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SOCIO–ECONOMIC ASPECTS IN PATHRI RAO MICRO WATERSHED PLANNING AND MANAGEMENT

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Abstract

Society and environment are closely interlinked and any change in any one of these variables has a direct bearing upon the other. As environmental degradation does not follow any administrative boundary the livelihood of the whole populace living in a region is affected. It is thus becomes necessary to understand and critically analyse the relationship between society and environment. Hence, there can be no sustainable natural resources management unless it involves the participation of all the inhabitants of the concerned environment/area in an active manner. This is where the role of watershed management becomes imperative. Watershed management refers to the conservation, regeneration and the judicious use of all the resources: natural (land, water, forest) and human within a particular watershed. So, the approach of watershed management should not only restrict to the conservational aspect of eco-restoration but it ought to assess and rectify the socio-economic restraint of the populace living therein so as to achieve sustainable integrated watershed development.

Introduction

The terminology watershed management in itself is much more intricate than it sounds. Earlier it was recognized as a geo-hydrological unit but now it is beyond doubt that beside physical aspects it also includes biological, economic and social aspects of an area. It has been conceived basically as a strategy for protecting the livelihood of the people inhabiting the fragile ecosystem experiencing soil erosion and moisture stress. The aim has been to ensure the availability of drinking water, fuel wood and fodder and raise income and employment for farmers and landless labourers through improvements in agricultural production and productivity (Rao, C. Harmantha, 2000).

The strict accomplishment of the watershed program for conservational issue needs also to look towards the socio-economic conditions of the people living in a region as only when the direct exploitative dependence of the local populace upon the natural resources is reduced to harmonious conditions by alleviating the socio-economic strata of the people living therein. Thus, an effective watershed management can be obtained only when both the scientific and anthropocentric factors including their hydrological relationships within a watershed is thoroughly understood.

The inapt utilization and management of the 'trio' of resources, i.e. land, water and biomass has a cumulative impact upon environment, productivity and pursues unsustainability. Restoration of ecological balance in problem regions involves all developmental ventures on a watershed basis as it aims towards an integration of the management of social and natural resources. It is interesting to note that only conservation and management of the ecological environment through watershed management approach is not going to do any good for the people, unless and until the socio-economic aspects and livelihood security obligations is not involved in the program to promote sustainability.

In the present paper an attempt has been made to analyse and critically apprehend the different socio-economic aspects in the Pathari Rao micro watershed. The name of the watershed comes from the non-perennial river 'Pathari', which carries the rain water of the hills to the plains for shorter period and is otherwise dry. The geophysical setting of the Pathari Rao micro watershed with scanty vegetation makes it an area prone to acute soil erosion. The problem of soil erosion in the area is accentuated due to the character of the soil which is mostly sandy loam thereby having a poor moisture retention capacity. Anthropogenic factors

have also aggravated the problem, the area nested with considerable human and cattle population, severely depleting the vegetation and soil productivity. This excessive biotic pressure in a risk prone system has led to an alarming depletion of the natural resources of the region thereby resulting in an alarmingly increasing rate of siltation, surface runoff, gully and sheet erosion and nil addition to the ground water (Singh, et.al, 2005). The micro watershed consists of 8 villages with a population of 22001. Village Garh has been taken as case study which represents bio-physical characteristics, socio-economic development and constraints prevailing in the whole villages of the micro watershed.

Study Area Profile

The study area lies in the south-western part of Pathari Rao micro watershed of Bhadurabad block, Hardwar district (Fig.1). Administratively it falls in the Garh-Meerpur gram panchayat. The village has 1143 households with a total population of 7692 persons. The village is largely comprised of Muslim households. The decadal (1991-2001) population growth is 3.6 per cent while the population density is 2289 persons / km^2 with a sex ratio of 767 (Table 1). Scheduled caste population constitutes 27.28 per cent of the total population.

Table 1
Demographic Characteristics of Village Garh, 2004

Indicators	Characteristics
Household (Number)	1143
Average Household Size (Persons)	6.7
Total Population (Persons)	7692
Density (Persons/km^2)	2289
Growth Rate (Per cent)	3.6
Sex Ratio (Females per thousand males)	767
SC Population (Persons)	2099
Literacy (Per cent)	58.54
Male Literacy (Per cent)	72.3
Female Literacy (Per cent)	39.7

Source: Field Survey, 2004.

