

## Indigenous Farming: Sustaining Ecosystem in Darjeeling

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### Abstract

Sustainability and conservation of natural resources are constantly threatened by a possibility of improper human intervention that is focusing their attention on the use of scientific and technical knowledge in agricultural activities. Optimum utilization of available resources in the Darjeeling Himalaya can very well be achieved through environmentally sound and sustainable farming practices. The tribal communities of Darjeeling unknowingly possesses some of the solutions for a more sustainable future of agriculture with their indigenous farming methods. Indigenous farming practices are embedded in local knowledge system constituted by subsystems like crop production, animal husbandry, environmental factors etc. A variety of crops like maize, ginger, pulses, potatoes etc., are planted by the farmers and within the vicinity of the households the farmers make compost with animal remains and forest litter. Resource conservation through indigenous farming system by traditional knowledge includes: sustainable land use planning, agroforestry practices, and management of water and livestock-based farming. Indigenous knowledge of the farmers helps them to be aware of the weakening balances on the environment due to intensive use of agro chemicals.<sup>1</sup>

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**Keywords:** Sustainability, Land Use Planning, Agroforestry, Management, Livestock Farming

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### Introduction

Science alone cannot do the justice in providing sophisticated knowledge of the natural world . The credit also goes to the human societies in developing rich sets of experiences through the traditional practices in relation to the environment they live in. These traditional practices are known as "Indigenous Knowledge Systems". The local knowledge consist of sets of information that guides the human society in providing proper understanding regarding agriculture and animal husbandry; hunting, fishing and gathering; struggles against disease and injury; and strategies to cope with the dynamic environments.<sup>2</sup> Indigenous knowledge is defined as the grouping of learning and techniques rising out of the specific conditions of populations and communities, which are native to a particular geographical area. Use of indigenous knowledge in agricultural techniques provides food security, which has become a growing concern

1 D. Mukherjee, *Journal of Crop and Weed*, Resource Conservation through indigenous farming system in the hills of West Bengal, 2012.

2 D. Nakashima, L. Pratt, and P. Bridgewater, *Tapping into the World*, UNESCO Sources, 125, July-August, p. 12, 2000.

for the governments of the developing nations.<sup>3</sup> Indigenous farming system is the one in which the household or the community people play a crucial role in arranging those farming activities, which fulfill the needs of the family. The traditional farmers take up various farming system based on agriculture, horticulture, pastures and forestry which are bewitched by geographical and climatic factors.<sup>4</sup>

It is said that the agriculture conservation can be achieved by the cohesion of ecological management with the use of both modern and traditional methods of agriculture. The use of indigenous farming system in the eastern himalayas is gaining importance due to increasing degradation of the hill slopes.<sup>5</sup> Agro forestry can be used as collective term for the efficient land use management and systematic growing of trees along with crops and livestock farming.<sup>6</sup> It is also believed that adversities of nature lead to the innovation of farming practices that use ecological and sustainable technical solution.<sup>7</sup> When local knowledge is used in the farming activities which is unique to culture and society, then it is known as indigenous farming system. This knowledge is passed from generation to generation, usually by word of mouth and cultural rituals, and has been the basis for agriculture in many parts of the world. The farmers practicing indigenous framing system rely on biodegradable waste and inputs. So without the aid of modern farm inputs such as chemical fertilizers and plant protection chemicals the farmers have been able to produce food crops on a sustained basis year after year keeping the ecology around them intact.

## **Objective**

The general objective of the study is to appreciate indigenous perspectives on ways of farming and using farming resources sustainably. Following are the specific objectives:

Firstly, to investigate and document indigenous knowledge on agricultural practices of rural households in remote communities. Secondly, to determine the values and beliefs on which traditional agricultural practices are based. Thirdly, to identify strengths and limitations of the indigenous knowledge on agricultural practices as they impact on human development and environment. Fourthly, to determine how specific traditional farming practices could be strengthened to promote sustainable development and livelihood security.

3 R. M. Dlamini, "Investigation of Sustainable Indigenous Agricultural Practices", published online in [www.hdl.handle.net](http://www.hdl.handle.net), 2007.

4 J. R. Subba, "Indigenous Knowledge On -recourses management for livelihood of the people of Sikkim", published online in [www.nopr.niseair.res.in](http://www.nopr.niseair.res.in), 2008.

5 D. Mukherjee "Resource conservation through Indigenous Farming System in the Hills of West Bengal, published online in *Journal of Crop and Weed*, available online in [www.cabdirect.org](http://www.cabdirect.org), 2012.

6 G. Sharma and T. Dhaka, "Opportunities and challenges of the globally important traditional agriculture heritage systems of Sikkim Himalaya", published online in [www.sikkimforest.gov.in](http://www.sikkimforest.gov.in), 2009.

7 E. Mallord "Unusual Farming Systems in the World Ecology and Society in Traditional Agriculture", published online in [www.fao.org/docrep](http://www.fao.org/docrep), 2009.

