Review Article

Participatory Rural Appraisal (PRA) Approach for Watershed Management in India: A review

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A B S T R A C T

Watershed management is the meant to containing the deterioration of natural resources for maintaining the ecological balance and sustainable economic development. This paper presents the brief review about various aspects of the Participatory rural appraisal (PRA) approaches in watershed management. The purpose of PRA is to make possible development practitioners, university and state department officials, and local people to work together to plan context suitable programs. Several government and NGOs are operation in the participatory watershed projects successfully completed and going on. The components of PRA consist of methods, performance and attitude and sharing thoughts with the other beneficiaries. The PRA work was the used in the semi structured interviews, transect walk, timeline, wealth matrix etc. are common techniques. Many workers evaluated the PRA in terms of soil erosion, measures taken to arrest erosion, groundwater recharge, soil moisture retention, soil fertility and productivity, crop and cropping systems, agricultural earnings, productivity of non-arable lands, and household welfare. The major bottleneck in adoption of this approach is a lack of coordination amongst the donors, government bodies, and the NGOs. Newly latest innovations, such as relevance of geographical Information systems (GIS) are very common thereby attractive its affirmative impact in improving the Socio-economic status of farmers.

Introduction

Land and water are the two most important natural resources gifted by god to human civilization. Judicious use of land and water resources is the fundamental to growth and sustainable development. The increasing human population as well as livestock population coupled with widespread incidence of poverty is exerting high pressure on Earth's limited land and water resources to meet various demands (Sikka *et al.,*. 2014). Over 120 M ha of land has been declared as degraded or problematic soils in India (NRAA 2011). The scarcity of water for agriculture and domestic purpose has been regarded as foremost problem and had resulted in low crop productivity and land

degradation. There is substantial potential to narrow down the gap between potential and actual yield by embracing of improved management technologies. Different studies had exposed the appropriate management of rainwater in enhancing the productivity (Samra 1997, Wani *et al.,* 2003). The concept of watershed management has evolved to ensure the effective use of both natural and social aspects, therefore watershed development programmes include land, water, vegetation, livestock and human resources as essential components (Sikka *et al.,* 2014).

A watershed can simply be defined as any surface area from which rainfall is collected and drained to a common single outlet. Watershed is synonymous with a drainage basin or catchment area. A drainage basin is can involve several towns or regions and even countries (Li *et al.,* 2005). There is not a determined size of a watershed as it may differ from a few hectares to several thousands of hectares of areas (Adams and Godwin, 1998).

Each watershed has a unique combination of inherent conditions, use and management, and the response to flow and water quality is highly variable and complex. The watershed programme is primarily a land based programme, with primary focus on water status and its main purpose being to enhance agricultural productivity through increased *in-situ* moisture conservation techniques and protective irrigation for socio-economic development of rural community (Joshi *et al.,* 2005). Watersheds serve as effective natural units to monitor the processes that influence the integrity of the functioning ecosystem. Watersheds are like a patchwork cover over the landscape; they are made of many pieces that fit together to make a whole (Adams and Godwin, 1998). Initially, watershed management programs were structure-driven approach for soil conservation and rainwater

harvesting, aiming at only some productivity enhancements (KV *et al.,* 2008). This was a compartmental and top-down contractual approach. This led to less transparency and inequitable benefits among the community members. The rich who could invest in a bore-well have harnessed the benefits of the augmented water sources. On the other hand, small and poor landholders comprising about 85-90% of the community could not get any equitable benefit from the conservation measures (KV *et al.,* 2008). As such, these interventions were looked at as the employment opportunities during the project period and people's participation was inadequate. India began to look at the watershed development programs in the 1970s for increasing land controlling land degradation and increasing the productivity of soils and soil fertility improvement (Yoganand and Gebremedhin, 2006). Although that the end of the 1980s the situation changed radically. Initially watershed projects were concentrating on soil and water conservation issues. A decade later, it became apparent that technical and physical works alone would not lead to the desired objectives of watershed development and the social, financial and institutional aspects of rural development must also be taken into account. During 1994, the Ministry of Rural Development (MoRD) of the government developed a group of guidelines for implementing its watershed programmes, which intended to realize the full benefits of watershed work (Yoganand and Gebremedhin, 2006). This progressive policy was essentially people-centered and it incorporated good practice from NGO and government policy, such as awareness raising, bottom-up planning, partnerships with NGOs, and community participation. Watershed management is the integration of appropriate technologies and strategies within the natural boundaries of a watershed or drainage basin for optimum development through

conservation, regeneration and judicious utilization of all resources: land, water, animals and human beings (Li *et al.,* 2005). In India there is a lot of indiscriminate use of limited water resources, therefore, urgent need of application of the technology of watershed management to solve its annual problems of droughts and floods. The demand for water exceeds its supply and conflicts sharing water resources are on the rise (Dutta, 2007).