Out of the total population 58.54 per cent people are literates while the percentage of male and female literacy is 72.3 per cent and 39.7 per cent respectively. These figures reflect a high literacy but considerable portions of this chunk have education up to primary school level only who neither have a perception regarding development nor any technical know-how.

As far as the occupational characteristic of the village is concerned there is a high dependency due to paucity of natural resources and other employment opportunities. The percentage of total workers and non-workers is 36.84 per cent and 63.16 per cent respectively. Of total workers the percentage of main workers is 78.47 per cent and of marginal workers is 21.53 per cent. Similarly, 12.80 per cent workers are engaged in cultivation, 36.57 per cent workers are listed as agricultural labourers while 44.53 per cent are engaged in other activities. The percentage of the workers engaged in household industries is only 6.38 per cent.

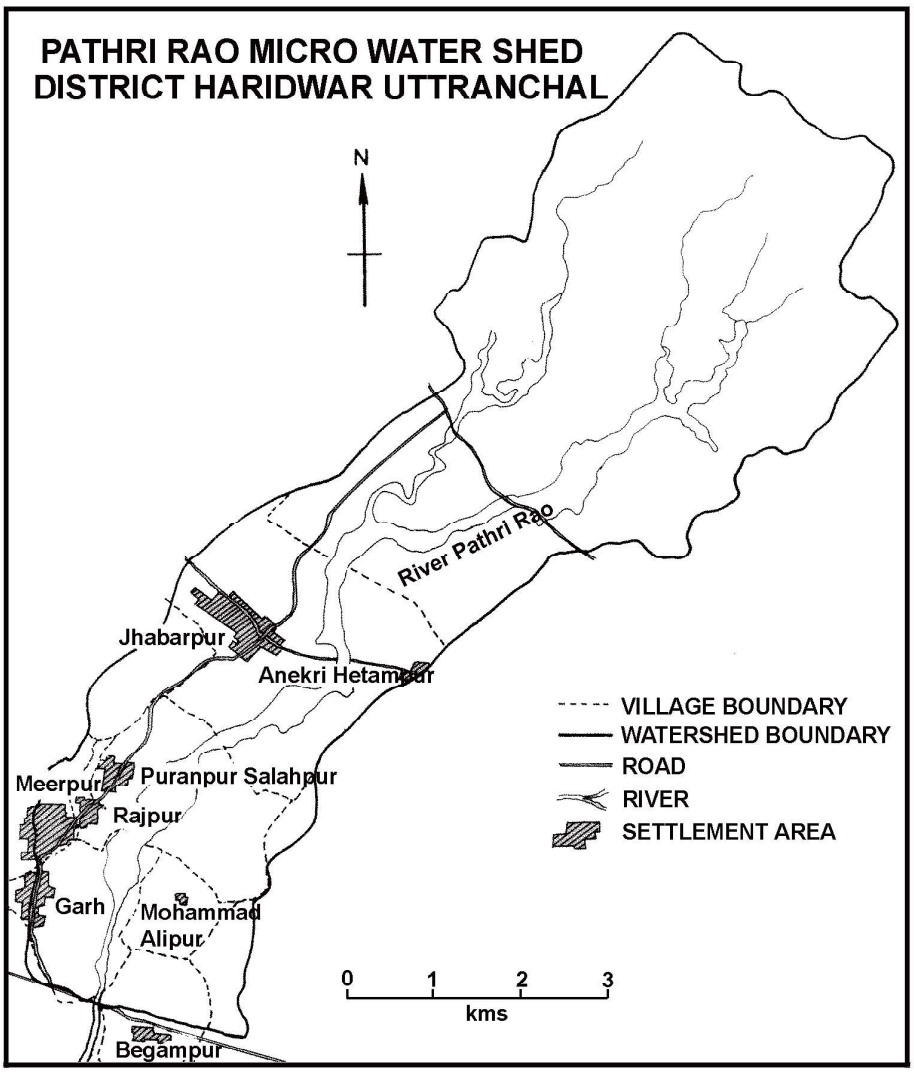
Landuse Pattern

The total area of the village is 336 hectares of which 205 hectares (61.01%) are under cultivation of which 57.56 per cent land is irrigated by tubewells. Fallow land constitutes 4.76 per cent of the total area. The double-cropped area is 145 hectares and the gross sown area is 350 hectares. The forest cover under the jurisdiction of village is only 3.57 per cent of the total reported area. The 22.02 per cent of the area is not available for cultivation while 8.63 per cent land is under other uncultivable land (Table 2).

Table 2
Landuse of Village Garh, 2004

Category	Area in Hectares	Percentage of Total
Total Reported Area	336	
Forest	12	3.57
Area Not Available for Cultivation	74	22.0
Other Uncultivated Land	29	8.63
Net sown area	205	61.01
Irrigated (% of NSA)	118	57.56
Unirrigated (% of NSA)	87	42.44
Double cropped area	145	43.15
Gross sown area	350	

Source: Field Survey, 2004.


PATHRI RAO MICRO WATER SHED
DISTRICT HARIDWAR UTTRANCHAL
N
River Pathri Rao
Jhabarpur
Anekri Hetampur
Meerpur
Puranpur Salahpur
Rajpur
Garh
Mohammad Alipur
Begampur
VILLAGE BOUNDARY
WATERSHED BOUNDARY
ROAD
RIVER
SETTLEMENT AREA
0 1 2 3
kms

The study area has two cropping seasons, *kharif* (April-October) and *rabi* (November-Mrch). The main crops of the *kharif* season are fodder, vegetable and sugarcane while wheat and vegetable are important crops of the *Rabi* season.

