EVALUATION STUDY
WATERSHED DEVELOPMENT AND COFFEE PLANTATION UNDER REVISED LONG TERM ACTION PLAN (RLTAP)

On behalf of
PLANNING & COORDINATION DEPARTMENT
GOVERNMENT OF ORISSA

D. J. Research & Consultancy Pvt. Ltd.
N 1/69, IRC Village, Nayapalli, Bhubaneswar-15, Orissa
Website: www.djrc.org

Final Report

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Abbreviation of words used in Watershed Development

ACA	**A**dditional **C**entral **A**ssistance
ADAPT	**A**rea **D**evelopment **A**pproach for **P**overty **T**ermination
APL	**A**bove **P**overty **L**ine
ASCO	**A**ssistant **S**oil **C**onservation **O**fficer
BDO	**B**lock **D**evelopment **O**fficer
BPL	**B**elow **P**overty **L**ine
DFID	**D**epartment **F**or **I**nternational **D**evelopment
DFO	**D**istrict **F**orest **O**fficer
DRDA	**D**istrict **R**ural **D**evelopment **A**gency
DWC	**D**istrict **W**atershed **C**ommittee
DWDC	**D**istrict **W**atershed **D**evelopment **C**ommittee
EAS	**E**mployment **A**ssurance **S**cheme
IFAD	**I**nternational **F**und for **A**griculrural **D**evelopment
IMR	**I**nfant **M**ortality**R**ate
IWDP	**I**ntegrated **W**asteland **D**evelopment **P**rogramme
JE	**J**unior **E**ngineer
JSCO	**J**unior **S**oil **C**onservation **O**fficers
LTAP	**L**ong **T**erm **A**ction **P**lan
MWs	**M**icro **W**atersheds
NRM	**N**atural **R**esource **M**anagement
NSSO	**N**ational **S**ample **S**urvey **O**rganisation
NWDPRA	**N**ational **W**atershed **D**evelopment **P**rogramme for **R**ain-fed **A**rea
ORSAC	**O**rissa **R**emote **S**ensing **A**pplication **C**entre
OWDM	**O**rissa **W**atershed **D**evelopment **M**ission
P & C	**P**lanning **A**nd **C**o-ordination
P D	**P**roject **D**irector
P I A	**P**roject **I**mplementing **A**gency
PRA	**P**articipatory **R**ural **A**praisal
PTF	**P**overty **T**ask **F**orce
RLTAP	**R**evised **L**ong **T**erm **A**ction **P**lan
S C A	**S**pecial **C**entral **A**ssistance
SCO	**S**oil **C**onservation **O**fficer
UC	**U**tilisation **C**ertificate
WDF	**W**atershed **D**evelopment **F**und
WORLP	**W**estern **O**rissa **R**ural **L**ivelihood **P**rojects
HYV	**H**igh **Y**ielding **V**eriety
RMC	**R**egulated **M**arketing **C**ommittee
NREGS	**N**ational **R**ural **E**mployment **G**uarantee **S**chemes
IRR	**I**nternal **R**ate of **R**eturn

ST	**S**cheduled **T**ribe
SC	**S**cheduled **C**aste
I A	**I**mplementing **A**gency
ITDA	**I**ntegrated **T**ribal **D**evelopment **A**gency
KBK	**K**alahandi, **B**olangir, **K**oraput, **R**ayagada, **N**awarangapur, **S**onepur, **N**uapada, **M**alkangiri
WDTM	**W**atershed **D**evelopment **T**eam **M**ember

EXECUTIVE SUMMARY

This summary provides the major findings of this flagship programme in KBK districts. The observations are based mainly on the primary survey data carried out in 49 projects randomly selected covering 69 revenue villages and 384 beneficiaries in eight KBK districts. Data and information have been supplemented also from secondary sources.

Many positive developments have taken place in treated watershed sample areas. They relate to change in the quality of land and vegetation, soil moisture, ground water recharge, arrest of land degradation changes in crop composition in favour of nitrogen fixing and high value crops, changes in income and employment and organizational changes that could in future lead to benefit sustainability.

At upper and middle reaches of the watershed run-off storage structures, water harvesting and/or water conservation structures, gully plugging, contour and graded bonding, contour trenches, periphery bonding to check the ravines, loose bolder check dams, dug out sunken ponds, plantations and in some cases masonry check dams have been constructed. Various measures for plantation of fruit trees, nuts and trees for firewood have also been taken up at all reaches. At lower reaches field bonding, farm ponds, dug wells and tube wells have been constructed. Watershed interventions appear to have made substantial positive changes such as land development including irrigation, soil moisture retention and decrease in land degradation.