The Drought Prone Area Program (DPAP) was one of the area development programs launched by the Government of India in 1972-73 to tackle the special problems faced by those fragile areas that are constantly affected by severe drought conditions and in addition, there were several operational research projects under DPAP. The Central Soil and Water Conservation Research and Training Institute (CSWCRTI), was reconstituted in April 1974 to attend to soil and water conservation issues on arable and non-arable lands, evolve and demonstrate conservation technology on watershed basis, and capacity building through training (KV *et al.,* 2008). In 1983, a program for development of dry land agriculture on watershed basis was initiated and the work began in 47 model watersheds on soil and water conservation measures, crop management and alternate land use systems. After the severe drought experienced in 1987, the Government of India had initiated the National Watershed Development Project for Rain-fed Areas (NWDPRA) in 1990-91 during the 8th Five Year Plan. The programs evolved and the projects designed for using the watershed development approach were the Drought Prone Area Program (DPAP), the Desert Development Program (DDP), River Valley Project (RVP), National Watershed Development Project for Rain-fed Areas (NWDPRA), and the Integrated Wasteland Development Program (IWDP). These projects being primarily engineering oriented

ones, largely focused on water harvesting through construction of percolation tanks, contour bunds, gully control structures, contour trenches etc. and came under state governments' soil and water conservation projects (KV *et al.,* 2008).

Presently, watershed models are being developed giving right of way to the empowerment of the community and the stakeholders so that the projects operate not as a supply driven project but as a demand-driven project. Earlier experiences from the various watershed projects have indicated that a straight jacket approach will not yield desired results and a mix of individual and community based interventions are essential. Multi-disciplinary teams are involved to afford all the technical expertise to solve the problems at the community level. The benefits are transparent and distributed well among the community members as well as women.

Weaknesses in the conventional approach of watershed management

The traditional system of natural resource use in rural communities has significantly evolved over the years. In the past, priority of watershed management was specified to the biophysical frame occupation of watershed which is often based on top-down approach (Rhoades and Elliot, 2000). Nevertheless in the traditional system, local people were not regularly consulted in the design of top-down approach, which resulted in failure of projects in achieving the project goals. Watershed projects are more efficient and effective when users are agreed a role in managing their own watershed resources (Johnson *et al.,* 2001). The active participation of users has a lot of implications for watershed management and research. There was hardly any scope for learning in the traditional approach and there would be propensity towards giving right of

way to the biophysical frame work of watersheds justified a top-down planning come close to. Planning in the traditional system was often based on the capacity of land rather than needs and capacities of local people (Rhoades and Elliot, 2000). This formed a variance between local population and outside watershed project managers and no flow of information between land users and other key factors such as researchers, planners and policy makers etc.

A major challenge in the traditional watershed management approach was the supposition of technology transfer instead of development of technology on peoples land and their surroundings. Another important weakness was regarding the training and research where the major responsibility for training has been given to agricultural research institutions and agricultural universities. They are sound in technical feature of watershed but are weak in social science aspects of the institution structure as well as forging related with non-farm sector to generate value added products from watersheds (SRISTI, 2005).

However, another key weakness was ignoring local knowledge on local soil types and conditions for suitability of technology to the precise soil while designing and implementation of the projects. It would be better to adopt on-farm research trails for watershed projects designed and implemented jointly by users, scientists and other stakeholders. The farmer participation on-farm research would provide an interactive mode so that both scientists and farmers can decide on the conduct of trials and technology to be tested, and active participation of stakeholders in the research that is most important for successful adoption of technology. In the conventional approach people's participation often limited to project implementation stage and no focus on institutional building for long term collective management of resources (Joy *et al.,* 2004).

