*IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*
*e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 9, Issue 9 Ver. II (Sep. 2015), PP 54-59*
*www.iosrjournals.org*

# Indigenous knowledge: As a Panacea for Environmental Management- Review

Inuwa Aliyu Dutse, Ramdzani b Abdullah, Jusang bin Bolong,
Abu Samah Asnarulkhadi
*Universiti Putra Malaysia, Serdang, 43300, Selangor Malaysia.*

***Abstract:*** *Indigenous knowledge potentials is been reviewed with the view of incorporating its importance and utilization in environmental and social problems solution drive that hitherto is not been given to the indigenous/local knowledge system as against the scientific knowledge system. The review attempts to provide inherent contributions, provisions and the potentials that are hidden in the indigenous knowledge system.*
*The paper argues that indigenous knowledge is a key player in all aspects of developmental efforts of empowerment, capacity building and sustainability in community development provided decision making, trust, respects and participation are given proper positions from initiation of such efforts up to monitoring and evaluation. This will result in sustainability through participation and commitment by the beneficiaries as their knowledge and priorities are incooperated in the process.*
***Keywords:****Environmental management; Indigenous knowledge; scientific knowledge; participation; sustainable development*

## I. Introduction

Despite the inherent appeal of integrating local knowledge into environmental decision making, positivist ways of knowing remain dominant in western culture (Fazeyetal., 2006; Innes and Booher, 2010), numerous previous studies have highlighted the reluctance of scientists and other officials to consider local sources of knowledge in different environmental governance context (Wayne, 1992; Murdoch and Clark, 1994; Weible et al., 2004; Giordano et al., 2010). Central agencies (government) most upon continue to rely on accepted scientific practices and are not willing to consider alternative knowledge ways (Berkes, 2002). The power dominance of scientific knowledge over local knowledge is seen as a main factor underlying the relations between state-societal and in determining whether different forms of knowledge can co- exist in decision-making processes (Murdoch and Clark, 1994).The benefits of collaborative approaches to environmental governance is that they promote the integration of local (indigenous) knowledge into decision making and this can be extents to other social issues that are relevant to other forms of capitals in development. It has been offered that local knowledge (indigenous) has a potential role in identifying and scoping environmental problems and issues (Fazey et al., 2006; Petts and Brooks, 2006) and this can ensure that full nature of problem is understood and integrated collectively (Rogers 2006).

The anxiety stems from the underlying difference between scientific and local knowledge which can result in strong differences of opinion regarding which forms of knowledge are valid in environmental decision making (Eden, 1996; Berkes, 2004)

This article explores the possibility of using indigenous knowledge in synergy with the scientific knowledge base as against the misconstrued perception of the later as practical knowledge of "Know-how" implicit and non-tacit ,that is informal, and context dependent originating from collective experience of generation of observations and practices(Ingram, 2005) form of knowledge compared with scientific that is seen as tacit and explicit system(Norgaard, 1984; Ingram 2008) and mostly as knowledge of " know-why". The knowledge systems are both unique in their respective ways; the scientific operates by separating and specialization with specific solutions whereas the indigenous knowledge functions by connecting and integrating thus a multifunctional in approach.

## II. Indigenous and scientific knowledge

Know-why knowledge as it attempt to understand the underlying principles and theory behind phenomenon (Lundual& Johnson,1994)while the local indigenous knowledge is practical knowledge(Thrift,1985).

These unique features will serve as attributes that could be enhanced in developing synergy that function in wide and varied forms in finding solution to problems that are hitherto associated to singular form of knowledge, most often the scientific knowledge system approach.

Indigenous knowledge utilization in community development and empowerment can play a great role in areas that area are open to or affected by environmental and poverty issues either by building on their capacity or through utilization by combining the two systems of knowledge as an enhanced form "hybridized" in finding solution and community empowerment through appreciation of their local cultural, religious, norms and attitude content as against singular western-based system in development

This is glairing in developing countries particularly in Sub-Saharan Africa where whole adoption of western development approach does not provide solutions to most of the objectives and are most often than not ends up not sustainable after cessation of programs. Thus, discrediting of existing indigenous knowledge and techniques (invariably subsistence oriented and often environmentally well-adjusted and sustainable and their replacement with scientifically informed and controlled technology for outside hegemony(Sillitoe,2000, p.5).

