CHAPTER – V

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Food security and environmental security are the principal global issues of 21st century. Despite the phenomenal advances made in agricultural technology, there are several regions of the world where food production has either not kept pace with the increase in population or has barely kept pace with the increase in population. Although stagnation and decline in agricultural production can be due to political and social reasons, degradation of soil and water resources and lack of appropriate technology to address the basic issue of resource mobilization and management may be the primary factors responsible for low agricultural productivity. Water scarcity and poor water quality are major concerns in numerous countries, which mainly depend on agriculture for livelihood of the people. Fresh water availability is already a major factor in sustainable use of resources. Water scarcity is further accentuated by ground and surface water pollution. UNDP warns that world soils and land resources have an important impact on the potential risk of enhanced greenhouse effect. So it is pertinent to note that watershed management plays a pivotal role in food security and environmental security in the present era, characterized by increasing conflicts over water resources. Watershed is a basic hydrologic unit, and hydrologic and ecologic processes govern the quality of soil and water resources within the watershed. Recently, watershed management has emerged as an appropriate strategy to manage natural resources to provide sustainable livelihood to the rural poor.

Evaluation of Watershed Development Programmes in India

Realizing the importance of raising agricultural productivity and improving the livelihood of rural population, India initiated watershed development programmes since 1970s. However, the programmes were initially known as Drought Prone Area Development Programme [DPAP] and Desert Development Programmes with a focus on arid and semi-arid regions of the country, especially Rajasthan. The village level microwatershed experiments were started in 1974 at four places and later expanded to 47 model watersheds.
in 1982-83. In 1986 Government of India selected 99 districts in 16 states under watershed management programme. During the 8th Five Year Plan, extensive changes were introduced in the programme for the development of rain-fed agriculture during 1990-91.

At present WDPs of the MORD and the Ministry of Agriculture (MOA) are run separately and are allotted different funds from different programmes – DDP, DPAP, IWOP or MORD and NWDPRA and River Basin Programme (RBP) for MOA. Council for advancement of people’s Action and Rural Technology (CAPART) also funds its own watershed development programmes. In addition, the programmes are allotted funds from employment oriented schemes like the Jawahar Rozgar Yojana (JRY), Employment Assurance Scheme (EAS) and Swarna Jayanti Swayamrozar Yojana (SJSY).

Investment allocations – watershed Development Programmes (WDPs)

In the light of the socio-economic and environmental benefits, India is one of the largest micro-watershed development (WSP) programmes. The country has made significant investments in this approach. It is estimated that since the mid 1990’s a total of Rs.17000 crores have been spent till march 2005 on watershed development in the country (table 1.1). These allocations/investments are expected to be doubled during 11th five year plan periods with enhanced per hectare investment. In the next 20 -25 years Government of India has a target of treating 63 million hectares with an estimated target of 76,000 crores. Though these investment figures are relatively small compared to the ongoing and proposed investments in major irrigation projects, the key concern is that the benefits realized from watershed development may be far below its potential.

Statement of the problem

The period 1994 – 2005 saw the implementation of the first generation programmes under the MoRDs and NWDPRA (MoA) on a very wide scale. During the period from March 2006 a total of 39,221 watershed projects are sanctioned of which
24,363 are under DPAP, 13476 under DDP and 1382 under IWDP. These projects are implemented by the various state government departments and non-governmental organizations to develop lands on watershed basis with the adoption of new guidelines 1994 and 2001 (Prof. Hanmantha Rao Committee guidelines) issued by the Central Government. Before dwelling on the second generation of watershed based development programmes with heightened targets and expectations, it is important to ensure that the experiences from the first generation of widely implemented watershed development are fully understood and internalized. Further, the review of existing studies reveal that not many studies are conducted to capture the experiences of watershed programmes which are implemented with the new guidelines. Hence, there is a need to conduct more number of micro studies at village level to understand the effective means of implementing the watersheds and lessons learned in the process and to determine the impacts of the projects on the people as well as the area. Hence, an attempt has been made in the present study to capture important lessons, experiences and impact of the programme in Kurnool district of AP with the following specific objectives.

Objectives

1. To examine the functioning of Watershed Development Programmes (WDPs)
2. Critically examine the recent policy guidelines pertaining to WDP.
3. To analyse the extent of people’s involvement in the planning and implementation of the programme.
4. To examine and assess the impact of the programme in terms of certain physical achievements – increase in ground water levels, the number of wells rejuvenated, additional area brought under cultivation, success of horticulture/afforestation programme, increase in agricultural productivity and in milk yield.
5. To estimate the income and employment generation through watershed development activities.
6. To assess the impact on the reduction of migration in watershed villages and finally
7. To analyse the people’s perceptions on the implementation and impact of the programmes.
Approach

The functioning of the programme is analysed in terms of examining the organizational structure, formation and working of people's institutions and participation of local communities in the programme. The impact of the programme is examined by analyzing the 'pre' and 'post' project situation. Thus, the study is based on 'Before and After' approach. Further, in order to know the influence of the specific programme and PIAs - NGO and GO - comparative analysis of IWDP Vs DPAP and NGO Vs GO implemented on watersheds have been conducted. A pre-designed interview schedule is used for this purpose.

