Watershed as a Development Intervention for Providing Livelihood Security in India.

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Introduction

All proponents of human security agree that its primary goal is the protection of individuals. However, consensus breaks down over precisely what threats individuals should be protected from. Proponents of the 'narrow' concept of human security focus on violent threats to individuals or, as UN Secretary-General Koffi Annan puts it, 'the protection of communities and individuals from internal violence'. Proponents of the 'broad' concept of human security argue that the threat agenda should include hunger, disease and natural disasters because these kill far more people than war, genocide and terrorism combined. Human security policy, they argue, should seek to protect people from these threats as well as from violence. In its broadest formulations the human security agenda also encompasses economic insecurity and 'threats to human dignity'. While still subject to lively debate, the two approaches to human security are complementary rather than contradictory. The concept of Human Security (HS) has led to healthy debates in terms of linkages between freedom from fear and freedom from want. It has also extended the debate over security from State to individuals and communities as actors concerned with, and responding to, new security threats to human welfare and well being (Human Security report, 2005).

Human security is also about the security of individuals and communities rather than the security of states and it combines both, human rights and human development, 'freedom from fear' and 'freedom from want'. In the Report of the Commission on Human Security, Amartya Sen conceptualizes human security as narrower than either human development or human rights. In relation to human development, he focuses on the 'downside risks': 'the insecurities that threaten human survival or the safety of daily life, or imperil the natural dignity of men and women, or expose human beings to the uncertainty of disease and pestilence, or subject vulnerable people to abrupt penury'. In relation to human rights, he seems them as 'a class of human rights' that guarantee 'freedom from basic insecurities – new and old'. Thus human security could be conceptualized as incorporating minimum core aspects of both human development and human rights (Kaldor, 2005).

Further, promoting basic economic security by reducing poverty and raising living standards can have substantial social impact. Economic security and development of social capabilities reinforce each other. An extensive body of literature and policy experience already exists on these issues (Commission on Human security, 2003). We can identify four priorities of policy action to promote human security:

- Encouraging growth that reaches the extreme poor.

- Supporting sustainable livelihoods and decent work
- Preventing and containing the effects of economic crisis and natural disasters.
- Providing social protection for all situations.

Research carried out in the late 1980s and early 1990s indicated that the focus on food and nutritional security needed to be broadened. It was found that food security was but one subset of objectives for poor households and only one of a whole range of factors that determined how the poor made decisions and spread risk and how they finally balanced competing interests in order to subsist in the short and longer term (Maxwell & Smith 1992). People may choose to go hungry to preserve their assets and future livelihoods. Therefore, it is misleading to treat food security as a fundamental need, independent of wider livelihood considerations. Thus, the evolution of the concepts and issues related to household food and nutritional security led to the development of the concept of household livelihood security. A livelihood "comprises the capabilities, assets (stores, resources, claims, and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation" (Chambers & Conway 1992).

Watershed Programme in India

Water for drinking and irrigation purposes are some of the major concerns in arid regions of India. Mitigating these basic problems has greater implication for livelihood security in those regions. Further, efficient and sustainable use of natural resources has become the *sine qua non* for economic development, especially in agriculturally dominated economies like India, where two-thirds of the cropped area is dependent on rainfall. The current study is precisely aimed at understanding how Watershed Programme in India had an impact on enhancing the livelihood security of the rural people.

Watershed as geo-hydrological is a natural geo-hydrological unit of land, which collects water and drains it through a common point by a system of streams. It comprises of a catchment area/recharge zone, command area/transition zone and a delta area/discharge zone. Such a unit can be a small area of a few hectares to a large area of hundreds of square kilometers such as that of Ganga river basin. Why watershed? Environment and development are interlinked issues. These problems are often ignored as the need for immediate economic benefit blinds us to their impact on environment. The deterioration of environment increases poverty and reduces the standard of living. Eighty percent of the rural community meets their food, fuel and fodder from their local environment is basically attributable to the increasing biotic pressure on the fragile eco-systems in the absence of adequate investments and appropriate management practices to augment and conserve the land and water resources. Population growth and poverty on the one hand and breakdown of institutions to manage common property resources are some of the major reasons for such intervention (Paranjape, 1998).

Over the last few decades, the Government of India has set aside substantial budgetary provisions for micro-watershed rehabilitation and development. This initiative underpins a shift in agricultural policy, which acknowledges the neglect of rainfed and common

areas during the period of the 'green revolution' and accepts a link between the degradation of rainfed areas and poverty (Farrington and James, 1999). Watershed development has undergone periodic reviews by expert committees, with a view to improve its strategy and components. A background to various schemes of wasteland and watershed development is given in the Appendix-1. The Technical Committee on Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP) Integrated Wasteland Development Projects scheme (IWDP) in 1994 under the chairmanship of Dr.C.H.Hanumantha Rao stressed the need for a holistic participatory approach to dryland development emphasising a well designed watershed programme. They envisaged a bottom-up planning approach, working where possible through NGOs, and with community participation as a central principle. The guidelines set up a cost norm of Rs. 4000, per hectare for each watershed of about 500 hectares.

Project Objectives:-

a) To promote the economic development of the village community which is directly or indirectly dependent on the watershed through:-

i) Optimum utilization of the watershed's natural resources like land, water, vegetation, etc. that will mitigate the adverse effects of drought and prevent further ecological degradation.

ii) Employment generation and development of the human and other economic resources of the village in order to promote savings and other income-generation activities.

b) To encourage restoration of ecological balance in the village through:-

i) Sustained community action for the operation and maintenance of assets created and further development of the potential of the natural resources in the watershed.

ii) Simple, easy and affordable technological solutions and institutional arrangements that make use of, and build upon, local technical knowledge and available materials.

c) Special emphasis to improve the economic and social condition of the resource poor and the disadvantaged sections of the Watershed Community such as the asset less and the women through:-

i) More equitable distribution of the benefits of land and water resources development and the consequent biomass production.

ii) Greater access to income generating opportunities and focus on their human resources development.

