

ESSENTIALITY OF MANAGING INDIGENOUS KNOWLEDGE IN PAKISTAN

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ABSTRACT

Indigenous knowledge refers to the large body of knowledge and skills that has been developed outside the formal educational system. It is embedded in culture and is unique to a given location. Although many authors in the past wrote extensively about the importance of indigenous knowledge, but until now proper management of this kind of knowledge is limited. Management of indigenous knowledge is essential for food security and health of millions of people in the developing world. Indigenous knowledge can be managed by its integration with scientific knowledge to achieve developmental goals.

Keywords: *Indigenous knowledge, Development, Technical innovation, Environment, Communities, Management*

1. INTRODUCTION

This article is about the significance of indigenous knowledge and its management in Pakistan's context. In Pakistan, about 66% people are living in rural areas and literacy rate is approximately 55%, which is even less for rural areas. Moreover, 25% people are living below the poverty line. Due to a varied climate, Pakistan is quite rich in medicinal herbs, which are scattered over large part of the country. Many indigenous communities living in different parts of the country indicate the importance of managing indigenous knowledge. Intelligent and sustainable use of land, water and soil without causing damage to the resilience and functioning of the surrounding ecosystem, is what is required by indigenous communities, which is of course possible with appropriate management at local and national levels. According to the World Development Report WDR (1999) knowledge and not capital, is the key to sustainable social and economic development. Building on local knowledge, the basic component of any country's knowledge system is the first step to mobilize such capital. Exchange within a community where providers and recipients speak the same language and share its underlying cultural concepts is much more easily accomplished than transferring tacit knowledge across cultures. Indigenous Knowledge and appropriate techno blending is essential in a sense that how people use their own locally generated knowledge to change, improve their livelihood and provide opportunities for designing development projects. If serious consideration is given to

Indigenous Knowledge management, it has the capability to provide practical tools for poverty alleviation, sustainable development and empowerment in general. The exchange of indigenous knowledge is the ideal outcome of a successful transfer and it could be useful to provide the foundation for indigenous innovations and experimentations. It is crucial for Pakistan to improve scientific as well as traditional or indigenous knowledge at the local level for monitoring and managing complex ecosystems, such as watersheds, forests, and seas, and for helping to predict and manage the impact of climate change and the loss of biodiversity and also try to learn through best practices of utilizing indigenous knowledge in different parts of the world.

2. LITERATURE REVIEW

2.1 Indigenous Knowledge

Indigenous or local knowledge refers to a complete body of knowledge, know-how and practices maintained and developed by people, generally in rural areas, who have extended histories of interaction with the natural environment. Indigenous Knowledge is unlike the international knowledge system, which is generated by universities, research institutions and private firms. According to Flavier et al., (1995) Indigenous Knowledge is the information base for a society, which facilitates communication and decision making; it is dynamic and is continuously influenced by internal creativity and experimentation as well as by contact with external systems. While Warren (1991) defines indigenous knowledge as local knowledge that is unique to a given culture or society, the basis for local-level decision making in agriculture, healthcare, food preparation, education, natural resource management and a host of other activities in rural communities. Msuya (2007) stated that local or traditional knowledge is unique to every culture or society. The knowledge influences planning as well as decision-making in local areas. Indigenous knowledge is culture-specific, and represents people's lifestyles and it may be related to a common practice seen in communities that are indigenous to a specific area. Indigenous knowledge is usually shared among local communities and transferred from one generation to the next, through oral traditions and story-telling. Also local people often have a good understanding of how and why resources and the environment have changed over time. It is unique to a given location or

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society and provides basis for decision-making of communities regarding food security, human and animal health, education and natural resource management.

2.2. Indigenous Knowledge Methodology

When discussing the indigenous methodology, one of the well-known Native American scholars, Elisabeth Cook-Lynn (Crow Creek Sioux) argues that, While it is important that scholars become theoretically informed, Indians should define their own perspectives on Indian history and culture instead of relying solely on the thoughts and dictates of anthropology and history theorists (Mihesuah, 1998).

Indigenous ways of thinking, understanding and approaching knowledge have long been dismissed by the academic world because they have been considered as not belonging to any existing theory (Cook-Lynn, 1997) or, often, they have been reduced to some nativist or even illogical and contradictory discourse (Smith, 1999). The quest for indigenous methodologies has often been interpreted by the academic world as a political gesture on part of indigenous people in their struggle for self-determination. Nevertheless, it must be acknowledged that indigenous methodologies already form part of the body of knowledge about indigenous peoples, and that they have a theoretical value.