Paradigm shift

Earlier resources were allocated by the central and state governments for watershed development and which are supply driven. These top-down approaches were not conducive for including the stakeholder's participation in designing the programs that are targeted to their improvement. There was lot of mismatch between the needs of the stakeholders and the activities for implementation of watershed development. Such watershed projects often failed to achieve the intended targets in the absence of peoples' participation. The participatory approach in watershed management has emerged as a new paradigm for watershed development in India. This paradigm shift was expected to contribute towards more decentralized governance and increased participatory approaches to natural resource management that will rise to face the new challenges by strengthening the capacity of local people.

Participatory rural appraisal approach in watershed management

The participatory rural appraisal (PRA) or participatory learning and action (PLA) of the field workers use of participatory approaches. Participatory watershed management has emerged as a new pattern for sustainable rural livelihoods and it occupied the central-stage of rural development in the fragile and semiarid environments of the developing nations. The concept of participatory watershed management emphasizes an inter-disciplinary, inter-sectoral and multi institutional mechanism (Rhoades and Elliot 2000). Participatory watershed management has been defined as a process "which aims to create a self-supporting system, which is essential for sustainability" (Wani *et al.,* 2005). Participatory watershed management provides opportunities to the stakeholders to

jointly negotiate their interests, set priorities, evaluate opportunities, implement and monitor the outcomes. This concept came widely into practice in late 1980s and over the time peoples' institutions, like zila parishads (district revenue administrative units), self-help groups, and watershed-implementing committees were gradually involved in the project management system. With allocation of more funds for watershed development, several non-governmental organizations came forward to aggressively participate in implementing the watershed programs The PRA continues to evolve so fast that no definitions can be final and has to be updated several times. PRA is defined and updated several times by different researchers and few of them are given below:

Participatory Rural Appraisal (PRA) is being used to describe a growing family of approaches and methods to enable local people to share, enhance and analyze their knowledge of life and conditions, to plan and to act (Mascarenhas *et al.,* 1991).

PRA is based on village experiences in situations where communities effectively manage their natural resources (Cavestro, 2003)

Participatory Rural Appraisal (PRA) is a process of understanding people, their resources, their socio-economic conditions and a process of exploring their problems, their aspirations and potentials in partnership with people themselves. PRA is an integral component of watershed management (Winnegge, 2005).

A PRA is defined as an 'intensive, systematic but semi-structured learning experience carried out in a community by a multidisciplinary team which includes community member (Theis and Grady, 1991).

PRA has been described as a growing family approach and methods to enable local people to express, share and analyze their knowledge of life and conditions to plan and act (Chambers, 1994).

PRA is a label given to a growing family of participatory approaches and methods that emphasize local knowledge and enable local people to make their own appraisal, analysis, and plans (World Bank, 2009).

Evolution of PRA and its development

In the field of rural development, the 1980s could be described as the decade of rapid rural appraisals (RRA). RRAs were referred as study used as a starting point for understanding a local situation; carried out by a multidisciplinary team; lasting at least 4 days but not more than 3 weeks; and based on information collected in advance, direct observation and interviews where it is assumed that all relevant questions cannot be identified in advance' with a move from RRA to participatory rural appraisals (Theis and Grady, 1991). The shift from conventional surveys onto rapid rural appraisals (RRA) was based on the realization that RRAs were not very participatory, ("windshield survey"), and the accuracy of the information was low. This led to a shift towards participatory rural appraisals (PRA) with the aim of increasing the involvement of the respondents. PRA therefore made much emphasis on "handing over the stick" (as participants drew maps or transects) to symbolize the shift in the control over the process (Chambers, 1994). Later on Li *et al.,* (2005) reported that as the former body of PRA, rapid rural appraisal developed in the 1970s and 1980s in response to the perceived problems of outsiders missing or miscommunication with local people in the context of development work. The purpose of PRA is to enable development practitioners, government officials, and local people to

work together to plan context appropriate programs. Chambers (1994) compared the RRA and PRA approaches and is given below in table 1.

In India, participatory watershed management has roots in the non-government sector that go back nearly as far as the government programs. The seeds of the participatory watershed management can be traced to a small village called Ralegan siddhi in Maharshtra state of India. Anna Hazare, a local leader was responsible for bringing many social changes in the village particularly soil and water conservation measures besides family planning, a ban on alcohol, protection of non-arable lands against open grazing and felling of trees and voluntary labor for community welfare and other measures which helped in restoring natural resources base of the village (Kerr *et al.,* 2002). This ultimately led to people participation in watershed management and the evolution of participatory watershed management looking beyond just the biophysical aspects to also focus on social and institutional aspects from a bottom up approach. It is now widely accepted that the communities must participate to enhance the productivity of natural resources in a sustainable fashion (Turton *et al.,* 2009).

