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Paradigm of participatory watershed management for sustainability: principles and practices

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Abstract
Watershed management is mainstay of natural resources conservation these days. Participatory watershed management approach is talked about a lot but with variable successes and failures. A new rational definition of watershed management is presented which is obvious as per the term "Watershed Management" and based on well-accepted theories of management. Earlier approach on watershed management was incomplete in itself. In the new paradigm the watershed management comprises conservation of natural resources including animal and human, participatory decision, formation of groups, motivation and working of groups towards common goals for deriving maximum benefits on a sustainable basis with minimum effort. The basis of decision and steps in decision making are presented. Practices for motivation, negotiation and control as applied to watershed management are also presented. The major change is in modus operandi. While discussing role of Participatory Rural Appraisal (PRA) a new term is proposed as Technical Rural Appraisal (TRA) which takes care of participatory management of the steps that have to go after PRA i.e. implementation, controlling and safe maintenance for sustainability. It recommends follow up of set principles of management in all aspects and save the time and energy that have gone unsuccessful in the past in the domain of watershed management, which will bring participatory watershed management from no where to everywhere for maintenance of sustainability.

INTRODUCTION

In India there has been concern for soil and water conservation since post independence and earlier. Works were on fragmented/individual field based on some norms decided by the state governments. This was approach right from the first - five year plan. In the domain of conservation of natural resources, watershed was accepted right in the first five year plan. Since then efforts have undergone many reforms and passed to many phases The term watershed came in prominence in the domain of soil and water conservation in the second five - year plan. Since then emphasis is being laid on land and water conservation on watershed basis. The fragmented field treatment approach got remodified to watershed scale approach. Seeing the logistics of scientific implications, beneficial gains and economic justifications ICAR started a country-wide scheme on Operational Project on Watershed Management early 80's. Working research institutions and state agricultural universities available in the area provided the scientific back up. Planning of watershed was carried out by the scientific organisations and executions were carriedout by state department of agriculture. The Central Ministry, who distributed funds to state government for execution of the projects, changed modus operandi and named as National Watershed Management Project for Dryland Areas (NWDPRA). Funds were allocated to

the different state Governments, which were to be utilized on the basis of criteria of selecting watershed by them selves.

In the late 20 the Century (1995-2000) approach has been towards participatory watershed management. Seeing the potential of resource conservation on watershed basis, programmes of watershed development by different ministries viz. Agriculture, Forest and Environment and Employment and Social Justice, Hanumantha Committee made guideline for participatory watershed management (GOI). However, there have been variable success and failures. In the participatory watershed management while the technical parts remain the same there has been change in the modus operandi. The modus operandi is not fully understood. Thus, results of watershed management have been very short lived ie it remained as success stories until there have been some technical follow up support and the system collapsed after withdrawal of such support. The objective of this write up is to review definitions and principles of of management, synthesise and analyse their implications in the natural resource management etc. on participatory watershed management for sustainability.

WATERSHED MANAGEMENT: A SYNTHESIZED DEFINITION

Based on technical implications and management perspective a new synthesized definition was proposed by Yadav and Bhushan (2000). As per this definition, "Watershed management is a social process of planning, organizing, actuating and controlling through a cooperative group actions for securing maximum benefits from natural resource viz., land, water, vegetation, animals and human with a minimum efforts for maximum prosperity and happiness of stakeholders, user groups and other people and the Government".

Table 1. Components of new definition of watershed management.

Factor group	Component	Emphasis and objective
System factor	Planning	To accomplish maximum return with minimum effort
Modus operandi	Organizing, actuating and controlling performance	Of the people by the people and for the people
Economics	Monitoring and evaluation for effective planning, and modus operandi	Act as check on directions and performance towards fulfillment of set goals.