Data Base

The present study is based on the data both from primary and secondary sources. The primary data has been collected from the sample watersheds - records from Watershed Committees (WCs), DRDA records and reports and farmers during the year 2008. Primary data is also collected from 30 members representing large and medium; small and marginal and landless groups selected on random basis from each sample watershed. A pre-designed schedule is used to collect information. The secondary data has been collected from Annual reports, Action Plans, Reports of various studies and government publications.

Sample Design

For the purpose of the study, a three-stage sampling method is applied in selecting sample watersheds. All the watersheds which are sanctioned during 1995 to 2007 in the Kunoo district are classified into programme-wise-DPAP, EAS, APRLP and IWDP. Only watersheds which are completed during 1990-00 to 200-07 under DPAP and IWDP are selected for the purpose of the study. This is because DPAP, IWDP and Haryali are the specific programmes but not the EAS and APRLP. But the watersheds which are sanctioned under Haryali Programme are still under implementation with new guidelines.
implementation of the watersheds are delayed due to difficulty in adopting new Haryali guidelines). Accordingly 16 out of 205 under DPAP and 6 out of 30 IWDP watersheds are selected. Further, all watersheds sanctioned under IWDP are sanctioned and implemented in Puapily mandal only, as a result all six watersheds under IWDP are selection from Puapily mandal only. Three mandals one each from three revenue divisions – Kurnool, Adoni and Nandyal are selected. Thus, 15 watersheds are selected from Bethamcherla – Kurnool, Devanakonda – Adoni and Banaganapalli – Nandyal for the purpose of the study. Further, 30 farmers representing large and medium; small and marginal and landless groups are selected on random basis from each sample watershed.

Findings: Watershed development programmes:

Andhra Pradesh:

Envisaged to develop 10 million hectares of degraded and wastelands, with an outlay of about Rs.4,000 crore (US$ 888.389 million) from 1997 to 2007 at the rate of 1 million hectares every year. However, only a little over 50 percent of the target has been achieved till March 2007 at a cost of about Rs.2,000 crore. Since new watershed guidelines have come into force from 1995-96 onwards, a total of 11083 watersheds are sanctioned to Andhra Pradesh up to 2006-07 which is largest number (almost 30 percent of the total watersheds) in the whole country. Nearly 53.3 lakh hectares of land have been brought under the programme for treatment with an expenditure of nearly Rs. 2000 crores during 1995-96 to March 2007. Among different programmes, the DPAP which contributed more than one-third (38.3 percent) of total watersheds followed by EAS (17 percent) IWDP (13.5 percent) RIDF VI (11 percent ) and DDP (9.5 percent ) . These programmes together covered more than 90 percent of total watersheds sanctioned in the state. However , if we take the number of watershed completed and under implementation 44 percent of watersheds are completed and remaining watersheds are under implementation , Interms of distribution of watershed across districts, more number of watersheds are sanctioned to Anantapur (1486), Mahaboobnagar (1077), Nalgonda (831), Prakasham (820), Chittor (688), Rangareddy (497), Kadapa (474) and Medak (441) . These
districts together accounted for more than 70 percent of total watersheds sanctioned to the state. It is quite natural because these districts are drought-prone and dry districts and receive less rainfall (less than 700 mm).

**Kurnool District:**

During 1995–96, 2006–2007 a total 1042 watersheds are sanctioned and 802 watersheds are completed. In Kurnool District it means 80 percent of watersheds are completed and only 20 percent of total watersheds are under implementation process. Nearly 38 percent (397) and 35 percent (354) of watersheds under DPAP and EAS programmes respectively were sanctioned. Another 16 percent, 10 percent, 30 percent are sanctioned under APRLP Hariyali and IWDP programmes respectively. The status regarding the completion of watersheds programme wise, more than 80 percent of watersheds sanctioned under DPAP and all watersheds sanctioned under IWDP, EAS and APRLP are completed. However all the watersheds sanctioned under Hariyali scheme are still under implementation. The data on status of watersheds across revenue divisions and mandals in the district reveals that Adoni revenue division got sanctioned more numbers of watersheds.

**Socio Economic profile of sample households:**

On the whole almost all the sample household beneficiaries are male and young in age and have primary and middle school education background socially BCs and SCs dominate the sample households and occupationally cultivators and agricultural labour dominate the sample households. Interestingly sample households have fair representation in the local level people institutions which are constituted for the implementation of the WDP.

**People’s Institutions**

The programme has led to the formation of two peoples institutions viz., Watershed Association and Watershed Committee in order to ensure direct participation of the
community in the process of decision making concerning to resource development. One positive feature of the programme is that it led to the formation of peoples institutions and promotion of leadership at the gross root level thereby creating some awareness among the people about the importance and content of the programme and ensured their participation in it. Further the process of forming these institutions gave rise to new echelons of power in the watershed villages resulting in a kind of metamorphosis in rural leadership.

IWDP

Composition of Watershed Committees (WCs)

The representation of women is less in IWDP sample watersheds because the share of women (26 percent) is less than their quota in local body elections (33 percent) and the share of SCs/STs (13 percent) is less than their share in total population (21 percent) of watershed villages.

OCs dominate in Chairman categories of WCs – OCs in four of six watersheds and BCs dominate in case of President category of Watershed Associations (WAs) – BCs in four of six watersheds. The educational qualifications of Secretary of WAs is good enough to perform the role of community organizer – qualification is Intermediate and Degree in four and SSC in two watersheds.

