A Conceptual Framework for Studying Institutions in Watershed Development

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Abstract

Improving productivity and incomes in rainfed areas is a major challenge in India, and a key to achieving this is improving the use of land and water which are the principal constraints in these areas. A major initiative through which this is pursued in India is Watershed Development (WSD) programs which have been taken up under different schemes funded by the Government of India and the state governments. Since poverty is particularly acute in the rainfed areas, large expenditures to the tune of about US$ 500 million per year are being made on WSD programs. A hierarchy of complex institutional arrangements of the government and other bodies undertakes the planning and implementation of WSD to the district and village levels. Institutional weaknesses are a significant challenge and often lead to poor implementation and results. The paper develops a conceptual framework for the study of institutional setups in the implementation of watershed development programmes. It uses the theoretical fundamentals of new institutional economics, and concepts of organizational design and governance from management sciences. It related these to observations from six in-depth case studies of watershed development projects in state of Andhra Pradesh, India which has the largest number of such projects. The framework that emerges may be useful for examining the institutional setups and performance of watershed development activities in various areas, as well as the better design of the institutional setups for watershed and other development programmes in India and elsewhere.

A Conceptual Framework for Studying Institutions in Watershed Development

1. Introduction

The main purpose of this paper is to develop a framework for the study of watershed development institutions in India. It is proposed to use the theoretical concepts of new institutional economics and, in addition, management concepts of organizational design and governance.

Institutions are humanly devised constraints that structure human interaction (North 1990). New institutional economics identifies formal institutions - which have their foundations in the laws and structures of organized society, as well as informal institutions which often informally exist or spontaneously develop to address specific issues and problems in society (Williamson 2000, Olson 2000, Picciotto 1995). New institutional economics identifies macro level institutions: which are humanly devised rules or "rules of the game" that structure interactions (formal rules such as constitutions, laws and property rights, and informal rules such as traditions and codes of conduct); and micro level institutions, such as institutions of governance including market or other modes of managing activities/ transactions and seeing activities through.

New institutional economics provides the rationale for existence and performance of institutions through several different approaches (see North 1997, Drobak and Nye 1997). Two major approaches among these are transaction costs and property rights. An important premise is that activities such as organized economic and developmental activities have both transformation costs as well as transaction costs. But transaction costs are frequently ignored, and when they are large, they can substantially affect or reduce performance. Good institutions are required when transaction costs are high and effective institutions can substantially reduce transaction costs and enhance performance. According to North (1997), a major challenge is to evolve institutions which: (1)

Minimize transaction costs (2) Create incentives that favour co-operative solution, in which cumulative experiences and collective learning are best utilised.

Based on these foundations, and the study of the empirical literature which has emerged (for example Ostrom 1992, Crase et.al. 2002, Herath 2002, Gandhi 1998, Gandhi and Namboodiri 2002), Pagan (2003, 2009) has identified a few characteristics that may be observed in effective water resource management institutions. These are listed and presented below:

1. Clear Objectives: Good institutions show clear objectives, and clarity of purpose. Clear objectives and their acceptance among stakeholders result in greater congruence, less conflict, and lower transaction costs.

2. Good Interaction: Good institutions show good internal interaction. This, particularly, brings formal and informal rules together. It helps reduce transaction costs and promote cooperative solutions. They also show good interaction with other institutions so that external transaction costs are also minimized.

3. Adaptiveness: Facing variation and change in their internal and external environments, successful institutions demonstrate adaptiveness. As opposed to rigidity, adaptiveness helps institutions reduce transaction costs and provide sustainable performance.

4. Appropriate Scale: Good institutions have appropriate scale in scope and size. If they are too large, internal transaction costs would be too high. If they are too small, they would have high external transaction costs and too little control over their environment.

5. Compliance: Good institutions achieve good compliance to their rules. If the rules of the institution are not followed by a large number of members, transaction costs become too high and the institution ceases to be meaningful.