Political institutional framework in India and various agencies

India is the seventh largest country in the world, with the population over one billion (Census of India, 2007). India has 28 states and seven centrally administered Union Territories. States have their own registration Assemblies. States have main authority on the natural resource in their range (Embassy of India, 2007). The water law in India is built on the traditional common sense, which holds that the land owner has a right to use the ground water flowing past their land equally with other riparian owners, to have the water come to them undiminished in flow, quantity or quality (International Environmental Law Research Centre, 2007). The federal government was responsible for national legislation and adjusting the state inequality of water resource, for example, providing for the transfer of water from one river basin to another. The state controls and regulates groundwater to foster its conservation and sustainability in its use, such as water supplies, irrigation and canals, drainage and embankments, water storage, hydropower and fisheries. The state government determines how to use the ground water in the state. The policy is now also encouraging local people participating water resource management (International Environmental Law Research Centre, 2007).

In a district level, the district rural development agency (DRDA) is assigned the responsibility for implementing the program through a watershed development advisory committee (WDAC). This committee would select Project implementing Agencies (PIAs) from among the departments, NGOs, or corporations interested in implementing the projects. Each PIA is responsible for 10 to 12 watersheds and is expected to appoint a multidisciplinary watershed development team (WDT) (KV *et al.,* 2008). At each watershed, the Watershed Executive Committee (WEC) implements the project. It is a nominated body of the Watershed Development Association (WDA) and consists of representatives of User Groups (UGs), Self Help Groups (SHGs), and the Gram Panchayat (GP), the lowest level of local government. The WDA comprises all adults from the concerned GP who are directly or indirectly dependent on the watershed area and representatives from the WEC. The funds for the project are to be released directly to the Village Implementing Organization (VIO) which is structurally linked to the Village Watershed Association (VWA).

The VWA is comprised of representatives from the various SHGs and UGs located in the village. The DRDA is assigned the overall responsibility for program implementation in the district with the WDAC advising it on issues such as the selection of villages, training and monitoring.

At the implementation level, watershed projects are planned and implemented by the WDA with the help of a multi-disciplinary WDT constituted by the PIAs. After completion of the watershed project, the VWA and WEC take over the operation and maintain the assets at the end of projects, through a Watershed Development Fund (WDF) created with contributions from UGs and SHGs (KV *et al.,* 2008).

Principles and components of PRA

Principles of PRA

According to Cavestro (2003) there are five key principles that form the basis of any PRA activity no matter what the objectives or setting:

Participation **-** PRA relies heavily on participation by the communities, as the technique is designed to enable local people to be involved, not only as sources of information, but as partners with the PRA team in gathering and analyzing the information.

Flexibility **-** The combination of techniques that is appropriate in a particular development context will be determined by such variables as the size and skill mix of the PRA team, the time and resources available, and the topic and location of the work.

Teamwork **-** Generally, a PRA is the best conducted by a local team (speaking the local languages) with a few outsiders present, a significant representation of women, and a

mix of sector specialists and social scientists, according to the topic.

Optimal Ignorance **-** To be efficient in terms of both time and money, PRA work intends to gather just enough information to make the necessary recommendations and decisions.

Systematic **-** As PRA-generated data is seldom conducive to statistical analysis (given its largely qualitative nature and relatively small sample size), alternative ways have been developed to ensure the validity and reliability of the findings. These include sampling based on approximate stratification of the community by geographic location or relative wealth, and cross-checking, that is using a number of techniques to investigate views on a single topic (including through a final community meeting to discuss the findings and correct inconsistencies).

Components of PRA

The three basic components of PRA (Mascarenhas, 1991) have been identified as

Methods,
Behavior and Attitudes, and
Sharing.

Their significance has been recognized and stressed in that sequence.

PRA methods used in watershed management

The first basic to be recognized was participatory methods to facilitate analysis by rural people. Methods have provided a professionally acceptable point of entry, for the spread of PRA (Chambers 1994).

There are a set of methods that are currently adopted in watershed management at the community level. These methods include:

Semi-structured interviewing

A semi-structured interview is a PRA method that engages villagers in a conversation through a series of guide questions (not structured questionnaire) relevant to the villagers. Important information is generated by talking with villagers about topics that interest them. SSI can be used with individuals, key informants, interest groups or other small groups of villagers (Cavestro, 2003). The process of a semi-structured interview involves the interviewer presenting the context of the study and its objectives to the interviewee or interview group (such as a family or household).