Table 1 contains various factors of watershed Management. Thus, watershed management comprises best use of natural resources including animal and human, formation of groups and working groups etc. It involves judgement and decision in determining plans in using data to control performance and progress against plans and direction through cooperative groups actions towards common goals to secure maximum prosperity and happiness on a sustainable basis. Therefore, watershed management comprises combination of biological and engineering works, accounting social and economic condition of people both living within the watershed and at the downstream side. It involves participation of people in organised groups and development of the people and not the direction of

the things i.e. human resource development (HRD) by capacity building. It comprises removing blocks to such performance, a way of operating and actuating in achieving the goals.

DYNAMICS OF WATERSHED MANAGEMENT

The watershed management for resource conservation started right after independence and has moved to different generations (Table 2). The river basin management is the new paradigm for resource conservation for sustainability.

Table 2. Water and soil conservation stages/generations.

Stages/generation	Strategy	Period	Scientific characteristics
Stage I	Individual field	After independence	Fragmented approaches, work on individual field on different considerations.
Stage II	Operational Watershed Management	In 1980s	All soil and water conservation measures applied on watershed basis by integrated approach.
Stage III	Participatory watershed Management	In 1990	A beginning is made wherein the management is being taken as social process.
Stage IV	Strengthen participatory approach and extension of watershed to river management	1999 onwards and in perspective as well	Development of group/community etc. And extension of PRA to Technical Rural Appraisal (TRA), Extension of management from a domain of watershed to the domain of river basin as a whole.

PRESENT DAY WATERSHED MANAGEMENT

Technical innovations resulted in techniques and practices for natural resource conservation and utilization. When technologies were transferred to implementation their successes did not come up to mark that means there occurred failure on part of implementation and maintenance for sustainability. The new paradigm lies in changing modus operandi from top to bottom to new style i.e. from bottom up approach. The modus operandi required capacity building and not administering of the things.

Watershed management in most successful cases has been on empirical schools or management by Customs School (Table 3). There is need to take it to contingency approach school as well. Findings of quantitative schools can be applied in planning and controlling. In a larger measures while the contribution of behavioural sciences and social systems schools will have greater applicability functions like organising, staffing and directing. The systems approach will have a role in bringing out interrelationship among all the functions. Thus, it support application of TRA in addition to PRA. With the introduction of PRA a beginning has been made in the watershed management to deal with the subject in the right perspective. Nevertheless, most of management theories and steps are not followed up at present. This write-up covers the important concepts and steps of man-

agement priniples. It is recommended that management principles be applied in the domain of watershed management without wasting still more time as it has happened in the past.

Table3. Different Schools of management and its correspondence with function of present days watershed management.

Schools	Functions
Management process school	Planning, organising, starting, directing and controlling
Empirical schools or management by customs school	Study of experience, passing over to the practitioner, success and failure provide guidance to manage in similar situation. Theoretical research is based on practical experience
Human behaviour schools	Understanding human behaviour in context of work groups and organizations, interpersonal relations among people. Motivation, participatory management behavioral sciences.
Social systems school	Cooperation of members working and the group is essential and is the core of good management
Decision theory schools	Decision-making is central to the study of management.
Mathematical school	Different factors involved in management can be quantified and expressed in the form of models, operations research mathematical tools simulation and model building are basic work.
Systems approach school	Study of various parts in their interrelationships rather than in isolation from each other.
Contingency approach school	It falls somewhere between simplistic and specific principles and complex and vague notions. Here management is situational.

MANAGEMENT AS A FACTOR OF PRODUCTIVITY

The productivity is constituted (Fig. 1) by technological development and group job performance which is again function of ability, motivation and physical condition. Snag in either of the factors will hinder productivity. Earlier efforts were mainly on technical innovations, which resulted in techniques and practices for natural resource conservation and utilization. When technologies were transferred to implementation their successes did not come up to mark that means there occurred failure on part of implementation and maintenance for sustainability. The new paradigm lies in changing modus operandi from top to bottom to bottom up approach.

HUMAN NEEDS AND BEHAVIOUR

Lot of biological and engineering endeavours have been put in and great success achieved. Here the focus is devoted to the social part of watershed management. The target object is one individual and its group behaviour. The individual behaviour is dominated by the primary needs and the group behaviour by other secondary needs. These

needs keep on changing upward (Fig.2). Primary needs arise out of basic physiology of life. It depends completely on what one directly has i.e. “live within the means”. The secondary needs motivate behaviour of a person. These are very complicated. Table 4 presents need versus human behaviour.