Apart from these, some relevant concepts have also emerged from management studies of organizational design and governance (see for example Nystrom and Starbuck 1981, Groth 1999, Ackroyd 2002). The studies indicate that good governance of institutions or organizations requires addressing of at least three important rationalities:

1. Technical Rationality: Good institutions show technical rationality. This deals with technical efficiency, particularly, the efficient conversion of inputs into outputs. Requirements include good technology as well as various other determinants of high productivity.

2. Organizational Rationality: Good institutions demonstrate organizational rationality. This deals with effective coordination. In organized society, division of labor and specialization lead to a large number distinct functions and tasks. The effective coordination across these becomes very important for overall institutional performance.

3. Political Rationality: Good institutions address political rationality. This deals with perceptions of fairness and justice. Organized activity frequently requires substantial human interaction and interdependence. Effective and sustainable performance frequently requires addressing of fairness and justice perceptions across individuals and groups.

2. Watershed Development in India

Improving productivity and incomes in rainfed areas is a major challenge in India. A key to achieving this is improving the use of natural resources – particularly land and water

which are major constraints in these areas. A major initiative through which this is pursued in India is Watershed Development (WSD) programs which have been taken up under different schemes funded by the Government of India and the state governments. About 60-70 percent of the country's population relies directly or indirectly on agriculture for incomes and employment including the majority of the poor. Poverty is particularly acute in the rainfed areas, and therefore, very large expenditures to the tune of about US$ 500 million per year are being made on WSD programs. Watershed development is also seen as an important measure for mitigating drought impact and reducing vulnerability of the large poor populations in the dry regions.

In principle, a watershed is considered a geo-hydrological unit or an area that drains to a common point. Practical definitions have varied over the years but for government project and budgeting purposes a watershed has been typically identified as an area of approximate 500 hectares in a village. This is being expanded in recent years. In watershed development programs, given the objective of improving land and water management, scientists and engineers have developed a variety of technologies which offer solutions to difficult watershed conditions. The solutions include interventions ranging from simple check-dams to large percolation and irrigation tanks, from vegetative barriers to contour bunds, and changes in agricultural practice e.g. in-situ soil and moisture conservation, agro-forestry, pasture development, horticulture and silvipasture. A hierarchy of complex institutional arrangements of the government and other agencies undertakes the planning and implementation of WSD. At the micro level, a project implementation agency is usually designated and it may handle one or more watersheds. A major institutional constraint facing the adoption and impact of WSD is the difficulty of moving from the state delivery of watershed infrastructure/ technologies to community management and ownership. The system frequently involves state funding and implementation of WSD activities and then withdrawing, and leaving assets, structures and initiatives to be managed by communities. Some models of devolution have emerged but substantial challenges remain.

Watershed development is given very high priority in Andhra Pradesh, especially in the dry regions. Andhra Pradesh is the largest state in the southern plateau region of India with a population of about 80 million and a geographic area of about 27 million hectares. Since it is over 50 percent rainfed, it provides a very good setting for WSD work. There have been many water and land management initiatives in the state. Andhra Pradesh has the highest number of watershed projects among the states in the country (over 9000), which are at different stages of implementation. Over the years, WSD projects have been taken up in Andhra Pradesh through various programmes/ schemes primarily supported by the Government of India in cooperation with state governments. These include the Drought Prone Area Programme (DPAP), the Desert Development Programme (DDP), the Integrated Wasteland Development Projects scheme (IWDP) (under the Dept. of Wastelands Development, Ministry of Rural Development), and the National Watershed Development Programme in Rainfed Area (NWDP) (Ministry of Agriculture). In addition, Andhra Pradesh also had WSD projects under the Andhra Pradesh Rural Livelihoods Project (APRLP). While these programmes/ schemes differ somewhat, the common aim has been to improve land and water resource management for sustainable production and incomes in the rural areas by focusing on activities within a defined watershed. Very recently since 2009 there has been a consolidation of all WSD programmes into the Integrated Watershed Management Programme (IWMP) under unified guidelines. Initially, the WSD included only natural resource management (NRM) activities, but later for increasing and widening the impact, following various evaluations and reviews, they have come to include production enhancement (PE) activities, and enterprise promotion (EP) activities in many areas/ states. The older projects did not have these components. The planning and implementation has been structured through guidelines and institutional frameworks which have evolved over the years through various experiences and reviews. Andhra Pradesh has led the country in terms of the number of watershed development projects and has also been at the forefront of strengthening of participatory processes in watershed development and the focus on improving livelihoods especially of the poor.