Vegetable and fodder crops occupy 24.58 per cent and 45.25 per cent of the total cropped area respectively. Sugar cane and rice account for an about 33 hectares (18.43%) and 11 hectares (6.14%) respectively while mustard and maize together share 5.51 per cent of the total cultivated area in the *kharif* season (Table 3).

Table 3
Cropping Pattern in Kharif Season

Crops	Area (ha)			Percentage
	Irri-gated	Un-irrigated	Total	
Rice	9	2	11	6.14
Maize		3	3	1.67
Sugarcane	30	3	33	18.43
Mustard		7	7	3.91
Vegetable	32	12	44	24.58
Fodder Crop		81	81	45.25

Source: Field Survey, 2004.

In the *rabi* season wheat occupies 81.69 per cent while vegetable crops occupy 15.49 per cent of the total cropped area. Pulses are cultivated in only 1 hectares (0.07%) and fodder crops occupy 3 hectares (2.11%) of the *Rabi* cropped area (Table 4).

Table 4
Cropping Pattern in RabiSeason

Crops	Area (ha)			Percentage
	Irri-gated	Un-irrigated	Total	
Wheat	101	15	116	81.89
Pulses		1	1	0.70
Vegetable	14	8	22	15.49
Fodder Crop		3	3	2.11

Source: Field Survey, 2004.

Due to several problems like heavy investment in irrigation, unavailability of fertilizers, low productivity of soil, and low return from produce, the cultivation of food and commercial crops in the area has not become lucrative, and has compelled households of big size holdings to convert their agricultural fields into mango and guava orchards.

Present Status and Constraint

In the study area the percentage of non-workers is very high constituting 63.16 per cent of the total population. While 49.57 per cent of the working force is engaged in primary sector in which 36.57 per cent is working as agricultural labourers. In the category of the workers engaged in other activities the percentage of wage labourers is very high and they mostly work as masons and daily wagers in the BHEL and in its surrounding area whereas only 6.38 per cent of the workers engaged in household industries. Only 12.80 per cent of the total population has land to cultivate and there is a scope for them to get cash income from the agriculture by cultivating commercial crops such as sugarcane, vegetable and fodder crops in the study area. But due to lack of proper irrigation, transportation and credit facilities farmers are bound to sell their own products to the mediators on the low price. The remaining population is both landless and devoid of any professional skills, the only job they can perform is basic masonry work. Though the literacy speaks out volumes but in reality this higher literacy is only in terms of primary literacy. So these people do not find jobs even in the nearby BHEL as a result despite being located at close proximity to the city, the area is still devoid of its advantages.