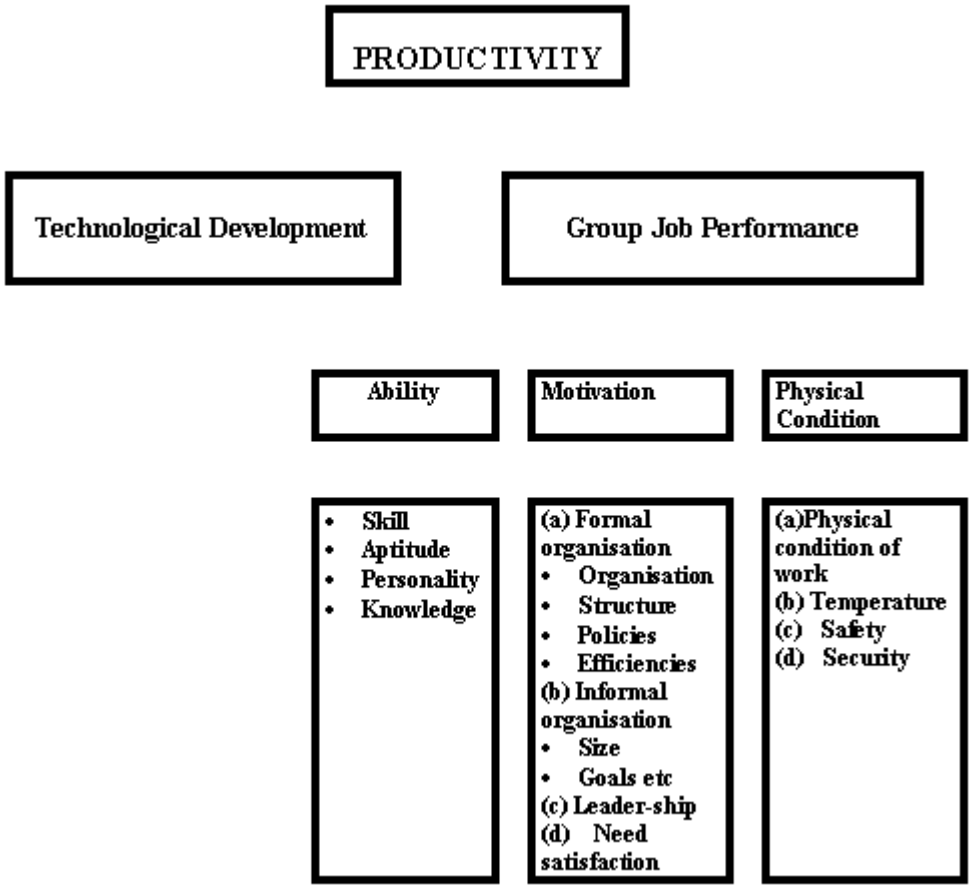

Figure 1. Factors of productivity in degraded land of gullied watershed as per principle of management.

The watershed management goal lies in fulfillment of largely physiological needs i.e. Roti, Kapara aur Makan (Food, Cloth and Shelter) and economic security i.e. safety need in general. The social needs, egoistic need and realisation needs are to be moderated, fulfilled or sacrificed in group actions. This becomes a challenging task for community organizations viz. users groups including self help group in a watershed, which remain as the main stay in the participatory watershed management. The watershed management has always to be on look out for the unsatisfied needs of the individuals that it can take proper steps to motivate them by providing opportunities for the satisfaction of such needs.

