

SOCIOLOGICAL STUDIES ON WATERSHED MANAGEMENT IN PAKISTAN - A REVIEW

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ABSTRACT

Pakistan is a sub-tropical country lying between 24° 37° Northern Latitudes and 61° 75° Eastern Longitude. Out of total land area of Pakistan, 26.6 million hectares comprised of the uplands where the critical watersheds of the various zones are located, however it is highly regretted to state that due to anthropogenic pressure about 60–70% of these watersheds are in depleted condition (Ashraf, 1991). It means that the community's needs are to be met through optimal utilization of these valuable resources using technological advancements, avoiding every kind of deterioration and degradation under improper use. The ever increasing human and livestock population has been exerting strong pressures on these natural resources in a watershed to fulfill the requirements of water, land, food, fiber, fuel, timber and other resulting in the disappearance of forests, expansion of desertification, soil erosion and flooding of rivers, thus threatening the life on the planet earth.

The importance of soil conservation/watershed management was first realized in the sub-continent at the start of the 19th century but the systematic work on this started in 1954 under "Erosion control and soil conservation project" in NWFP. United Nations Conference on Environment and Development (UNCED) held at Rio-de-Janerio, Brazil in June, 1992 approved a new kind of development that is human-sustainable and shared, emphasizing the involvement of the local community at all levels of planning and implementation. Review of the most of the sociological studies conducted so far in Pakistan under this approach revealed that this approach not only made these projects successful but also helped in prolonging their vitality for the welfare of the population. In this context, it is relevant to note that the use to which the land is put, should be determined by the owners, farmers, institutions and Government as the case may be according to their perception and needs.

As John Spears reported for the World Bank in March, 1982 that half of the world's population lives in or adjacent to the mountainous watershed environment and is affected by the way they are naturally framed. Thus the management decisions for these areas are influenced by a host of physical factors such as soil, climate, technology as well as the socio-economic aspirations of the community. Farmers are also influenced by their economic, political and social conditions which needed proper attention for sustainable development of the natural resources in any watershed area. Sustainable development is possible only if the useful life of the resources is prolonged so as to permit its exploitation not only for the present generation but by the generations to come. This can only be achieved through integrated watershed management and the active participation of local communities. This is a holistic approach, by now generally accepted as the best one and gaining popularity all over the world including Pakistan. The article addresses the same issue and emphasizes that participatory watershed management is the only solution for sustainable development of natural resources in degraded watersheds of Pakistan.

INTRODUCTION

Pakistan is a sub-tropical country lying between 24° and 37° Northern latitudes and 61° and 75° Eastern longitudes. The total land area of the country is 87.98 million hectares (Amjad and Shah, 1996) which can be divided into four physical sub-divisions of

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Northern and Western mountains, the Indus basin and the Coastal Zone. The Northern mountains constitute the major portion of the watershed areas of the Indus and Jhelum river system. The land in these watersheds is mainly in private ownership and the steep slopes are thus cultivated oftenly.

Out of about 88 million ha total land area of the country, 26 million ha comprises the uplands, where watersheds of various sizes are located (Ashfaq, 1991). Pakistan being an agricultural country totally depends on the storage of water for the production of hydroelectricity, irrigation water and domestic water supply. Thus water storages is the backbone of Pakistan agricultural economy. However it is highly regretted that the loss of storage capacity due to sedimentation in the water reservoirs has left serious repercussions on the economy of the Pakistan, leading (65 to 70%) watershed areas in to totally depleted condition. This is because of the accelerated runoff and consequent soil erosion that has reduced the agricultural as well as forest output to the extreme low level. It is therefore badly required to ensure the soil conservation in order to sustain the production of forest and agricultural products through the active participation of local communities being cry of the day.