From 1995 onwards under the new guidelines around 10,000 watershed projects falling under drought prone area programme (DPAP)) have been launched. Out of these, Andhra Pradesh alone accounts for as many as (24 percent) followed by Madhya Pradesh (17 percent), UP (10 percent), Gujarat (8.6 percent) and Tamilnadu (7 percent). Unfortunately very few studies are done in the states which fall in the regions like Andhra Pradesh and Madhya Pradesh, which are at top in respect of the number of watersheds implemented and hill regions which require immediate attention (Rao, 2000). Many of the studies, which we came across in India on Watershed implementation, concentrate more on the success models of Watershed implemented through the efforts of individuals or NGOs.

Considerable efforts have been made by the govt. of Andhra Pradesh through *Water Conservation Mission* and *Neeru-Meeru* programmes, for development of degraded and wastelands. But we come across very few studies, which try to understand in-depth the impact of watershed development and processes involved for successful implementation of the projects. In Andhra Pradesh, the two highly drought prone districts of Kurnool in (Rayalaseema) and Mahabubnagar in (Telangana), are at the top in terms of number of watershed (Rao 2000). Within Telangana region Mahabubnagar District receives the lowest rainfall (642.4 ml). Further according to the human development index ranking, Mahabubnagar district in Telangana region occupies the lowest position among the 23 districts in the state because of its lowest position in income as well as education (Rao and Subrahmanyam 2002). Hence I Choose to study Mahabubnagar district and within that one of the most scanty rainfall *Maddur Mandal's* village *Nandipahad*.

The study aims at reviewing some of the literature available on watershed development through studies carried out across the country on various issues. Further, to assess the impact of watershed on land use pattern, irrigation facility, cropping pattern, productivity of crops, income generation, wages, education and health facilities to the households, non-farm sector, landless labourers, women and other marginalized sections of the society. Finally to understand the status of agricultural extension services provided to farmers to enhance the agricultural productivity and draw inferences from the study to enhance the outcomes of the watershed development programme in arid regions.

The secondary data sources for the study include Population Census, Agriculture Census, Mandala Gananka Darshini and Agricultural Crop's Abstract for various years. Further documents submitted by Nandipahad Watershed Committee are also utilised for this purpose. Watershed implementation period was from 1996-97 till 1999-2000 under Employment Assurance Scheme (EAS) which is a part of livelihood protection programme in drought prone regions. Wherever possible the pre and post watershed secondary data sources are compared and contrasted for understanding and analysing the changes observed after watershed implementation in the village. Further, independent field observations and photography are used to substantiate and supplement the other data.

For analysis of the data generated unlike the earlier studies on multi-criteria approach which assign weights to different achievements (similar to cost benefit analysis) and arrive at a singular numeric to judge the outcomes, this study does not use any weights in the analysis for arriving at a singular numeric. Instead multi-criteria approach is used to cover a broad range of achievements like, changes in agricultural productivity leading, changes in cropping pattern, growth of irrigation, changes in redistribution of land, discernable changes in the migration pattern, and the other benefits which can be derived from community participatory exercises. Frequency tables along with percentages, growth rates and graphs are used for analysing the data collected from the field.

Reflections on Issues Related to Watershed as Observed Through Literature

A brief review of the watershed literature is discussed here to capture the major issues surrounding the watershed development. It is widely acknowledged that watershed development programmes could be used as an effective means for augmenting income and reducing poverty among the watershed communities (Deshpandy & Narayanamoorthy, 1999, Kshirsagar, K.G., M.P.Madhusoodhanan, S.Chavan and R.Rathod, 2003). The studies on Western and Central Rainfed zones of India viz. Gujarat, Rajasthan, Madhya Pradesh and Maharashtra reveal that the impact of National Watershed Development Programme for Rainfed Areas (NWDPRA, implemented in 1990) across the four states have been varying and beneficial for the agricultural sector. Even though the guidelines are well prepared but these are not effectively implemented. Absence of any external monitoring and evaluation has relaxed the programme and the implementing officers also do not realize these constrains due to absence of feedback. The extension machinery was not properly equipped to meet the requirements (Deshpande and Narayanamoorthy, Chapter 3, 1999).

The studies on NWDPRA, Southern Plateau for the states of Andhra Pradesh, Tamilnadu, Karnataka shows that the benefits of watershed can be seen in physical terms like increase in water levels, yield, changes in income and employing more wage labourers when compared with the non-beneficiaries. But the participation rate of the beneficiaries in the various meetings and training programmes was less than 50 percent. The study highlights that there is a need for holistic plan for the purpose of effective implementation of the programme in all the three states. Though Tamilnadu study points to the most required people's participation the impact on net income of the beneficiaries is not perceptible enough to encourage them to participate enthusiastically (Deshpande and Narayanamoorthy, Chapter 4, 1999).

However the NWDPRA impact of the treatments under the watershed development approach in the hill areas is quite different than that of the plains. Apart from increase in crop production, cropping intensity, optimum use of the farm inputs etc. other aspects like soil degradation, protecting landslides, deforestation, gully/ravine formations, however, and need immediate attention. Out of the available reports, it comes out very clearly that the planning exercises of NWDPRA were extremely mechanical and concentrated more on agriculture as the major activity. Thus proper local level planning is the most significant aspect of NWDPRA treatment in hill areas. The absence of participation of the beneficiaries has caused skewed impact of the programme (Deshpande and Narayanamoorthy, Chapter 6, 1999).