Planning Mechanism

It is evident that there are numerable problems related to biophysical and socio-economic environment in the study area, which is further worsening due to high population growth. These multifarious problems related to the sustainable development of the area cannot to be solved in piecemeal and an integrated area development planning is vital which is entirely based on the eco-development approach. Eco-development is ecologically sound development and implies structural transformation of the habitat in harmony with the changing ecological conditions with a view to ensure a satisfactory quality of life to the people, which is socially desirable, economically viable and ecologically sound ultimately ensuring long term

constructive development. It is a bottom up approach in contrast to top down, offering insight for macro level policies to become relevant to micro level and complexities towards resource development and management. Therefore to improve biophysical and socio-economic environment at the village level, eco-development planning has been put forward as a model of operation: reduction of biotic pressure and improvement of sustainable livelihoods of the people in the area. Firstly for arresting and reversing the process of environmental degradation and increasing production and income from natural resources on sustainable basis, scientific land use planning should be the top most priority of the development agenda. This could integrate forest land, pasture land and farm land ecosystems and it is suited to local needs and requirements, which further protects people, plants and animals and the environment as a whole. It is essential to protect environment of the area because environment is one of the most important pillars of sustainable development. Such efforts will lead to optimum utilization of natural resources and generate more employment opportunities for native people. This initiative requires pro-active peoples' participation in all decision making process (Singh, et.al, 2005).

It is thus, the need of the hour to make environmental issues as a part of the local plans and call for watershed management which is an integration of technology within the natural boundaries of a drainage area for optimum development of land, water and forest resources. Integration of many scattered programmes of soil conservation, afforestation, minor irrigation and other development activities into well prepared micro-watershed projects based on a micro level study of climate, land, water and forest resources on one hand, and human and animal resources on the other, offers scope for bringing about sustained natural resources development (Singh and Juyal, 2001).

Improvement of rural economy has therefore been a focal theme of the socio economic development planning through increase in crop and milk production and promotes bee keeping, mushroom cultivation, herbal plant cultivation and poultry. Human resource development has to popularize with a process of increasing the knowledge, skills and capacity of all the section of the society. The success of watershed management programmes mainly depends upon the level of participation of the people of the area under study. People must decide what their priorities and programmes of work are for conservation and development.

There should be people organizations, *van* panchayat, forestry associations, local youth and ex-service men groups for eco-development promoting rural employment and income generating activities. These activities may be land and/or water based, integrated land use systems and also cottage and small-scale industries suited to the temper and culture of the communities. Peoples' participation in watershed management reduces the cost benefit by correcting the mistakes committed in designing various structures and political interference and thereby making an eco-friendly program suited to the area (Fig 2).

Thus, the success of watershed management programme mainly depends upon the level of participation of the people living in the area. They have to knit together through committees, gram sabha, youth club, farmers group, self-help group etc. it is thus the need of the hour that there ought to be active peoples' participation at the grass root level so as to achieve a holistic approach of development (Singh, et.al, 2004).

Need for Participatory Planning and Development

The participation of people and collective actions are critical ingredients for watershed management programs as it involves the trio of sustainability, equity and participation (Iyer and Roy, 2005). The conservational and enhancement of socio-economics of the local populace entails sustainability which requires a rationale management of land, water and biomass of the region. The equitable access to livelihood resources and active peoples' involvement in securing and nurturing the ecological, economic and social well-being of the habitat is the need of the hour for attaining sustainability.

