Agricultural Management to the Landslide Problem of Kalimpong Himalayan Subdivision in Darjeeling District, West Bengal State, India

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Landslide is a major problem in the Himalayas that can be caused due to deforestation, illegal mining, unplanned transportation and big dam construction.

Step cultivation is the right choice for mountain production system that could reduce scope for natural hazard.

Kalimpong Himalayas is that pocket that exists in vicinity of Nepal, Darjeeling, Bhutan and its foothill Duars, Sikkim and Chumbi valley of Tibetan Autonomous Territory, Barindland-Boikunthopur watershed (containing an Aryan Diaspora from Kashmir-Tibet region), and transnational Teesta River towards Rajshahi Division of North West Bangladesh.

This transnational territory still favours orange orchard instead of tea estates as in other places. Illegal coal mining on Damuna-Daling rock series, road construction and excess logging in Kalimpong has exerted lethal impacts on entire ecosystem. But step cultivation in terms of contour trenches and bench terraces, and special systems of water holding have proved positive in resisting soil erosion. Choice of crop and classification of soil are also important. Remote villages using solar energy are another important characteristic.

Introduction

Environment can be defined energy, mineral nutrients, air and water. A mountain environment, while similar in many respects, has some unique characteristics as it constitutes high and sloping lands, low laying valleys, forests and vegetations of various types as well as river beds and meadows. These unique features of mountain environments tend to be quite sensitive to disturbance and disruption by external factors. Therefore, environmental degradation is an adverse alteration of natural system's integrity, diversity and productivity. In an ordinary sense, an environmental degradation is a process of degeneration of elements and factors pertaining to the conditions and circumstances of life on the planet earth.

Area and People

Here, the study is not area specific or community specific. It is an in general study on the rural agriculturists staying on the Kalimpong Himalayan subdivision of Darjeeling district of West Bengal, India. Emphasis has been put on irrigation techniques by the local peasants basically included under Nepali community. The three hill subdivisions of Darjeeling district, Kalimpong, Kurseong and Darjeeling sadar consisting of eight developmental blocks and occupying an area of 2417 km² comprise the Darjeeling Himalaya- the beginning point of the eastern Himalayas eastwards the Central/Nepal Himalayas. The altitudinal range of this hilly region varies from 130 to 3660 m. Due to their great variation, a wide array of climatic zones are available, which favor the luxuriant growth of diversified and rich vegetation. This region is also the abode of many endemic elements and a number of species which have become rare, threatened or endangered. People living in villages and far-flung areas depend completely on forest resources for maintaining their day-to-day needs like medicine, food, fuel and household articles. Unlike tea estates in Darjeeling-Kurseong region; the sub-division of Kalimpong is covered with dense forestry, some agricultural land and orange gardens along with sericulture.



DARJEELING DISTRICT



Some basic reasons for landslide in Kalimpong Himalayas

Exploitation of Forest Resources: The richness and variety of vegetation is another characteristic feature of this region. Due to result of physiographic, climatic and biotic factors; this region till now contains a very rich variety of vegetation. The configuration of mountain and the impact of strong moisture-laden monsoon winds greatly influence the characters of vegetation. The forest areas are heterogeneous but mainly intercepted by terraced cultivation land. Hill forests cover approximately 28% of the North Bengal forests. Over 1000 species of flowering plants have enriched the beauty of hilly region of Darjeeling district. The fauna of this region is varied. This forest area can be further

divided into 3 sub-categories (according to altitude). There is a good scope for community specific study on ethno-medicinal use and forest/biodiversity management of local people that indirectly help in protection of the Himalayan geo-morphology and reduce the scope of landslide. Use of alternative energy resources such as solar energy systems despite fuelwood collection and/or settlement of small-scale hydroelectric dams here and there may also reduce harmful effect of soil erosion. Illegal logging and establishment of plantations are responsible for deforestation and subsequent soil erosion turning into severe landslide.