Watershed development projects in Andhra Pradesh have been implemented under many different guidelines/ programmes including DPAP, DDP, APRLP and Hariyali. Under the Hariyali guidelines, the local self government body of the Village Panchayat (Gram Panchayat) is the implementing agency at the village level. The natural resource management (NRM) activities are implemented directly by the Village Panchayat, and the production enhancement (PE) and enterprise promotion (EP) activities are implemented through the Village Organization (VO) which is a collective of the village's self help groups (SHGs).

Please see the Appendix for details on the history and evolution of watershed development programmes in India.

3. Application of New Institutional Economics, and Organization Design and Governance Fundamentals

According to North (1997), institutions are of great importance in economic development and, as indicated above, the two major objectives that they achieve are reducing transaction costs, and promoting cooperative solutions in which collective learning and experience are best utilized. Transaction costs are often very large and seriously reduced the performance in economic development. Good institutions result in substantially lower transaction costs and as a result greatly improved performance.

In the context of watershed development, diverse kinds of activities are involved such as creation of natural resource management structures, improving water and soil conservation, planting of better crops and varieties including water saving high value crops, technologies for efficient use of water, and the promotion of livelihood enhancing enterprises for the landless. In each of these activities, apart from material and financial inputs, a substantial amount of human interaction is involved in the planning and implementation. This includes structures, processes and governance through formal and informal institutions. As a result, transaction costs are very high, frequently resulting in

failures. A good institutional setup becomes very important for reducing transaction costs and promoting cooperative solutions. It should also address the different rationalities. Without this the outcomes would be poor and the benefits not durable. The application of new institutional economics fundamentals and the management concepts of organizational design and good governance may therefore be very useful in the study and design of institutions for the implementation of watershed development programmes.

In the process of developing the conceptual framework, the experience of watershed development in Andhra Pradesh has been examined in 2009/10 through six in-depth case studies undertaken under an ACIAR supported project on enhancing institutional performance in watershed management in Andhra Pradesh:

1. Case Study of the Narasamapalli Watershed (Narasamapalli Village, Anantapur District, Andhra Pradesh, India) (DDP, VIIIth Batch 2002)

2. Case Study of the Jainallipur (Jaljeevni) Watershed (Jainallipur Village, Mahbubnagar Mandal and District, Andhra Pradesh, India) (APRLP, 2002 Batch)

3. Case Study of the B. Pappuru Watershed (Bundalapalli Pappuru Village, Narpala Mandal, Anantapur District, Andhra Pradesh, India) (APRLP 2001 Batch)

4. Case Study of the Chandupatla Watershed (Chandupatla Village, Nakrekal Mandal, Nalgonda District, Andhra Pradesh, India) (Hariyali –II, 2006 Batch)

5. Case Study of the Vattem Watershed (Vattem Village, Bijnapally Mandal, Mahbubnagar District, Andhra Pradesh, India) (Hariyali-I, 2003)

6. Case Study of the Rathipalli (Antyodaya) Watershed (Rathipalli Village, Munugode Mandal, Nalgonda District, Andhra Pradesh, India) (DPAP – IV, 1998)

4. Rationalities: Organization Design and Governance Fundamentals

Based on the experience and lessons seen in these case studies, it is found necessary to substantially expand the management framework of organizational design and good governance to include a number of more rationalities in the context of institutions in watershed development programs. The following expanded list of rationalities is proposed in the context of studying the performance of watershed development institutions:

- Technical Rationality
- Economic Rationality
- Environmental Rationality
- Social Rationality
- Political Rationality
- Organizational Rationality
- Financial Rationality
- Government Rationality

These are described below.