Improvement in quality of cultivated land in watersheds in KBK has taken place in 51% of watershed area. In Nuapada district land development

benefit is highest among the KBK areas with 60% of land showing improvement in treated watershed areas. Kalahandi (55%), Sonepur (52.11%) and Nawarangpur (50%) are districts that experienced 50% or more of the total cultivated land showing improvement in quality. Even in the other four districts Bolangir, Rayagada, Malkangiri and Koraput districts substantial land quality improvement is substantial (49%, 48%, 45% and 41% respectively).

In terms of moisture improvement Nuapada has shown the best results with about 55% of cultivated land area showing development. In Nawarangpur 50% of the cultivated land has shown increase in moisture content, as compared to 42% for the KBK region as a whole. In Bolangir, Kalahandi, Malkangiri, Sonepur and Rayagada districts moisture content has improved in 30% to 45% of land areas. In Koraput only in 27% of land moisture content improvement was reported. The experience of soil moisture improvement is short after full treatment of watershed which completed only this year. The improvement has to be seen in the context of generally increasing trend of temperature in KBK region. In the next five years or so a comprehensive evaluation study is likely to throw more light on this aspect if scientific data are merged with socio-economic information to further analysis on the subject.

Arresting high rate of land degradation experienced in KBK region was considered as very high priority in planning. Due to land treatment under watershed development programmes land degradation has been halted to some extent. In the sample projects about 36% of land has experienced deceleration in land degradation earlier caused by gully erosion and soil

erosion due to heavy rains. Some of these lands have in fact improved in quality and have now become suitable for agriculture purposes.

Positive impact in terms of crop area coverage in treated watershed projects. Increases in yield and production of some crop groups have also been observed in such areas. From the primary survey data it is found that in the sample areas of KBK region crop area on beneficiary farms has increased by 7.4%. The increases in cropped area in terms of high land, mid land and low land are 2.7%, 7.3% and 10.6% respectively. Lower percentage increase in cropped area in upper reaches is technically tenable as substantial proportion of land is used for structures that arrest natural resource degradation and improves quality of land resulting in improvement in land quality, productivity increase and improvements in farm income.

Continuous cultivation of uplands for cereals mostly paddy depletes soils of nutrition. Without substantial proportion being put to nitrogen fixing crops (legumes), land quality degradation was the order of the day. The significant favourable change observed is that cereals as a proportion of gross cropped area has come down from 74.22% to 68.33 %. Low value millets have been neglected in favour of high value crops. Area under pulses has gone up by 10% as compared to pre-watershed development. Oilseed, a deficit item for Orissa has experienced area increase of 34% while area coverage under vegetables has gone up by more than 100 percent in post-implementation period.

Crop Yield: Improving yield under dry-land technology is one of the major objectives of dry-land agriculture. Cereal yields, which are generally low in KBK districts, and specifically in dry land areas, can be

improved through proper rainwater and moisture management being tried in watersheds with some degree of success. It is observed that there has been an increase of 43% in cereal yield in post-watershed implementation period. In case of pulses, where the pre-watershed yield was too low (3.01 Qnt/ha) in post-implementation period, yield has gone up by 38% even without any additional input use. In case of oilseeds, yield has improved by 21% while for spices and condiments 17% increase has been recorded. In case of vegetables, however, there has been a decrease of 17% in yield although, it would not be fair to compare the yields before and after because of changes in composition of vegetables. Production of vegetables on sample farms has substantially increased (74%) because of the area effect on output.

The yield increase although substantial as compared to the pre-implementation period, yield in the post implementation is still low except for cereals. Average cereal yield in Orissa is 1513 kg as against which KBK watershed cereals have yield rate of 2203 kg. Overall yield of pulses in watershed commands is 415 kg/ha up from 301 kg. Although comparable to average all Orissa pulses yield of 406 Kg/ha (for 2005/6, Orissa Agriculture Statistics), it still lower than many other districts, e.g., Bhadrak (600 kg), Cuttack (468 kg) Kalahandi (620 kg) Raygada (513 kg) etc. Increasing yield through further improvement in moisture management, full coverage under HYV pulses and appropriate integrated pest management will be the strategy for adoption in subsequent years. Although yield increase of 34% has been recorded, this yield at 442 kg/ha is much lower than the State average 555 kg/ha. Considering that oilseeds provide higher returns than either cereals or pulses, more efforts are necessary to improve their yield in watershed areas.