<u>Illegal mining</u>: Daling rocks of Pre-cambian age are lying above the Lower Gondwana rocks of Permian age. This thin bed Lower Gondwana rocks consists of quartzitic and carbonaceous sandstone. This is sandwiched between Daling rocks and Siwalik rocks of Tertiary. As a result of thrusting and tectonic events during the post-Permian upliftment of Himalayas, these Lower Gondwana carbonaceous rocks in Damuda series have been greatly crushed as seen in the forms of coal and shale. Illegal mining in this Damuda-daling series is also responsible for soil erosion in some pockets. This problem is also related to energy crisis and economic profile of the locals inhabiting nearby this exposures of cola seams.

<u>Road Construction</u>: The construction of a hill road involves felling existing vegetation, cutting and blasting stable slopes, and rolling down of resultant debris that in turn destroys vegetation and causes severe erosion resulting landslides. Here, road construction could not be held responsible for landslide.

<u>Cropping:</u> Unscientific coal excavation, deforestation, excess pressure in the road transport, rapid urbanization and plastic pollution are the five main reasons of soil degradation and landslides in Darjeeling Himalayas. But degradation of soil cover in somewhat interior region is subjected to crop cultivation and mainly due to loss of top soil

by water erosion. Soil on the steep hill slope is shallow in depth with poor water retention capacity and excessively drained with high potential for erosion. The soil of the foothill slope and valleys are moderately deep and well drained with moderate erosion hazards.

Review on Agricultural Management

- Kelkar in 2004 has mentioned Inge Kaul, Isabelle Grunberg and Marc Stern (1999) who viewed the rapid developmental activities of the Western-Modern Society in search of a wider global market economy as the root cause of six major problems as pointed out in UNDP report: Challenges of global warming, Rapid loss of bio-diversity, Crisis-prone financial market, Growing international inequality, Emergence of new-drug resistant disease strains & Genetic engineering. Folk communities with their traditional knowledge regarding intimate understanding of nature in respect to pre-agricultural, agricultural and post-agriculture performances can do a lot to check these problems including natural disasters like soil erosion.
- Mondal in 2009 has discussed on the link between biodiversity management and sustainable development with reference to the issues of Indigenous Knowledge and Indigenous Rights in the context of North Eastern Himalayas of India. Indigenous communities may be the tribal elements and again the folk, peasant and marginal communities at rural areas. Indigenous or aboriginal are associated to colonial perception: these are actually excluded folk people but now in a process of inclusion and their so far neglected knowledge is becoming more and more essential to solve problems created and unsolved by modernity.
- Dvorak, 1988, has addressed a note on the importance of Indigenous Soil Classification which he has conducted in Semi-Arid Tropical India. Actually, knowledge about indigenous soil classification is very essential for microorganisms

living within the soil, soil fertility, grassland, conservation of soil, cultivable crops, animal husbandry and poultry, water nature, water sources, fishery, forest-agricultural land ration, nutrition level and ecology.

Warren in 1991 has stated the fact that farmers have remained no longer passive consumers, but active solvers of so many geo-environmental problems followed by other socio-cultural and politico-economic anomalies. It involves local-level innovation and their transmission to a wider periphery.

Here I would also address the The Rio Declaration on Environment and Development, often shortened to Rio Declaration, was a short document produced at the 1992 United Nations "Conference on Environment and Development" (UNCED), informally known as the Earth Summit.

The 27 Principles of the Rio Declaration are as follows-

Principle 1. The role of humans.

Human beings are at the centre of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

Principle 2. State sovereignty

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Principle 3. The Right to development

The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Principle 4. Environmental Protection in the Development Process

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process chain and cannot be considered in isolation from it.

Principle 5. Eradication of Poverty

All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.

Principle 6. Priority for the Least Developed

The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.

Principle 7. State Cooperation to Protect Ecosystem

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

Principle 8. Reduction of Unsustainable Patterns of Production and Consumption

To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

Principle 9. Capacity Building for Sustainable Development

States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.

Principle 10. Public participation

Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 11. National Environmental Legislation

States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

Principle 12. Supportive and Open International Economic System

States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on an international consensus.

