



## Implications in the rehabilitation of degraded watershed and rangeland in Hazara regions of Pakistan

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### Abstract

Hazara region is located in the north of Khyber pakhtunkhwa, Pakistan. Hazara region is one of the most important areas with respect to watershed and rangeland resources. The watershed and rangeland of the upper area of the region are being cleared for cultivation, grazing, fodder, fuel wood, and timber. Removal of vegetation on steep slopes in conjunction with intense monsoon rainfall has aided to massive erosion and landslides, resulting in deterioration of watershed and rangeland resources in particular and environment in general. Keeping in view the above situation, a local organization started support to locals for rehabilitation of environment through plantation of multipurpose tree species. The tree species were first raised in the nurseries and then provided to locals for restocking of deforested range land, watershed and wasteland. The study was arranged to study the impact of these restocking measures on the rehabilitation of degraded watershed and rangeland. The study concluded that local community mostly prefer to plant trees on their farmland or land which belong to individual due to their sole ownership and avoided rangeland and watershed due to communal ownership and interference in the use of these plants later on by the community. The study also indicates the purpose of plantation and fodder was found to be the most important among these due to dependence of the community on livestock. The study concluded that involvement of local community in the management of natural resources and integrating their local requirements are the keys of success for any rehabilitation program.

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## Introduction

Most of the part of the northern mountains and some part of the Pothwar plateau constitute the major watersheds draining to the Indus Rivers System. In fact, the watersheds of Tarbela, Mangla and many small dams fall in to this area. These watersheds have faced excessive and wide spread felling of woody vegetation and have overgrazing in the past century. Sediment studies in Pakistan's rivers have been carried out since 1916. The geologic erosion is predominated in the watersheds of the Indus, Kabul and Swat rivers, whereas accelerated erosion is caused by defective land use in the watersheds of other tributaries of Indus and Jhelum. The forest area is only 5% of the country's geographical area and is defined legally and not biologically because of the definitional difficulty due to colonial legacy and thus area is insensitive to the number of trees. (Shahid 2001).

The earthquake that struck Pakistan in 2005 measured 7.6 on the Richter scale, affecting some of the poorest regions of the country, killing more than 73000 people and disrupting the lives and livelihoods of millions of smallholder farmers. In the aftermath, landslides and landslips ripped through 10 percent of hillside arable land, forests and rangelands (FAO, 2006). Flash floods and mudslides destroyed food and fodder crops, fruit tree plantations and livestock (Marquis, G 2015). District Mansehra and Kashmir were the mostly affected region in the said earthquake.

Nurseries offer unique opportunities for ecosystem management because they offer the opportunity to not only preserve, but actually increase biodiversity levels. In addition to the traditional commercial timber species, nurseries are propagating a wide variety of diverse plants. The importance of forests and trees is widely recognized. Forests and trees fulfil extremely important social, economic and environmental roles. The role of forests and trees for environmental protection is well known. They are crucial to land stabilization, watershed protection, desertification control, sand dune fixation, windbreaks, erosion control, agro-forestry, soil fertility restoration and microclimate mitigation. El-Juhany, Loutfy I. (2009).

Ecological restoration of disturbed land continued to gain acceptance as most desirable approach to site improvement. However, some disturbed soil have seriously been altered that native communities cannot recover. In addition weeds are dominant over large area and appear more silent and persistent than many native species (Monsen, Stephen B., and E. Durant McArthur 1995).

Technical and economic factors hinder effective ecological restoration, especially in developing countries. Three examples show how social policy, economic threats and opportunities, and national and international development policy are driving the restoration of degraded landscapes in southern Africa. First, new opportunities in nature tourism, together with the declining profitability of traditional ranching, have led to diversification into game farming, tourism, and hunting, all initiatives that rely on properly functioning ecosystems. Second, new environmental legislation is forcing industries, particularly mining, to restore land upon termination of their activities. Third, through South Africa's "Working for Water" program, an elegant solution to problems of excessive water use, local residents are developing skills in clearing alien plants and restoring rangelands (Milton, S.J., Dean, W.R.J. and Richardson, D.M., 2003).

Poor land use have ushered in profound degradation of this watershed. This paper also provides the tools needed to improve on the perception and attitude of the inhabitants towards the exploitation of this watershed and their local environment in general (Kometa, Sunday Shende; Ebot, Mathias Ashu Tambe 2012).