Indigenous Knowledge is a practical concept, which can be used to facilitate communication among people coming from different backgrounds such as researchers, development practitioners and beneficiaries. Indigenous Knowledge is a key element of the social capital of the poor; their main asset to invest in the struggle for survival, to produce food, to provide shelter or to achieve control of their own lives. Indigenous knowledge contains several important characteristics which distinguish it from other types of knowledge. These include originating from within the community, maintaining a non-formal means of dissemination, collective ownership, development over several generations and subject to adaptation, and embedded in a community's way of life as a means of survival. This kind of knowledge is generally passed by word of mouth through generations and is not often recorded in writing, but to achieve the desired results for development, it should be recorded and the latest available technologies could prove useful in this endeavour. Indigenous knowledge is dynamic in nature, and changes its character as the needs of people change. It also gains vitality from being deeply

entrenched in people's lives, consequently it has the potential of being translated into commercial benefits by providing leads for development of useful practices and processes for the benefits of the mankind.

2.3 Significance of Indigenous Knowledge

The focus on the role of knowledge in development processes is the result of understanding about the relationship between economic growth and the application of knowledge. Indigenous knowledge is an integral part of the development process of local communities (Davies and Ebbe, 1995). Indigenous knowledge is an important resource in the development process and sharing it within and across communities can help in enhancing cross-cultural understanding and promoting the cultural dimension of development. Indigenous knowledge is an important part of the lives of the poor while it is also an integral part of the local ecosystem. It is also evident that knowledge for development should not only be confined to scientific and technical knowledge but also encompass community-based knowledge systems and development practices that underpin the day-to-day survival and innovations at local levels. Indigenous knowledge holders and innovators encourage economic self-sufficiency for indigenous peoples, and also provide incentives for the conservation and sustainable uses of environment (Mwantimwa, 2008). Indigenous knowledge is important for both the local and global communities as it is based on exchange within a community and expresses human creativity, both individual and collective. Nakashima (2000) supports that indigenous knowledge provides the basis for local-level decision-making about many fundamental aspects of day-to-day life, e.g. hunting, fishing, gathering, agriculture and animal husbandry, food production, water, health; and adaptation to environmental or social change. Indigenous knowledge provides the basis for problem-solving strategies for local communities, especially the poor. Local and traditional knowledge is the knowledge held by individuals that comes from their own observations, experiences, beliefs or perceptions rather than from scientific research. Low economic cost is involved in acquiring indigenous knowledge but it can contribute largely to overall economy. Allen (2001) found that the use of indigenous knowledge and local innovation is cost-effective, sustainable and locally manageable, since deployment and mobilization is not expensive. Similarly, UNESCO (1999) and Hamel (2004) argued that indigenous knowledge is capable of increasing production and real the economic growth rate without

further damaging the environment by better knowing, harvesting and using knowledge as a vital and competitive development resource. Knowledge is indispensable for understanding and promoting technical, economic and social change in society. Elisabetsky (1990) reported that annual world market value for medicines derived from medicinal plants by indigenous people is US \$ 43 billion. Gorjestani (2005), states that building an indigenous knowledge can be particularly effective in helping to reach the poor since indigenous knowledge often is the only asset they control and certainly one with which they are very familiar with. It is also a key element of a social capital of the poor and constitutes their major asset in the effort to gain control of their own lives. Significance of indigenous knowledge for Pakistan is greater due to its large area with high mountains and varied climate. According to Pie and Mandhar (1987), at least 70% of medicinal plants and animal species in the Himalayan ranges Pakistan consist of wild species and for healthcare 70-80% population depends on the traditional medicines.

2.4. Transformation of Indigenous Knowledge

The integration of indigenous knowledge into the development process is essentially a process of exchange of information. Indigenous knowledge is local and tacit in nature which is rooted in a particular community and situated within broader cultural traditions; it is a set of experiences generated by people living in those communities. Therefore, separating the technical from the non-technical and the rational from the irrational could be problematic, so its transformation needs careful attention. The process of exchange of indigenous knowledge within and among developing countries, and many developing and industrial countries involves essentially six steps according to the World Bank (1998):

2.4.1 Recognition and Identification

Some indigenous knowledge may be embedded in a mix of technologies or in cultural values, rendering them unrecognizable at first glance to the external observer (technical and social analyses may be required to identify such indigenous knowledge).