The importance of soil conservation was realized in the sub-continent at the start of the century but in Pakistan systematic work started in 1954 under the "Erosion control and soil conservation project in NWFP". With the construction of Mangla dam, the water and power development authority launched a soil and water conservation project in 1959 to check the rate of sedimentation of the reservoir. After successful implementation of the pilot and operational phases of this project the forest department was directed to initiate similar projects elsewhere in the province of NWFP. Consequently, based on a land use survey of the watersheds of Indus and its tributaries converging and area of 90650 km² (65500 square miles), different projects of watershed management were started in different parts of Pakistan.

The Bhurban Watershed Management Project was started in 1963-64 for a period of five years at a total cost of 2.15 million rupees covering 53 km². Its major objective was the rehabilitation of eroding hills by planting fruit and forest trees. Work done comprised planting of apple orchards over 1000 ha by land owners with planting stock supplied free of cost, afforestation of 1600 hectares, and terracing, leveling of cultivated land at 50% subsidy over 1110 hectares out of total project area.

The Agriculture Development Corporation operated the Soan valley land improvement project from 1964 to 1972. During this period 49200 ha were treated with terracing and check damming and 26800 ha of gullied waste land was developed for cultivation. In 1974 the project was merged with the soil conservation directorate, Punjab. Under the directorate of soil and water conservation Rawalpindi, since 1965, terracing and improved agronomic and cultural practices have been adopted over about 265000 ha, gullied land reclaimed over about 69000 ha, and afforestation and check damming alone over about 38000 ha.

The Punjab Forest Department also launched a similar project of land rehabilitation around Ghoragali from 1968 to 1972 and completed afforestation and terracing over 2676 ha and check damming over 426 ha.

The Mangla Watershed Management Project (1960 to 1990, estimated cost 122.6 million rupees) was executed by WAPDA. Under this project about 50 million trees have been planted over a gross area of about 400 km² and 128 silt trap storages and 200 masonry dams and 1606 masonry spill ways constructed. Extension services were provided to farmers in soil conservation and improved agronomic practices.

In NWFP watershed programmes started with launching of Kaghan valley watershed management project in 1965-66. It was a five year project with an estimated cost of 2.05 million rupees. The scheme involved rehabilitation of about 7.6 km² (30 square miles) of the watershed of Kunhar river with terracing of about 2254 hectares (5569 acres) and afforestation of 5422 hectares (13400 acres). Area on the left bank of Kunhar river, starting from Balakot and extending upto Kawai was selected for the project. The achievements of the project included improvement in crop and grass yield, reduction in the inflow of sediment and planting of apple, peach, plum, and apricot orchards.

Following the above pattern ,a watershed management project in Kaghan and Daur areas of Hazara District was started in the area in 1970-71 with the assistance of the World Food Programme. The estimated cost was 18.6 millions. The purpose of the project was to demonstrate the correct land use and the improvement of the economic conditions of the hill farmers, reduction in soil erosion and siltation of water storage reservoirs. After about 3 years of operations the pilot project which basically served as a demonstration area was evaluated by W.F.P/F.A.O. The overall performance was considered satisfactory particularly in engaging the idle labour in establishment of plantations, increasing the food and fodder production of the area and changing the attitude of local people towards tree plantation. Consequently a new project, watershed management and forest extension in NWFP” extending over the whole of the Hazara Civil Division was approved in 1977.

Thus an improved watershed management with an integrated and participatory approaches is thus badly required for the increased, sustainable production reducing soil erosion with improved potentiality of stream flow.

It has also been observed that most of the watershed areas are in a precarious condition due to continued misuse through deforestation, unchecked grazing and irresponsible extension of cultivation, the land areas of watersheds have been severely deteriorated resulting in decreased agricultural production due to the lack of proper watershed management.

Owing to the destruction of vegetative cover and gradual denudation of hilly catchments; the sedimentation release and run-off have increased resulting into the recurrent annual floods, coursing a great loss to the property and human lives.

In 1955 the flood destroyed 2420 villages and 400 people and 70000 cattle lost their lives. When crop stand on the areas of 101,911 hectares was completely destroyed and according to (Johnson 1979), the total damage caused by the flood amounted to Rs.83 million.