Value of Output by Land Category: Uplands, before project implementation, were experiencing severe water stress leading to wilting crops and poor output and very low-value realization. After implementation, there have been two important changes; from a change over from low value cereals to pulses, oilseeds, other crops (varieties of vegetables) including plantation having higher values, and increase in yield of these crops. As a result uplands benefited by watersheds have increased the value of output by 100%, whereas in case of midland and lowlands, increase in value of output of 80% and 73% has been recorded. It is interesting that although lowlands get higher benefits in terms of getting higher proportion of water harvested, the uplands have benefited the most followed by midlands. This largely fulfils a major objective of watershed intervention in KBK districts.

Water being the critical constraint before project implementation farmers were usually avoiding risk of using inputs like fertilizers or even high-yielding seeds. With better moisture availability and water from irrigation, fertilizers and high yielding seeds use has increased. But due to general increase in awareness in the area on account of several related programmes on agriculture (like agricultural diversification, horticulture etc), even non-beneficiaries have increased input use. It is observed that in case of non-beneficiaries of watershed development cost of cultivation has increased by 44%, where as in case of beneficiaries, it has gone up by 56%. This is a significant development considering the fact that the small and marginal farmers are resource deficient. But once the expected income increase is high even the former risk averters become risk takers.

Input Intensity: Income from agricultural operations has substantially gone up for the beneficiaries. Net income per ha has increased from Rs.4551 to Rs.7987, an increase of Rs.3436, 75% increase. In case of non-beneficiaries, increase in net income per ha has been Rs.1743. So the increase in case of beneficiaries is almost double that of beneficiaries. For cost-benefit purposes, this additional benefit has to be considered in relation to the investment made in watershed treatment and maintenance cost. Even at the current rate of additional benefit accrual from watersheds, the entire cost is recovered within a maximum period of four years. This by any standards is a remarkable achievement and must be kept in mind while planning for future investment in watersheds for consolidating benefit realization.

Wide inter-district variation in net benefits from agricultural operations is observed in post implementation period. It is lowest in Malkangiri (Rs.3950/ha) and highest in Koraput (Rs.10698/ha). While these variations also reflect the cropping pattern changes (from low value to high value crops) and the difference in input use, the quality of investment and coverage of items of infrastructure has also a very important role. During investigation in sample areas, it was found that in Malkangiri, watersheds are deficient in water harvesting structures, a critical input to increase benefits. A district that is probably the least developed should have concentrated more on water harvesting structure to reap maximum benefit from watersheds.

Employment Generation: In addition to the employment generated in construction works, positive changes in cropping pattern, increase in cropping intensity, inclusion of more labour intensive crops (vegetables

for example), have contributed to more effective use of family labour and use of hired workers. Overall, 34 days of additional employment is generated per ha in watershed areas. Variations in per ha additional labour are observed among districts; Kalahandi, Koraput, Nuapada, Raygada and Sonepur having almost same number of days of additional employment per ha where as Malkangiri (20 days) and Nawarangpur (41 days) showing extreme conditions. Here again Malkangiri is getting the least employment benefit among districts.

Income: It has been found that the per capita monthly income has increased by 64 % in the watershed areas of KBK region. Before implementation of the project average monthly per capita income was only Rs.249 (below 'poverty line') and now it has increased to Rs.410 much above the cut-off poverty level. In Sonepur district, change in monthly per capita income is highest at 94%. In Koraput and Nawarangpur districts the increase in monthly per capita income is below that of Sonepur. Bolangir district also shows a substantial increase in income (68%). In Kalahandi and Malkangiri districts the increase is about 46% and 44% respectively. Though Malkangiri shows a 44% increase, the average income level is still below the poverty line. The saving grace is that the average per capita income is very close to the poverty line (Rs.283 after the implementation of watershed projects). Rayagada and Nuapada districts also show more than 50% increase in per capita monthly income. The above analysis shows that there is very positive impact of watershed development programmes on the income of the people, basically those who are poor and below the poverty line. Through this programme it has become possible to have a sustainable income source through natural resource management.