The set of questions are prepared but open, allowing the interviewees to express opinions through discussion. Questions are generally simple, with a logical sequence to help the discussion flow. Interview questions should be tested prior to interviews. Training people to conduct a semi-structured interview is important and practice is required to become an effective interviewer. Training needs to address team preparation, interview context, sensitive listening, sensitive questioning, judging responses, recording the interview and self-critical review.

Social mapping

Social mapping is a PRA method just that involves the sketching/drawing of houses and other social facilities and infrastructure (i.e. temple, stores, rice mills, school, pharmacy, trails and roads, water pumps, irrigation and recreation facilities) in a village. These features have usually not been well specified in the village vision setting and village land-use maps. It helps to visualize and situate the location of households and other social facilities/infrastructure in a village. It serves as a baseline for planning, implementation, monitoring, and evaluation of village development activities (including selection of village organizing strategy).

Transect walks

Transect walks was designed to have the community illustrate development workers the physical characteristics of their communities. Transect walks are used to achieve an understanding of the natural resources of a village, their diversity and associated problems, and to assess opportunities. Parameters usually covered include topography, land use and ownership, soil features, vegetation, crops, etc. They are very useful in planning land development interventions and identifying sub-zones for special consideration. If conducted at the beginning, middle and end of the project period (during the same season), they can be used for monitoring and evaluating changes along the particular transect.

Transect walks can be used to compare reactions/discussions of different types of stakeholders, such as government officials, NGO team members, the local community, etc. They can provide a good cross-section of information that can be used for specific purposes of verification and appraisal. A participatory transects walk entails taking a walk along a pre-determined route with a group of key informants from the local community, and exploring the geography of the area through their eyes.

The walk should take in a cross-section of the area of intervention, covering all the agro-ecological zones. For example, this might cover from ridge to valley in a watershed, or straight across a slope if interventions are all roughly at the same elevation. Keystone Foundation, Kotagiri, Tamil Nadu in 2000 conducted a transect walk under 14 tribal areas in Nilgiri hills (NGO Programme, 2005).

Spider web diagram

It is highly visual method for analyzing the relative importance of, or progress on, different aspects of an intervention, representing each project aspect by one arm of the frame of the web, and ranking its importance from 1–10.

The spider web diagram is also called a cobweb diagram, participation wheel or an evaluation wheel. It is a highly visual method for analysing the relative importance of, or progress on, different aspects of an intervention. This exercise can be done to plan projects, but particularly to monitor and evaluate them (NGO Programme, 2005). Each aspect is represented by one arm of the frame of the web, and is graded from 1–10.

It is also possible to rank programme /village/group/individual performance during (monitoring) or at the end (evaluation) of a programme.

The spider web diagram is a relatively quick and easy tool for comparative impact assessment, providing a visual result to which participants can readily relate. However, it is not so suitable for quantitative estimates, which participants in any case found difficult to judge.

Participatory resource mapping

In which a group of participants draw a map of their village, depicting important resources and places; how the area is represented is interesting in itself, as generally aspects of greater importance are portrayed more prominently. The resource map is a tool that helps us to learn about a community and its resource base. The primary concern is not to develop an accurate map but to get useful information about local perceptions of resources. The participants should develop the content of the map according to what is important to them. The objectives of resource map is to learn the villagers' perception of what natural resources are found in the community and how they are used (Cavestro, 2003)

Photographic comparison method

Photographic comparison is a simple way to stimulate community discussions on changes in a particular geographical area over a period of time. Such comparisons can be used to consider changes in land use, land cover, land form and water bodies.

Photographs can be used to track any major physical changes, but less readily any changes related to people and institutions, particularly with regard to attitudes and approaches. Fully capturing social change requires supplementary information collected through other means, such as group discussions (NGO, 2005).

Matrix ranking

It is used to elicit the preferences and opinions of participants with regard to a particular subject; matrix scoring for varieties of a crop provides not only fascinating and useful information and insights, but also good-looking tables with figures.

Scientists and others can be so impressed by farmers' criteria, judgments and abilities as demonstrated in matrix scoring that they go on from this method to others, and progressively become more participatory in their approach.