Meetings

The Watershed Committees (WCs) and Watershed Associations (WAs) are functioning effectively in implementation of the programme. Because the meetings of both the Committees are regularly held and in the required number - 57 against 48 – WCs and 24 against 16 WAs in IWDP sample watersheds. Further, attendance in meetings is more than 80 percent to 100 percent in small size villages where households are less than 200.

Formation of User Groups and Self-Help-Groups (SHGs)

Sufficient number of User Groups (UGs) 18 to 24 in four of six watersheds are formed in IWDP watersheds to implement the programme. More than 90 percent funds
are spent through UGs only. A number of (9 to 14) SHGs are existing in sample watersheds before implementation of programme and sufficient number of new SHGs are also formed in the implementation of the programme in sample watershed villages. Further, groups are also functioning effectively because the amount of funds rotated among SHGs numbers varied from Rs. 95,000 to Rs. 1,80,000 and groups have also sanctioned crop loans and loans raising for horticulture purpose.

Large number of (on an average 59) training programmes are conducted in the watersheds and participation of women (91) and SCs/STs (33) in the training programmes is very good.

Achievements

Three watersheds are large in size (680 hectares to 800 hectares) and the other three watersheds are nearing to normal in size (404 hectares to 453 hectares) in IWDP watersheds. The average percentage of funds utilization is 104 percent in IWDP watersheds. Thus, PIAs of IWDP watersheds are effective in funds utilization and also they are successful in mobilizing resources from other development programmes. The percentage of money spent on works is little less than norms percentage spending. The expenditure on training is more than double (22 to 29 percent) norms percentage (10 percent) and the expenditure on administrative cost is less (9%)

Land Use Changes and waterlevels

Nearly three-forth of watershed area is treated in IWDP watersheds. However, on an average a little more than 50 percent of non-arable area is treated. Thus, the PIAs have failed to treat the non-arable though the programme specifically meant for developing all waste lands. The IWDP is successful in increasing water level in wells in sample watersheds – on an average 32 percent reduction in depth to water table. Further, on an average 6 abandoned wells are rejuvenated, 5 open wells and 8 deep bore wells are constructed irrigating an additional area of 10 hectares under open wells and 15 hectares

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under bore wells. This is mainly due to the execution of all the physical works related to conservation because money spent on works is 75 percent of the money sanctioned.

**Afforestation**

On an average under IWDP 13 hectares are covered with 1565 plants with a density of 120 plants per hectare. Silvi Pasture programme is also implemented on an average 64 hectares in sample watersheds. Results have shown that both afforestation and Silvi Pasture programme is highly successful because the survival rate is more than 80 percent in watersheds.

**Dairy Development**

80 percent to 100 percent households purchased the livestock due to implementation of the programme. As a result on an average 14 families have got direct benefit by additional income through production and sale of milk on continuous basis at an average of 93 lts of milk, per day is produced per day. Thus, dairy development programme is highly successful in watershed villages in terms of growth in livestock and increase in milk production.

**Yields, Employment and Income**

The data reveals that the programme significantly increased the yields of almost all important crops in watershed villages – increases are to the extent of 78 percent, 56 percent, 50 percent, 41 percent and 26 percent in case of groundnut, paddy, jower, redgram and vegetables respectively. When it comes to the size classes medium and large farmers are more benefitted compared to small and marginal farmers in case of paddy and groundnut but reverse is the case of rain-fed crops like jower, redgram and vegetables.

On an average 55 man-days are generated to men and women and wage rates are increased from Rs. 28 to Rs.40 for men and Rs. 20 to Rs.40 for women due to implementation of the programme. Thus, significant member of employment (man days) is
generated, wage rates are increased and wage rates are also equalized between men and women in the watershed villages.

Income of the households in the watershed villages is substantially increased – Rs. 2942, Rs.4,618 and Rs. 8,790 to land bys and small and marginal farmers and medium and large farmers. This could be due to higher wages paid, higher yields and dairy development with the implementation of the programme.

**On the whole** from the impact of analysis of IWDP the following broad conclusions can be drawn. The programme has led to the formation of people institutions and promotion of leadership at grossroot level in to sample watersheds. The representation of women and SCs/STs is WCs in IWDP watersheds is by OCs Dominate in Charimancategory of WCs and BCs dominate in president Category of WAs. The educational qualifications of secretary are satisfactory. Meetings of WCs and WAs are held regularly and in adequate number and members attendance to the meetings are more than 80 percent. Adequate number of WAs and SHGs are formed to implement the programme. SHGs are also functioning effectively because of rotation of funds and sanctioning of loans. Further, adequate number of trainings are conducted and women and SCs/STs participation is good and satisfactory.

IWDP watersheds are successful in funds utilization and also spent nearing to the norms percentage on works. Further expenditure spent more than the norms percentage on works. Thus, spent more on trainings and less on administration. IWDP also successful in treatment of watershed area but failed in treatment of non-arable lands though the IWDP is specially meant for developing wastelands. However, 46 percent of sample households have brought their waste lands into cultivation.

The Programme is successful in increasing water table in watershed villages. Further, the programme is successful in rejuvenation of abandoned wells, digging new bore wells and getting additional area into irrigation. Nearly 50 percent of sample households their
irrigated area. IWDP is highly successful in helping households to purchase livestock and production and sale of extra milk thereby benefitted significant number of families in watershed villages. Afforestation programme is also successful because of highly survival rate and courage of area. Further, the Horticulture is successful because of high survival rate and giving good yields.

