International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182 Print ISSN: 2349-5979
www.allsubjectjournal.com
Volume 2; Issue 11; November 2015; Page No. 522-526

Local community: Indigenous knowledge of agriculture system

(A case study of Tons Valley and Upper Yamuna Basin)

Anil Dutt, Rajendar Prasad Tiwari
Research Scholar Dept. of Geography. H.N.B.G.U. Srinagar.

Abstract
Indigenous Knowledge is the information base for a society, which facilitates communication and decision-making. Indigenous information systems are dynamic, and are continually influenced by internal creativity and experimentation as well as by contact with external systems.
Indigenous Knowledge have originated from indigenous people, for instance in medicine and veterinary medicine with their intimate understanding of their environments. Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people's cultural values. Indigenous knowledge is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own lives. It has significant contributions to the development and is equally essential for sustainable development.
Today, many indigenous knowledge systems are at risk of becoming extinct because of rapidly changing natural environments and fast pacing economic, political, and cultural changes on a global-regional and local scale. Practices vanish, as they become inappropriate for new challenges or because they adapt too slowly. However, many practices disappear only because of the intrusion of foreign technologies or development concepts that promise short-term gains or solutions to problems without being capable of sustaining them. The tragedy of the impending disappearance of indigenous knowledge is most obvious to those who have developed it and make a living through it. But the implication for others can be detrimental as well, when skills, technologies, artifacts, problem solving strategies and expertise are lost.
Study Area is marginal regions occupied by marginal societies have strong adaptation capabilities to the environment. The region has a highly developed traditional knowledge system.

Keywords: community, agriculture system

Introduction

Indigenous Knowledge

The indigenous knowledge is receiving increasing attention by academia, but the development institutions have not yet developed a unanimous perception towards the concept of indigenous knowledge. None of the definitions is essentially contradictory; they overlap in many aspects.
Warren (1991) and Flavier (1995) present typical definitions by suggesting: Indigenous knowledge (IK) is the local knowledge – knowledge that is unique to a given culture or society. It is the basis for local-level decision making in agriculture, natural-resource management, and a host of other activities in rural communities. (Warren 1991)
Indigenous Knowledge is the information base for a society, which facilitates communication and decision-making. Indigenous information systems are dynamic, and are continually influenced by internal creativity and experimentation as well as by contact with external systems.
While using similar definitions, the conclusions drawn by the various authors are that, the basic component of any country's knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood.

Importance of Indigenous Knowledge

Indigenous Knowledge have originated from indigenous people, for instance in medicine and veterinary medicine with their intimate understanding of their environments. Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people's cultural values. Indigenous knowledge is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own lives. It has significant contributions to the development and is equally essential for sustainable development.
Today, many indigenous knowledge systems are at risk of becoming extinct because of rapidly changing natural environments and fast pacing economic, political, and cultural changes on a global-regional and local scale. Practices vanish, as they become inappropriate for new challenges or because they adapt too slowly. However, many practices disappear only because of the intrusion of foreign technologies or development concepts that promise short-term gains or solutions to problems without being capable of sustaining them. The tragedy of the impending disappearance of indigenous knowledge is most obvious to those who have developed it and make a living through it. But the implication for others can be detrimental as well, when skills, technologies, artifacts, problem solving strategies and expertise are lost.
Indigenous knowledge is part of the lives of the rural poor; their livelihood depends almost entirely on specific

skills and knowledge essential for their survival. Accordingly, for the development process, indigenous knowledge is of particular relevance for the following sectors and strategies:

- **Agriculture**
- **Animal husbandry and ethnic veterinary medicine**
- **Use and management of natural resources**
- **Community development**
- **Poverty alleviation**

Indigenous knowledge is not yet fully utilized in the development process.
Indigenous knowledge is relevant on three levels for the development process.