Rangelands are increasingly defined by decreased productivity, water resource degradation, and conflict. Seasonal shifts between restricted and open access and communal and private property regimes create strong functional linkages that define problems and shape solutions. This article presents experiences in managing linkages between rangeland and other resources in the context of participatory integrated watershed management (German, L., Ayele, S. and Admassu, Z., 2008).

In semiarid mountainous belt of Pakistan communal natural resources are economically very important. Majority of the local marginal groups are heavily dependent on communal forests, water points and rangeland for their survival. In this scenario the contribution of women is quite significant both in the utilization and management. Changes in physical as well as human factors have enhanced the stress which led to degradation of these limited resources (Tabassum, I. and Rahman, F., 2012).

The available evidence on utilisation of land, water and rangelands resources in Pakistan shows that they were unwisely and inefficiently used in the past. Continuation of such practices may result in irreversible losses. Unfortunately, the farming community (the real affectée) is not realising the nature, importance, and consequences including low input-low output associated poverty trap. Conserving natural resources through community mobilisation with empowerment. The primary requirement is that local communities should own the interventions by becoming partners in the development activities of their areas. This will not only make easy access to various institutions working for finding solutions to their problems, it will also make the tasks of various public and private development institutions and NGOs relatively easy. This paper highlights the mechanisms of partnership in conserving natural resources. It also attempts to sensitise policy makers and development planners towards creating awareness and practising partnership with empowerment in planning and implementation of natural resource conservation and rehabilitation projects (Farooq, U., Ahmad, M. and Jasra, A.W., 2007).

Due to several problems in pasture improvement program in Nepal, it has resulted in only a sporadic success in this field. The problem is compounded by lack of applicability of new technology to existing pastureland, difficult terrain, harsh cool windy dry climate, limited soil moisture level, wind erosion, lack of trained manpower at field level, lack of incentives to the trained field workers, improper placement of trained manpower, lack of national directives on pasture research work,

lack of rangeland policy in the country, unplanned and uncontrolled grazing, lack of institutional coordination, lack of community participation in Pastureland management, enormous increase in population pressure (human and Cattle), unproductive due to unwise use of land, man-made destruction of natural vegetation and land tenure system of the country (Chaudhary NP. 2008).

Past and present land use has seriously impaired the hydrologic function of most upland areas in Pakistan. Damages from flooding, erosion, sedimentation, and loss of productivity have created a crisis situation that cannot be ignored. Remedial measures have been taken but reach more needs to be done. (Megahan *et al*, 1980).

The present study has focused on the implications in rehabilitation of rangeland and watershed in the Hazara Regions of Khyber pakhtunkwah and to devise recommendations for future project for better result.

#### **Materials and methods**

The materials used during this study include questionnaires, reports of the local organizations, laptop for transferring of data for analysis, stationary.

For conduction of the said study, fourteen well informed persons from the region were identified in consultation with local organization and interviewed. The data was collected from the individual through a well-designed questionnaire keeping in view the need and objective of the study. The questionnaire was pre-tested in the field before getting information and certain questions were added and irrelevant were deleted in the light of observations and personal discussions with persons. Thus the refined questionnaire developed after pre-testing in the field was used for the collection of data.

#### *Analysis of data*

After collection of data, it was transferred on a tally for enumeration of the responses. The data was then tabulated and percentages were calculated for interpretation, discussion, drawing, conclusion and making recommendations using excel sheet. The graphs were prepared in the excel sheet from the data.

*Description of the study area*

Hazara region has a diverse type of terrain that includes mountain ranges, plains, Lakes and valleys. The climate of the region is warm in summer and cold in winter. The northern part where there are high mountains is cold in summer due to snow covered mountains and is very cold in winter.

Forest and Forestry is the most important and versatile natural resource and provide wide ranged economic, social, environmental and cultural benefits and services to the communities. Since time immemorial, these mountainous people have depended on Forestry for various products to fulfill their basic needs such as Fuel wood, Timber, Fodder. In many places the carrying capacity of the land has now been degraded. Consequently, the forested upper slopes of these foot hills are being cleared for cultivation, grazing, fodder, fuel wood, and timber.