A study was conducted to locate differential impact of watershed across agro-climatic zones in the three distinct agro-climatic regions of Maharashtra, i.e. Solapur, Akola and Aurangabad districts. The study observed that there was a definite improvement in fodder, fuel and food availability in the programme areas across agro-climatic zones. Further, the scarcity zone with highly degraded and fragile natural resources would take a long gestation period first to recoup the natural losses and the incremental gains would begin only after this, whereas, the results can be ascertained quickly in assured and moderate rainfall zones. As far as the awareness of the farmers regarding the watershed

activities, they appear to have adequate level of understanding of the ongoing watershed activities. Moreover, almost all the farmers have expressed their satisfaction for the extension support that they received (Deshpande and Narayanamoorthy, chapter 7, 1999).

Recognising the need for a comparative study of socio-economic impact assessment of the watersheds implemented through the different funding agencies (DPAP, NWDPRA, EAS, IWDP), and World Bank. A study was conducted in Karnataka and a neighbouring state Andhra Pradesh. The area under cultivation was enhanced in both the states; around 76% of area was brought under well irrigation in Karnataka, whereas it was 80% for Andhra Pradesh. There was no major shift from farm to non-farm activities in both the states, whereas livestock registered a positive change. Migration was still continuing in Karnataka, where as in Andhra Pradesh it is largely due to drought for past three years. There is a clear shift towards commercial crops in both the states. There is a clear significant change in the landowning communities. However, the issue of equality and gender requires more attention, due to dominance of big landowning community, (Kalpatharu Research Foundation 2001).

As regarding the social capital and its impact on watershed, studies found that social capital exists in varying degrees for the purpose of collective action. However, Social cohesion, effective local leadership, and supportive role of the local bureaucracy- play a crucial role in the success or failure of Watershed development programmes (D'silva Emmanuel and Sudha Pai, 2003). Further Krishna, Anirudh., (2004) study on watershed implementation in Rajasthan, suggests that instead of focusing their energies exclusively on developing newer and better programmes and implementing these from the top down, development agencies ought to consider as well the capacities that emerge from the bottom-up that enable villagers to succeed in multiple development enterprises.

The review of implementation of the Common Guidelines by Turton suggests that the Guidelines severely underestimated the range and depth of training that would be required. The chronic shortage of social-science perspectives and skills among (especially) government department staff at the local level were identified as the major hindrances in realizing the potential results (Farrington, 1999).

Coming to the question of equity, Study by Vaidyanathan, A. (2001) highlights that, villages in India vary a great deal in caste composition, configurations of power. There are indeed villages where feudalism of the worst type is still in place. However, a variety of forces have eroded traditional power structures, and given greater political voice and space for the poorer, lower castes and communities but in varying manner and degree. He further feels that the strategy for institutional change has to be selective and differentiated. This has indeed been the case with NGO initiatives. There is much to be learnt from a critical and objective study of their experience – successes and failures.

Since most of the watershed development programmes are essentially land-based, and landless as well as weaker sections of the society in many cases feel left out of the programme. Further it is seen that women benefit somewhat less than men, though all

benefit (Samra, J.S., 1999, Jacob Nirmala, 2003, Sangameswaran, Priya 2006, Roy, U.N., and Iyer K. G., 2001, Parikh, A., S.Acharya and K.Maiteraie, 2004).

The study assessing the nature of implementing watershed programme across arid and semi-arid regions of Andhra Pradesh reveals that even though 'user groups' are reported in most watersheds, there is little resemblance to the organisation, role and responsibilities of such units with those mentioned in the guidelines. In pre-1995 watershed projects including the most prestigious World Bank project in Maheswaram, lack of maintenance by farmers led to rapid loss of assets/treatments. The government and other funding agencies pushing for targets and expenditure is contrary to the participatory spirit of this programme. Quite often in critical positions at all these levels a great deal of illiteracy prevails on the programme, its critical elements and processes determining its success. Important functionaries at the all levels require thorough training on the technological, participative and capacity-building aspects of watershed development programmes (Yugandhar, Venkateswarlu and Vijay Kochar, 1999).

As regarding other administrative bottlenecks, the public sector faces several challenges: Pressure to spend substantial resources by a fixed deadline, the limited time permitted for preparatory (especially group-formation) activities, unclear criteria for selecting areas and villages to be rehabilitee, and limited human-resources capabilities to respond to novel and challenging requirements. A study of the performance of local government in Mahbunagar District of Andhra Pradesh by Krishna (1997) reveals that the pressure to spend allotted monies – were causing officials to shortcut participation. Implementing Agencies were operating part-time, and had little prospect of meeting the standards of participation and consultation set out in the 1994 Guide Lines (Farrington, 1999).

Pre and Post Watershed Analysis of the Study Village through Secondary Data

The impact of Watershed is multifaceted. In the case of Agricultural productivity we find that, first the changes take place in the land use pattern, which is visible by an increase in area brought under cultivation and also by bringing the marginal lands under plough. Second, by changing the cropping pattern on the marginal lands from low density-low value crops to horti-silvi pastoral or regular crop system. Third, direct impact on the production and productivity of the crops are the significant changes marking a step towards a sustainability of the technology used in cultivation of the crops. The productivity increases for traditional as well as commercial crops. In the socio-economic sphere, Watershed enhances the incomes of the people through rise in productivity, employment opportunities and rise in wages. The income rise influences the asset formation, rise in expenditure on education, health and growth of horticulture and non-farm sector. These in turn influences the socio-economic well being of the people in terms of reduction of poverty, rise in standards of education and access to health facilities etc. Further the availability of the infrastructure like transport, health and communications and other agricultural extension services also accelerate the performance of Agricultural sector (Deshpande and Narayanamoorthy, 1999, introduction).