According to the USAID 1979 reported between 1993 and 1978 five serious flood victimized 12.7 million people and destroyed ten thousand villages.

Regarding the loss of the storage capacity of the water reservoirs; it has been noted that the Tarbela dam had the capacity after construction in 1974 of 11.62 million ac. ft. In 1984 this has been reduced to 10.03 million ac.ft. due to sedimentation. According to the recent estimates the sediment yield in Indus is greater and in fact one of the highest in the world.

Keeping in view the above mentioned facts it is urgently required to take contingency measures to conserve and sustain the natural resources which are degenerating day by day. More over integrated and participatory approaches are required to be implanted for the sustainability and rehabilitation of the degraded watershed areas, because until and unless the local people are involved, these watershed areas can never be protected.

Thus sociological studies are badly needed that would assist to explore the new vistas of community participation and integrated watershed management to address the above said issues and ensure the better watershed management in future.

REFERENCES

Studies on the social aspects of watershed management started emerging in the mid of nineteen eighties in Pakistan. Since then several studies have been added to the growing multiple discipline of watershed management. A brief review of these studies is as follows:

Neelofer Asgher conducted a study in 1984 entitled as "A sociological analysis of the forest owners, dwellers and manager in the upper Siran valley of Hazara division". Her sample consisted of 3 household heads in an area of about 30 square kilometers. Data were collected through a structured interview schedule. Some members of the local and headquarter staff of forest department were also interviewed to get the balanced view of the situation, without using any type of questionnaire. The main findings of the study were as follows:

- a. The community had a long tradition of largely unhindered forest unitization with or without the permission of the local forest managers.
- b. There was a need to change the present unsatisfactory relationship between Guzara forest owners and the forest department by modernizing the management.
- c. There was a need to establish wood based industries in the vicinity of the forests to generate income for the local people.
- d. There existed semi feudal relationship in the population which hampered the development process. However, due to modern media the old traditions were changing slowly and.
- e. the Landlords and the tenants had contrary interest which was a major obstacle n permanent soil conservation and afforestation works.

Munir Ahmad (1984) undertook a survey of two communities in Gujar Khan tehsil of Rawalpindi district namely Missa Keswal and Shang. His main objective was to know the perception of the rural peasants about soil conservation. He sampled 65 heads of the household from the universe of 27 villages. The data for this study was collected through informal means without using any type of questionnaire. His main findings were as follows:

- a. All the inhabitants of the area were land owners (Zamindars) and were holding one to six acres per family.
- b. the size of individual household holding was decreasing steadily due to the system of inheritance and sub-division as well as due to soil erosion.
- c. There was general interest in watershed improvement activities carried out by the water and power development authority (WAPDA) and the agency for the Barani area development (ABAD) in the adjacent areas and there was a voiced demand for such activities in the study area.

Zarnigar Tayyib and L.C. Tennyson conducted a study on "Rural perception of watershed management in the Swat district of NWFP" in 1985. Fifty households were selected as sample, 23 of them in Lower Swat, 8 in Upper Swat and 19 in Kohistan Swat. The main findings of this study were as under.

- a. Ninety six percent of the observed were aware that soil erosion was severe problem in their area.
- b. Many of them were attempting to mitigate erosion themselves but they lack finances and technical know how to achieve success.
- c. Most of them were willing to participate in watershed management programmes and were highly receptive to the idea of extension in the form of meetings and training sessions.

M. Imran Alam and A.C. Dualdulao (1986) conducted the study entitled as "A sociological study of Murree tehsil with reference to watershed management". One hundred interviews were conducted in ten villages of five union councils by means of multi stage sampling techniques. The objectives of this study were to find out the factors such as demographic, socio-economic and land use practices, that were directly or indirectly related with the proper watershed management. The important findings were as follows:

- a. There was generally low monthly income among the inhabitant with 69 percent of the families earning less than Rs. 1000 per month.
- b. Average land owned by one family was 17.22 kanals, with two main crops as wheat and corn.
- c. There was low crop production in the area with average per kanal production of 28 kilograms for both wheat and corn.
- d. Only ten percent of the farmers had tried to plant fruit trees and eighty percent of the families were raising some type of livestock with the average of 1.5 heads per family.
- e. The farmers had low awareness of the causes of soil erosion but they were aware of the engineering structures for the control of erosion.