Matrix ranking criteria's are used for the rows in a matrix and items for columns, people fill in the boxes for each row. The items are ordered for each of the criteria and people put in piles of stones, seeds for scoring relative values.

Ranking exercises are not only relevant with villagers as participants, but often they are also very useful for planners and development practitioners. To work with illiterate farmers, problems have to be symbolized with pictures or objects.

Ranking was used to identify the importance of agricultural problems. The problems had been identified in informal interviews during the preparation phase for the workshop (Cavestro, 2003).

Time line (historical mapping)

Used to gain a historical perspective and to compare changes over a considerable period of time, with various factors being documented; The facilitators meet small groups of villagers and discuss with them the most important events in the community's past and prepare with the information a historical timeline which serves as the base for further work.

It is important to involve different groups of the communities to get their usually different perspectives.

The timeline with basic events can be used for focused discussions on problems, social and technological innovations or on communities' history of co-operations and activities which helped them to solve in past problems successfully.

H form

This is used to rank specific issues and lists both the positive and negative aspects. This helps people to come to a finale by showing both sides of an issue. This method is particularly designed for monitoring and evaluation of programmes. It was developed in Somalia for assisting local people to

monitor and evaluate local environmental management.

The method can be used for developing indicators, evaluating activities, and to facilitate and record interviews with individuals or group discussions. As described below, it is used with literate participants, but it is also possible to use the tool when not everyone is literate

Wealth ranking

Wealth ranking is a PRA method that determines the economic attributes of households in a village. It shows information on the relative wealth and well-being of households in a village. It helps in determining the social and economic status of households in a village.

The information generated by the wealth ranking exercise helps in identifying the poor households in the village. Ranking is done by villagers themselves.

It serves as baseline and as an opportunity to identify indicators for planning, implementation, monitoring and evaluation of village development activities (Cavestro, 2003). Well-being ranking is an extension of the concept of wealth ranking; the latter largely relates to income and physical assets, whilst well-being also includes more over-arching issues like health, access to basic needs, indebtedness, etc (Alur *et al.,* 2005). Mearns *et al.,* (1992) found in Mongolia that wealth ranking was useful in this context as part of a "hidden agenda" by giving "every appearance of being the kind of 'hard' statistical method that Mongolian researchers and bureaucrats, like their counterparts in many parts of the world, have been professionally socialized to use and expect.

Table.1 Comparison of RRA and PRA (Chambers, 1994)

Sr. No.	Particular	RRA	PRA
1	Period of major development	Late 197Os,1980s	Late 198Os
2	Major innovators based in	Universities	NGOs
3	Main users	Aid agencies Universities	NGOs Govt. field organizations
4	Key resource earlier overlooked	Local Peoples knowledge	Local peoples capabilities
5	Main innovation	Methods	Behaviour
6	Predominant mode	Extractive -elicitive	Facilitating-Participatory
7	Ideal objectives	Learning by Outsiders	Empowerment of local people
8	Outcomes sought	Useful Information Reports Plans Projects	Sustainable local action and institutions

Behaviour and attitude

Increasingly in PRA, a second basic came to be seen as the behavior and attitudes of outsiders. For local people confidently and capably to express their own knowledge, to conduct their own analysis, and to assert their own priorities, outsiders had to step off their pedestals, sit down, "hand over the stick," and listen and learn. Such behavior conflicts with much normal professional conditioning and self-esteem. In the field, most outsiders find it difficult to keep quiet, to avoid interrupting, to abstain from criticism, to refrain from putting forward their own ideas. In line with this recognition, field experience training came to stress changes in how outsiders behave. Kumar, a leading trainer in the Indian Government service, placed his main emphasis on behavior and attitudes. He made the counterintuitive discovery that outsiders with less briefing about the methods were more successful as facilitators than those who were more fully briefed. To tackle the problem of behavior in the field, Anil Shah, of the Aga Khan Rural Support Programme

(India) invented "shoulder tapping" (Shah, 2001) as a corrective. This is a contract between outsiders to tap the shoulder of any colleague who criticizes, asks a leading question, or puts forward his or her own ideas. The most powerful and immediate change in behavior and attitudes has been through DIY (do-it-yourself). This entails requesting local people to be teachers, while the outsiders are students who are taught to do a local task such as winnowing grain, mudding a wall, thatching, spreading manure, weeding, transplanting, washing clothes, cooking, or fetching wood or water. In a refinement developed by Kamal Kar in India, the outsiders are videoed with subsequent viewing and discussion of a playback both to them and to villagers. The impact can be strong, both personally for outsiders, and in establishing rapport between outsiders and villagers.