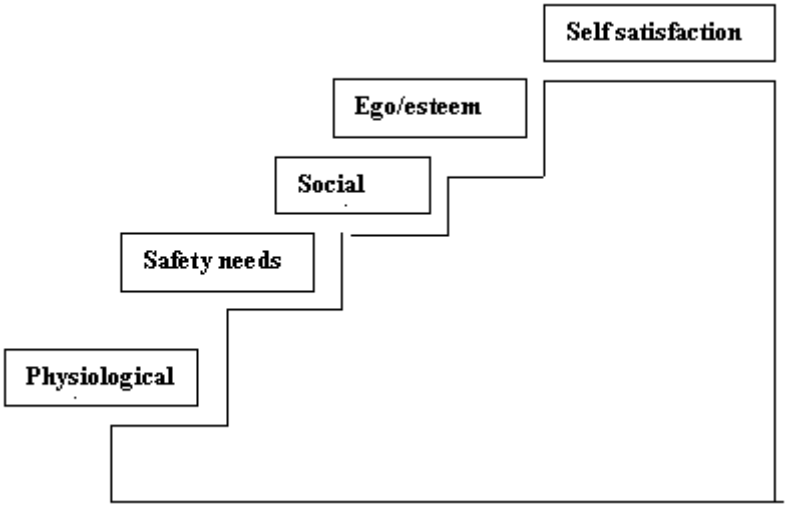

Figure 2. Moslow's hierarchy of needs.

CONCEPT AND ADOPTION OF PARTICIPATORY APPROACH

The participatory approach has been practiced in the industrial sector since much before than it is introduced in watershed management. It follows a certain set principle of decision making. The present PRA does not appear to fulfill all requirements of participatory approach. It takes in to account of things, what people have experienced and their easy attitude towards things. While one is dealing with water the basic principles of hydraulics come into way. This needs best scientific and engineering solution. In the PRA peoples preferences are reckoned and a confidence is built up so that the feel getting involved in doing things for their own benefit. This is necessary for achieving their participation. Proper design of the selected measures and works involves a job of specialist. This should be achieved by inviting such specialist services., which can not be overlooked otherwise. Thus, after such work execution details are decided, people should be motivated to participate and cooperate to fulfil the assigned task. That means the PRA adopted principle of participatory approach from industry, it should take complete cognizance, adopt all principle of management and make use of for betterment of situation. After all it is the change in modus operandi.

The best planning is basic and people's participation is resorted to execution, harnessing the benefit on sustainable basis. The sustainability is the basic requirement as the agriculture sector fulfils the basic physiological need, which is urgent and repetitive. The guidelines for watershed development prepared by Ministry of Employment and Social Justice take this fact and recommended project plan preparation through group of experts and made budgetary provision for such works.

Table 4. Successive human needs and their implication on human behaviour.

Need Type	Need type Hierarchies order	Factors	Behaviour implication
Primary needs	Physiological need	Food, drinks and sleep etc	Effort of tooth and nails
Secondary needs	Safety needs	Protection from fine accident and economic security	Fear, danger and selfish attitude.
	Social need	Desire for love, affection with other people including acceptance by ones work group	Inclination towards one side, favourtism and nepotism etc.
	Ego/Esteem needs	Desire for personal work and dignity, independence, achievements and competence etc.	Acquire super most position
	Self satisfaction / realization	Urge to put ones potentiality to full use.	Preaching

WHY PARTICIPATORY APPROACH IN WATERSHED MANAGEMENT

As revealed earlier, the management has been defined as a social process. In the industrial sector the gains are definite because of work being under a control condition ie no calamities of the weather to the extent of hampering the productivity. In the agriculture sector climate is controller of the success of the enterprise. But, the sector has to fulfill the basic needs of the people, which is urgent and repetitive. That means there should be productivity under all weather condition. That means the watershed can not be taken as a social process alone. It is a technological process as well. The scientific and technological solutions are to be applied to achieve the production .The sustainability in production can be achieved only through peoples participation for maintenance of the assets and facilities created in the watershed. Thus, be it industry or agriculture, the principles of productivity demands peoples participation. This justification suffices the approach and the content of this article.

DECISION MAKING - A CORE OF PARTICIPATION

Well conceived, analysed and mutually agreed decision is factor of safeguarding every ones interest and unity in discharging appropriate function towards fulfillment of set goals. Following steps (Fig.3) constitute the decision making and its actuation.