2.4.2 Validation

This involves an assessment of significance and relevance (to solving problems) of indigenous knowledge, reliability (i.e., not being an accidental

occurrence), functionality (how well does it work?), effectiveness and transferability.

2.4.3 Recording and Documentation

Recommendation and documentation is a major challenge because of the tacit nature of indigenous knowledge (it is typically exchanged through personal communication from master to apprentice, from parent to child, etc.). In some cases, modern tools could be used, while in other circumstances it may be appropriate to rely more on traditional methods (e.g., taped narration, drawings).

2.4.4 Storage in Retrievable Repositories

Storage of indigenous knowledge is not limited to text documents or electronic formats, it could include tapes, films, storytelling, gene banks, etc.

2.4.5 Transfer

This step goes beyond merely conveying the knowledge to the recipient; it also includes the testing of knowledge in a new environment. Pilot studies are the most appropriate approach in this step.

2.4.6 Dissemination

The dissemination to a wider community adds the development dimension to the exchange of knowledge and could promote a wider and deeper ripple impact of the knowledge transfer. Indigenous knowledge could prove to be useful for the poor in areas like: agriculture, animal husbandry and ethnic veterinary medicine, use and management of natural resources, primary health care (PHC), preventive medicine and psycho-social care, saving and lending, community development, and poverty alleviation. Indigenous knowledge could be a missing link between neglect and empowerment, as well as between losing and surviving (World Bank, 1999).

2.5 Indigenous Knowledge System

Unlike other knowledge systems, the Indigenous Knowledge System (IKS) is a policy framework to stimulate and strengthen the contribution of indigenous knowledge to social and economic development. Local knowledge systems often combine specific and general aspect of knowledge with great ease as everybody has local, everyday knowledge about the environment. The degree of local or indigenous knowledge also depends on the nature

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of the community. Indigenous knowledge systems are geared to dealing with diversity in both natural environment and social organization, and continue to evolve over time. They differ from scientific knowledge in their capacity to deal with local problems and in the degree to which they are accessible to the members of a social group charged with resource management and production. Indigenous knowledge has benefited from the flow of information, resources, skills and perspectives over a period of time. Traditional knowledge is different than formal scientific knowledge. The latter is an explicit or codified knowledge that is transmittable in formal, systematic language (Table-1). On the other hand, traditional knowledge is a tacit knowledge of the local or indigenous people, which is personal, content-specific, and therefore hard to formalize and communicate. Local or indigenous people acquire knowledge by actively creating and organizing their own experiences.

Indigenous knowledge systems are typically human centered, very diverse, applies technology of local origin with strong cross-linkages and is developed after years of experience and experimentation, trial and error and incremental refinement. For example, knowledge about the characteristics of a particular plant and its properties as a healing substance, the technology of its use, is what gives medicinal plants their social and economic value. Management of knowledge is important, since to have knowledge is not sufficient but connecting knowledge with its application empirically or conceptually or even philosophically to desirable social ends is essential. Indigenous knowledge systems generally provide a way of connecting, knowing, feeling and doing. It is necessary to integrate indigenous knowledge systems to other knowledge systems for achieving more benefits. Rahman (2000), supports that in order to properly understand and incorporate traditional knowledge systems for sustainable socio-economic

Table-1: Distinctions of Traditional and Scientific Knowledge Systems (Rahman, 2000)

Traditional knowledge	Scientific knowledge
Tacit knowledge (Subjective)	Explicit knowledge (Objective)
Knowledge of experience (body)	Knowledge of rationality (mind)
Simultaneous knowledge (here and now)	Sequential knowledge (there and then)
Analog knowledge (practice)	Digital knowledge (theory)

An indigenous knowledge system consists of a wide range of knowledge that has largely remained hidden from the mainstream of education, innovation, industry and commerce. Indigenous knowledge holders, as custodians thereof, have enormous potential for innovation and commercialization of indigenous knowledge. In such knowledge systems, generation of knowledge starts with "stories" as the base units of knowledge; proceeds to "knowledge," an integration of the values and processes described in the stories; and culminates in "wisdom," an experiential distillation of knowledge (Smylie, 2003). The existing knowledge about critical spheres, such as health, agriculture and water management could be captured using a variety of existing means. These may be recorded using a variety of existing media such as paper, images, audio and video. Existing practices recorded using low-tech ICT without adding large, expensive infrastructure and is retained in the local language using local techniques for capturing it, indeed low-tech approach should be a starting point.

development and poverty alleviation, the scientific community perhaps need to unlearn the old view of knowledge and should grasp the importance of local or indigenous people's view.