Principle 13. Compensation for Victims of Pollution and other Environmental Damage

States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

Principle 14. State Cooperation to Prevent environmental dumping

States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

Principle 15. Precautionary principle

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing costeffective measures to prevent environmental degradation.

Principle 16. Internalization of Environmental Costs

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

Principle 17. Environmental Impact Assessments

Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

Principle 18. Notification of Natural Disaster

States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.

Principle 19. Prior and Timely Notification

States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith.

Principle 20. Women have a Vital Role

Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

Principle 21. Youth Mobilization

The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

Principle 22. Indigenous Peoples have a Vital Role

Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

Principle 23. People under Oppression

The environment and natural resources of people under oppression, domination and occupation shall be protected.

Principle 24. Warfare

Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary.

Principle 25. Peace, Development and Environmental Protection

Peace, development and environmental protection are interdependent and indivisible.

Principle 26. Resolution of Environmental Disputes

States shall resolve all their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations.

Principle 27. Cooperation between State and People

States and people shall cooperate in good faith and in a spirit of partnership in the fulfillment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.

Agricultural Management to reduce the Landslide Problem

Agriculture is the main occupation of the traditional rural communities in contemporary time and the paddy and maize are their main crops. Of course those who have no land or have small piece of land to cultivate, are earn their livelihood mainly by agricultural labor. In agriculture they follow the terrace cultivation.

In the hills three types of soils are generally recognized-black, white and red. Black soil is most fertile of the three, red is of intermediary type and white the poorest among them. Red soil requires a good amount of manuring to produce a yield equal to that of black soil and it is suitable for dry crops, such as, maize and millet, on account of the rich vegetable mould.

Hard worker hilly agriculturists cultivate *chaul* (paddy), *mookai* (maize), *kodo* (millet), *Adrak* (ginger), *phapar* (buckwheat), *eilachi* (cardamom) as their main crops. Besides these local hill people produce a large variety of *Sabji* (vegetables) like *Raisak*, *Torisak* (mustard leaves), *Squash*, *Golbhera* (tomato), *Farsi*(pumpkin), *Kuvindo* (cucumber), *Aalu* (Potato), *Kobi* (cauliflower), *Bandakobi* (Cabbage), *Gaajor* (carrot), *Mula* (radish), *Beet* (beet), *Booigun* (brinjal), *Koirala* (bitter gourd), *Boori* (bean), *Painjj* (onion), *Loosun* (garlic), *Khursani* (chilli) etc.

The major source of water supply in agricultural sector is springs or small rivulets locally known as *Jhoras* with only limited discharge available during post monsoon period. The irrigation facilities exist only in 8 - 10% of the cultivated land predominantly from perennial *jhoras* and river lift irrigation in the foothills. Altogether, the cropping intensity in Darjeeling district is as low as 10%. To improve the present level of cropping intensity and productivity in the hills; there have introduced various soil moisture conservation treatments for hill watersheds, such as, bench terraces in lower hill areas and contour hill trenches on steep slopes. Bench terraces and contour trenches are well sufficient for stability of sloppy lands

and stream training works during cultivation process.



Bench Terrace



Contour Trenches

Besides these, Small Water Harvesting Tanks with hand pack retaining walls are increasingly becoming popular in this region. This system is very useful water harvesting structure on the inherent topographic features and steep slopes of the mountains. These tanks are generally filled with water from the nearby springs using siphon pipes. For providing stability to the Small Water Harvesting Tanks, hand-packed rough walls are usually made with locally available stones/boulders from the foundation level and also soling of pond base. The stored water is utilized for giving life saving irrigation to Maize, Cardamom and Vegetables, which are grown extensively in the region.



Water Harvesting Tank on Hill Slopes

Hilly communities at villages or village cluster with sometimes scattered settlement in Darjeeling Himalayas have made their land into terraced fields, which generally prevents sliding of mud (though it does lead to erosion of soil). On the other hand construction of irrigation system and avoidance of slope area for any developmental activity have considerably reduced the occurrence of landslides.