## **Case Study of Darjeeling**

The study area is Darjeeling, which forms a significant part of the eastern himalayan region. Darjeeling is characterized by a diversity of farming practices that have been developed and nurtured through many generations. People of Darjeeling gained this knowledge and developed skill through experience and learning by doing. Darjeeling is the northern most district of the state of West Bengal in India. It is located on the lap of the himalaya. The district comprises four subdivisions namely, Darjeeling Sadar, Kalimpong, Kurseong and Siliguri. Darjeeling Himalaya consists only of the first three subdivisions of the district and forms a significant part of eastern himalayan system. The fourth subdivision Siliguri is mainly characterized by the terai portion and foothills of the district. The district is bounded by state of Sikkim in the north, Nepal in the west and Bhutan on the northeast. The exquisite scenic grandeur and invigorating climate in the area have earned the place the title of "Queen of the Hill Stations".

## **Need of Indigenous Farming System**

In most of the Himalayan ranges soil erosion and land degradation are big problems. Available natural resources such as land, forests and water have continuously been degrading globally. Their picture at regional level too is dim. Yet indigenous farming practices including, crop, seed production and management had always motivated the agriculturists to develop an improved agriculturally fit technology. This becomes more necessary in hilly areas. Therefore, the resource conservation is of major importance for hilly and rain fed areas as it restores 'farm moisture' after recycling weed as green manure. Soil, water and vegetation are three basic natural resources. In order to manage land, water and vegetation, technical knowledge suitable to the specific conditions of a region was required. Darjeeling Himalaya farmers gained this knowledge and developed skill through experience and learning by doing. The Eastern Himalaya region is characterized by a diversity of farming practices that have been developed and nurtured through many generations.

The role of conservation agriculture in improving efficiency, equity and environment is well recognized and concerns have been raised at the global level to conserve natural resources for a better quality of life. This can be efficiently practiced by use of local indigenous and traditional knowledge. The idea behind conservation agriculture is the integration of ecological management with modern, scientific agriculture practice along with indigenous traditional knowledge (ITK) practices.<sup>8</sup> The design of farming system is the need of an hour that would permit continuous sustainable production and the same time well adapted to the requirements of farming community.

8 <http://www.google.co.in/url?url=http://cropandweed.com/vol8issue1/pdf2005/40.pdf>, accessed on 11.08.2013.

## **Indigenous Farming System in Darjeeling Hills**

Firstly, in the initial stage the severely eroded lands require complete forest cover of local origin coupled with protection from grazing. The local perennial tall tufted grass species *amliso* (*Thysanolaenaagrostis*) can reclaim and protect the degraded land, terrace risers, water ways, land between trees, and vulnerable points, provides fodder to animals in winter and spikes for brooms. Farmers take care to grow the crop on steeper marginal and fragile lands so as to minimize the soil erosion and landslides. Before restoration of degraded lands, the stabilization of landscape against erosion or slope failure is essential. It can be done through the grading of slopes and with an effective vegetation cover; the establishment of plants may control gradients without supplemental mechanical measures in protecting the landscape against water erosion.

Secondly, in Darjeeling, agro-forestry is an integral part of the farming system, where trees are integrated extensively with crop and livestock production. Traditional agroforestry systems in the Eastern Himalaya show the way to reconciling short-term food and livelihood needs with long-term environmental conservation and enhancement. The combination of trees, grasses, herbs and shrubs along with large cardamom plantation arrest the flow of water, reduce the risk of soil erosion and water pollution hazards. The following are indicators of the manner in which it has handed down over generations:

### *Cardamom based agro forestry*

The large cardamom based agroforestry system is observed to accelerate the nutrient cycling, increases the soil fertility and productivity, reduces soil erosion, conserves biodiversity, conserves water and soil, serves as carbon sink, improves the living standards of the communities by increasing the farm incomes and also provides aesthetic values for the mountain societies.<sup>9</sup> Hence, large cardamom agro forestry practice also supports conservation of tree biodiversity in the region.<sup>10</sup> Majority of cardamom plantations have himalayan *alder* (*Alnusnepalensis*) as shade trees since the combination of *Alnus* and cardamom is sympatric and may control gradients without supplemental has proved to be ecologically and economically viable.

### *Jhum system of cultivation*

Only Lepchas usually practice this system at high altitude of Rimbhik and Lava region. Normally jhum farmer cultivates jhum fields for two years within a nine-year cycle

9 S. Buckingham, *Synthesis Report on Cardamom Cultivation*, Fauna and Flora International Community based Conservation in the HoangLien Mountains, Darwin Initiative of the US Government in Vietnam, p. 76, published online in [www.tropecol.com](http://www.tropecol.com), 2004.

10 D. Mukherjee, *Association of Medicinal Plants with important Tree species in hills of Darjeeling*, published online in [www.ajouronline.com](http://www.ajouronline.com), 2008.

(1:4 ratio of cropping to fallow). But the alder system allows two harvests in two out of every four to five years (1:1 ratio of cropping to fallow). The farmers are able to improve the already declining jhuming system through the incorporation of a component, alder tree that is native and indigenous to the community.<sup>11</sup> This intervention results in minimized soil erosion, availability of more productive land, increased soil fertility and sustainable food production. The introduction of *alder* into the jhuming system under a five-year agricultural cycle could stabilize the system, with adequate nutrient recovery and make the system sustainable. Apart from nitrogen fixation, the production of nitrogen-rich litter and mineralization too contribute to biological build-up of soil fertility.