3. BEST PRACTICES BY THE APPLICATION OF INDIGENOUS KNOWLEDGE

During natural disasters in rural areas, survival mostly depends on indigenous knowledge, because the informal means by which indigenous knowledge is disseminated provides a successful model for other knowledge on disaster risk reduction management. Velasquez (2008), highlighted that the locals of Chitral (Pakistan) have learned to interpret early signs of potentially destructive flash floods. Such signs may be the color, smell and behavior of mountain streams as well as meteorological forecast skills. In 2005, 106 houses were destroyed in Brep village due to a Glacial Lake Outburst Flood (GLOF). However, not a single life was lost since the interpretation of the stream behavior acted as an early warning and the village was

evacuated in time. Dekens (2007) states that based on this experience and the local knowledge of a flood 100 years ago, in 2006 the community twice warned an engineering company to relocate their camp since it was on the flood. The company did not heed to the local knowledge, and a foreign engineer lost his life to a flash flood on July 14th 2006, which also destroyed millions of rupees worth of equipment.

Another example of the best practices of indigenous knowledge which is related to development process is given as a Karez system in Xinjiang area of the China. Turpan is one the district of Xinjiang, which is very dry in all seasons and very hot during spring, summer and autumn. High temperature and strong solar radiation result in high annual evaporation. So local people developed a traditional irrigation water system (TIWS) for irrigation which is called Karez, this is TIWS which is able to make use of underground water efficiently. According to Velasquez (2008) Karez is composed of four primary components: vertical wells, underground canals, a surface canal and small reservoirs. As a result of Karez system, Turpan, a basin located in the arid area of Northwestern China, is well-known for its wide variety of agricultural products. In the Turpan area of Xinjiang, Karez is still being used to supply water resources for irrigation and domestic use. At present, modern technology has been integrated into the traditional Karez system to further reinforce the successful traditional practice.

The Karez system is a proven and effective indigenous drought reduction technology that is still in use.

This system based on traditional knowledge has several advantages that are given as follows:

3.1 Support by Earth's Gravity

Since Karez takes advantage of topography to divert deep subsurface flow through an underground canal to land surface for gravity irrigation, the cost for water-lifting equipment and its maintenance are almost negligible.

3.2 Stable Outflow

The major water sources of the Karez system are melting snow and underground water. The underground canal can minimize high evaporation so the impact of climate change is small. In addition, problems with sand blast can be avoided in the underground canal. All this makes the Karez system able to provide stable water resources, though total

water volume may not be very large. As observed, there has been a very stable population for thousands of years in Karez areas, regardless of environment changes.

3.3 High Water Quality

Melting water from glaciers enters the system and the soil provides a very good filter to remove pollutants. Unlike water channels on land, the underground canal minimizes water pollution and at the same time is rich in minerals. The water quality is suitable for drinking and domestic use.

3.4 Construction with Simple Tools

Most Karez systems are built with simple tools and do not require complex equipment.

Indigenous communities in Pakistan also have traditional Karez system in Baluchistan which can be improved and reinforced with modern technology and management. Knowledge about flood preparedness is transmitted orally through learning by doing, daily observation of their local surroundings, storytelling, and the internalization of certain practices over generations. The dissemination of this knowledge occurs at two levels: among community members (i.e., early warning of upcoming floods) and between generations (i.e., transmitting knowledge and lessons learnt from previous flood events).

4. MEASURES TO MANAGE INDIGENOUS KNOWLEDGE

Indigenous knowledge needs to be addressed and integrated into educational programs or learning environments (Mwantimwa, 2008). Students connect well to what they are taught and can become a major knowledge source for their community's sustainable development. The Ministry of Science and Technology will need to support the department of education and labour to provide indigenous knowledge holders with means to obtain specific education and training.

It is worthwhile to prepare national policies in support of indigenous practices, to ensure that valuable indigenous knowledge is identified, recovered and documented, shared and applied for improving the living conditions of the society. The department of education should take steps to include indigenous knowledge into curricula and relevant accreditation frameworks. This could create awareness among students about indigenous knowledge and enable

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them to understand the impact indigenous knowledge systems on their daily lives.