4.1 Technical Rationality

Technical rationality deals with efficient conversion of inputs into outputs. Good institutions are able to achieve high technical efficiency. This requires the use of best/ appropriate technology and operational procedures which lead to high productive efficiency. The achievement of technical rationality often requires involvement of technically skilled people or experts from the necessary disciplines. Without technical rationality the inputs and resources used are not converted to benefits in line with the possible potential. In the context of watershed development technical rationality is

involved in the selection of natural resource management technologies and structures, their location, their specifications and their construction. It is also involved in the selection of best crops, varieties and technologies for farms and enterprises.

4.2 Economic Rationality

Economic rationality deals with the consideration of costs, benefits and returns. It involves the economically efficient use of scarce resources. It includes the evaluation and selection of activities from the point of view of markets, demand, prices, profitability and returns to investment. Without this the activities may fail economically and the best returns in terms of incomes are not generated from resources used in watershed development. This is particularly important because the major objective of watershed development programmes is the improvement of incomes and livelihoods of people.

4.3 Environmental Rationality

Environmental rationality deals with taking into consideration the environment and its conservation. The methods and activities of watershed development can affect the environment and need to take this into consideration. In rainfed areas the environment is often fragile and one of scarce/ poor resources especially water and land. Thus the care of or contribution to the conservation of water, land and natural vegetation becomes of considerable importance. Externalities of activities need to be considered and the watershed development outcomes should be long term and sustainable. Making sustainable use of land and water taking into consideration the environment are of substantial importance.

4.4 Social Rationality

Social rationality deals with taking into account the social or people setting. In the rural setting where watershed development activities are undertaken, a large number of people

live, own and derive livelihoods from the resources and they often belong to a number of social groups. These include caste groups, tribes, farmers with different landholding sizes, landless, various professions, men, women, poor and more. Societies are often traditional. The watersheds may include lands belonging to different social groups and also the activities and outcomes of watershed development may affect various social groups differently. Achieving the acceptance and cooperation of different social groups usually becomes necessary for effective implementation of watershed projects. The distribution of activities and benefits also becomes important. In the absence of addressing social rationality, transaction costs may escalate, difficulties arise and performance may suffer.

4.5 Political Rationality

Political Rationality deals with the perceptions of fairness and justice across different groups and individuals. Large activities such as watershed development require substantial human involvement and interaction. Various leaders and power/ interest groups historically exist. Taking this into account and addressing issues and perceptions of fairness and justice become important for smooth and sustainable functioning. This may require expanded involvement and participation in the formulation of rules and plans, and the settlement of differences/ disputes that may arise. It may require the balancing of different needs and concerns. In the absence of this, transaction costs rise, performance suffers and activities become difficult to sustain.

4.6 Organizational Rationality

Organizational rationality deals with the problem of organization and coordination. In most activities, specialization and division of labour leads to a number of separate tasks, functions and also rationalities to address. The effective coordination across these becomes crucial for good overall performance. This often requires leadership, managerial skills and knowledge. In watershed development this usually requires the formation of an

appropriate local organization such as a watershed committee or village organization, with effective leaders/ staff, sub-committees, sub-groups, systems and meetings. It also requires dealing with the government and its structures and procedures. In the absence of addressing this rationality, overall performance suffers due to poor organization, lack of coordination, timeliness and congruence.

4.7 Financial Rationality

Financial rationality deals with discipline and care required for proper handling of financial resources. Substantial financial resources are provided by the government for watershed development and strong procedures and accounting systems need to exist to see that they are used effectively for the intended purposes and not misused or lost. Financial rationality needs to exist in the handling of these resources without which the planned beneficial watershed development activities of the desired quality cannot take place and outcomes would be poor. It may also result in internal conflict, disputes and government sanctions.