- It is, obviously, most important for the local community in which the bearers of such knowledge live and produce.
- Development agents need to recognize it, value it and appreciate it in their interaction with the local communities. There is need to understand it – and critically validate it against the usefulness for their intended objectives.
- Lastly, indigenous knowledge forms part of the global knowledge. In this context, it has a value and relevance in itself. Indigenous knowledge can be preserved, transferred, or adopted and adapted elsewhere.

No doubt that the indigenous knowledge would contribute to solve existing problems and achieving the objectives of sustainable development. To foster such a transfer a sound understanding of indigenous knowledge is needed. This requires means for the capture and validation, as well as for the eventual exchange or transfer and dissemination of indigenous knowledge.
Traditional knowledge & Resource Management in the Himalayan Region

Historical, Cultural and Social Perspectives

The Himalayan hill range of Uttarakhand comprises two hill zones, Garhwal and Kumaon. References to Garhwal are found in the *Skanda Purana* (Kedarkhanda) and the *Vanaparva* in the *Mahabharata*. The hill tract of Garhwal in those days was known as 'Himvat'. It is the expression of divinity, meditation, penance and attainment. Garhwal is a constant source of spiritual attainment where people come to visit ancient holy places for realising their *moksha*.
In the Garhwal region the Ganga, Yamuna, and many rivers and rivulets are seen in their blissful infancy. Garhwal has a galaxy of peaks and glaciers, a vastness of meadows and valleys which have no parallel in the world. High mountain peaks, complexities of altitude, physiographic features and geological structure, adds to the peculiarities of this region.
Each Valley has its own significance in view of its culture and traditions. In the Himalaya there were vast resources of forest, scenic beauty, agriculture, horticulture, minerals and, above all, hardy and painstaking people with their rich cultural heritage.

Study Area

Tons Valley, Upper Yamuna Basin, Uttarakhand Himalayas is selected as a study area for a number of reasons.
First, the Tons valley, upper Yamuna basin, has various types of landforms – upland and lowland. The regional geo-environmental systems have played a constaining role for the Societies and communities.
Second, it has very diverse biophysical and socio-economic features. Societies and communities in this region are well adapted to the environmental constraints of the Himalayan region.
Third, these marginal regions occupied by marginal societies have strong adaptation capabilities to the environment. The region has a highly developed traditional knowledge system.
The Tons Valley, Upper Yamuna Basin, is a mountainous territory. It has very diverse biophysical features with a number of glaciers, glacial lakes, Mountain Rivers and narrow valleys. The region has rich biodiversity and contains the least exploited and least damaged ecosystems. The fragile environmental system is of the region is very sensitive and environment is vulnerable to degradation.
The upland areas of the region are marginalized with a relatively low population density. It has high incidence of poverty and little socio-economic infrastructure.
The resource use pattern is closely linked with forests, cultivated land and livestock. All the people are relying on natural resources (especially forest, water, arable land and pasture) for their livelihoods. The agriculture is mainstay of the people which is interlinked with other subsidiary activities such as animal husbandry, horticulture etc.
The farmers adopt subsistence farming systems which is characterized by substantial diversity. Three types of land use patterns are; intensive lowland agriculture in the plains areas; mixed farming, animal husbandry, horticulture and agro forestry in midland areas and transhumance or seasonal herding of animals in highland areas.
People across various agro-ecological regions have come up with the indigenous technologies, unique in mode, to match the potential of specific region. The 'mountain agriculture' developed by the people of the region for the conservation and management of natural resources has high potentiality to adapt to hares environment. Adaptations of communities to the changing circumstances in diverse agro-ecological and socio-economic conditions are has facilitated sustainable agricultural development, food security, and environment protection.