We can classify agricultural land on the basis of irrigation to the agricultural field:

- (i) <u>irrigated in whole year:</u> situated comparatively lower part of the villages in valley areas or near the river/stream. That type of land is suitable for cultivating paddy seedlings;
- (ii) <u>irrigated in near about 6 months:</u>
 contains a small patch in opposite side of the hill in the hilly slope.
 Generally paddy, squash, green chilly, tomato, *raisak*, zinger etc. are produce in this type of land;
- (iii) <u>irrigated only rainy season:</u> grows the crops not need much more water, like maize, millet and also some tomato, zinger, green chilly, cauliflower, cabbage etc. along with a little bit of paddy;
- iv) <u>fully non-irrigated:</u>

land located at the top portion of the hill, cultivated the crops which need a very less amount of water, like millet, maize etc.

Conclusion

Local people, including farmers, landless laborers, women, rural artisans, and cattle rarer, are the custodians of traditional knowledge. Moreover, these people are well informed about their own situations, their resources; what works and doesn't work; and how one change impacts other parts of their system. It should not be forgotten that Indigenous knowledge is a very sensitive issue, related with cultural identity and ethnicity. It reflects the dignity of the local community and puts its members on an equal footing with the outsiders involved in the process of technology development (Haverkort and Zeeuw, 1989). Truly, the Article 8(j) of the Convention of Biological Diversity (Rio, 1992) has indicated the importance the noble deed of: "respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life-styles relevant for the conservation and sustainable use of biological diversity".

The simple and controlled life of local hilly community is one type of management for preventing landslide that may not be found in tea gardens, deforested landscapes, illegal unscientific mines and unplanned urbanization in other parts of the same Darjeeling Himalayas. And hill people of Darjeeling are still progressing in their economy and modern education, show affinity towards modernity with controlled use of vehicles for transportation, and despite all socio-economic and environmental hardenings combine with one another through social bondage/ sense of solidarity.

But their knowledge is local, practical, empirical and scattered in nature. Or it is embedded within pre-existing partial systems, tradition and culture; therefore justified and static but value-loaded, symbolic, subjective, ethno-scientific, humanitarian and biased. Often technical and rational parts are highly overlapped with non-technical and nonrational parts. Researcher has to conduct anthropological study at in-depth, micro level and qualitative way. Even he/she has to encode symbols, trace Worldview, be post-structural, conduct Ethnography and analyze logic behind the phenomenon. Here, however the study is concentrated on technical aspects.

References

- Dvorak, K.A. 1988. *Indigenous Soil Classification* in Semi-arid Tropical India. Economics Group Progress Report 84. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru PO, Andhra Pradesh 502 324, India.
- Haverkort, B. and H de Zeeuw. 1992. "Development of Technologies towards Sustainable Agriculture: Institutional Implications." pp.231-242, in W.M. Rivera and D.J. Gustafson (Eds.), *Agricultural Extension: Worldwide Institutional Evolution and Forces for Change*. New York: Elsevier Science Publishing Company.
- Kaul, I., I Grunberg, and M. Stern, 1999. Global Public Goods- Concepts, Policies and Strategies, In Inge Kaul, Isabelle Grunberg and Marc Stern, (eds.), 1999. *Global Public Goods- International cooperation in 21st Century*: 450-507. USA: Oxford University Press.
- Mondal, S.R. 2009. Biodiversity Management and Sustainable Development- The Issues of Indigenous Knowledge System and the Rights of Indigenous People with Particular Reference to North Eastern Himalayas of India, In D. Das Gupta (ed.) *Indigenous Knowledge System and Common People's Rights*: Chapter 27. Jodhpur, India: Agrobios.
- Rio Declaration on Environment and Development. 1992. *The 27 Principles of the Rio Declaration*.

http://en.wikipedia.org/wiki/Rio_Declaration_on_Environment_and_Development Retrived 16 September 2012 Warren, D.M. 1991. Using indigenous Knowledge in Agricultural Development. World Bank Discussion Paper No. 127. Washington D.C.: World Bank. Internet source: www.worldbank.org/afr/ik/basic.htm_68k, Retrieved on 01.05.2012.