Ignoring local peoples knowledge, interest and their exclusion from the planning, management and decision making in issues that have direct relation with them are now found to be the main sources of conflicts between local people, agencies and government in development strides and resulting in unsustainable causes of such development. Therefore for success of any development strategy, the local knowledge must be allowed to be used for commitment and sustainability, for it helps in knowledge gathering, problems identification and solution in their perspectives as local residents have evolved with their surroundings environment over a long time and have retained traditional ecological knowledge and activities that facilitate conservation (Berkes et al. 2006) and are dependent on the natural resources in their areas for food, fuelwood (An etal.2002; Pote et al., 2006) , Honey and other products (Fabricius and Berger,1997), and medicinal herbs(Dzerefos and Witkouski, 2001)

This kind of knowledge can, as it relates to resource use can complement modern system and aid research while supporting equitable and culturally sensitive method of management (Drew,2005; Gadgil et al., 1993).

In combining these two forms of knowledge (indigenous and scientific), can contribute to a more comprehensive understanding of complex and dynamic natural systems and processes by triangulating different local and scientific knowledge sources, it may be possible to investigate uncertainties, assumptions and develop a more rigor understanding as well (John, et al., 2004) and decisions based on such knowledge are likely to be more robust (Hansen, 1994; Reed, et al., 2004, 2008).

Many bodies of literatures are suggesting that a combination of local (Indigenous) and scientific may empower local communities to monitor and manage environmental changes easily and genuinely (Reed &Doughill, 2002; Thomas & Twymen,2004; Stringer & Reed, 2007; Reed, et al.,2008, Ingram, 2008).

Hybridizing these forms of knowledge it may be possible for researchers and local communities with varied understanding to interact to produce a more relevant, effective environmental policy and practices (Stringer & Reeds, 2007; Forsyth, 1996; Nygen, 1999). In allowing the interaction between researchers, development partners and communities to work together with good interactions, respects and appreciation of their knowledge content and each other's capacities in both fields and mental reasoning from planning, strategies setting, implementation, completion and finally monitoring & evaluation of their felt needs success will poster enhancing capacity building potentials of the community and impacts with a resultant sustainability of such efforts for future development.

Furthermore, this will result in efficiency and cost effectiveness when compared with the programs having the(top-down) centralized approach mechanisms that does not necessarily reflects their felt needs and participation, this as well avoids the use of community members as data collectors through transformation into active participant in development efforts (Caputo et al., 2005), enhances benefits of working together (Reed, et al., 2008).

The mechanism helps in developing meaningful trade-off between participation and scientific rigors (Abbotts and Guijt, 1997), the transfer mechanism between producers and consumers is therefore concretized through relational dimension brought about participation mechanism between parties involved while the hitherto pattern of one-way mechanism will be reversed, thereby bringing about simplified adoption and acceptance of new ideas and technology in communities for sustainability, capacity building, ownership and attitudinal changes. The impacts of these changes could easily be replicated to other areas through interaction with benefiting communities and will serve as capital development in social, human and financial of the community.

The compatible natures of these knowledge forms are many (heterogeneous) and mixed up of tacit and implicit bases that are not disentangle (Lung, 1992; Murdoch & Clark, 1994, Clark & Murdoch, 1997).

## III. Knowledge co-production scenarios

The knowledge production aspect that are unveiled by local knowledge is building knowledge base that are developed through partnership between researchers, development agencies and communities which is being formed, validated and adapted to changing circumstances, thus, production of new knowledge.

Indigenous groups in Canada have welcomed a dialogue with science in many ways for knowledge production as partners in different ways through trust-building, respect and partnership with communities in areas of development such as resource management and planning (Davidson-hunt &O'flaherty 2007); community health (Parlee et al., 2005); environmental monitoring (Berkes et al., 2007); environmental contaminants aspects (Berkes et al., 2001); development impacts (Peloquin&Berkes, 2009); biodiversity conservation (Davidson-hunt &Berkes 2006; Berkes et al., 2007) and in climate change (Berkes& Jolly, 2001; Peloquin&Berkes, 2009).

The knowledge making process has in directly also open up development in democratic process of science knowledge for adoption of indigenous knowledge and will further lessen the acceptance and will reduce the skeptical tendencies between the two frontiers of knowledge. This is achieved as knowledge co –production requires partners to be willing and open during partnership in research (Moller et al., 2009c).

The exchange of information through informal communication networks plays an important role in facilitating innovation and adaption, as knowledge is not shared equally throughout a society.

## IV. Contributionof Indigenous Knowledge to Environmental Scenarios

Indigenous/local knowledge have contributed in environmental management practices and it is often gone unnoticed by the scientist due to its implicit nature but in recent times through adoption or perhaps changes in the research systems in development this are beginning to manifest, thus adding values to indigenous knowledge.