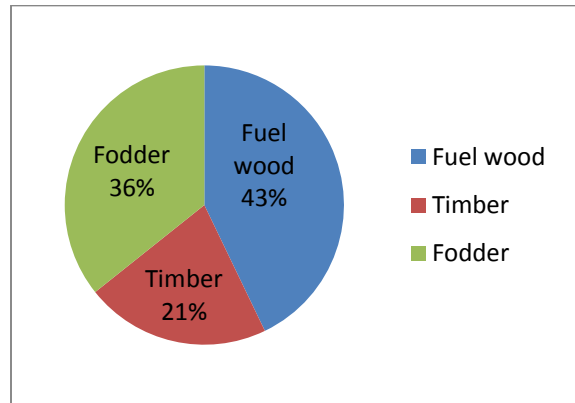
One of the options to control this deteriorating situation of deforestation and clearing of vegetation is to restock the deforested area in general and watershed in particular to keep balance between utilization of trees and restocking.

**Results**

*The result obtained from the study is reproduced below*

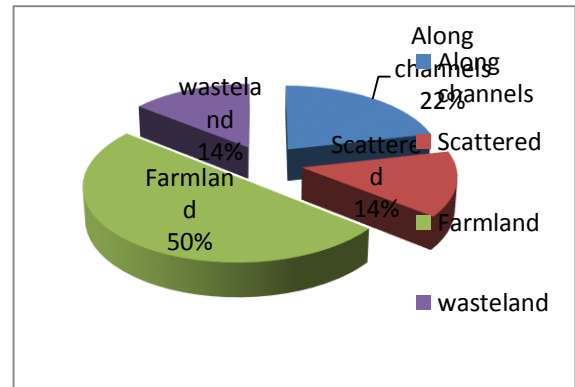
Fig. 1. depicts that most of the respondents (43%) were raising trees for the purpose of fuel wood as there is shortage of fuel wood. 36% were responded that the trees has been utilized by the community for plantation of fodder for their live stock while 21% responded for utilization of plantation for timber. However the trees species are mostly multipurpose and may be utilized for the all the above purposes.

Similarly, Fig. 2. reveals that the main use of these saplings is plantation on their farm land (50%). The trees are mostly cultivated on the bunds of agriculture land or marginal portion on their farm land. (22%) beneficiaries responded that the trees will be planted along the irrigation channel in their agriculture field while 14% replied the trees are grown for plantation either on waste land or scattered in their field.



**Fig.1.** Purpose of plantation.

It is obvious that no one is interested to plant the trees for rehabilitation of degraded watershed and Rangeland due to the reason that most of such land in the area either belong to community or Government. Utilization of saplings mostly for farm forestry by the community reveals that the communities are generally interested in managing the resources which belong to them.



**Fig. 2.** showing site for plantation.

**Discussion**

The parameters studied in the research included purpose of plantation and sites of planting trees by the community. These parameters are discussed as follow.

These community members who reside in the vicinity of these watershed and range land only occupy the land for cultivation purposes without any documentary ownership. Complicated Land tenure system in the area play another important role which contributes towards the disinterest of the community in restocking of watershed and range land as the land actually does not belong to these tenants.

Any project which is going to be implemented in the area take into confidence the actual owners of these watershed and rangeland who does not have any physical interference in the land due to land tenure system which leads to failure in implementation due to conflict of interest between owners and tenants.

During the study it was found that people believe in the area that plantation on such sites which does not actually belong to them will give no benefit in the short as well as in the long run as the basic aim of the saplings was to rehabilitate the degraded watershed and rangeland which supposes no utilization of plants for domestic purposes while the community are interested in utilization of trees on short term basis. On the other hand the plantation of trees on farmland shows sole ownership on the trees. Even if the land is vacated by the owners due to Government policies on the watershed and rangeland, they will have to harvest the trees planted on their farm land. The study also reveals that the community utilize trees from their own land whenever they want on maturity without any interference from outside.

The study also reflected that most of the rangeland which is to be rehabilitated for reduction of floods is situated in the alpine zones of the area which is best site for migration of their herds of livestock due to presence of lush green fodder there. The plantation at such sites will definitely disturb their herding if no alternate measurement is taken for their livestock during summer season and obviously the rehabilitation program will lead to failure. According to community members the plantation on community land is handing over of their own land to the Government. The most important finding of the study is that communal land is the land of each and every one thus does not follow any management system in the village ha compounded the issue of watershed and rangeland rehabilitation. Plantation on the communal land creates complications in utilization due to collective ownership and utilization of trees often leads to community conflict which they usually try to avoid to their traditional culture prevailing in the area.

The study also depicted that the main purpose of provision of saplings to the community was the rehabilitation of rangeland and watershed, but the result indicates deviation from this purpose due to priorities of the communities specifically requirement for fuel wood and fodder. The utilization of saplings for fuel wood purpose reveals shortage of the same in winter due to severe cold with no other energy sources i.e gas etc. Second to fuel wood, fodder is another important need of the community and plantation was carried out for this purpose (36%).