Significant number of man-days are additionally generated there by reduced the seasonal migration. Wage-rates are also increased and equalize between men and women. Further, crop yields are increased significantly but medium and large farmers are more benefitted compared to small and marginal farmers. Moreover average income among households increased substantially to all classes farmers.

**DPAP**

**Composition of Watershed Committees (WCs)**

The composition of Watershed Committees reveal that the representation of women (15 Percent) and SCs and STs (14 percent) is very low in DPAP sample watersheds compared to their quota in local body elections (33 percent) and their share in local population (21 percent) of the watersheds respectively. Further, there is no women and SCs/STs representation in 4 out of 15 watersheds.

OCs dominate in chairman category of WCs – 9 out of 15 watersheds chairmen are from OCs, whereas BCs dominate in president category of Watershed Associations (WAs) – 10 out of 15 watersheds presidents are from BCs, if we take the social background of chairmen of WCs and president of WAs. The educational qualifications of secretary of WAs is good enough – SSC, intermediate and Degree – to perform the role of Community organizer to maintain the minutes books.

**Meetings – WCs and WAs**

In majority watersheds of DPAP watershed Committee meetings are not held regularly and in adequate number, in three watersheds 52 to 58 meetings and in another
five watersheds only 24 to 42 meetings are held against the norm of conducting 60 meetings during the span of five years. Watershed Association meetings are also not held regularly because in three watersheds 12 to 16 and in 9 watersheds only 10 or less than 10 meetings are held against norms of 20.
Formation of User Groups (UGs) and Self-Help-Groups (SHGs)

Adequate number of (13) User Groups are formed particularly in seven watersheds 16 to 24 UGs are formed for the purpose of implementation of WDP. UGs are also actively involved in implementation of the programme because 70 percent to 100 percent of funds are spent on works through UGs. Further, in most of the watersheds of DPAP sufficient number of (6 to 9) new SHGs are formed to mobilize women in order to encourage them to take up economically productive activities with the help of funds provided for the purpose though SHGs are not existing before the implementation of the programme. SHGs were also effectively functioning because Rs. 20,000 to Rs. 50,000 are provided and some portion (10 to 30 percent) of funds are spent on works through them.

Training Programmes

In majority watersheds adequate number of (10 to 22) training programmes are conducted but in one watershed not even a single training programme is conducted. However participation of women and SCs/STs is not satisfactory in the training programmes because on an average only 12 and 10 women and SCs/STs members respectively participated and in some watersheds only 2 or 3 members participated.

Financial - Achievements

Most of the DPAP watersheds are nearing to normal in size because 490 hectares to 566 hectares in 9 watersheds and 600 to 717 hectares in three watersheds and it is very less in (370 to 460). In the remaining three watersheds In majority watersheds, percentage of funds utilization is nearing 100 percent. However, in significant (five) number of watersheds the percentage funds utilization is not satisfactory (57 percent to 78 percent). However, the percentage of funds utilization is more than 100 percent in NGO-DPAP and less (less than average) in GO-DPAP. Thus, GO-DPAP watersheds are not effective in utilization of funds. Further, the amount of money spent on works is less (less than 71 percent) than the norms (80 Percent) of spending on works particularly in majority watersheds it is very less in six watersheds (40 percent to 67 percent). Here also NGO-
DPAP watersheds have and spent money on works more than the norms but GO-DPAP watersheds have spent less on works.

In most of the DPAP watersheds treatment of the watershed area is good which is around 80 percent. In other words area treatment is given priority in implementation of WDP. Further, treatment of non-arable area is good particularly seven watersheds (50 percent to 92 percent) though the DPAP is not meant for the development of waste lands and it is a welcoming feature.

**Water levels**

WDP is not quite successful in reduction of depth to water table in DPAP watersheds because between two periods (pre and post project periods) there is no change. It is 16 percent reduction in four and less than 10 percent in five watersheds. This may be because the amount spent on works is less than 73 percent in most of the watersheds.

In majority watersheds of DPAP not much number of (only 4 to 5) abandoned wells are rejuvenated. However, surprisingly as a result of rejuvenation abandoned wells significant area is brought under irrigation additionally – 6 hectares to 48 hectares. In most of the watersheds a good number of (on an average 22) new bore wells are constructed in DPAP watersheds. As a result on an average 55 hectares are brought under irrigation additionally on the whole though the reduction in depth is not much, but significant number of hectares are brought under irrigation additionally through digging new bore wells and rejuvenation of abandoned wells. With regard to NGO-DPAP Vs GO-DPAP NGOs watersheds are better than GO watersheds in terms of rejuvenation of abandoned wells, digging of borewells and additional area is brought under irrigation.

**Afforestation and Horticulture**

The afforestation programme is not successful in DPAP watersheds because the survival rate is only 10 percent to 22 percent in majority of the watersheds though significant
number of hectares and large number of (thousands) seedlings are planted. But survival rate is 75 percent to 85 percent in five watersheds. However, Horticulture Programme is successful in DPAP watersheds because survival rate is good – 60 percent to 95 percent though less number of hectares with supply of less number of plants are covered. Further, the plants are in a good condition giving good or moderate yields in majority watersheds. Here also GO watersheds are better than NGO because the survival rate is higher (54 percent compared to 22 percent) in most of the watersheds.