Among these scenarios are, in the development of oasis ecosystems in desert environment which is been initiated by human activities where small depressions collects dampness, a stone shades and seed flourishes and a favorable dynamic develops, the plant generates its protections from sunbeams, concentrates water vapor, attracts insects, produces biological materials and the soils which nourishes it, and this results in microcosm generation as a result of the biological systems developed through their coexistence and this result to aoses development in such environment, by using these processes the people of the desert initiate aosis production in such harsh environment through palm trees planting protected by dry branches from sand as time goes on large tilled fields develop. This traditional knowledge and techniques originates from people and transmitted by recognizable and experienced actors. This supports diversity, reproduces and enhances local resources (UNCCD, 2005:109).

The oasis exemplifies sustainability through positive growth of fertile niche development in a harsh hostile environmental surroundings with limited local resources yet not been exploited but manage well.

The mechanism of indigenous wetland management knowledge in Ethiopia is also important in environmental implication of the knowledge as it provides more rational to management of resources by the users based on their perceived significance to benefit ratio outcomes.This resulted in problems solving innovations in varied forms such as drainage ditches mechanisms, cover crops for shade and information sharing patterns in animal grazing systems that helps in sustaining and maintenance of scares resources for better utilization by all herds owners and these were developed and maintained by the local people through transmission of local knowledge, experience and practices which hitherto is attached to scientific system as pioneers.

## V. Environmental adaptive management contribution of indigenous knowledge

This literature review examine the contribution of indigenous knowledge to environmental management particularly in monitoring long term ecological changes using communities experience in such efforts. Two scenarios are discussed here in Africa and Solomon Island.

1- **Roviana village (Solomon island)**

This shows how the communities in the island use their indigenous knowledge in monitoring a long term ecological changes around their communities through their assessment of the causes of increase in the seagrass, which was attributed to rise in sea levels and increase in nutrients supply from anthropogenic sources as the major cause of that changes in the sea grass and these were the same reasons attributed scientifically to the sea grass, thus, villagers monitor long term ecological changes around them with similar result output to scientific findings, and these are inherent knowledge within community members through observation and practices of indigenous knowledge.

Change detection through ecological feedbacks is therefore essential to adaptive management framework as without change detection abilities the chances of response mechanism is nipped. This can lead to sustainable resource stewardship by allowing customary governance in management (Cinner and others 2005b; Aswani and Sabetian 2009).

**Indigenous knowledge of vegetative changes, fodders identification and grazing regulations by herders**

It was found that herders have names of all fodder plants in detailed and can identify the species in their vegetative, generative stages and their palatability to their herds. These allows for control through regulated grazing process for protection, equity and sustainability of grazing resources by all community members and moreover assigned movement patterns of herds based on seasons and resource availability for herds based on size for protection of seeds bank of the environment with an established norm codes and penalties for defaulters.

The knowledge based was further analyze and compared with the scientific sets of identification standards of ranking in southern Africa (Trollope et al 1990) it was found to be similar with scientific in terms of outputs and characteristics, this further gives indigenous knowledge the inclusive ideas on plant successions

It was also found that the herders attached significance to certain values and characteristics such as sprouting quality, palatability, yields, resilience and nutritional values of grasses (fodders) which are also characters of scientific standards.

It became apparent that this knowledge system is inherent and comprehensive, but only needs to be explored for utilization by scientific based systems and development.

**Indigenous knowledge in climate change mitigation and adaptation strategies**

Researchers are gradually recognizing the importance indigenous knowledge in climate change studies as it adds values in the following:

- It creates moral economy as it involves cultural context through which decision-making processes are understood better based on observed indicators or relationships with events (Adugna,1996; Woodley,1991)
- Provides room for security, assurance and sense of community to community members
- Provides resemblances to scientific methods against the primitive assertions in the past
- It provides a participatory mechanisms advantages
- Enshrines sustainability principles of economy, equity and environment and
- Provide understanding and effective communication for spread of adaptability in mitigation.

These advantages are obtained through experiences of others from indigenous knowledge system (local knowledge).

Local actors should progressively take the lead while partners back their efforts to assume greater responsibility for their development and reducing vulnerability entails the strengthening of adaptive capacities of vulnerable individuals and groups.

## VI. Conclusion

The quality of environmental and poverty reduction efforts can be made to be sustainable in local community development and their empowerment mechanisms positively through local community knowledge appreciation and utilization, decentralization of engagement approach, capacity building and proper management of participation mechanisms that gives equal interaction, support, decision making and awareness creation by ease in access to information.