- f. Most of the trees found on private lands were identified as fuelwood trees, while the problems encountered for planting and raring of the trees were described as lack of water and cooperation by forest/agriculture department, besides animal grazing and tree insects.
- g. The general problems of the area were lack of drinking water, roads, electricity and increase in soil erosion. To solve these problems a heavy majority (78%) prefer to seek the assistance of local union councils and their members.

Muhammad Rafique Sardar (1986) conducted a study to find out the mountain farmers perception of soil erosion and their response to soil conservation. The universe was consisted of approximately 57955 hectares of land located in two sub watersheds of the Siran and Batkas rivers in Mansehra district of NWFP, having the population of 131590 persons comprising 19658 households. The sample size consisted of 0.9 percent of total households numbering 185 units located in 4 villages. The sample units were selected through modified random sampling method at village level and through devised simple random sampling at individual unit level. The data were collected through questionnaire, which was consisted of 69 questions.

He concluded that the inter relationship of man, resource use, and nature were leading to an accelerated degradation of the geo-ecosystem of the watersheds. The respondents cope successfully with the soil erosion problem and were well aware of soil conservation measures on cultivated terraces, however, unsophisticated were their traditional measures. Their conservation measures include construction of bench terraces, diversion drains, terrace back planting and planting of barren land. The study also indicated that prevailing land tenure system, the tenancy system, and traditional land use patterns were some of the casual factors for accelerated environmental degradation.

A sociological study titled "Needs and problems of farmers with reference to integrated watershed management in Muzafarabad district of Azad Jammu and Kashmir" was conducted in May, 1987 to find out the needs and problems of farmers regarding integrated watershed management in Muzafarabad district of Azad Jammu and Kashmir.

The universe of this study was Muzafarabad district of Azad Jammu and Kashmir with a total population of 466297 persons (1981 census), scattered in 636 villages of 47 union councils. The major portion of the universe district lies in Mangla reservoir watershed. Out of its total land area of 1.511 million acres, 1.332 million acres were classified as catchments of Mangla reservoir.

The important findings of the study were as follows:

1. The major ethnic groups in the area were Gujar, Syyed, Mir, Awan, Abbasi and Mughal.
2. Majority among the respondents were illiterate (63%), while the literate persons had low level of education.
3. Average monthly income of the respondents was estimated at Rs. 935. Tehsilwise, the average monthly income was Rs.1008 for Muzafarabad, Rs.1424 for Hattian and Rs.466 for Athmaqum.

4. About half of the respondents (51%) had done terracing/ planting and made diversion drains as well as retaining walls for soil conservation. But about another half (49%) had done nothing to prevent the soil of their land from eroding away.
5. Less than half of the respondents (43%) had the combination of fruit and forest trees while the remaining had forest trees (20%) fruit trees (27%) and not tree at all (10%).
6. Almost all the respondents (99%) were found using fuel wood as means of energy in their homes. However, some of them were supplementing fuel wood with kerosene (8%), dung cakes (2%) condensed natural gas and electricity (1% each).
7. More than half of the respondents (54%) were obtaining fuelwood from nearby forests, while thirty five percent were depending upon their own land for fuelwood. Only 4 percent were purchasing it from market.

The sociological study titled "Perception of watershed farmers in Naltar valley of Gilgit on soil erosion and their strategies to control it" was conducted by Imran Alam and M. Rafiq Sardar with a view to find out the perception of watershed farmers about soil erosion and related socio economic problems in Naltar valley watershed. The study was conducted in the Naltar valley of Gilgit district, Northern Areas. Naltar valley was divided into two parts as Naltar Bala (upper) and Naltar Payan (lower). The valley was stretched from Naltar lake (Height 3200 meters) to River Hunza at Nomel village (Highest 1750 meter) and have about 550 number of families residing in the region which were mostly engaged in subsistence farming on small parcels of land and livestock rearing.