Facilities available in Nandipahad include a high school, good communication and protected water amenity, along with a pucca road, electric supply, agriculture cultivator's

organisations and SHGs by 2001. Only amenities, which require some attention, are health care and ample and uninterrupted power supply. Female population is slightly higher i.e. 50.9 percent than male population in 2001. Literacy showed a marginal improvement by 10.3 percent points in 2001 from 1985's 9.7 percent. By 2001 only 20 percent of the population was literate; within that male literacy was around 30 percent whereas female literacy was only 11.2 percent (table 1). Main workers constitute approximately 27 percent of total population in 2001. Within which 81 percent are male and 19 percent are female. Major occupations of main workers include cultivation (37.5%), other trade (28.9%), agricultural labour (26.9%) and household industry (6.7 %). However females predominantly work as agricultural labour. A striking feature in gender distribution of the work force is that female share of marginal workers is preponderant with 77.3 percent, within which agricultural labourers is predominant (table 2). Around 47.32 percent of population is non-working population which is dependent on the rest of the working population. Caste composition of the village clearly shows the dominance of backward castes.

Table 1: Population and Literacy Details of Nandipahad Village for 1985 and 2001.

Sr. No	Nandipahad	Total (No. & %)		Male (No. & %)		Female (No. & %)	
		1985	**2001**	**1985**	**2001**	**1985**	**2001**
1	Total Population	1232	2092	620 (50.3%#)	1027 (49.1%#)	612 (49.7%)	1065 (50.9%)
2	No.of. Households	240	330				
3	Literate (%) Illiterate (%)	9.7+ 90.3+	21 79	17.1 82.9	30.1 69.9	2.1 97.9	11.2 88.8

Note: # percentage with respect to row total population, +percentage with respect to column total population.
Source: Mandala Gananka Darshini, for 1985, Published by Bureau of Economics and statistics, Hyderabad, A.P
Census of A.P (2001) 'District Census Handbook', Mahabubnagar, 2001.

Table 2: Distribution of Population According to Different Occupations as Revealed by Census 2001.

Sr. No	Nandipahad	Total (No. & %)	Male (No. & %)	Female (No. & %)
	Total Population	**2092**	**1027**	**1065**
	Main Workers in Total Population	**565 (27%)+**	**457 (81%)#**	**108 (19%)#**
1	Cultivators	212(37.5%)	186(87.7%)	26(12.3%)
2	Agri. Labourers	152(26.9%)	104(68.4%)	48(31.6%)
3	Household Industries	38(6.7%)	37(97.4%)	1(2.6%)
4	Other Trade	163(28.9%)	130(79.8%)	33(20.2%)
	Marginal Workers in Total population	**537 (25.1%)+**	**122 (22.7%)**	**415 (77.3%)**
5	Cultivators	15(2.8%)	9(60.0%)	6(40.0%)
6	Agri. Labourers	444(82.7%)	69(15.6%)	375(84.4%)
7	Household Industry	16(3.0%)	11(68.8%)	5(31.2%)
8	Other Trade	62(11.5%)	33(53.2%)	29(46.8%)
	Non-Workers	**990 (47.32%)+**	**448 (45.3%)**	**542 (54.7%)**

Note: +percentage with respect to column total population, # percentage with respect to row population

Source: Mandala Gananka Darshini, for 1985, Published by Bureau of Economics and statistics, Hyderabad, A.P Mahabubnagar District Census Handbook, 2001, Census of A.P.

Table 3: Percentage of Land Put to Different Uses Over the Years 1994-95 to 2002-03.

Land under different uses	1994-95	1995-96	1996-97	1997-98	1998-99	2000-01	2002-03
1. Barren Land	9.5	9.5	9.5	9.5	9.5	9.5	9.5
2. Non-Agri. Land	7.0	7.0	7.0	7.0	7.0	7.0	7.0
3. Permanent Pastures	7.2	7.2	7.2	7.2	7.2	7.2	7.2
4. Miscellaneous	0.001	0.001	0.001	0.001	0.001	0.001	0.001
5. Current Fallows	28.5	27.5	31.1	18.4	5.1	14.9	20.4
6. Net Sown area	47.7	48.7	45.1	57.8	71.1	61.3	55.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Area (in acers)	2114	2114	2114	2114	2114	2114	2114

Note: It includes both Khariff and Rabi seasons taken together. Source: Agriculture Census for the respective years, Directorate of Economics and statistics, Govt. of Andhra Pradesh, Hyderabad.

Looking at the land use pattern, there is a definite rise in the net sown area over the years, from around 47.7 percent in 1994-95 to highest around 71.1 percent in 1998-99 (table 3). However there is no definite trend over the last few years, which was due to decline in rainfall.

Table 4: Landholding Data of the Village.