Perception: A state of awareness out of which, consciousness of being arises.
Conception: the power of mind that develops ideas out of perception.
Investigation*:* The search and acquisition of information pertinent to the specific concepts so that advantage and limitations of alternative course of action can be compared.
Selection: A discrimination among the alternatives so that most desirable course of action is designated as decision.

Promulgation: A declaration of decision so that persons concerned are adequately notified.

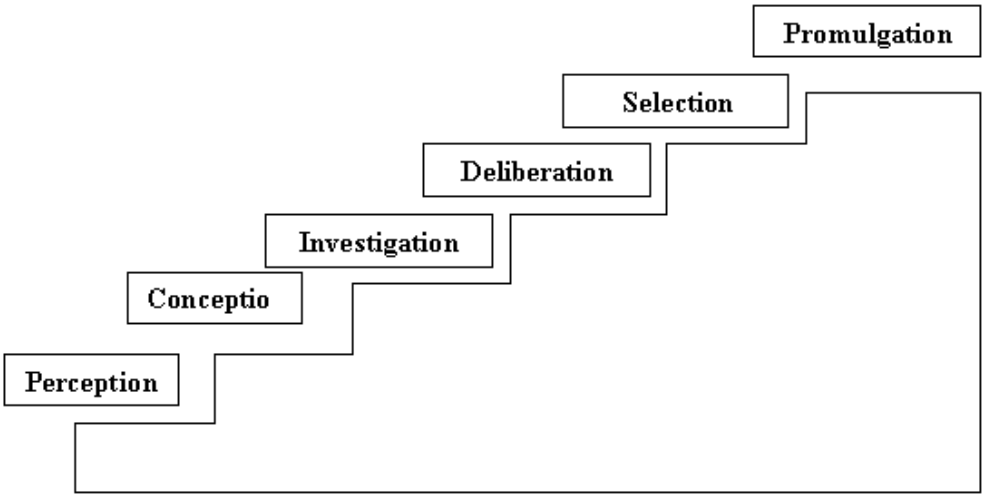

Figure 3. Steps in decision making.

PRA-RRA and TRA

Participatory Rural Appraisal (PRA) is an entry point activity. It is a way of learning from and working with community members to investigate analyse and evaluate constraints and opportunities as well as make informal and timely decisions (Table 5) about development initiatives.

Table 5. Correspondence of PRA activity with steps of decision making.

Steps of decision making	Successive stages	PRA activity
Perception	I	Development of objectives and aims of PRA
Conception	II	Do it yourself
Investigation	III	Transect walk, seasonal diagramming, mobility map, daily routine diagram, future possibility, historical time line, case study, semi structured interview.
Deliberation	IV	Diagramming, transect walk, farm mapping, livelihood analysis.
Selection	V	Venn/chapati diagram, sequencing flow charting, pre-diagram.
Promulgation	VI	Not so precise, not on social or obligatory binding.

The PRA evolved in 1970s/1980s and RRA in 1980s/1990s (Samra and Mishra, 1999) is adoption of principle of decision making. The concept of participatory management has been in industrial sector much before than it is being introduced in watershed management. In the industrial sector benefit flows between the proprietor and the workers. In the participatory watershed management entire benefit is for the people who own and/or use the resources and GO and NGO stand as a facilitator. The indirect benefit of watershed

management flows to the public and to the nation. Thus, the entire situation culminates at **the people, by the people and for the people,** which calls for participatory management. However, it is felt that there exists lack of cultivation of cooperative skill in PRA as all activities of PRA remain limited to existing knowledge of things, material and what should be best to serve their needs. In the natural resource management specially water which in my case can not make any compromise for its flow/route, there is need to make compromise among people and provide routes and channels for best managed regulated flow for sustainable settings. This will help reduce drudgery that occurs due to water shortage or surplus situations. This requires a cooperative planning and operation on give and take basis.