Methodology

Indigenous knowledge is nowadays commonly used in agricultural innovation, generally, methodological tools used are: individual farmer interviews, village-based interviews to do mostly with farmer-to-farmer.
A wealth of traditional knowledge could be harnessed through their cooperation. Their experiences are required to be shared and discussed to promote technology for development. Therefore the farmers, traditional wisdom will be documented. Information will be collected with respect to the social and historical perspective of the Garhwal region too.
The very local character of the knowledge; their own learning environment and evolution, similarly proposes based on micro-scale emphasizes the necessity for the creation of Indigenous Knowledge system. There is need for development of expert information systems, based on the best local knowledge.

Village Level Participatory Approaches (VLPA) on experiences and practices of Villagers of their indigenous knowledge helps in identification, analysis and verification of farmer innovators. The present study will use participatory rural appraisal (PRA)

Farmers will be interviewed to obtain information on traditional knowledge. Individual contacts will be made and questions will be asked about traditional systems in the villages. Representation of women among the farmers will also be ensured. By means of informal interviews and interaction with old and young farmers and farm women, responses will be recorded for critical analysis.

In order to educate young farmers, elders communicate innovation through proverbs, short stories and examples. How traditional knowledge is transmitted from one generation to another will also be documented.

The objective of the study

Primary objective is to assess the risk to the indigenous knowledge-based farming systems and vulnerability of mountain communities to externally induced change; the main aim of the study is to suggest the method to reduce vulnerability of mountain communities to externally induced change;

Evaluates the importance of indigenous knowledge-based farming systems, more particularly its geo-ecological significance; prepare a geo-environmental information system of indigenous knowledge.

Documentation of indigenous knowledge; Examine the vulnerability of societies and communities of the Himalayan region to the impacts of externally induced change.

Suggest the method of conservation and development of indigenous knowledge for continued adaptation to changes; assist in formulating an integrated strategy for the conservation and development of indigenous knowledge; Prepare guidelines for 'regional conservation and development programmes.'

Approach of Study

A case study approach will be used to examine the traditional knowledge of societies and communities of the Himalayan region.

The case study is a preferable approach when research questions are where and 'how'. It is useful in examining and explaining processes that led to the adaptation to hares and negative environment of the Himalayan region. In this research, the main question is how the societies and communities adapted and developed their own 'regional adaptation programmes

Indigenous Knowledge and Traditional Agriculture

All human societies have exploited their environment for their existence and survival. At the same time, ecology and economy has been held in fine equilibrium. The livelihood of the Himalayan people is totally dependent on their ecological surroundings. Diverse livelihood options stems from the use of forests, pastures, and crop lands such as, crop production and animal husbandry. It contributes towards enhancing the livelihood options of the people.

In a real sense, every culture of a social system, traditionally, is the result of people's action to survive and their attempts to optimize the use of available resources, i.e., soil, water and vegetation. Traditional knowledge has a sound base as it has been tested and practiced over the years. It is appropriate technology in particular geo-environmental conditions and in the living conditions of people.

A diversity of cultures and production systems has evolved across the Himalayan region to deal with its extraordinary ecological diversity. These systems were in ecological balance to a great extent and were in position to meet local and regional demands. The indigenous system of natural resource management in 'mountain agriculture' unique in mode, to match the potential of specific region for the conservation and management of natural resources, continues with prevailing farming systems. A few noteworthy examples include the following; terracing and bunding, rain water harvesting, use of local plant species, cultivation of rain fed rice and rice transplantation, rotational grazing and seasonal herding of highland animals. Communities have traditionally had a keen interest in the use and protection of natural resources. Communal management, risk mitigation and coping strategies were a common feature of these traditional agricultural systems.

Use of tradition crops and local plant species has evolved and lived for generations in sustaining the livelihoods of mountain communities. This is particularly important to maintain the biodiversity in the region. Indigenous communities have also been practicing/using organic farming through the centuries. Traditional agricultural systems are important in sustaining the natural resource management through the built-in community cohesion.

Conservation is basically part of 'Mountain culture'. It is therefore not unexpected that in the historic past Uttarakhand had a tradition of giving highest attention to the conservation of biodiversity. Community participation in natural resource management for agriculture, seed conservation and seed exchange is common to the socio-cultural practice of management of traditional agro-ecosystems and traditional agro-biodiversity.

