pressure, cancer and obesity (26-28). Consequently, serious health problems can result when traditional foods are no longer consumed, even if there is little or no exposure to toxic substances.

Although most affected communities would agree that sociocultural impacts should be included in any discussion of risk assessment, current models have no way to incorporate or deal with these effects except to call them value judgments (29). Even recent attempts to develop frameworks that incorporate broader real world contexts and stakeholder participation into risk assessment continue to be flawed because "alternative" types of information (social, cultural, economic, environmental justice) are viewed as merely providing a context for risk assessment. No methodologies exist to allow valuable information about all effects to be integrated into the risk assessment itself.

A new paradigm of risk-based decision-making—distinct from the one in which Native people often find themselves in a reactive mode, committing valuable resources to attempt to improve poorly conducted risk assessments—is clearly needed.

Holistic Decision Making

Holistic risk assessment is a way to integrate human health and ecological risk, and make better decisions that are more protective of people and the earth as a whole (30-34). Such a framework integrates both a consideration of the effects of contaminants on the physical health of human beings, and holistically examines impacts on the natural world, and on cultural, social, subsistence, economic and spiritual practices. To incorporate these many different effects, a holistic model would need to examine and include aspects from many fields of study, integrating qualitative research findings with the sciences of toxicology, epidemiology and ecology.

This expanded definition of health would be more

inclusive than just the absence of disease or injury. Many community members at Akwesasne, for example, believe that concepts of health should include and reflect traditional Native American values, attitudes, beliefs and practices. As with many Native communities, however, traditional views of health are integrated such that it becomes impossible to consider physical, mental, spiritual, and social well-being in isolation (16,27).

In addition to the physical, social and cultural determinants of human health, the health of the natural world is central. This is especially true for Native peoples, where relationships among and between human beings and the natural and spiritual worlds are built on concepts of respect, caring, appreciation, duty, purpose, and responsibility (3,10,14,34, 35-37). Health, then, has many definitions for the Mohawk people. Health is based on peaceful, sustainable relationships with other peoples including family, community, Nation, the natural world and spiritual beings.

To be successful in developing a holistic, integrated approach to addressing environmental contamination problems, it is essential that affected communities be involved directly in both meaningful decision-making and in researching impacts and alternatives. Support for community capacity building, training, community-level action, communication, and leadership building are integral to any successful research.

Furthermore, as part of any risk management strategy, the affected community needs to play a key role in identifying ways to remediate, restore, or replace resources that have been affected.

It is clear that if a holistic approach is to be used to solve human health and environmental problems, it must integrate the best information that can be found from many different sources, especially those that are most knowledgeable and intimately connected to the problems at hand. The First Environment Program at Akwesasne has worked to follow a community environmental health research paradigm that is based on principles of environmental justice. This paradigm states that knowledge must be generated and disseminated in a shared process within the community in a way that allows people to reclaim their power to protect their families and the natural world.

Finally, because it is essential to minimize the time in which individuals, communities, and ecosystems are negatively impacted, an effective means for evaluating decision-making processes needs to be developed to ensure that actions have focused on the right issues, have served to prevent problems, and have produced sound results in a timely fashion. In developing an integrated framework for risk-based environmental decision-making, there is much to be learned from Native people, who have experience in developing equitable partnerships and using holistic, integrated thinking to solve problems. ■

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