Sl.No.	Land holding Area (in Acers)	1994-95		2002-03	
		Number of landholders	Total Area	Number of landholders	Total Area
1	0 - 1.23	77	74	27	26
2	1.24 - 2.46	39	73	42	85
3	2.47 - 4.93	67	233	86	298
4	4.94 - 7.40	40	247	33	198
5	7.41 - 9.87	21	172	33	282
6	9.88 - 12.35	17	198	18	198
7	12.36 - 18.52	20	310	20	283
8	18.53 - 24.70	12	272	11	238
9	24.71 - 49.41	14	449	9	293
10	49.42 - 73.81	5	389	4	301
11	Above 73.81	Nil	Nil	Nil	Nil
	Total	312	2417	281	2202

Source: Mandala Gananka Darshini, for years 1994-95 and 2002-03, Directorate of Economics and statistics, Govt. of Andhra Pradesh, Hyderabad.

The Lorenz curve estimates of equity of land distribution for the given years are 0.87 and 0.84 respectively, showing that there has been marginal change in the overall land distribution pattern by 2002-03 (table 4). It is observed in the field that some of the land taken through ceiling is redistributed to the Below Poverty Line (BPL) and Scheduled Castes (SC) and Scheduled Tribes (ST) groups through welfare programmes on an annual basis.

Table 5a: Crops Under Khariff Season in Nandipahad Village During and After the Watershed Construction (in acers)

Sl.No.	Khariff Crops	1997-98	1998-99	1999-2k	2000-01	2001-02	2002-03	2003-04	2004-05
1	Jowar	484.48	N.A.	312.44	391	320	352	308	339
2	Ragi	18.75		143.66	77	10		81	88
3	Green gram	0.3		11.51	12	25	151	204	122
4	Horse gram	52.35		34.79	36	20			
5	Chillies	2.3		2.91	3	5			
6	Paddy	99.7		147.49	148	92	110	101	122
7	Red gram	385.63		403.24	415	182	278	226	206
8	Batavia				22			30	
9	Bengal gram	22.66		20.62		125			
10	Gingilly oil (Til)	4.21		15.82	15	12	15	12	4
11	Cotton	6		9.63				9	11
12	Sama(Little millet)	26.51		8.99		10			
13	Mangoes							5	
14	Groundnuts					20	65	49	49
15	Castor							14	66
16	Sunflower								6
	Total area	1102.89	0	1111.1	1119	821	971	1039	1013

Note N.A=Not available as the data text was lost, Source: Agricultural Crop's Abstract for the respective years, Directorate of Economics and statistics, Govt. of Andhra Pradesh, Hyderabad.

Table 5.b: Crops Under Rabi Season in Nandipahad Village During and After the Watershed Construction (in acers)

Sl.No.	Rabi Crops	1997-98	1998-99	1999-2k	2000-01	2001-02	2003-04
1	Jowar	78.15	274	178	125	78	81
2	Paddy	25.6	78	82	125	166	72
3	Groundnuts	5.9	8	37.25	35	21	18
4	Ragi	-	-	-	-	-	4
5	Spices	-	-	-	-	-	2
6	Sunflower	-	-	-	-	-	4
	Total	109.65	360	297.25	285	265	181

Note: Data for 2002-03 & 2004-05 is not in the table as no rabi crops have been reported during that years
Source: Agricultural Crop's Abstract for the respective years, Directorate of Economics and statistics, Govt. of Andhra Pradesh, Hyderabad.

The major crops grown in the village are jowar, red gram, paddy and horse gram in khariff season and Jowar, paddy and groundnuts in rabi season. There is a rise in gross and net sown areas over the years. The rise is more visible in the rabi season than the khariff season (table 5.a and 5.b). It has risen from mere 109.65 acers in 1997-98 to 360 acers in 1998-99 and later due to meager rainfall it has come down to around 181 acers in 2003-04. The major objective of the watershed project of achieving agricultural growth through rise is gross and net area irrigated is visible clearly here. Further rise in use of surface bores for exploiting the ground water is also an indirect indicator of probable rise

in ground water levels. However, while watershed physical benefits are quite vividly apparent, but lack of maintenance of the watershed structures has rendered almost 40 to 50 percent of them as non-functional. This was one of the major constrain that is observed during field work as hampering the realisation of its true potential.

Table 6: Number of Dug wells and Surface Bores in Pre and Post Watershed Era.

Years	No. of Dug Wells	No. of Surface Bores	Total
1994-95	30	11	41
1995-96	30	12	42
1996-97	30	12	42
2002-03	38	60	98

Source: Mandala Gananka Darshini for the respective years, Directorate of Economics and statistics, Govt. of Andhra Pradesh, Hyderabad.

Moving towards the irrigation sources one of the major objective of the watershed project of achieving agricultural growth through rise is gross and net area irrigated is visible clearly here. We find that water extraction through dug wells and surface bores has more than doubled in a span of seven years. However the number of dug wells has not gone up as much as the surface bores, which have increased tremendously from 11 in 1994-95 to 60 in 2002-03(table 6). Here one can see that sources of extracting water for irrigation have increased commendably and correspondingly the area irrigated through this source also shows significant changes. However, largely due the long years of dry spells, irrigation through dug-well source is nil in 2002-03. It indicates that post watershed era brings about positive changes in the ground water level however dry spells for a long time can emasculate much of the benefits that can be derived through this programme.

A point to note here is that irrigation facility is available mostly to paddy cultivation followed by groundnut and off late chillies has started receiving some irrigation facility. Jowar, which has the highest acreage, does not have any irrigation facility and is purely dependent on the rainfall, which is subject to vagaries of nature. The area under the non-food crops has risen over the years, some of the major crops reported under this category are cotton, sunflower, groundnut, castor oil and gingili oil. Under horticulture section two major fruits produced are, viz. batavia and mangoes. Surprisingly there is virtually no change in the data reported of agricultural implements for the year 2002-03 in Mandala Gananka Darshini, except for decline in use of both diesel and electric pump sets (table 7). However, this unchanged data is quite contrary to our general understanding of watershed benefits, which assumes a rise in holding of agricultural implements with rise in agriculture cultivation. Another reason could be non-reporting of the data by officials concerned in a systematic way.