The underlying success is to be hinged to the community knowledge of their environment, the working norms, culture, religious influence on their believe with their environment which focuses their commitment but above all the attitude are mostly influence by knowledge as the bottom line to such changes as environmental knowledge level in any community or society is directly related to environmental behaviors of such community, the higher the knowledge the more concern will be their attitude towards solving such environmental problems/issues, and this knowledge based are most often obtained from experiences and practical that are transmitted from generation to generation and help in provoking the inert environmental and social issues in that community thus indigenous knowledge is the bases for initiation when complemented with the scientific western knowledge and developmental mechanisms in solving environmental and other social problems in communities.

This provides comprehensive understanding of complex and dynamic changes of human unpredicted nature through involvement in their communities' developmental processes and self- evaluation of that which have direct significance on themselves being major actors from problems identification to evaluation stages based on their local knowledge and complemented with scientific knowledge.

From these arguments reviewed, it is paramount to accept that two heads are better than one in whatever circumstance, thus, the two knowledge formsmust complement each other rather than seen as different contributors to development efforts in both environmental and social endeavors for sustainability through contribution

Lastly, the hope is that by bringing these local knowledge into the development processes and advocating for more participatory projects, these will be better informed, and integrate the needs of the beneficiary community and more likely to succeed (Roue and Nakashima 2002; Veitayaki 2002; Briggs et al., 2003; Hunn et al.,)