Sharing

The third basic in the philosophy and practice of PRA came to be recognized as sharing. For

practitioners and trainers this has become increasingly a conscious strategy and mode of spread. It has two dimensions: sharing knowledge and sharing experience. Sharing knowledge takes three main forms:

Local people share knowledge among themselves, especially through analysis in groups and visual presentations.

Local people share that knowledge with outsiders. As a condition for facilitating this process, outsiders restrain themselves from putting forward their own ideas, at least at first, or imposing their own reality.

Outsiders themselves share what they learn with each other and with local people.

The sharing of PRA experience has been between individuals, organizations, countries and continents. Some of this has flowed from NGOs in India such as Action Aid, AKRSP, MYRADA, OUTREACH, Seva Bharati, and SPEECH which have established, maintained and disseminated this culture of sharing.

Village camps have been made open to people from other organizations. Quite often, a training camp organized by an NGO has included not just its own staff but also people from other NGOs, from government and from other local communities. Sharing of experience has then been part of the rationale and culture of the camp: beyond the sharing of information by villagers, presenting it to each other and to outsiders, the aim has been sharing among outsiders and between them and villagers of daily experience, food, and sometimes celebration, and sharing among outsiders of learning through self-critical appraisal of process. Some international sharing South-South has been in the same spirit. In early 1992, three Indian NGOs – Action Aid, AKRSP and MYRADA - hosted the first international PRA field workshop to which participants came from 11 other countries of the South.

Organizations practicing PRA in watershed development in India

There are many organizations using participatory methods in watershed development programs in India. To name a few of these key NGOs: Myrada, Aga Khan Rural Support Program (AKRSP), Indo-German Watershed Development Program (IGWDP), Watershed Support Services and Activities Network (WASSAN), Water Organization Trust (WORT), International Crop Research Institution for the Semiarid Tropics (ICRASAT), the Development Support Center (DSC), the Bharatiya Agro Industries Foundation (BAIF), and the International Centre for Integrated Mountain Development (ICIMOD). These NGOs are often funded and/or partner with the Government of India's Ministry of Rural Development (MoRD) offices, UN agencies, including UNDP and UNEP, as well as foreign governments, including USIAD, DFID from the UK, GTZ from Germany, and the bi-lateral Indo-Canada Environmental Facility.

The Aga Khan Rural Support Program (AKRSP) is one of the more prominent NGOs that is better at disseminating information on its work. The AKRSP model for use of PRA methods in watershed development entails: Deciding the objective of the planning exercise; deciding the methodology and who should participate; informing villagers about the programme; preparing a base map on ground/paper; conducting a transect walk; assessing equity aspects; conducting focus groups; holding village meetings; developing management plans; and submitting a community proposal (to the Government to be funded) (PLA Notes, n.d.). The outcomes from these interventions include: Maps;

baseline information; listing of priorities; involvement of different groups of the village in the process; opportunity identification matrix; village natural resource management plan; understanding potential conflicts between various groups in the village in implementing these policies; prioritize plan and proposal for identifying these priorities; and a common frame of reference for implementation, management, monitoring and evaluation of project (PLA Notes, n.d.).

Analysis of the impact of participatory watershed management

In recent years, many developing countries have adopted watershed development approach as part of their rural development strategy.

For example the Government of India with the help of external donors, extensively undertaking the watershed development programs in the dry and semi-arid regions as a means of addressing soil erosion, water table and drought rural unemployment and poverty. It was probable that watershed programs would augment farm income, raise agricultural productivity and conserve soil and water resources through the process of participatory watershed management.

Watershed programs were initiated over a wide range of agro eco-regions of India. These watershed programs are supported by National governments and also by some international donors.

As Rhoades and Elliot (2000) noted funding participatory watershed projects was one of the most popular investments by development agencies and international donors in the post-Earth summit years. The new paradigm shift in watershed development focused on achieving the overall goal of enhancing sustainable rural livelihoods for reducing the incidence of rural poverty. Most of the watershed projects were launched for the following purposes:

Raising farm income
Enhancing agricultural productivity
Soil and water conservation
Generating rural employment
Reducing risk by diversifying crops in rain fed areas

Several useful studies have been conducted to assess the contribution of participatory watershed programs (*Turton et al.,* 1998; Kerr *et al.,* 2002; Wani *et al.,* 2005; Joshi *et al.,* 2003; Reddy *et al.,* 2004) and the results from these studies are discussed here.