Table 7: Agricultural Implements Available in the Village for the Years 1995-96 to 2002-03.

	Agriculture Implements	1995-96	1996-97	2002-03
1	Carts driven by (cattle)	344	344	344
2	Ploughs			
(a)	Wooden	198	198	198
(b)	Iron	Nil	Nil	Nil
	Total	**198**	**198**	**198**
3	Pump sets			

	(a)	Diesel	15	5	0
	(b)	Electric	15	37	33
		Total	**30**	**42**	**33**
4		Other equipments (Tillers, Dusters etc.	Nil	Nil	Nil
5		Fish Ponds	Nil	Nil	Nil

Source: Mandala Gananka Darshini for the respective years, Directorate of Economics and statistics, Govt. of Andhra Pradesh, Hyderabad.

If we look at live stock the percentage change over the years it is the goats that showed tremendous rise (98.5 %) followed by poultry (81.1%), sheep (57.8 %) and buffaloes (48.7 %) (table 8). Surprisingly the milch animals showed a decline to around -44.2 percent. It is further observed that though there is a rise in livestock holding (Graph-1) but, it has resulted in rise of school dropout rates too and especially of girl child, as they have to tend the livestock in addition to attending the household chores. However, Government of A.P has taken an initiative of conducting early morning and night classes for the dropout children in the village. But the turnout ratio for the part-time classes is quite poor and often the teacher-in-charge needs to run around the village to collect students for the classes. Though primary and higher education are free of cost, but as it is a drought prone area most of the children are engaged in some or other forms of livelihood activities. Child labour is quite rampant in the entire Mahabubnagar district either due to drought or crop failures and consequent struggle for existence. It is observed that watershed as an institution has not made considerable efforts to address some of these key socio-economic problems in the village.

Graph - 1

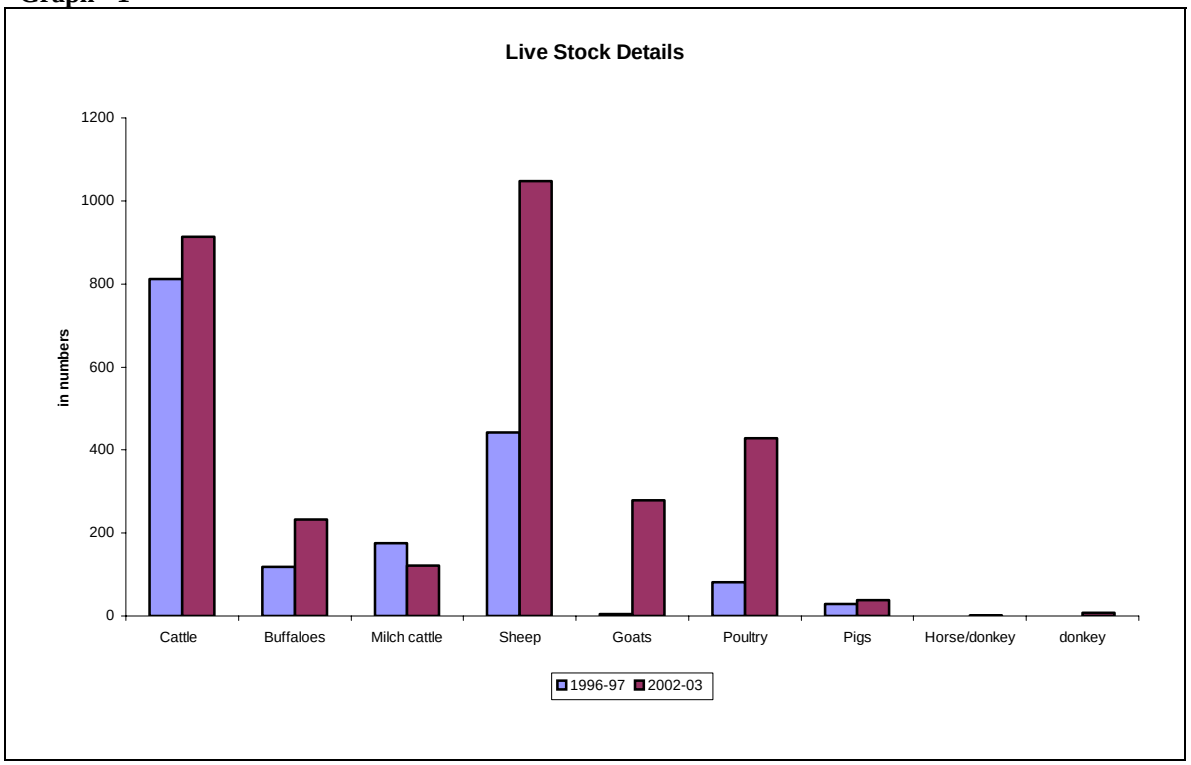

Table 8: Livestock Details for the Years 1996-97 to 2002-03.

