

INDIGENOUS KNOWLEDGE, SCIENCE AND TECHNOLOGY :

An overview

Prof. Rohana Ulluwishewa
Department of Geography
University of Sri Jayawardenepura

WHAT IS INDIGENOUS KNOWLEDGE ?: Knowledge is 'understanding and familiarity gained by experience' (OALD, 1989) and according to Roling and Engel (1991), 'knowledge occurs between the ears, a property of mind. It cannot be heard, seen or touched'. Indigenous knowledge (IK) is often defined as local knowledge that is unique to a given culture or society. It is the basis for agriculture, health care, food preparation, education, environmental conservation, and a host of other activities. Much of such knowledge is passed down from generation to generation, usually by word of mouth (Warren, 1989). IK is also known as local knowledge, people's knowledge, folk's knowledge, traditional knowledge, traditional wisdom, non-western knowledge and traditional science.

IK is generated by people through their day-to-day experience when they face the challenges of nature and society. Most of it is not documented but embedded in culture in various forms such as cultural practices, customs, traditions, religious and spiritual beliefs, rituals, ceremonies and folk stories and songs. It is a knowledge system which has evolved in a given locality, and it describes how to face and win the challenges of nature and society of the locality of its origin. Therefore, IK is the knowledge of a given location, and it, as its existing form, cannot be generalized and

globalised. Hence, it is location-specific and less applicable outside its original locality. IK is also coded in local terms of local languages, and therefore, it is, very often, not standardized and cannot be understood by outsiders.

CULTURE : STORE- HOUSE OF INDIGENOUS KNOWLEDGE Culture is defined as the complex whole which includes knowledge, belief, art, morals, law, customs, and any other capabilities and habits acquired by man as a member of society. As mentioned before, IK is stored in culture in various forms in which it has been evolved. It is related to the entire culture of the given community, including its identity, spiritual and religious beliefs. Hence, IK and culture are inseparable. Local people see IK as part of their overall culture and vital to their survival. Some argue that more culture is more wealth, that having more know-how, more languages, and more centres of interest enriches indigenous people, as well as enriching in the process the rest of the country's citizens and some segment of humanity as well (Davis and Ebbe, 1993).

IK is preserved by the local people not because of its potential economic value, but because it is vital to meet their day-to-day survival needs. While preserved in the given culture, IK is being fed by both knowledge systems adopted from external cultures and inventions created by the community itself. Therefore, IK is, very often, in a changing and developing process. Hence, it is dynamic rather than static. Any IK system is preserved as long as the culture of the given community is preserved. When the culture is subject to internally generated changes the

IK is also changed, but not destroyed. However, if a culture is subject to externally generated drastic changes, the stress enforced on culture, causes destructive effects on culture as well as IK. When culture is destroyed, the IK system embedded in it is also destroyed.

INDIGENOUS KNOWLEDGE AND SCIENCE:

IK is different from science in a number of ways. Science is defined as an organized knowledge obtained by observation and testing of facts about the physical world, natural laws and society (OALD, 1989). Scientists explore nature and human communities in order to identify laws which describe relationships between various phenomena, seek explanations for the identified relationships and subsequently build theories which are then used for making predictions and designing technologies, the practical applications of knowledge. Local people too, similar to scientists, explore nature and society within the limits of their localities, but not as organized research. They explore nature and society as a part of their daily life and of their struggle to survive.

Science is generated by professional scientists whereas IK is generated by local people. While science is a knowledge system of capitalist market economies, IK is that of subsistence economies. Therefore, IK based technologies were designed for small-scale production to meet family needs. But on the other hand, science based technologies were designed for mass production to cater national and global markets. Local people have produced to meet their daily needs which were relatively few due to the low population and their simple way of life. They could produce to meet their needs without trying to dominate and exploit natural resources excessively. They have developed technologies which act

in harmony with nature. However, science enables people to dominate nature and exploit natural resources. It was deemed to be necessary in the modern society to meet increased human needs in the modern society.

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Local people too, through their interactions with nature and society, understand the relationships between various phenomena, but perhaps, unlike scientists, they do not search for detailed explanations. At large, the identified 'relationships' remain as beliefs, without a detailed knowledge of rational explanations. As long as the beliefs perform to the level of their expectations, there is no need to seek rational explanations. Therefore, IK remains descriptive. Rational explanations are required when commodities are produced for market. When an economy is transformed from subsistence into a market one, producers begin to seek rational explanations for the identified relationships. Then, scientific inquiries begin to play an important role¹.