As evident, the PRA is an entry point for convincing and motivating people for participatory approach. Although there is a type of PRA for evaluation termed as "evaluative PRA", there is lack of Technical Rural Appraisal (TRA). As evident water and land resources need a specific requirement, there is need to conduct TRA where in best decision is taken and people are prepared to adopt and cooperate in carrying out such decision. Adoption of research results and engineering principle are key for any project dealing with water, be it for drinking, irrigation, sewage water drainage or flood water. While dealing with water no compromise will work, it has to follows set principles. Fig 3 sets net gain of change in the peoples attitude towards work. In order to keep such things to persist all the time TRA is fully justified.

MOTIVATION: DOUGLAS THEORY OF X VS MC GREGOR'S THEORY Y

Different styles of watershed management have different bearing on the motivation of man in an organisation. Theory X represents the traditional view of human nature and emphasizes the need for control and direction over man. On the contrary Theory Y indicates the individual and organization and highlights the need for improving and utilizing inner motivation.

The theory has been advanced to suggest that human beings combine a bit of both the attitudes according to circumstances. In relation to Moslow's hierarchy of needs it may be said that Theory X may be more applicable where a man is concerned with lower level of needs. Once he has adequate level of satisfaction a basic physiological and safety needs, Theory Y may be used to making an appeal to a higher level needs. It implies that a first priority work should be chosen which satisfy basic physiological needs. Thus, the development of agricultural lands at first priority is the right step in the watershed management.

NEGOTIATION TO REACH A WIN SOLUTION

Negotiation is a basic means of getting what one wants from the others. It is back and forth communication designated to reach an agreement when one and the other side have some interest that are shared and others that are opposed. It is fundamental generic human activity, a process that is often used in labour management relations (Ascent, 2000).

In the people's participation, the negotiator, who will not necessarily be the one who gets the best price, is the one who is able to address and meet all the stakeholders needs. Strong will, clarity of objectives, the less rigid, more flexible instances for the new millenium negotiations reflect preparation, deep commitments to goals, mastery of complex issues and a firm grasp of the negotiators.

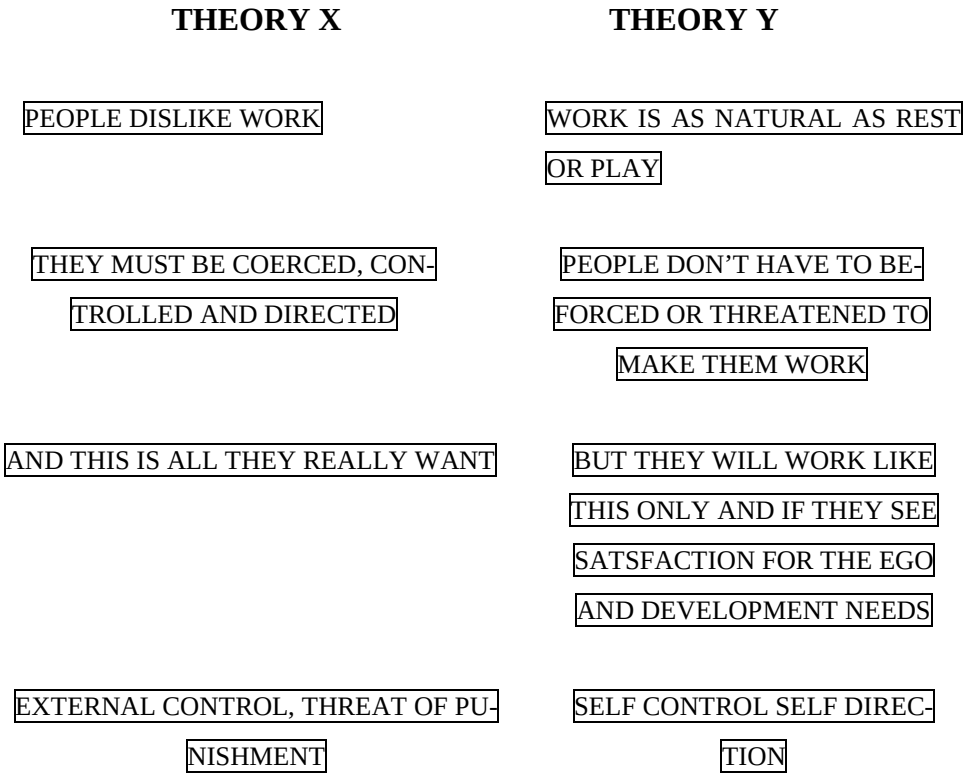

Figure 4. Human nature theory X vs theory Y.