The following were the important findings of the study.

1. Heavy majority of the respondents were illiterate (86%) while the literate persons had primary education only.
2. Among the respondents who had sources of cash income (60%) the average monthly cash income was Rs. 814.
3. Three main crops raised in the area were wheat, potato and maize.
4. Majority of the respondents (60%) faced to the problem regarding livestock management like less availability of grass / fodder which becomes severe in the winter months.
5. Grazing was the only benefit mention by the significant number of respondents (23%) derived from forests other than timber/fuelwood.
6. Majority of the respondents (60%) perceived that forests will decrease in future in the valley.

Keeping in view the importance of integrated and participatory watershed management to conserve these natural resources and their improper exploitation at the hands of local communities, Mr. Anwar Ali (2005) wrote "The deeply dissected land tenure system and conflicts between the government and forest users have led to a drastic degradation of the resources. Although legislation theoretically limits the rights of local people, in fact the majority of them have access to forest resources. They fulfill nearly all their requirements from these forests but contribute nothing to their protection and development. The existing forest legislation and management systems have failed to achieve their objectives and if nothing is done to check degradation then the forests will soon disappear".

Hakim Shah, M. Jahangir and T. Naz (2005) explained that the more productive and sustainable use of the limited arable land and other natural resources is a key strategy to improve environmental and local living standards in watershed areas. PARDYP began promoting a numbers of measures to improve local lively hood and environmental conditions. It helped to establish a net work of separate social organizations for men and women that pool savings to spend on common problems. Skill development and income generating training have been run including food and vegetable preservation, kitchen gardening, solar devices and seedling nursery management. Women's community centers have been setup to run skill training courses for a changed social scenario in the area and thus ensure sound strategic resolves for future watershed management programmes and project".

CONCLUSION

John Spears reported for the World Bank in March, 1982 that half of the world's population lives in or adjacent to mountain watershed environments and is affected by the way they are farmed. Rising human and livestock populations in developing counties, and the mounting pressure on scarce upland and forest resources, have led to severe environmental degradation in this century. They are the cause of much of the catastrophic flooding, loss of human life, drying up of perennial rivers, increased sedimentation of dams, and disruption of downstream agriculture frequently reported in the world press. Studies have shown, for instance, that the denudation of water catchment areas has caused the flooding in the Indus river system in Pakistan to be far higher in the last 25 years than during the previous 60 years, and has led to serious silting of the dams and canals of Pakistan's irrigation system. The cost of repairing flood damage below the Himalayan catchments in India has been, on average, US\$ 250 million a year in recent years, in addition to the loss of production and livelihood suffered by millions. While part of this damage is the result of natural geological erosion, much of it is attributable to excessive population pressure and misuse of land. Te list of examples could go on. They illustrate one fact: that as populations increase in developing countries, more people are forced on to land that becomes less and less productive. These marginal areas inevitably include the mountainous regions with their thin soils and fragile ecological systems that are particularly susceptible to abuse. Ironically, it is generally the poor who are pushed into these areas, attempting to survive on increasingly unproductive and eroded land without being able – or even knowing how – to prevent the degradation of their source of survival.

The long term answer to this problem is the adoption of modern integrated watershed management approaches for the conservation of these natural resources, involving the local population. This will not only sustain the rehabilitation of these degraded watershed areas but will also be useful in making them aware of the importance of these gracious gifts of the nature. For seeking the active role of the local communities at all levels of planning and execution of the watershed projects the detailed sociological studies in the wake of modern changing climate is the need of the hour in all the critical watershed areas of Pakistan. This will serve as a strong foundation for better future participatory watershed management of those fragile watershed zones ultimately contributing to the country's economy in multiple ways on sustainable basis.

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