CRITICISMS AGAINST SCIENCE:

However, the popular belief that science and its technologies are universal is now being challenged. Both science and IK have been originated in certain locations, and therefore both are, in definition, location specific. But, science claims to be universal because (1) it travels fast and hence can be found everywhere on the globe, and (2) it can be

applied outside its original location. However, some argue that science is applicable everywhere not because it is universal but because we change the world to suit it [science]. Scientific theories are deducted from experiments which are conducted under artificial conditions created in laboratories or experimental farms. Therefore, scientific knowledge is replaceable anywhere on the globe where the same artificial conditions have been created.

It is also hard to justify the use of science as a yardstick to measure validity of IK, because science itself is a relatively young discipline which is still developing. It still has a long way to go. It has been evident that what is accepted once as a scientific truth, is later found to be untrue. Some argue that science is a subject of dead matter because in science, conclusions are drawn from experiments and analysis which have been done using dead matter. Hence, in science, 'life' and the spiritual elements of life are not taken into account. Science is objective and based on materialism, and therefore can deal only with the material world. On the other hand, IK deals with both the material and the spiritual world. Since it cannot deal with spiritual elements, science rejects a part of the IK which is based on spirituality; as myth.

It is also said that science is responsible for today's environmental crisis. Before modern science came into existence, nature was considered as a living mother who nurtures all living beings including plants and animals by providing air to breathe, water to drink, and food to eat. Therefore, it was believed that she should be given due respect, honour and protection if the human kind is to survive. However, science changed this attitude. Science views nature as an inanimate object which can be manipulated by humans for their benefits. It

has reduced nature from the status of a living mother to an inanimate machine, a pool of resources and a man's slave which is separable, manipulable and exploitable. Science explores nature and tries to understand it, and thereby dominates it to use nature for the benefit of humans.

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MARGINALIZATION OF INDIGENOUS KNOWLEDGE :

IK is used by its creators and bearers themselves, in the place of its origin. Since it is less applicable outside its place of origin, it has no market value. But science is generated by professional scientists and it is claimed to be universal. Science and science-based technologies are sold to its users, the capitalist producers. Therefore, scientific knowledge is perceived as a commodity and an income-generating asset. If this commodity (scientific knowledge) is to be marketable, it should be globally usable. Therefore, unlike IK, scientific knowledge is made standardized and systematic so that it could be globally understandable. Being a commodity, science travels fast. But IK which is less applicable outside its place of origin, is deeply rooted and tied to the culture of its original place, and hence does not travel fast.

Science multiplies itself rapidly, because it has to search for solutions for the problems which have been created by itself. For instance, use of technologies produced by science to dominate nature causes 'new' problems, e.g. environmental degradation, health problems etc. Seeking solutions for 'new problems' calls for further scientific

research which leads to enhancement of science and creation of further advanced technologies. Hence, science is self-multiplying unlike IK which advocates living with nature. IK was designed to prevent such problems rather than to heal. Therefore, IK is generally incapable of dealing with most of the new problems which have emerged as a result of human interference in nature.

Science, by virtue of its self-multiplying nature, offers solutions to the problems it creates. Hence, scientific knowledge is becoming more and more demanded and marketable. However, on the other hand, the IK, since it often cannot offer solutions to the new problems, is increasingly becoming redundant and marginalized. Modern society prefers knowledge systems and technologies which involve less work and bring quick results. IK and IK based technologies generally involve hard work and it does not bring quick results. Furthermore, it is a common fashion that IK is justified by scientific yardstick, and the IK that cannot be proved by science, is branded as myth. At present, a large share of IK is considered as myth and are increasingly being condemned and rejected. This is particularly true with regard to the present young generation who have been trained and educated with western knowledge. In the modern society in which everything is measured in terms of its market value, IK is increasingly losing the place it had in the society.

POTENTIAL OF INDIGENOUS KNOWLEDGE FOR SUSTAINABLE DEVELOPMENT:

However, since recent times, many scientists, academics and policy makers are beginning to realize the potential value of IK for sustainable development. Local people have a wide knowledge of the ecosystem they live in and ways to ensure that natural resources are used sustainably. Therefore,

IK which had been accumulated over centuries has potential value for sustainable development. It can help other people learn how to live in harmony with nature and the environment in a sustainable fashion. The potential values and suggested applications of IK for sustainable development can be summarized as follows:

- (1) Historical evidence proves that some local people have utilized natural resources over centuries without impairing their capacity to support the community and their successive generations. Therefore, IK of natural resources management could provide valuable information base which could be used in the management of natural resources for sustainable development.
- (2) If development is to be sustainable, the development projects should always involve local people as partners so that they could participate fully in designing, planning, implementation and evaluation. Use of IK for development projects facilitates the participation by local people.
- (3) The knowledge developed by local people over centuries can be integrated with modern scientific knowledge in order to create appropriate knowledge systems and technologies leading to sustainable development. Agro-forestry is one example.
- (4) Communication gap that exists between project personnel and local people often impedes sustainable development. IK can facilitate communication by providing a better understanding of how people perceived their environment and organize their perception.