It is essential to create a knowledge sharing culture among communities and encourage those who could initiate innovation. Although indigenous knowledge is an important component of global knowledge but before adopting indigenous knowledge, integrating it into development programs, or even disseminating it, practices need to be scrutinized for their appropriateness just as any other technology because without proper verification it may be harmful in some cases. It is presumed that the awareness, pilot applications and mainstreaming are necessary steps required for the successful integration of indigenous knowledge into the development process in Pakistan. Higher education institutions need to play a role in harnessing and disseminating indigenous knowledge for sustainable development by providing a knowledge base, and transmitting new skills, libraries that can be used for collecting, preserving and dissemination of the indigenous knowledge. Incorporating indigenous knowledge into an educational environment can help students feel ownership of the knowledge they bring to learning environments. In this way scientific and indigenous knowledge can be integrated for the development process.

5. SIGNIFICANCE OF ICTS FOR MANAGING INDIGENOUS KNOWLEDGE

Technology should be introduced where necessary, but in minimalistic ways, so as to add value to the traditional systems and make them more resilient to new threats, such as those posed by climate change. Undoubtedly information and communication technologies can play major roles in improving the availability of indigenous knowledge systems and enhancing its blending with the modern scientific and technical knowledge, information and communication technologies. This could generate wealth and jobs, build bridges between governments and citizens, build relations among organizations and communities, and improve the delivery of essential services to poor people. Therefore, the application of ICTs is essential to stimulate the flow of indigenous knowledge and incorporation of modern scientific and technological understandings to traditional knowledge. It can enable indigenous communities to protect their unique cultures and knowledge through digitization. Further possible uses of ICTs for indigenous knowledge are as follows:

- Capture, store and disseminate indigenous knowledge so that traditional knowledge is preserved for the future generation;
- Promote cost-effective dissemination of indigenous knowledge;
- Create easily accessible indigenous knowledge information systems;
- Promote integration of indigenous knowledge into formal and non-formal training and education;
- Provide a platform for advocating improving benefits from indigenous knowledge systems to the poor.

Environmentally friendly technologies together with indigenous knowledge can be used for both conservation and sustainable use of the natural resources, as well as reducing poverty. Indigenous knowledge and technical innovation are important parts of the lives of the poor and main assets to invest in the struggle for survival, to produce food, to provide shelter and help to shape local visions and perceptions of environment and society. Indigenous knowledge and techno blending practices to the local setting can help to improve agriculture production and sustainability of development assistance. Technologies should be used to collect, preserve and exchange indigenous knowledge in Pakistan, particularly in rural areas.

6. CONCLUSIONS AND RECOMMENDATIONS

Indigenous knowledge is not exclusive to the developing world, nor is it always related to ancient traditions but it is found to be somewhat conflicting with knowledge systems generated by universities, research institutions and private firms across the world. It is not sensible to overlook the importance of indigenous knowledge, especially in the developing countries as it forms important the basis for local-level decision-making in agriculture, healthcare, food preparation, education, natural resource management, and a host of other activities in rural communities. Effective exchange, adaptation and use of indigenous knowledge and technical innovation could lead to poverty alleviation in rural communities. According to IFAD (2007), the availability and application of local knowledge resources and appropriate provision for facilitating and sharing innovations improves productivity and generates livelihood choices with or without value addition. Indigenous knowledge is linked to so many different aspects of daily life and is thus so firmly embedded within local communities. Further research and development of indigenous knowledge will have a

broad impact on the livelihoods of rural peoples. Indigenous knowledge have potential to contribute development strategies in several ways, such as by helping identify cost-effective and sustainable mechanisms for poverty alleviation that are locally manageable and locally meaningful by better understanding of the complexities of sustainable development in ecological and social diversity. The valuable leads/clues provided by traditional knowledge help save time, money and investment of modern biotech and other industries into any research and product development. Partnership for indigenous knowledge and technological innovation will be fruitful when the developing countries like Pakistan share as well as use indigenous knowledge. Pakistan needs to pay special attention to identifying, collecting, documenting, characterizing, recognizing and sharing indigenous knowledge at national level. There is also a need to strengthen local authorities at district level, including administrators, teachers, and nurses, extension workers to support communities in managing and sharing their indigenous knowledge and acquiring knowledge from outside world. The following steps could be prolific to manage indigenous knowledge in Pakistan:

- Identifying and testing instruments for capturing and dissemination of indigenous knowledge;
- Integration of different knowledge systems, indigenous and modern
- Raising awareness of the importance of indigenous knowledge among native communities and general public;
- Protecting the intellectual property rights related to indigenous knowledge;
- Promoting inter-cultural exchange of experiences in education for sustainable development.