User groups in a watershed emphatically present special and important cross interest differences worthy of consideration. The users group are unfamiliar and uncomfortable with the complexities inherent in a watershed. The complexities comprise of so many reservations, multiple of diverse convictions, vast economic differences at the beginning of participatory approach. It needs strong negotiation of give and take from the resources that will emerge from a rational and ideal watershed management. In this domain, undoubtedly, the role of personality, culture, inter-personal, group dynamics and experience, insight and subject matter expertise among other factors have immense bearing on the outcome of the negotiation.

WHERE IS THE CHANGE ?

The watershed strategy has changed from one to four stages (Table 2). The basic fact remains that behaviour of water, soil and land and to some extent of vegetation has remained as it is that means precision, accuracy, rigidity etc. has to be the same to fulfill best goals set by an ideal planning. The real change has occurred in the mind of people. The surroundings have induced lot of demands. While the primary demands arose due to increase in population, the secondary demand grew due to advancement in quality of life and greed for maintaining standard of living. The secondary needs increased. The gaps in fulfillment of secondary need changed behaviours. Individuals resorted to adopt other paths that hindered the working. Realization of these facts lead to present days participatory management by bottom up approach. Thus, while technical aspects remaining the same, only modus operandi has changed. The bottom up approach is resorted to in Panchayati Raj. But it will be a mistake to leave every thing for participation. Importance of scientific and technical implication can not and should not be under looked. Thus, watershed management proves to be a technical as well as a social process. The term watershed is total toward technical expertise whereas management is tilted towards social process i.e. where modus operandi has changed. The Ministry of agriculture guideline (GOI) rightly made following four training modules each of one week.

Watershed treatment measures, low cost modules, ITK and production techniques.

Participatory rural appraisal (PRA), community organisation , Group behaviour and convergence of services.

Project management tools and techniques, operational analysis, CPM, post cognizance agreement and time management etc.

Administration of rural development programmes.

District board/district rural development agencies administrative accounting procedures construction, measurement, work audit, computerization and report writing etc.

DISCUSSION

New Paradigm Approach

In watershed management, both the aspects of technological and social management part are necessary and complementary. The division of work is drawn that clearly specifies who has to do what (Fig.5). Government's role is creating condition for fulfilling the physiological needs of the people. This situation will help induce participant eagerness in the resource poor and technology ignorant subsistence-farming stakeholders. The land form transformation practices which are cost intensive practices such as inward bench terracing and drainage line treatment etc. once created other reforms will follow up fast. In participation mode other facilities and services can be easily created by group actions etc.

Quality of Life-An Additional Objective for Watershed Management

For good quality of life the environment viz. surrounding, roads, drainage and setting of rural housing lot are to draw attention of GO/NGO and resource poor, held in primary need fulfillment etc, farmers. The social and resource maps prepared in PRA exercises (Fig. 8, Samra and Mishra, 1998) exemplify the poor condition of village lots and quality of life. Thus, it demands extension of PRA activity and introduction of new term as TRA. The TRA entails all such activities. So far little thinking has been given to improve upon the housing lots, street and drainage etc in the rural areas. These are important factors for creating condition for good quality of life in the villages. Sanitation is key factor in the quality of life. Gandhian way of carrying *khurpi* for digging small hole for defecation and coverage of night soil is the beginning point which should be provoked. The NGOs can easily handle the task of provoking and convincing the people to resort to such activity.