Many of the traditional crops are grown under marginal conditions and often provide strong adaptation to the local environment. The traditional practice of mixed cropping, cultivation of many crops in same agricultural field at the same time has potentiality to reduce vulnerability of farming communities to the vagaries of nature. Thus, these marginal regions occupied by marginal societies still have lower vulnerability to the vagaries of nature.

Traditional knowledge is proven technology for natural resources management. The science of natural resource management is based on the Traditional values which are sustainable in nature and ecologically sound traditional wisdom of farmers and its contribution in augmenting productivity.

It is obvious that traditional practices of agriculture may disappear unless their values are promoted.

Farmers' Traditional Knowledge of Agriculture

Farmers' traditional knowledge of agriculture includes tested technologies in the field. They use a special type of traditional plough. Other types of 'improved' ploughs do not work in the hills as the soil is gravelly and not deep.

Under rain fed conditions farmers in hill regions plough their land several times before the onset of rain to conserve water and increase water retention capacity.

Farmers plough their land straight instead of in circles and open parallel furrows for rainwater harvesting and retaining moisture.
Farmers of hill regions prefer mixed cropping for minimising risks under rainfed conditions and creating ground cover for checking runoff and soil loss.
They grow legumes with maize and ginger or turmeric with maize. After sowing ginger and turmeric, farmers use paddy straw, wheat straw or leaf litters as mulch to ensure proper germination.
Farmers do not practise weeding and interculturing in the maize crop because of soil conditions and the requirement of fodder in the rainy season.
Farmers of the Garhwal hills store seeds by selection for different plots with special identification and use them in those particular plot.
In lowland valley floors they grow paddy and irrigated wheat and in uplands they take rainfed rabi crops.
In the hills farmers grow mainly *mandua*, *jhangora* and *guar*. Because of recent developments they have been attracted towards off-season vegetables, e.g., peas, tomatoes, etc.

Manure and Manuring
In view of the soil's condition and texture the farmers of the hill region use farmyard manure in the fields before sowing. In lowland areas, for paddy they do green manuring also. Use of chemical fertilisers has increased but people retain their belief in traditional methods.
Farmers do not dig compost pits for the collection of cow dung, residues and garbage. Instead of pits they accumulate the matter in heaps in the open for decomposition. The reason behind it is that decomposition is slow due to low temperature and little sunshine. In pits compost would not get ready in time. In the open rapid decomposition takes place. This practice is traditional but has a scientific basis.

Vegetative Measures for Natural Resources Management
Hill farmers grow trees of economic value and suited to their requirements. In order to have conserve soil and water they grow grasses for ground cover and Shrubs like *bagrera* are grown, and in wild form are available *bhang*, etc. they grow trees to meet fuel and fodder requirements.
For the development of horticulture the trees grown are citrus, mango, guava, pear, peach and plum. In the hill areas, at higher elevations peach, pear, *khumani* and apple are grown. Because of undulating topography and climatic conditions in the hill ranges, these have tremendous potential for economy.

Women's Knowledge in Management of Resources
Women in the Garhwal hills are architects of the rural economy. They are devoted to agriculture, animal husbandry, dairying, child-rearing, cooking, fodder and fuel management, etc. For centuries, women's knowledge of nature's various products have paved the way for sustainable development.
Women have used locally available technologies and natural products and locally and commonly available knowledge for water purification. (Shiva 1988)
In hills, practically, each terraced field has a row of fodder trees along its edge. The household women manage these carefully for procuring maximum leaf fodder yields through lopping. They know when and how to lop without damaging the main tree (Sarin and Khanna 1991). When women lop trees they enhance the productivity of the oak forest under stable conditions.
Older women train the younger ones in the art of lopping. Groups of women and old people go together to lop fodder and develop expertise by learning by doing (Shiva 1988).
Farm women know the nutritional needs of their families. That is why women in Garhwal continue to cultivate *mandua*. They say that without their *mandua* and *jhingora* they could not labour as they do. These grains are their source of health and strength

Watershed Management
During the ancient period, village boundaries were decided upon on a watershed basis by the expert farmers in the villages. Such boundaries were socially acceptable to all the members of the system. Such age-old village boundaries are fixed at the common point of the drainage system in between two villages. It is still in vogue and people do not go beyond the limits of their hydrological boundaries.