As the area is remote having limited access to general market for food and other necessary item, the people mostly depends on livestock. The livestock mostly consist of goats and sheep other than cow and buffalos. The summer season is best for fodder production, but the same become short during winter. During the dearth period, the people generally feed their livestock with dried stored fodder collected during summer season. Fodder trees are important substitute for provision of feed to their livestock in such scarcity period. Timber and protection of watershed seems of less importance due to less need in the area. The community is unaware about the impacts of degradation of watershed and rangeland and its impact on the environment.

They do not know the fact of exploitation of these resources will lead to situation in future where rearing of livestock and accommodation becomes impossible. One of the possible reasons of avoiding plantation for rehabilitation purposes was lacking of awareness campaigns by the local organizations and concerned authorities on the importance of trees and watershed and rangeland recourses. The program also lacks proper Memorandum of Understanding with the communities stipulating the future possible management and harvesting of trees for utilization for clarity of the community and shared responsibilities of the both the organization and the community.

## Conclusion

From the above study it is concluded that sense of ownership in the local community and their involvement of the natural resources is necessary in carrying out any watershed and range land rehabilitation program. The rehabilitation program will not be succeeded until and unless the local community is not taken into confidence and taking into accounts their needs in relation to forestry.

The study also concluded that farm forestry should be given more priority in any rehabilitation program as community prefer to plant trees on their private lands followed by plantation for fodder trees.

The study also concluded that the main purpose of plantation in hilly areas is for using as fuel wood and fodder due to shortage of both in winter season.

### *Recommendations for future intervention*

On the basis of the study and analysis of data the some recommendations are suggested for future rehabilitation programs.

Firstly, the farm forestry trees species should be given priority as the community are more interested in plantation of trees on their farmland.

The multipurpose trees species in broader consultation with the community members should be included in the program for better results. Secondly, the community residing in these fragile watershed areas should be taken into account before initiation of a project for creation of ownership and better management.

These people are in better position to succeed a program due to their dependency on the resources of the area. Lastly, early growing species should be introduced in the rehabilitation program as it gives immediate return and locals are interested to adopt it easily.

## References

**Ahmad S.** 1993. Viability of agriculture resource base: A critical appraisal. In agricultural Strategies in the 1990s: Issues and options. Pakistan Association of Agricultural Social Scientists p. 449-466.

**Ahmad S.** 2001. Watershed Management in Pakistan: Achievements and Issue 1-17.

**Chaudhary NP.** 2008. Problem affecting pasture and rangeland management in the Himalayan region of Nepal. In Proceedings of the XXI International Grassland Congress and the VIII International Rangeland Congress (Volumeii).

**El-Juhany, Loutfy I.** 2009. Forestland degradation and potential rehabilitation in southwest Saudi Arabia. Australian Journal of Basic and Applied Sciences **33**, p. 2677-2696.

**Farooq U, Ahmad M, Jasra AW.** 2007. Natural resource conservation, poverty alleviation, and farmer partnership. The Pakistan Development Review pp.1023-1049.

**German L, Ayele S, Admassu Z.** 2008. Managing linkages between communal rangelands and private cropland in the highlands of eastern Africa: contributions to participatory integrated watershed management. Society and Natural Resources **21(2)**, pp.134-151.

**Kometa SS, Ebot MAT.** 2012. Watershed degradation in the Bamendjin area of the North West Region of Cameroon and its implication for development. Journal of Sustainable Development **5(9)**, p.75.

**Marquis G.** 2015. Reducing disaster risk in Pakistan through watershed management. Unasylya **66**. p. 243-244.

**Megahan and Amjad Chima M.** 1980. World Forestry: Watershed Management in Pakistan Past, Present, and Future. Journal of Forestry **78-4**, p. 217-219.

**Milton SJ, Dean WRJ, Richardson DM.** 2003. Economic incentives for restoring natural capital in southern African rangelands. Frontiers in Ecology and the Environment **1(5)**, pp. 247-254.

**Monsen SB, McArthur ED.** 1995. Implications of early intermountain range and watershed restoration practices (pp. 16-25).

**Tabassum I, Rahman F.** 2012. Degradation of Communal Natural Resources and their Impacts on Mountain Women: A Case Study of Karak District Pakistan. Pakistan Journal of Social Sciences (PJSS) **32(1)**, pp.157-169.