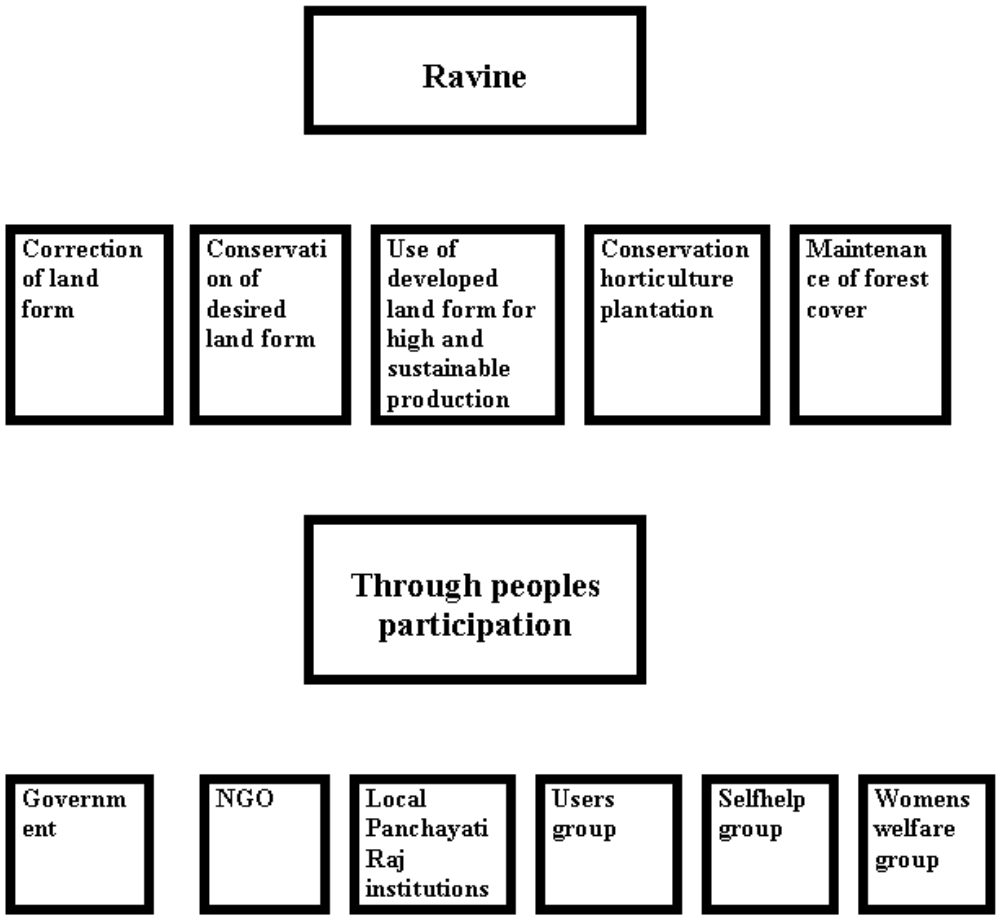

Figure 5. Chart of rehabilitative work / Actions for zone management in ravine watersheds.

The participatory approach is aimed at sharing mutual benefits that will emerge from the natural resource management on a sustainable basis. The concept of participatory approach is opted from industrial sector. It has to pass from different phases. The top to bottom decision vide Fig.5 is to change to flow from bottom up approach. Joint decision is to flow upward. In doing so course curricula and training programmes are to be framed. Trained people will carryout deliberations to take decision, promulgate and participate. The net beneficiaries will realise the gains of participatory approach and keep the pursuits in continuous action.

Convergence of Services

In practice usual expression is shortage of funds for implementing watershed treatment measures. While technologies reduce cost and method of implementation, there lies great scope in convergence of services of other department viz. road, irrigation, animal and health.

CONCLUSION

The watershed management is techno-socialogical process. The earlier techno-favouring approach has to shift towards sociological aspects of human and group behaviour management as well for management of natural resources for welfare of human. Since agriculture fulfills the physiological needs, first priority for should be development of agriculture land. Inclusion of improvement in quality of life as one of the objective of watershed management is recommended. Convergence of the services fall in the domain of management. Weakness in any link will render inefficiency of other factors and the loss in productivity.

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