4.8 Government Rationality

Government rationality deals with the kind, quantum and speed of government support. This depends on the guidelines, budgets as well as structures and procedures. The resources provided for watershed development come almost entirely from government sources. The availability of these resources depends substantially on government bureaucracy structures, management and procedures. The obtaining of these resources also depends substantially on the knowledge, skills and focus on the part of the assigned government functionaries in negotiating the procedures of the government. It also involves their mobilizing and guiding the villagers. In the absence of these, resources are not available as per need, on time and to the extent required, resulting in poor performance and outcomes. The incorporation of these aspects through leadership, knowledge, clear assignment and involvement become of considerable importance.

5. New Institutional Economics Fundamentals

The existing institutional framework under which watershed development programmes are implemented has evolved over time but yet appears to have considerable scope for improvement. Even though there are success stories, in many cases the implementation is delayed, adequate funds are not made available in time, the technical aspects are not adequately taken care of and community participation and ownership is limited. In light of the observed variation in watershed project performance, it is important to identify what are the institutional weaknesses, how can the transaction costs be reduced and what aspects would lead to substantially improve performance.

Research based on new institutional economics fundamentals has identified several features of good institutions and these have been developed and described further below in the context of watershed development.

5.1 Clear Objectives

Clear and correct objectives which are shared (for example technical and economics) would lead to lowering of transaction costs and improved performance. In the context of watershed development, clearly specified objectives with respect to natural resource management, productivity enhancement and livelihood improvement would be important for reducing transaction costs and enhancing performance. The objectives should cover the technical aspects, economic aspects as well as organizational assignment of responsibilities. The objectives should be communicated and shared. Specific aspects need to be identified and the projects need to have clarity and shared vision with respect to the objectives and regular review and planning for the achievement of the objectives.

5.2 Good Interaction

Good interaction reduces transaction costs by effectively bringing the formal and informal rules and objectives together. It would bring the logic, various forces and different objectives together covering all the rationalities including technical, organizational, political, social, and government. Bringing together the needs, setting and knowledge of the village with the formal scientific watershed development approaches and government schemes is very important for planning appropriate activities, their acceptance and their ownership by the villagers.

5.3 Adaptiveness

The watershed programmes needs to adapt to the different physical, social and political settings in the project locations. They also need to adapt to changes in these over time. There is also need for adaptiveness across different rationalities for balance, acceptance and performance. Thus, there should be provision for this adaptiveness in the project design and implementation. In the absence of which transaction costs would rise and project performance would suffer. The scope for adaptiveness and the use of this scope is very important.