Irrigation
Farmers use to carry water to their fields through small irrigation channels known as *gul*s. These go from the source of water along the slopes to the fields. By means of gravitational force they transport irrigation water from its source. In hills it is difficult to construct *gul*s for all the terraces, narrow nalies are convenient in transporting water to every field. In order to make judicious use of water, they use rotational irrigation. In the Garhwal Himalaya farmers use tree trunks as rainwater irrigation channels by taking care of undulating topography and checking seepage losses

Water Harvesting
The region of Garhwal comes in the high rainfall area and in the lack of proper management system most of the rainwater goes waste as runoff. Farmers of the hill region have their traditional technology for making small dug-out ponds to harvest rainwater. They construct such ponds at several places and use the water for survival or for supplemental irrigation.

References

1. Altieri MA, Merrick LC. In situ conservation of crop genetic resources through maintenance of traditional farming systems, Economic Botany, 1987, 41(1).
2. Babu SC, Rajasekaran B. Agroforestry, Attitudes towards Risk and Nutritional Availability: A Case Study of South Indian Farming Systems. Agroforestry Systems, 1991, 15(1).
3. Babu SC, Warren DM, Rajasekaran B. Expert Systems for Utilizing Indigenous Technical Knowledge in Farming Systems Research: The Case of Crop Varietal Selection. In D. M. Warren, L. J. Slikkerveer, and D. Brokensha (eds.) The Cultural Dimension of Development: Indigenous Knowledge Systems, London: Intermediate Technology Publications (in press), 1994.
4. Badri B, Badri A. Women and biodiversity, Development, Journal of SID, 1994, 1.
5. Ellen R, Harris H. Concepts of indigenous environmental knowledge in scientific and development studies literature - A critical assessment; draft paper East-West

Environmental Linkages Network Workshop Canterbury, 1996, 3.
6. Flavier JM. The regional program for the promotion of indigenous knowledge in Asia, in Warren, D.M., L.J. Slikkerveer and D. Brokensha (eds) the cultural dimension of development: Indigenous knowledge systems. London: Intermediate Technology Publications, 1995, 479-487
7. Mathias E. Framework for enhancing the use of indigenous knowledge, Indigenous Knowledge Monitor, 1995, 3(2).
8. Mundy P, Compton L. Indigenous Communication and Indigenous Knowledge. Development Communication Report, 1991, 74(3).
9. Rajasekaran B, Warren DM. Indigenous Rice Taxonomies and Farmers Rice Production Decision-Making Systems in South India. In D. M. Warren, L. J. Slikkerveer, and D. Brokensha (eds.) The Cultural Dimension of Development: Indigenous Knowledge Systems, London: Intermediate Technology Publications (in press), 1994.
10. Rajasekaran B, Whiteford MB. Rice-Crab Production in South India: The Role of Indigenous Knowledge in Designing Food Security Policies. Food Policy, 1992, 18(3).
11. Rajasekaran B, Warren DM, Babu SC Indigenous Natural Resource Management Systems for Sustainable Agricultural Development - A Global Perspective. Journal of International Development, 1991, 3(4).
12. Warren DM. Linking Scientific and Indigenous Agricultural Systems. In J. L. Compton, (ed.), *The Transformation of International Agricultural Research and Development.* Boulder: Lynne Rienner Publishers, 1989, 153-170.