The development efforts made so far have departed erroneous as they are just injecting financial assistance in the form of development programmes which have made the rural poor

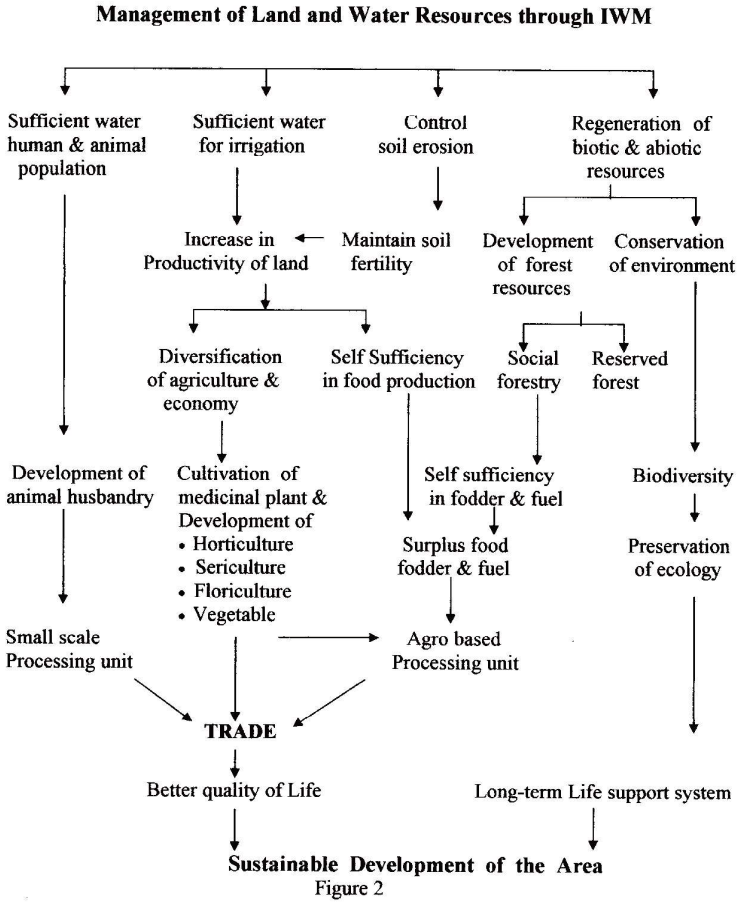


Figure 2

dependent on external agencies rather than self reliant in the last five decades. Now, the situation has come to such a stage that without external assistance the weaker sections of the society are not in position to generate their own resources, help themselves to change their social and economic condition. This has happened because the rural poor have been kept away from participating in the local area development decision-making processes.

Based on past experience, we need to reorient and rededicate the policy efforts and change direction. Both political and development participation have equal importance to make a community self-reliant. After the enactment of the 73rd Constitutional Amendment Bill, 1993, the weaker section of the society has been given space to exercise their political power, whereas their development participation is yet to be materialized. Almost the five decades of implementation of the rural infrastructure building programmes with the help of middlemen/ contractors have made the rural people so dormant that, whenever an initiative is being undertaken to involve them in the implementation process, it fails. The middle men/ contractors are now well habituated with implementing different rural development programmes in the name of the rural poor.

There is no doubt about the facts that attacking poverty and its reduction to appreciable extents seems to be not manageable only by the government sector. There are many areas where it is very difficult for government sector to intervene

effectively. They need collaboration and cooperation from other than government institutions i.e. NGOs for creating opportunity, facilitating empowerment and providing security to fight against poverty. The NGOs preference over the governmental mechanism increases because of their close proximity to the people. Networking, building collaboration and integrating each others activities for building social capital are the path way through which NGOs tried to empower the marginalize communities. Amidst such a situation there exists enough scope for associating the NGOs in development sphere.

Conclusion

The watershed management is an integrated use of land, water and vegetation in an area for providing an answer to alleviate drought, moderate floods, prevent soil erosion , improve water availability, and increased food, fuel and fodder production on sustained basis. Simultaneously it maintains ecological balance between land, water, plant and animal kingdom in the area. In the last two decades of operational research and development in watershed management has a given ray of hope on eco-development strategies. However, large scale application of the results of such development efforts could not be achieved mainly due to lack of integration of various line departments operating in the watersheds. The IWM approach at micro-level, a single window system of providing goods and services can be ensured by complete integration of soil, water conservation, forestry, agriculture, horticulture and livestock components through a unified implementing agency. Further it calls for assigning responsibilities to macro institutions for creating a sustainable livelihood environment at micro-level.

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