But, IK is, very often, not known by development professionals because today it remains only in the memory of local groups in remote areas. It is also highly fragmented, dispersed and not always documented. Such knowledge is being lost with each succeeding generation because the younger generation may not be prepared to adopt IK systems which have been practised by their ancestors. It is being forgotten as its place is taken by modern scientific knowledge, technologies and education. It is often ignored and condemned by many, claiming that it is not scientific. As pointed out earlier, IK is in some cases, less effective and incapable of dealing with modern problems. Above all, people who are already accustomed to modern technologies which are easy and comfortable, are unlikely to return to IK based technologies.

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PRESERVATION AND USE OF INDIGENOUS KNOWLEDGE:

There is a controversy on how IK should be conserved: in-situ or ex-situ conservation? In-situ of IK may be possible in a situation where the local communities remain isolated without being strongly influenced by modern cultures, and they are still interested in preserving their cultural heritage. In such a case, the following measures may contribute to the preservation of IK.

- ⌘ Preservation of local culture
- ⌘ Strengthening of local social institutions

- ⌘ Empowerment of local people
- ⌘ Legal recognition of local people's right to their physical as well as intellectual properties
- ⌘ Use of IK and IK based technologies for development

Though in-situ conservation is the best way of conserving IK, it may not be possible to implement under many circumstances where local people have undergone drastic cultural changes. When a culture is changed due to modernization, IK embedded in the culture will also be replaced by modern scientific knowledge. In such a situation, the following measures may contribute to the preservation of IK.

- (1) **Blending IK with Modern Knowledge:**
Action should be taken to study local knowledge and local technologies with a view to understanding their scientific validity, and blend them with modern science in order to create and appropriate knowledge system. This is necessary because people in modern societies tend to accept only the knowledge systems which are consistent with science. It is suggested that the studies be undertaken with local people's participation, and the results should be disseminated into local communities.
- (2) **Documentation and Preservation of IK:**
Immediate action should be taken to document and preserve the IK systems of which scientific validity cannot be proved by scientific methods and discarded as myth (due to the limitations of modern science). Information on local setting (both physical and cultural) in which the IK system has evolved, should also be documented together with the knowledge system, because such information would be vital to

understand how the particular IK and IK based technologies did work and benefited the particular local communities.

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1. An example:

Local people grow Kohila (*Lasia spinosa*) in mud-holes in which the water drained from washing and bathing near the well is accumulated. They know the relationship between two phenomena: X=growing Kohila and Y=the mud-holes near the well. The IK with regard to growing Kohila is 'Kohila grows in the mud-holes near wells' or in other words 'X is related to Y'. However, as long as Kohila grows in the mud-hole near the well and its yield is adequate to meet their family needs, they do not want to bother to seek rational

explanations for the question why Kohila grows in that particular location or in other words 'why X is related to Y'. Therefore, IK remains descriptive.

However, such a descriptive knowledge becomes inadequate if Kohila is to be grown for the market, because large scale Kohila cultivation calls for a knowledge which explains the relationship between X and Y : what type of soils and what amount of soil moisture are required for Kohila cultivation. Such a knowledge is necessary when a vast area is to be made suitable for Kohila cultivation. It is at this point that one has to go beyond the scope of indigenous knowledge, and to seek rational explanations: why X is related to Y ? Once the rational explanations are found they are standardised and expressed in global terms, and it becomes 'science'. It may be a statement like this: 'Kohila can be cultivated on such and such soils with such amount of moisture under tropical conditions'. Then the 'science' is used to produce a package of technology which is subsequently sold to the potential Kohila producers.

Modern Kohila farms are different from traditional way of Kohila cultivation in mud-holes near wells. The traditional Kohila mud-holes are natural ecosystems whereas the modern large-scale Kohila farms are mono cultures in which Kohila is cultivated under the environmental conditions which have been artificially created by using advanced technologies. Therefore, modern Kohila farms are highly vulnerable to diseases and pest problems which call for technological solutions. In order to seek such solutions, scientists will start to conduct research and it further contributes to the development of science. Thus, scientists have to continue to do research in order to seek solutions to the problems created by science itself. Therefore, science is self-multiplying.