Livestock Details	1996-97	2002-03	% Change observed
1. Cattle	812(48.7)	914(29.8)	11.2
2. Buffaloes	119(7.15)	232(7.6)	48.7
3. Milch cattle	176(10.5)	122(4.0)	-44.2
4. Sheep	442(26.5)	1047(34.1)	57.8
5. Goats	4(0.2)	279(9.1)	98.5
6. Poultry	81(4.9)	428(14.0)	81.1
7. Pigs	30(1.8)	38(1.2)	21.1
8. Horse	0(0)	1(0.0)	100
9. Donkey	0(0)	7(0.2)	100
Total	**1664**(100)	**2640***(100)	**36.97**

*Note: Excluding Poultry and dogs

Source: Mandala Gananka Darshini for the respective years, Directorate of Economics and statistics, Govt. of Andhra Pradesh, Hyderabad.

Watershed expenditure is concentrated in bunding, gully plugging, horticulture and check dam. Bunding and gully plugging are labour intensive jobs and confirm to the basic norms of project implementation of involving labour to the maximum extent possible in the project. While watershed physical benefits are quite vividly apparent but lack of maintenance of the watershed structures and consequent collapse of 40 to 50 percent structures constructed, has hampered the realisation of its true potential. Government has now resorted to take support of NGO's involvement in agriculture extension training programmes apart from the current extension services. It reflects the inefficient utilising the resources of incurring double expenditure for delivering a single training service.

Analysing the other agricultural extension services in strengthening the agricultural sector we find that they are almost negligible in the Maddur Mandal. Government has now resorted to take support of NGO's involvement in agriculture extension training programmes apart from the current extension services. For example during the field work it is observed that SRI vari, a new method of paddy plantation system, which is being popularised to reduce the extent of water use in paddy cultivation, and organic farming are currently implemented with the help of NGO's supported by Agriculture University and ICRISAT rather than the extension service facility which should have been doing the job. It reflects the inefficient way of utilising the resources of incurring double expenditure for delivering a single training service.

Both Labourers and farmers reported the inefficiency of watershed committee in implementing the project, which is also reflected in the post-watershed maintenance that is negligible. My visit to the watershed structures in the farms revealed that around half of the structures are in a dilapidated condition and the rest were intact but would require maintenance in the long-run. Post-watershed maintenance of the created structures is completely absent as the watershed committee believes that it is the state's responsibility to maintain the structures and they are waiting for the government to release the funds of maintenance. This aspect highlights the apparent deficiency in awareness of the watershed committee regarding the sustainability of watershed structures on its own. Neither the NGO (PIA) nor the government department associated watershed activities have taken care to disseminate information and training regarding watershed structures and its maintenance to the local graduate educated person as required by the guidelines.

Observations in the field revealed that there was clear-cut discrimination of the marginalized section of the society in terms of their participation in the decision-making process. Further marginalized have no opportunity in community based participation and since most of them do not have land and other livelihood assets they also stand to have no gains in the benefits of watershed programme. This calls in for bringing land and other livelihood asset redistribution to marginalised sections to realize the equity aspect of the programme. One thing is very clear from the discussions with PIA and the Watershed committee is that both of them have failed in implementing the watershed project in a democratic and participatory approach. In fact this finding highlights that, though some amount of physical benefits could be accrued through watershed implementation quite easily; however it would take a much longer time and sustained efforts to realize the other wholistic aspects of watershed.

Summary and Conclusions

Studies which reviewed watershed across the country identified that watershed development in general improves the water availability and productivity of agriculture which could enhance the livelihood security of the people. Further, the water scarcity zones with highly degraded and fragile natural resources would take a long gestation period first to recoup the natural losses and then the incremental gains would begin only after this. Whereas, in assured and moderate rainfall zones the results can be quickly ascertained.

As far as the *awareness* of the farmers regarding the watershed activities is concerned, excluding Maharashtra, rest of the Indian states farmers did not have adequate level of understanding. Moreover, farmers have expressed their dissatisfaction regarding the extension support that they received. It was found that location specificity of the watershed treatment must be kept in mind and enough flexibility should be given to the local team leaders in the process of implementation. Social capital exists in varying degrees for the purpose of collective action. Social cohesion, effective local leadership, and supportive role of the local bureaucracy- play a crucial role in the success or failure of Watershed development programmes.

Regarding the implementation part, at all the levels of govt. functioning, a great deal of illiteracy prevails on the programme, its critical elements and processes determining its success. Important functionaries at all levels require thorough training on the technological, participative and capacity-building aspects of watershed development programmes. Further, 1/3rd of the Project Implementing Agencies (PIA) in every district should be from the voluntary sector, so that positive attitudes and actions would become feasible towards involvement of NGOs.

Regarding NGO initiatives scholars feel that, watershed development pioneered by the NGOs has led to substantial amount of increase in income and employment for the people. Many such cases of outstanding success efforts were originally driven by acute distress caused by recurring droughts. But success earned by the NGOs is nowhere comparable to the policy framework and infrastructure available to the areas in the

country, which have experienced Green Revolution. This calls for turning watershed development into a truly spontaneous and demand driven movement of the people in dry land areas not covered so far.

As regards the adequacy, relevance and sustainability of the programme is concerned. In most of the states, the research teams have indicated that the programme was adequate and relevant. But there was a mixed reaction about the sustainability of the programme. In order to make watershed sustainable it is essential to ask the beneficiaries to contribute either by sharing labour or cash contribution or supervisory role, to the process of implementation. This would go a long way in deriving complete participation from the beneficiaries.

a wider strategy involving issues of agricultural technology suited to rain fed areas, price and credit policies, infrastructure development for processing, marketing and transportation of agricultural produce and trade policies to afford reasonable protection to dry land farmers and to provide opportunities for export of their products. Further, strategies to involve landless, marginalised sections and particularly women in the watershed development in a more participatory and economically meaningful way would enhance the outcomes of the project.