**Dairy Development:**

50 to 90 percent of households in most of the watersheds have purchased livestock with the implementation of the programme in DPAP sample watersheds. This led to increase in the population of livestock. As a result of increasing the livestock, as some of them are milch animals, on average more than 28 families in nine watersheds are benefitted by increasing income through production and sale of milk on continuous basis. This is because 50 to 400 lts. per day in 12 watersheds are produced and sold. Thus, Dairy Development programme is highly successful in sample watersheds of DPAP.

**Crop yields,**

The WDP is highly successful increasing crop yields in almost all important crops in sample watersheds – increases are to the extent of 20 percent, 50 percent, 45 percent, 23 percent and 35 percent in case of paddy, jower, red-gram, groundnut and vegetables respectively. When it comes to the size classes, in general, medium and large farmers are more benefited compared to small and marginal farmers.

**Employment:**

Significant number of man-days – more than 70 man-days are generated subsequent to the implementation of the programme in DPAP sample watersheds both for men and women. Further, wage rates are increased to men and women and equalized in the sample
watersheds – wage rates from Rs. 32 to Rs. 47 for men and Rs. 25 to Rs. 47 for women are increased.

Seasonal migration is almost reduced – 75 percent to 90 percent in 60 percent of sample households due to generation of additional employment and income.

Income

Income per annum amongst households increases substantially in sample watersheds – Rs. 2,320; Rs. 3,750 and Rs. 7,425 to landless, marginal and small and medium and large farmers respectively. This may be due to higher wages paid, higher yields in agriculture and increase in quantity milk with the impact of the programme.

On the whole from the impact of analysig of DPAP the following broad conclusion. The representation of women and SCs/STs is less in WCs. But NGO-DPAP watersheds are better than GO-DPAP. OCs dominate in chairman category of WCs where as BCs dominate president category of WAs. In majority watersheds meetings of WCs and WAs are not held regularly but attendance of members to meetings is good. Adequate number of UGs and SHGs are formed. Further, adequate number of training programmes are conducted but women and SCs/STs participation is not satisfactory. However, NGO-DPAP is better than GO-DPAP.

DPAP watersheds have not utilized the funds to the 100 percent level. But NGO-DPAP is effective in funds utilization and also they have spent more than norms percentage of money on works but not GO-DPAP. They Spent more money on training and less on administrative cost. DPAP is successful in treatment of watershed area and non-arable lands. NGO-DPAP is better GO-DPAP in treatment of the watershed area but vice-versa in treatment of non-arable lands.

The DPAP is not much successful in improving the water table in wells but NGO-DPAP is better than GO-DPAP. The DPAP is not successful in rejuvenation of abandoned
wells but significant area (hectares) is irrigated additionally. Here also NGO-DPAP is better than GO-DPAP. However, the DPAP is successful in digging new bore wells and irrigating the cultivable to a significant extent. Here also NGO-DPAP is better than GO-DPAP. The afforestation programme is not successful in DPAP because the survival rate is less. But GO-DPAP is better than NGO-DPAP because of high survival rate. However, Horticulture Programme is successful because the survival rate is high and giving good or moderate yield though less number of hectares with less number of plants supplied. But GO-DPAP is better than NGO-DPAP because of high survival rate.

The DPAP is highly successful in helping households to purchase livestock and in production and sale of extra milk. Here also, GO-DPAP is much better than NGO-DDPAP. The programme is also high successful increasing crop yields in almost all important crops but in general medium and large farmers are more benefitted compared to marginal and small farmers.

Significant number of man-days are generated subsequent to the implementation programme in DPAP. NGO-DPAP is better than GO-DPAP in their respect. Further, wage rates are increased due to higher wages paid in watershed works compared to agriculture works. But NGO-DPAP is better than GO-DPAP and also wage rates are equalized between men and women. More over seasonal migration reduced to the extent 75 percent in 60 percent of DPAP watersheds NGO-DPAP is highly successful in reducing migration but not Go-DPAP. Average income per annum increase amongst households to a significant extent in all classes of farmers. However, more incomes to all classes of farmers are accrued in GO-DPAP compared GO-DPAP.

**COMPARATIVE ANALYSIS**

**DPAP Vs IWDP – NGO Vs GO**

Women and SCs/STs representation in watershed committees is less in both DPAP and IWDP watersheds because the women representation (26 percent and 15 percent respectively) is less than their quota of 33 percent in local body elections and the share of
SCs/STs (14 percent and 13 percent respectively) is less than their share (21 percent) in the total population of watershed villages. However, women representation is higher in IWDP (26 percent) compared to DPAP (15 percent) watersheds DPAP watersheds. Where as SCs/STs representation is slightly higher in DPAP watersheds.

When it comes to the question of NGO Vs GO implemented watersheds, the women and SCs/STs representation is more in NGO implemented watersheds compared to GO implemented watersheds. This is mainly because there only 2 percent to 3 percent are the women and SCs/STs in 4 out of 11 GO – DPAP implemented watersheds.

OCs dominate in Chairman category of WCs and BCs dominate in President Category of WAs in both DPAP and IWDP and NGO and GO implemented watersheds taking into account their social background. The Chairman position of WCs is more influential than the president position of WAs looking into the nature and functions they perform in implementation of the WDP at watershed level. Further, discussions with officials reveal that the WC Chair Person hail from the dominant or influential sections, while the WAs President was more often than not a dummy candidate. The Secretary of WAs posses’s required qualifications in both the programmes to perform the role of community organizer.