5.4 Appropriate Scale

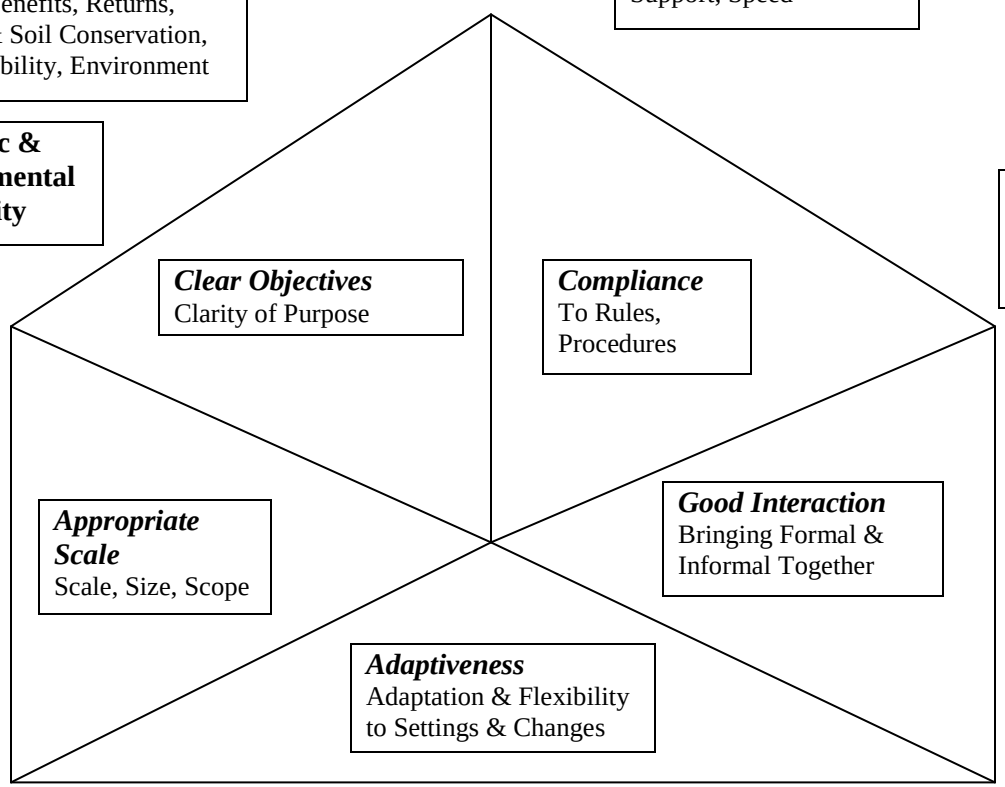
Watershed development projects need to be undertaken at a scale level which would provide reasonable control over the water and soil resources in the area. If the scale is too large, transaction costs would become be very high and this would make the management of the activities difficult, for instance if distant communities and resources in other jursisdictions are involved. If the scale is too small, it would be affected heavily by other and external activities resulting in poor control and performance. Thus an optimum scale is important for watershed performance. Besides this, higher level issues need to be taken care of effectively by higher level bodies or authorities.

5.5 Compliance

Compliance to the rules of the institution is essential to make the institution meaningful and therefore effective in reducing transaction costs and delivering performance. Watershed development programmes are generally undertaken in areas where natural resources such as water are very scarce and lands are very fragile. Thus, their management and their sharing according to the institutions rules is of great importance. Compliance to financial discipline is also of very importance since substantial government and public resources are involved and should be effectively used.

A conceptual framework is developed which puts together the various elements discussed above and this is presented in the figure below.

Conceptual Framework



Government Rationality

Guidelines, Programs, Funding, Structure, Procedures, Expertise, Support, Speed

Demand, Prices, Markets, Costs/ Benefits, Returns, Water & Soil Conservation, Sustainability, Environment

Economic & Environmental Rationality

Organizational & Financial Rationality

Local Organization, WC, VO, UG, SHG, Leadership, Coordination, Financial Discipline

Clear Objectives
Clarity of Purpose

Compliance
To Rules, Procedures

Appropriate Scale
Scale, Size, Scope

Good Interaction
Bringing Formal & Informal Together

Adaptiveness
Adaptation & Flexibility to Settings & Changes

Social & Political Rationality

People, Castes/Tribes, Land Groups, Customs, Beliefs, Power Centers, Leaders, Involvement/ Participation, Distribution of Benefits

Technical Rationality

NRM Methods, Locations, Specifications, Quality, New Crops, Varieties, Technologies, Enterprises

6. Indicators of Performance of Watershed Development Projects/ Institutions

6.1 Improvement in Water Availability

An important outcome expected out of watershed development work is improvement in water availability for agriculture. Water is an extremely scarce resource in the dry rainfed areas in which watershed development activity is generally focused. It is the critical lacking input and many watershed development activities are focused on conserving soil moisture and augmenting and managing groundwater in a sustainable way. This improves crop prospects and yields substantially in rainfed areas, and is seen as a fundamental benefit of watershed development.

6.2 Conservation of the Soil, Soil Fertility and the Environment

A major problem in many rainfed areas, especially those with slopes, is that there is substantial loss of soil and soil fertility with heavy rains and wind. Many measures in watershed development are aimed at conserving the soil, soil fertility, the natural vegetation and the environment. These measures are very important for long run benefits to agriculture and livelihoods in the given and other areas, and also increase the life of various structures made for NRM and water management.