It is crucial to develop a framework for incorporating indigenous knowledge system into development programmes of governmental and non-governmental organization (NGOs) and into the curricula at various levels, which can bridge the existing gaps between modern and indigenous knowledge systems.

REFERENCES

- Allen and Davina, 2001. Dependency Theory (online), Available at: <http://www.xrefer.com>
- Cook-Lynn, E., 1997. Who Stole Native American Studies Wicazo Sa Review, 12:1, pp. 9-28.
- Davies, S., and Ebbe, K., 1995. Traditional knowledge and sustainable development; proceedings of a conference, held at the World Bank in September 1993, World Bank, Environmentally sustainable development proceedings Series No. 4, Washington D.C.
- Dekens, J., 2007. Local Knowledge on Disaster Preparedness in Chitral District, Pakistan ICIMOD, Kathmandu, Nepal 2007 www.proventionconsortium.org/themes/default/pdfs/.../Pakistan3_GN.pdf
- Elisabetsky, 1990. Plants used as analgesics by Amazonian Capbocols, *International Journal of Crude Drug Research*, 28, pp. 309-320.
- Flavier, J.M., et al., 1995. The Regional Program for the Promotion of Indigenous Knowledge in Asia. In Warren D.M, L.J., Slikkerveer, D. and Brokensha, L. (Eds)
- Gorjestani, N., 2005. Indigenous Knowledge for Development, Opportunities and Challenges. Available at: www.higher.edu.et/index.php/he-documents/.../110-assaye-and-ziyn5
- Hamel, L. J., 2005. Knowledge Policies for Sustainable Development in Africa: A Strategic Framework for Good Governance. ECA /SDD, Addis Ababa.
- IFAD, 2007. Promotion of Local Knowledge and Innovations in Asia and the Pacific Region.
- Mihesuah, D. A., 1998. Natives and Academics: Researching and Writing about American Indians. Lincoln: University of Nebraska Press.
- Msuya, J., 2007. Challenges and Opportunities in the Protection and Preservation of Indigenous Knowledge in Africa. *International Review of Information Ethics*, 7, pp.1-8
- Mwantimwa, K., 2008. The Relationship of Indigenous Knowledge and Technological Innovation to Poverty Alleviation in Tanzania.
- Nakashima, D.J., 2000. What relationship between scientific and traditional systems of knowledge? pp. 432-444 In: Ana Maria Cetto (ed.), Science for the Twenty-First Century: A new commitment, Paris, UNESCO
- Pie S. J., and Manandhar., 1987. Sources of some local medicines in the Himalayan Ecosystems
- Rahman, A., 2000. United Nations Conference on Trade and Development Expert Meeting on Systems and National Experiences for Protecting Traditional Knowledge, Innovations and Practices, r0.unctad.org/trade_env/docs/rahman.
- Smith, L.T., 1999. Decolonizing Methodologies: Research and Indigenous Peoples. London: Zed Books.
- Smylie, J., et al., 2003. Knowledge translation and indigenous knowledge Circumpolar Health 2003 jch.fi/issues/63suppl2/ICCH12_Smylie.

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International Journal of Circumpolar Health, 63.

- UNESCO, 1999. Indigenous and Local Knowledge Systems and Sustainable Development; www.unesco.org/shs/most
- Velasquez, J., 2008. Indigenous Knowledge for Disaster Risk Reduction. [www.unisdr.org/...Indigenous Knowledge./Indigenous_Knowledge-DRR.pdf](http://www.unisdr.org/...Indigenous_Knowledge./Indigenous_Knowledge-DRR.pdf)
- Warren, D. M., 1991. Using Indigenous Knowledge in Agricultural Development; Discussion Paper 127, Washington: World Bank Research Center (IDRC). 958-201-1-DD-Topic 1991
- World Bank, 1998. Indigenous Knowledge for Development a Framework for Action. Available at: www.worldbank.org/afr/ik/ikrept.pdf
- World Bank, 1999. World Development Report 1998/1999: Knowledge for Development. World Bank Development Report 1999 Knowledge for Development Oxford University Press, London