Meetings

Meetings of WCs and WAs are held regularly and in the required number in IWDP watersheds – 57 of 48 and 24 of 16, whereas in DPAP watersheds meeting of both committees are not held regularly and in the required number – 52 of 60 and 14 of 20. However, NGO implemented watersheds are better compared to GO implemented watersheds in conducting meetings in the required number. Surprisingly in both DPAP and IWDP and NGO and GO watersheds numbers attendance to meetings is more than 80 percent. Thus, peoples are actively involved in implementation of the programme.

Formation of User Groups (UGs) and Self-Help-Group (SHGs)
Adequate number of (15 to 13) User Groups (UGs) are formed in both IWDP and DPAP and NGO and GO watersheds for the implementation of the programme. However, more number of UGs are formed in NGO (15 in IWDP and 14 in NGO-DPAP) compared to GO (12) watersheds. 65 percent to 100 percent funds are spent on works through UGs in all watersheds. Thus, UGs are actively involved in implementation of the programme.

Considerable number of new SHGs are (5 to 10) formed in all watersheds to mobilize women and to undertake income generating activities with the funds provided from outside ranging from (Rs10,000 to Rs. 1,00,000) sources in watershed villages. Further, SHGs are also functioning satisfactorily because of rotation of funds among themselves and sanctioning of loans for income generating activities.

**Training Programmes**

Adequate number of training programmes (10 to 59) are conducted for the stakeholders of watershed villages in majority watersheds of both IWDP and DPAP and NGO and GO to sensitize and ensure the peoples participation in the implementation of the programme. However, more number of (59) training programmes are conducted in IWDP and less on an average (9) in DPAP. Large number of programs are conducted in NGO implemented watersheds 12 to 14 in NGO-DPAP and 60 in IWDP compared to GO watersheds (10). Participation of women and SCs/STs in training programmes is good in IWDP 91 women and 33 SCs/STs but not satisfactory in DPAP watersheds – 12 women and 10 SCs/STs. Further, women participation is satisfactory in NGO watersheds but not in GO watersheds.
Achievements

The size of watersheds is bigger in (586 hectares) IWDP compared to DPAP (526 hectares) particularly to NGO-DPAP (498 hectares) watersheds. Further, the size of DPAP watersheds is nearing to normal size, whereas the size of IWDP watersheds either bigger or smaller size (500 hectares) as suggested by policy guidelines committees. Funds have been sanctioned and released @ Rs.4,000 per hectare with respect to IWDP and @ Rs. 3,000 per hectare with respect to DPAP. Thus, more funds are available to IWDP watersheds compared to DPAP. Moreover, time duration to complete the WDP is five years in DPAP and four years in IWDP.

The percentage of fund utilization is more than 100 percent in IWDP (109 percent) and less than 100 percent in DPAP (92 percent) watersheds. Thus, the implementation institutions of IWDP have been able to mobilize resources from other development programmes for the development of the watersheds but not in case of DPAP. This factor may have its own influence on the impact of the programme. With regard to NGO Vs GO, the percentage of fund utilization is 100 percent or more than 100 percent in case of all NGO implemented watersheds, whether IWDP or NGO-DPAP but less than 90 percent in GO-DPAP watersheds.

IWDP watersheds have reached the norms of (76 percent to 78 in four of 6 watersheds) percentage of spending sanctioned amount on works but DPAP watersheds have failed to spend (71 percent) the sanctioned amount on works. Here also all NGO implemented watersheds spend 80 percent or more than 80 sanctioned amount on works but GO implemented watershed spend less than 70 percent of sanctioned amount on works.

The expenditure on training more than (12 to 26 percent) required norms (10 percent) in both DPAP and IWDP and NGO and GO watersheds. Here also, IWDP watersheds and NGO watersheds have spent more on training than DPAP and GO. The extent amount and number of meetings training programmes play an important role in
creating awareness and enhancing number participation in implementing the programme. The expenditure on administration is less in all watersheds (less than 10 percent).

**Land Use Changes**

The treatment of watershed area is more in DPAP (79 percent) compared to IWDP (75 percent). This is because in 12 of 15 DPAP watersheds the area treatment varied from 78 percent to 91 percent where as in IWDP only in one watershed the area treated is 85 percent. The GO watersheds are also better than Go in treatment of the area of watersheds. Further, DPAP is highly successful in treatment of non-arable lands because in 50 percent of DPAP watersheds 48 percent to 92 percent of non-arable lands are treated, where as in IWDP only in three watersheds 56 percent to 72 percent of non-arable area treated. This may be due to the area treatment is given priority in DPAP over IWDP. In this context, the point to be mentioned here is that IWDP is a specific programme to develop waste lands, all the waste lands should have been covered particularly in the context that all non-arable lands are common property resources. Moreover, surprisingly GO implemented watersheds are in a better position than NGO implemented watersheds even among DPAP watersheds because only 18 percent of non-arable area is treated in two of four NGO-DPAP watersheds. As a result GO watersheds and better than all NGO is treated of non-arable land also. Thus, NGOs as PIAAs and specific programme like IWDP have failed to prioritize the works while implementing the programme. However unity the treatment of non-arable lands more sample house holds have brought their fallow and into cultivation in IWDP compared to DPAP and NGO watersheds compared to GO.