6.3 Improving Sustainability

Many measures of watershed development should result in improving sustainability of the natural resource base and the farming activities of the rural people. This should include maintenance activities. The existing resources are therefore used in a more effective and sustainable way. This results in greater stability and sustainable growth in the agricultural production and other avenues of income.

6.4 Improvement in Crop and Animal Production

Measures for improving water and soil conservation and management should lead to improved possibilities for crop and animal production. However, maximizing the benefits from these improvements often requires adoption new crops/ animals, better varieties and breeds, and better technologies and agricultural inputs. Technologies for making better use of scarce water and fragile soil resources are very important. Improvements in agricultural and animal production are thus important indicators of the performance of watershed development activities.

6.5 Improvement in Farmer Incomes

The benefits from water, soil, crops, and animals can be greatly enhanced if appropriate and remunerative crop and animal production for which the demand and prices are high are selected and the output is marketed in the best possible way. A measure of the performance of watershed development activities would be the improvement in farmer incomes.

6.6 Improvement in non-farmer incomes

A large section of the rural population does not have land and are, therefore, non-farmers. Most of the poor belong to this group. With increase in farmer incomes there is a scope for raising non-farmer incomes as well. This can be done through labor and by helping them undertake activities which tap into the increasing product and service demands of the farming community. Various marketing, processing, artisan and service activities are possible and are being promoted under the livelihood enhancement component of the watershed development programmes. The involvement of women through self help groups in such activities leads to greater incomes and better distribution of the benefits. Thus the performance of watershed development programmes also needs to be measured through enhancement of non-farmer incomes. This would lead to greater equity, inclusive growth and the alleviation of poverty which are major objectives of watershed development programmes.

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Appendix

History and Evolution of Watershed Development Programmes in India

The history and concept of watershed development in India can be traced back to the Famine Commission of 1880 in British India which first indicted its importance. It was identified again in 1928 by the Royal Commission of Agriculture. After independence in 1947, the Government of India supported programmes in watershed development started during the 1950s. The first step towards a systematic effort to tackle the problem of drought and desertification through watershed development began with the establishment of a research centre at Jodhpur in 1952 with the major focus of carry out research on core needs of desert area development. In 1959, the entire responsibility for research on dry land/desert areas was entrusted to the above centre which was then designated as Central Arid Zone Research Institute (CAZRI). The first large scale government supported watershed programme was launched in 1962-63 and a major purpose was to check siltation of multi-purpose reservoirs through soil conservation works in the catchments of river valley projects.

During the Second and Third Five Year Plans, the problems of drought-affected areas was mainly sought to be solved by launching Dry Farming Projects, which were initially taken-up in a few areas and emphasized moisture and water conservation measures. The Fourth Plan continued to lay major emphasis on dryland farming technology, and for this purpose, the All India Coordinated Research Project for Dryland Agriculture was started, and later based at the Central Research Institute for Dryland Agriculture (CRIDA), was set up. Under its aegis 24 pilot projects were started to serve as training-cum-demonstration centres for application of technology relating to soil management, water harvesting, improved agronomic practices, drought resistant crops, and more.

The origin of the Drought Prone Areas Programme (DPAP) can be traced to the Rural Works Programme launched in 1970-71 with the object of creating assets designed to

reduce the severity of drought in the affected areas. The Programme spelt out a long-term strategy in the context of the conditions and potentials of idenfified drought prone districts. In all, 54 districts as well as parts of 18 other districts contiguous to them were identified in the country as drought-prone for purposes of the programme. The programme grew to cover 12 percent of the country's population and nearly one-fifth of the area. Labour-intensive activities such as medium and minor irrigation projects, road construction, soil conservation and afforestation projects were taken up under the programme. The success of these activity prompted the government to take up a mega sized project named the Drought Prone Area Development Programme (DPAP) in 1972-73, with the principal objective of mitigating the impact of droughts in vulnerable areas.