Many studies revealed that participatory watershed projects had a positive impact on crop productivity. Due to increased irrigated area under watershed area helped in increasing crop productivity (Shah, 2001). Productivity gains were reported to be greater in case of rain-fed crops. Average yields of rain-fed crops (e.g. soybeans and legumes) increased by as much as by 280% (Renfro, 2007) This information suggests that participatory watershed management programs made significant impact in terms of productivity gains in rain-fed areas which contributes to increased farm income and better livelihoods of the poor in fragile and high risk environments. The watershed programs have also helped in improving soil moisture content. Many farmers in the watershed development area reported an increase in soil moisture level (Shah, 2001). This improved soil moisture will open new opportunities for diversifying farming activities in rain-fed areas. Due to the watershed programs cropping intensity will be increased significantly and it is observed that cropping intensity is increased by 13-25% (Renfro, 2007). Soil and water conservation measures adopted in the watershed

development projects were helpful in augmenting water storage capacity and improving local water resources by reducing the rate of runoff, and increasing the ground water recharge (Butterworth *et al.,* 2001). Watershed development projects have greater potential to generate employment opportunities to the rural people. This was due to the increased availability of water resources, diversified cropping pattern including cultivation

Current challenges to PRA

In the year 2001/2002, approximately US$175 million was spent in watershed management programs in India. But there is to be deficient in of coordination amongst the donors, government bodies, and the NGOs (Sharma, 2003). Furthermore, there is no effective policy-level communication at both the national level and within individual states among the various ministries concerned with watershed management. The three ministries that are most involved in watershed management are driven by separate and differing policy priorities (Wilson *et al.,* 2003). There is also the issue of proper participation because most of the projects are in the villagers will participate in the program mode. When there is preexisting inequalities the surface level participation worsens the situation. Watershed programs generally tend to benefit people with land and even the guidelines provide cost estimates per hectare. Access to groundwater is also bound with the land a person owns. All of these issues for the landless people are not addressed. This outcome in the lack people's sense of ownership and the lack of sustainability of the project itself (Sharma, 2003). Other issues include not paying enough attention to the watershed hydrological boundaries, ignorance of environmental sustainability, failure to monitor and evaluate the impact properly (Gosain and Calder, 2003), fixed budgeting

systems that fail to account various biophysical and socio economic conditions, blueprint guidelines for different agro ecosystems, and no focus on drinking water. There is also a tendency to focus on high cost technology like check dams which amount up to 50% of the total cost and benefit only 15% of the targeted households. Rather than identifying and building on the low cost and effective local structures the indigenous knowledge is completely ignored (Sharma, 2003).

Innovation

GIS based technologies are now being used in watershed management. It is second-hand for both the planning stage and monitoring and assessment stage. It has been used to study the water and sediment flow and prioritize a watershed. It has also been used to monitor and evaluate the watershed management programs. Participatory three dimensional mapping is an exercise that involves the community members in creating a three dimensional map of the watershed. This leads to better transfer of technology and a sense of empowerment. The data gathered from this exercise can be transferred to GIS and vice versa (Gosain and Calder, 2003). Similarly Mc Call and Minang (2005) reviewed the participatory GIS (PGIS) and participatory mapping applications within participatory spatial planning for community-based natural resource management in Cameroon.

In conclusion, Development and management through integrated watershed management with active participation of local community always yielded positive outcome. The watershed interventions using PRA helped in increasing ground water table, raising farm income, enhancing agricultural productivity, soil and water conservation, generating rural employment, reducing risk by diversifying crops in rain fed areas. NGOs and SHGs are

key players as it involves less investment with smaller groups and found to be worthy in improving socio-economic status of local or rural people. However lack of coordination among stakeholders, lack of interest of local people are major bottlenecks in adoption of PRA approach in watershed management. It is evident from the above discussion that there is a need for more empirical evaluation of PRA methods used in watershed development programs in India. In order to conduct this kind of analysis, it is necessary to collect base line data, impact data, and to include participatory monitoring practices in programs. In addition, reviews have indicated the need to forge stronger institutional linkages among watershed development partners, including the Government, NGOs and communities that would support the programs for the long-term. Ideally, all these measures will provide to make the circulation between landless and resource poor people more equitable.

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