**Ground water**

The reduction in depth to water table is higher in IWDP (33.5 percent) and lower in DPAP watersheds (16 percent) during pre project and post project period.

On an average around 6 abandoned wells are rejuvenated in both IWDP and DPAP watersheds. Thus there is no difference future is IWDP and DPAP rejuvenation of abondoued wells. Here NGO watersheds are better because in two of four NGO-DPAP
watersheds 12 wells are rejuvenated. As a result, the additional area brought under irrigation is same in both the programmes (IWDP and DPAP). Further, more hectares are brought under irrigation in NGO (27 hectares) watersheds to GO.

More new wells (open and bore wells) are dug in DPAP watersheds (26) compared to IWDP (Bore wells) watersheds (8). Here also, more number of new wells are dug in GO watersheds compared to NGO watersheds. As a construction of new wells the additional area brought under irrigation is more in DPAP (55 hectare) compared to IWDP watersheds (15 hectares). Here also GO watersheds have brought more irrigated area (79 hectares) than NGO watersheds (46 hectares).

**Afforestation**

Under afforestation programme more number of hectares with number of seedlings are covered in DPAP (19 hectares with 2675) compared IWDP (13 hectares with (1562 seedlings). However, survival rate is very high (76 percent to 80 percent) in IWDP and very low (37 percent) in DPAP. Surprisingly GO-DPAP watersheds are better than NGO-DPAP watersheds because the survival rate is 45 percent in GO-DPAP compared to NGO-DPAP (45 percent).

More number of hectares with the supply of more number of plants are covered in IWDP (32 hectares with 4000 plants) compared to DPAP (9 hectares with 635 plants). However, survival rate is good and more or less same in both the programmes. Further, plants are giving good or moderate yields in both the programmes. Thus, Horticulture Programme is successful in both the programmes. Here also, the GO watersheds are better than NGO watersheds because of high survival rate.

**Dairy Development**

The WDP helped two-thirds to 53 percent of households to purchase livestock in post project period in both the programmes. This is welcoming feature because growth in livestock population helps rural development in many ways. However IWDP is better than DPAP and NGO watersheds are better than GO. As a result of increasing the livestock on
an average 93 lts. per day additional or extra milk is produced in IWDP and DPAP respectively leading to increasing income through the sale of milk on continuous basis. Thus there is no difference IWDP and DPAP in their respected. Surprisingly, the additional milk production is more (110 lts per day) in GO-DPAP watersheds than NGO-DPAP (45 lts per day) and NGO IWDP (93 lts) watersheds. In terms of number of families significant number of families are benefitted in both the programmes. However, more number of families are benefitted in GO-DPAP (49) compared to NGO-DPAP (12) and NGO-IWDP (14).

**Crop yields**

Watershed development programme is successful in increasing the yields substantially in almost all crops in both the programmes – ranging from 20 percent to 78 percent in case of paddy, jowar, redgram, groundnut and vegetables. With regard to DPAP Vs IWDP in some crops DPAP watersheds recorded more and in some crops IWDP watersheds recorded more, thus there is no much difference between IWDP and DPAP. When it comes to size classes in DPAP medium and large farmers recorded more (to the extent 15 percent) compared to small and marginal farmers in all crops. In case of IWDP watersheds also medium and large farmers recorded more increase compared to small and marginal farmers in case of paddy and groundnut on the contrary in case of rain-fed crops jowar, redgram and intensive crop like vegetables small and marginal farmers recorded more increase compared to medium and large farmers. However, these are not principal crops in IWDP sample watersheds. Thus in general medium and large farmers are more benefitted compare to small and marginal farmers in both DPAP and IWDP.

When it comes to NGO Vs GO, NGO watersheds (either NGO DPAP or IWDP) have given priority to some extent to small and marginal farmers compared to GO implemented watersheds but data is available in one or two crops only

**Employment and Income**
Significant number of man-days are generated both in DPAP (71 man-days) and IWDP (53 man-days) subsequent to the implementation of the programme. However, more number of man-days are generated in DPAP compared to IWDP. But there is no much difference between NGO and Go watersheds in employment generations. Further, wage rates are also increased both in DPAP-from Rs.32 to Rs.47 for men and from Rs. 25 to Rs. 47 for women compared to IWDP – from Rs. 28 to Rs.40 for men and from Rs. 20 to Rs. 40 for women. This is mainly due to the higher wage rates paid in watershed works compared to agriculture works. Here also increase in wage rates are more in DPAP compared to IWDP and also increase in wage rates are more to women compared to men. With regard to NGO Vs GO wage rates are lower in NGO-DPAP (Rs. 40) and IWDP (Rs.40) compared to GO-DPAP (Rs. 49). Moreover, the important point to be noted here is that wage rates are equalized between women and men because same wage rates are paid both for women and men in watershed works. Thus, women is more benefitted due to the implementation of the programme- equalizing wage rates and more increase in wage rates. Seasonal migration is reduced to the extent of 70 percent to 90 percent in both the programmes – DPAP and IWDP and in NGO-DPAP. IWDP is better than DPAP. However seasonal migration is reduced in all NGO-DPAP and NGO-IWDP where as only in 5 out of 11 watersheds of GO –DPAP. However, in six out of 11 GO-DPAP watersheds migration is not reduced to the bare level. The income increased substantially amongst households to the extent of Rs.2,320 to Rs.8,725 to different size of classes of farmers in both the programmes across watersheds due to the implementation of the programme. This, is due to higher wages, higher yields in crops and in case increase in milk production in each watershed. However, income increase is more in IWDP compared to DPAP among different size classes of farmers. But medium and large farmers have recorded more income compared to landless small and marginal farmers in both the programmes.