In the Fifth Five Year Plan, DPAP adopted the strategy and approach of integrated area development laid down by the Task Force constituted by the Planning Commission. With the suggestion of National Commission on Agriculture (1974) a specific programme for the hot desert areas consisting mainly of afforestation and livestock development was initiated, as the Desert Development Programme (DDP) in 1977-78. The Drought Prone Areas Programmes and the Desert Development Programme were reviewed periodically by the Ministry of Rural Development, which recommended modifications in the nature and coverage of these programmes from time to time. The major emphasis was on productive agriculture, dryland as well as irrigated, and vegetation cover. In 1980, the Ministry of Agriculture started a new scheme called the Integrated Watershed Management in the Catchments of Flood Prone Rivers (FPR). The DPAP was withdrawn from areas covered under DDP as both programmes had similar objectives. The main thrust of DPAP/DDP was on activities relating to soil conservation, land shaping and development, water resource conservation and development, afforestation and pasture development. The Ministry of Agriculture launched a scheme for propagation of water harvesting/conservation technology in rainfed areas in 19 more identified locations in 1982-83. Encouraged by the results of the watershed programmes, the Ministry of Rural Development in October 1984, adopted this approach in 22 other locations in rainfed areas. In 41 model watersheds at these locations, the Indian Council of Agricultural

Research (ICAR) was also involved to provide research and technology support. These Operation Research Projects aimed at developing "model watersheds" in different agro-climatic zones of the country.

With experience gained from all the approaches, the concept of integrated watershed development was first formalized in 1990s, and in 1990, the National Watershed Project for Rainfed Areas (NWDPRA) was launched in 99 selected watersheds to enhance crop productivity in arable rainfed areas. By 1994 it covered 2,554 micro watersheds. In 1993, the Government of India constituted a technical committee headed by Dr C.H Hanumantha Rao to review these programmes. The committee indicated that "the programmes have been implemented in a fragmented manner by different departments through rigid guidelines without any well-designed plans prepared on watershed basis by involving the inhabitants. Except in a few places, in most of the programme areas the achievements have been dismal. Ecological degradation has been proceeding unabated in these areas with reduced forest cover, reducing water table and a shortage of drinking water, fuel and fodder" (Hanumantha Rao Committee, 1994, Preface).

The Committee, therefore, proposed a revamp the strategy of implementation of these programmes, drawing upon the "the outstanding successes" of some ongoing watershed projects. It recommended that sanctioning of works should be on the basis of the action plans prepared on watershed basis instead of fixed amount being allocated per block as was the practice at that time. It called for introduction of participatory modes of implementation, through involvement of beneficiaries of the programme and non-government organisations (NGOs). Based on its recommendations a new set of guidelines were formulated and came into effect from April 1, 1995 and applied to all the Ministry of Rural Development's watershed projects. At the time, the Department of Land Resources, the Ministry of Rural Development administered three area-based watershed programmes for development of dry, rainfed, wastelands, and degraded lands namely Drought Prone Areas Programmes (DPAP), Desert Development Programme (DDP) and Integrated Wastelands Development Programme (IWDP). The Common Guidelines of

1994 were revised by MoRD in 2001 and then again modified and reissued as "Guidelines for Hariyali" in April 2003.

The watershed programme has become the centerpiece of rural development in India. The Ministry of Environment and Forests as well as bilateral funding agencies are also involved in implementation of watershed projects in India. The new initiative of the Department of Land Resources called "Hariyali" had the objective of empowering PRIs both financially and administratively in implementation of Watershed Development Programmes. Under this initiative, all new area development programmes under Integrated Wastelands Development Programme (IWDP), Drought Prone Areas Programme (DPAP) and Desert Development Programme (DDP) were to be implemented through the PRIs in accordance with the guidelines for Hariyali from April 1, 2003. In November 2006, an apex body called the National Rainfed Area Authority (NRAA) has been setup. It brought out new "Common Guidelines for Watershed Development Projects" in 2008 in order to have a unified approach by all ministries, leading to the Integrated Watershed Management Programme (IWMP). These guidelines are now applicable to all watershed development projects of all Departments / Ministries of Government of India concerned with watershed development projects.