Even in the study village we find that watershed brings about positive changes in the productivity of different crops but the translation of the same into higher income cannot be ensured. Therefore a policy intervention in this area is imperative to ensure good remuneration to the farmers. Further, watershed also enhances the capacity of water retention and thereby increases the ground water level. However, dry spells for a long time can emasculate much of the benefits that can be accrued through this programme. There is also a need to evolve efficient irrigation systems to ensure appropriate utilization of water. As ground water is a common resource and extraction of the same can be

While watershed physical benefits are quite vividly apparent but lack of maintenance of the watershed structures by the watershed committee has resulted in collapse of 40 to 50 percent structures constructed. This has also hampered the realisation of its true potential. Therefore maintenance of watershed structures after the withdrawal of government support is quite crucial for the sustainability and success of watershed implementation.

In the initial phase of watershed health and education may not be the predominant areas of concern. As it is witnessed in the field that school drop out rates have increased quite substantially after the rise in cattle holding in the post watershed era. Therefore there is a need to inculcate the importance of education and awareness regarding health issues to enhance the human development aspects of the implemented village.

As agriculture is not able to support the livelihood demands of the villagers, it has forced them to out-migrate in large numbers (around 60 percent) to larger cities and nearby towns to supplement the livelihood requirements. In fact out-migration is found to be a positive and only alternate way of surviving in such harsh environment. The problems

associated with of out-migration cannot be solved easily until and unless there is insurance of protected livelihood security in the arid regions.

Government has now resorted to take support of NGO's involvement in agriculture extension training programmes apart from the existing extension services. Rooting of money through NGOs is an inefficient way of utilizing the resources and personnel of the govt. departments. There is a need to rethink about the involvement of NGO sector in the watershed development process as their involvement in implementation just replicates the government cousins in many instances.

Generally, respondents reported that there was a *lack of professional approach* in the way awareness camps were conducted, forming of groups for community based participation, training programmes for watershed and other livelihood training and selection of the watershed committee members Both Labourers and farmers reported the inefficiency of watershed committee in implementing the project, which is also reflected in the post-watershed maintenance that is negligible. This aspect also highlights the apparent deficiency in awareness of the watershed committee regarding the sustainability of watershed structures on its own. Neither the NGO (PIA) nor the government department associated with the training of watershed activities have taken care to disseminate information and training regarding watershed structures and its maintenance to the local graduate educated person as required by the guidelines.

One more positive side of the watershed programme is that it enhanced a *general awareness* about the various policies and programmes which are implemented at the village. They freely expressed the shortcomings of the programme when questions were put to them. Most of them identified lack of *Transparency* in the accounts of watershed activities undertaken, inappropriate ways of dissemination of *information* and *lack of dedication* by the officials concerned as the major hindrances in improving the status of village substantially. As policies were made from 'above' based on best practices available the elementary organic process of social and community participation has been sacrificed to accommodate technical fulfillments of the guidelines. There is a greater need to strengthen the 'organic process' of involving communities to participate and coordinate effectively to fulfill the set programme goals. Further, corruption is found to be percolating from the govt. departments down to the project beneficiaries, which is a negative sign.

In conclusion a few observations are highlighted which could enhance the outcomes of the watershed and livelihood security. First and foremost is making tangible efforts towards enhancement of educational standards of project implementing communities. Because lack of education, inertia to participate in the programs and absence of awareness regarding the rights and responsibility of the *users groups* of the project can bring about a speedy failure of any development programme however technically perfect it may be. Further, appropriate information dissemination, transparency in project implementation and general lack of enthusiasm from the implementing agency can result in bringing other externalities which may be detrimental to the people's participatory approach. Finally, though some amount of physical benefits could be accrued through

watershed implementation quite easily; however it would take a much longer time and sustained efforts to realize the participatory and other wholistic aspects of watershed programme.

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Appendix-1

Background for Watershed Guidelines 1994

Watershed development projects have been taken up under different programmes launched by the Government of India. The Drought Prone Area Programme (DPAP) and the Desert Development Programme (DDP) adopted the watershed approach in 1987. The Integrated Wasteland Development Projects scheme (IWDP) taken up by the National Wastelands Development Board in 1989 also aimed at developing Wastelands on a watershed basis. This programme has now been brought under the administrative jurisdiction of the Department of Wastelands Development in the Ministry of Rural Development. The fourth major programme based on the watershed concept is the national watershed Development Programme in Rainfed Areas (NWDPRA) under the Ministry of Agriculture.

So far these programmes have laid down there own separate guidelines, norms, funding patterns and technical components based on their respective and specific aims. While the Desert Development Programmes focused on reforestation to arrest the growth of hot and cold deserts, the Drought Prone Areas Programme focused on reforestation to arrest the growth of hot and cold deserts, the Drought Prone Areas Programme concentrated on non-arable lands and drainage lines for in-situ soil and moisture conservation, agroforestry, pasture development, horticulture and alternate land uses. The Integrated Wasteland Development projects, on the other hand, made silvipasture, soil and moisture conservation on wastelands under government or community or private control as their predominant activity. The NWDPRA combines the features of all these three programmes with the additional dimension of improving arable lands through better crop management technologies.

While the focus of these programmes may have differed, the common themes amongst these programmes have been their basic objective of land and water resource management for sustainable production. The Technical Committee constituted by the Ministry of Rural Development under the Chairmanship of Prof. Hanumantha Rao, studied the implementation and impact of the DPAP, DDP and also the IWDP programmes all over the country and recommended that a common set of operational guidelines, objectives, strategies and expenditure norms for watershed development projects should be evolved integrating the features of the three programmes under the Ministry of Rural Development.