On the whole the performance of IWDP watersheds are better than the performance of DPAP in the present study on the following aspects viz., in conducting meetings of Watershed Committees (WCs) and Watershed Associations (WAs) regularly and adequately formations more UGs number of training
programmes and participation of women and SCs/STs in training programmes; funds utilization of sanctioned amounts and money spent on works more than norms percentage; money spent on trainings; survival rate in afforestation programme; water table in wells; percentage of sample households brought their fallow lands under cultivation; helping households to purchase live stock; percentage of sample households increase in irrigated area; high survival plants under afforestation reduction in seasonal migration and finally increase in average income among households.

However, performance DPAP is better than IWDP in the following respects viz., DPAP SCs/STs representation in WCs treatment of watershed area and developing non-arable lands, digging new borewells and getting additional area into irrigation; production and sale of extra milk; number of families benefitted in dairy development; more number of generation of mandays and high wage rates.

There is no much difference between the two programmes in the following aspects viz., representation of women and SCs/STs in Watershed Committees formation of adequate number of SHGs. Social background of Chairman category of WCs and President category of WAs; no difference rejuvenation of abondoned wells and irrigating additional and under irrigation through rejuvenetion of abandoned wells survival rates in Horticulture programme; crop yieds and wage equalization between men and women.

On the Whole the performance of NGO watersheds are better than the performance of GO in implementation of Watershed Development Programmes in the following respects viz., representation of women and SCs/STs in WCs; regularity in conducting meetings of WCs and WAs; number of conducting training programmes and participation of women and in the training programme; effective utilization of funds and spending more money on works and trainings than the specified norms of percentage; NGO percentage of sample house holds brought their fallow land into cultivation water table in wells increase in irrigated area through abandoned wells and new bore wells; percentage of sample house holds increase in irrigated area high survival rate of plants in Horticulture programmes enabling more number of households to purchase livestock and
resulting in creased income levels leading to reduction of seasonal migration in the selected watershed villages.

On the other hand GOs have shown better performance than NGOs regarding treatment of watershed area and non-arable lands; no digging new bore wells and getting additional area into irrigation, extra production of milk there by benefitted in more number of families under dairy development programmes; increased in the number of man-days along with raised wage rates to both male and female in the selected watershed villages.

Perceptions

To sum up, most of the sample households participated in gramsasabha meetings and gave suggestions abut the implementation of the programme. They viewed that the programme contributed for the formation of people's institutions and promotion of leadership at gross root level. Further, the institutions also contributed to creat awareness among the people of the importance and content of the programme and need to participate in them. Sample respondents irrespective of the programme feel that watershed development programme has a positive impact on agriculture and other natural resources. They have reported as having benefitted from the works on moisture and soil conservation and stoppage of soil erosion, promotion of horticulture to improve the land, afforestation in the watershed region and creation of employment opportunities as a result of the above activities income generating activities, agriculture development measures, watershed plus activities etc.). They feel that the programme particularly benefitted to increase yield levels, water levels in the wells leading to increase in irrigated area, development of animal husbandry – growth in livestock and increased milk yield/production, promoting horticulture – high survival rate and giving good yields. Moreover, they reported that the programme constituted for the reduction in seasonal migration and mitigating the drought. Finally they expressed satisfaction about the quality of works carried out in the programme and repaires to undertake maintenance of assets created out of the funds utilized from the watershed development fund.
Observations of the Researcher

The government officials of the different departments have to undertake the implementation of the programme without prejudice to their normal duties. As such, their full undivided attention to the WDP cannot be expected. At present all the training programmes to WC, WA, UGs and SHGs members are being undertaken largely by the personnel involved in the programme. It requires to be studied whether such officials who require training themselves and need to be oriented can perform their task effectively. Some inadequacies are observed in designing the course material of the programme. Further, the programme appears to be weak with regard to community organization for maintaining the assets created as well as continuing the programme through User Groups and people’s involvement after completion of the project. Finally the involvement of the people in the planning the works is not to the desired extent in general in most of the watersheds. The involvement of people in the execution of works was however good in most places.

Policy implications.

The watershed development programme has a positive impact on agriculture and other natural resources. Stopege of soil erosion due to soil and moisture conservation, the programme particularly benefited to increase yield levels, water levels in the wells leading to increase in irrigated area thereby an increase in crop production, development of animal husbandry – growth in livestock and increased milk yield, promoting afforestation and horticulture - high survival rate and giving good yields. Finally the programme is highly successful in generation of additional employment, increase in wage rates, income levels and equalizing earnings between men and women. These achievements have resulted in reducing the seasonal migration. Beside, the programme has paved the way for the promotion of rural leadership. It has also been successful in bringing about fairly good awareness among the people regarding the need for watershed development activity for promotion of agriculture in fragile economic zones.
Regarding the IWDP vs. DPAP and NGO vs. GO, the performance of IWDP is better than DPAP in many respects and also the performance of NGO as PIA is better than GO in many respects.