## References


[1]. Abbot, J., Guijt, I., 1997. Changing views on change: A working paper on participatory monitoring of the environment, working paper. International Institute for Environment and Development London
[2]. Adugna G (1996). The dynamics of knowledge systems versus sustainable development. Indigenous Knowledge Dev Monit 4(2):31-32
[3]. Aswani S 2005. Customary sea tenure in Oceania as a case of rights-based fishery management: does it work? Review in Fish Biology and Fisheries 15: 285-307
[4]. Berkes F., 2009. Indigenous ways of knowing and the study of environmental change. Journal of thr Royal Society of New Zealand 39:151-156, this issue.
[5]. Berkes F 2008. Sacred Ecology. 2nded. New York and London, Routledge.
[6]. Berkes F 2009. Community conserved areas: policy issues in historic and contemporary context. Conservation Letter2:19-24
[7]. Berkes F, Jolly D 2001. Adapting to climate change: social-ecological resilience in a Canadian westrn Artic community. Conservation Ecology 5 (2):18
[8]. Berkes, F., 2002. Cross –scale institutional linkages: perspectives from bottom-up. In :ostram, E., Dietz, T., Stern, P.C., Stonich, S., Weber,E.U. (Eds.), The Drama of the commons, National Academy Press, Washington.
[9]. Berkes, F.,2004. Rethinking community based conservation. Conservation Biology 18(3), 621-630.
[10]. Berkes, F 2004. Community based conservation in globalized world. Proceedings of the National Academy of Sciences, 104(39), 15188-15193.
[11]. Briggs, J., J.Sharp, N. Hameed,and H. Yacoub 2003. Changing women's roles, changing environmental knowledges: Evidences from upper Egypt. The Geographical Journal 169: 313-325.
[12]. Caputo, F.P., Canestrelli, D., Boitoni, L., 2005. Conserving the terecay(Podocnemicuinisfilis, Testudines: Pelomedusidae) through a community-based sustainable harvest of its eggs. Biological conservation 126, 84-92
[13]. Cinner JE, Maarane MJ, Mcclanahan TR, Almany GR 2005b. Conservation and community benefits from traditional coral reef management at Ahus Island, Papua New Guinea. Conservation Biology 19:1714-1723.
[14]. Davidson-Hunt IJ, O'Flaherty RM 2007. Researchers, indigenous knowledge people and place based learning communities. Society and Natural Resources 20: 291-305.
[15]. Drew, J 2005. Use of traditional ecological knowledge in marine conservation. Conservation Biology 19: 1286-1293
[16]. Eden, S.,1996. Public participation environmental policy: Considering scientific, counter-scientific and non-scientific contributions. Public understanding of science 5, 183-204.
[17]. Fazey, I., Fazey, J.A., Salisbury, J.G., Lindenmayer, D.B., Dovers, S., 2006. The nature and role of experiential knowledge for environmental conservation. Environmental Conservation 33(1),1-10.
[18]. Giordano,R., Liersch, S., Vurro, M., Hirsch, D., 2010. Integrating local knowledge and technological knowledge to support soil salinity monitoring in the Amudarya river basin. Journal of Environmental Management 91, 1718-1729.
[19]. Hansen, B. (Eds),1994. Report on the seminar on the integration of indigenous people and their knowledge. Reykjavik. Iceland. Ministry for the Environment (Iceleand).Ministry of the Environment (Denmark) and the Home Rule of Greenland (Denmark Office) Copenhangen, Denmark.
[20]. Hunn, E. S., D. R. Johnson, P.N. Russell, and T.F. Thorton 2003. Huna Tlingit traditional environmental knowledge, conservation and the management of a "wildeness" park. Current Anthropology 44: S79-S103.
[21]. Ingram, J., 2008. Are farmers in England equipped to meet the knowledge challenge of sustainable soil management? An analysis of farmer and advisor views. Journal of Environmental Management 86, 214-228.
[22]. Innes, J.E., Booher, D.E., 2010. Planning with complexity: An Introduction to Collaborative Rationality for Public Policy. Routledge , New York.
[23]. Johnson, N., Lilja, N., Ashby, J.A., Garcia,J.A., 2004. Practice of participatory research and gender analysis in natural resource management. Natural Resources forum 28, 189-200.
[24]. Long, N., 1992. From paradigm lost to paradigm regained. The case of actor-oriented sociology of development. In : Long, N., Long, A. (Eds), Battlefield of knowledge: interlocking Theory and Practice of Social Research and Development. Routledge, London, pp.16-43
[25]. Lundvall, B.A., Johnson, B., 1994. The learning economy. Journal of industry Studies 1, 23-42
[26]. Murdoch, J., Clark, J., 1994. Sustainable knowledge. Geoforum 25(2), 115-132.
[27]. Moller H, Charleton K, Knight B, Lyver PO'B 2009a. traditional ecological knowledge and scientific inference of prey availability: harvest of sooty shearwater (puffinusgriseus) chicks by Rakiura Maori. New Zealand Journal of zoology 36: 259-274.
[28]. Norgaard, R., 1984. Traditional agricultural knowledge: past performance, future prospects and institutional implications. American Agricultural Economics Association 66, 874-878.
[29]. Nygen, A. 1999. Local knowledge in the environment-development discourse: from dichotomies to situated knowledges. Critique of Anthropology 19:267-288.
[30]. Roue, M., and D. Nakashima 2002. Knowledge and foresight: the predictive capacity of traditional knowledge applied to environmental assessment. International Social Science Journal 173:337-347
[31]. Parlee B, BerkesF ,Teetl'itGwich in renewable Resources Council 2005. Health of the land, Health of the people: a case study on Gwich'in berry harvesting from North Canada. EcoHealth 2:127-137.
[32]. Peloquin C, Berkes F 2009. Local Knowledge, subsistence harvests, and social-ecological complexity in James Bay. Human Ecology 37:533-545
[33]. Petts, J., Brooks, C.,2006. Expert conceptualization of the role lay knowledge in environmental decision making: challenges for deliberate democracy. Environment and Planning A 38, 1045-1059
[34]. Reed, M.S., Dougill, A.J.,2002. Participatory selection process for indicators of rangeland condition in the Kalahari. The Geographiical Journal 168,224-234
[35]. Reed,M.S., Dougill,A.J., Baker,T., 2008. Participatory indicator development: what can ecologist and local communities learn from each other? Ecological Applications 18, 1253-1269.
[36]. Rogers, K.H., 2006. The real river management challenge: integrating scientist, stakeholders and service agencies. River Research and application 22, 269-280.
[37]. Sillitoe, P., 2000. Indigenous Knowledge, Science and the Poorest. Anthropology Today 16 (6), 3-7

[38]. Stringer, L.C., Reed, M.S., 2007. Land degradation assessment in southern Africa: integrating local and scientific knowledge bases. Land Degradation and Development 18,99-116
[39]. Thrift, N., 1985. Flies and germs: a geography of knowledge. In: Gregory, D., Urry, J. (Eds.), social Relation and Spatial structures. Macmillan, London
[40]. Trollope, W. S. W et al. (1990). Veld and pasture management terminology in southern Africa. Journal of grassland Society of South Africa 7(1):52-61
[41]. United Nations convention to combat desertification 2005. Land degradation neutrality
[42]. Veitayaki, J. 2002. Taking advantage of indigenous knowledge: the Fiji case. International Social Science Journal 173:395-401
[43]. Weible, C., Sabatier, P.A., Lubell, M., 2004. A comparison of a collective and top- down approach to the use of science in policy: establishing Marine protected Areas in California. The policy Studies Journal 32(2), 187-207.
[44]. Woodley E (1991). Indigenous ecological knowledge systems and development. Agric Human Values 8:173-178