#### *Zabo Farming System (under rain shadow zone)*

The *Zabo* is an indigenous farming system in high altitude. *Zabo* means impounding of water. It has a combination of forest, agriculture and animal husbandry with well-founded soil and water conservation base. It has protected forest land towards the top of hill, water harvesting tank in the middle and cattle - pig yard and paddy for storage for the crops as well as for irrigation during the crop period. Seepage water accumulates by internal drainage system, which in turn enhances crop yield.

Thirdly, the hill farmers have developed the indigenous techniques of bamboo drip irrigation for irrigating crops in hill slopes. Bamboo and wood log pipes (*huburs*) of various sizes are made and used as prefabricated water management structures. The *huburs* are installed above 15-25 cm above the bed level of these fields in order to maintain proper water level.<sup>12</sup> For fish culture, a vertical pit is dug in the middle of the plot, so that the water remains in these pits even when it drains away from the surrounding fields. This system of tapping natural streams, making water courses, application and harvesting of water behind the bunds on wet terraces, and safe disposal is a good example of the indigenous understanding of natural resource conservation and management.

Fourthly, the rearing of different species of animals (cattle, sheep and goat, yaks, pigs, poultry, etc.) is done for draught, milk and meat purposes and these animals also provide manure to meet the crops requirement of nutrients. The production of dairy cattle on small land holdings in the rural area in conjunction with primary agriculture production creates employment and contributes substantially to domestic income and obtaining better utilization of farm resources. For better livestock the availability of

11 P. S. Ramakrishna, *Shifting Agriculture and Sustainable Development: An Interdisciplinary Study from North Eastern India*. MAB Book Ser., UNESCO, Paris & Parthenon Publishing Group, Carnforth, Lanesh., U.K. 4, Republished by Wiley Eastern, New Delhi, India, p. 42, 1992.

12 AK, Mishra, and U.C. Sharma, *Traditional Water and Land Management System of the Apatani Tribe*, Asian Agro-History, 3:185-94,1999.

fodder in plenty is necessary and we can avail it by adopting some indigenous methods like to encourage the propagation and planting of fodder tree species and grasses on village waste and marginal lands, community grazing lands, out scrub between and around the farm boundary etc. Leguminous fodder crops have the advantage of producing fuel wood as a by-product and it also enriches the site through nitrogen fixation, which helps in effective soil and water conservation.

### **Policy Implications**

The tribal farmers have some excellent informal wisdom based on their personal practices for doing the sustainable farming under risk prone agro-system. Tribal farmers are not only the practitioners and living authorities of local practices of soil, crops and pest management but also are repositories of indigenous wisdom. However, it is found that sustainability concept is better applied to irrigated agriculture and is not applicable to rain fed agro-ecosystem like that of Darjeeling. Sustainable agriculture requires the use of energy and inputs to maintain the environmental balance and at the same time to fit into stable economic, social and cultural conditions of the farming community. Therefore, the generation of sustainable agricultural technologies for risk prone agro-ecosystem is possible by grafting the scientist's wisdom on rootstock of farmers wisdom. The study also depicts that unless we use the farmer's wisdom towards farming system, we will not be able to bring about major changes in development of agriculture to provide it with sustainable base. On account of these conclusions, the following policy implications may be considered for promoting more sustainable agriculture. Firstly, planning and managing rural landscape on the concept of farming system to sustain the biodiversity and agro-ecosystem. Wherever appropriate, maintain wind breaks, use diversified cropping system, and adapt medicinal and ethnic fruits cultivation. Secondly, optimizing the use of local internal resources to the landscape while closing nutrients cycles by integration of productive system with local culture, needs and markets. Thirdly, by promoting and rewarding management based on indigenous farming system rather than solely scientific led system. Fourthly, expanding knowledge on the complexity of indigenous agriculture system and increasing rational use of local knowledge for sustainable natural resources management and livelihood. Educating the policy makers and planners about the value of local and indigenous knowledge systems in sustaining agricultural and natural resources can bring tremendous amount of development in agricultural process.

### **Conclusion**

In the context of several externalities of the fast changing world, global policies and prospects, the indigenous farming system in the Darjeeling Himalayas show successful examples of sustainable management of resources, goods and services. They also

provide many climate change adaptations. Indigenous Farming System is a mixture of natural and man made adaptive ecosystems developed by mountain societies - an evolving dynamic landscape management system that supports human needs providing ecological/economical sustainability to both upstream and downstream communities. The mountain farmers have been applying the traditional technologies to adapt in the changing situations at temporal and spatial scales. There is a need to take up detailed studies on every aspect of traditional farming system, which will help in the formulation of inclusive participatory conservation policies and programmes. This will help in mainstreaming the experiences in conservation and climate change adaptation to attain sustainable development in Darjeeling.