Watershed and Poverty Reduction: Reducing poverty both in number and intensity in KBK is a major planning objective of the Government of Orissa. This becomes more important considering the fact that these districts also have higher concentration of "very poor" among the rural poor population.[1] On the basis of monthly per capita income of the beneficiaries of watershed development programme, an estimate has been made to find out the percentage of households that crossed the poverty line. In the studied watershed areas of KBK region it has been found that around 76% of the households were living Below Poverty Line before project implementation. After the implementation of watershed programmes this ratio has come down to 40% which shows there is increase of household income through the programme. About 36% point households have crossed the poverty line in the last four years of implementation of the programme. The incidence of poverty in the sample watershed project areas is much lower than the level of rural poverty recently estimated at 47.76% on the basis of NSSO expenditure survey.[2] The State specific poverty line for rural Orissa for the year 2004-05 has been estimated at Rs. 325.65 per capita per month.[3] With better organization at ground level for accessing rural credit and markets, farmers in watershed areas are likely to cross the poverty line much faster than the State as a whole.

[1] See Tripathy and Misra, (2004) " Poverty Reducing Growth Strategy"- PTF, Planning and Coordination Department, Government of Orissa
[2] Mahendra Dev S and C. Ravi, "Poverty and Inequality": All-India and States, 1983-2005, Economic and Political Weekly, February 10, 2007
[3] Himanshu (2007), "Recent trends in Poverty and Inequality": Some Preliminary Results, Economic and Political Weekly, February 10, 2007

Household Expenditure: The intensity of backwardness and poverty in the KBK is so high that it is difficult for people to meet their minimum food requirements. Rice and Ragi are the main food of the people and the nutritional content in these crops is not satisfactory. Apart from this, they are mostly dependant on the forest to collect tubers and fruits to cope with food scarcity. Though the government has been providing food support to the backward people, some of them are still unable to derive the benefit of such support due to low purchasing power. However, the condition of the people, who mostly belong to scheduled castes and scheduled tribes, has changed after the introduction of the watershed programme in their areas. The cultivated areas have been developed and people are growing different crops to mitigate food scarcity. Before, most of the income of rural people was diverted towards food items. Now this scenario is changing.

The evaluation study found that for the tribal community in Bolangir district under the watershed project, the consumption level has gone up in comparison to before situation. Before the implementation of the watershed programme monthly per capita expenditure on food was Rs.148 but after the implementation of the watershed programme, monthly per capita expenditure has increased to Rs.189 amounting to an increase above 28 percent. Similarly the expenditure on non-foods pre and post implementation was Rs.136 and Rs.219 per month respectively. This amounts to an increase of around 61 percent. It shows that people of Bolangir district are spending more on non-food items than for food. People in Nuapada district used to spend more on food items during pre-implementation. But now the gap between expenditure on food and non-food items has narrowed to the extent that it varies only by a little over

a rupee. However pre and post implementation statistics show that with a rise in income the expenditure on food items has increased by 38 percent. The expenditure on non-food items in Sonepur district has increased by about 68% whereas with regard to food items the increase is 22%. Watershed development plus related activities together have substantially improved food security status of beneficiary households. This data shows the over all increase in the welfare of the beneficiary under the watershed project.

Migration: After the implementation of the watershed development programme under various schemes it has been possible to check the migration up to some extent in the watershed project areas. In the watershed areas of KBK region there has been 48% reduction in the labour migration.

Cost-Benefit of watershed intervention: Under the existing conditions, the internal rate of return (IRR) to investment on capital cost and additional cost of cultivation and maintenance has been calculated. The cost benefit analysis shows very high returns to investment at around 40% in the KBK region. For some of the districts like Koraput and Nawarangpur, IRR is found to be more than 50%. In Malkangiri district the IRR is lowest at only 4%, since it has been observed that land development and water conservation works in the districts has not been taken up with priority and these items do make a lot of influence to change cropping pattern and productivity. The IRR figures show that the land and water management works taken up in all KBK districts except Malkangiri are successful interventions. With higher than current level of

involvement of both beneficiaries and implementing agencies, WSD has the potential to further increase returns to investment.

Coffee Plantation: Coffee plantation target has been achieved and it has been ascertained that the tribal and SC farmers have slowly been getting initiated in the programme. With coffee production coming into full swing from next year and thereafter, the farmers would get substantial benefits provided marketing is taken care of and reasonable prices are ensured. They should also be covered under a suitable insurance policy to minimize their risk of low production and/or fluctuation in market prices. Small-scale processing of high quality coffee in production areas could be thought of to meet any 'niche' market and for high income realization by the poor producers. Further training of coffee farmers, officials and staff, and coffee processors will help in achieving programme objectives.

Conclusion: The programme has made substantial positive difference to the lands and the people who mostly depend on them for their principal source of livelihood. Quality of land has improved, soil moisture and irrigation status enhanced, drinking water availability improved, cropping pattern diversified, productivity increased and additional net income derived by the beneficiaries has substantially reduced poverty. People have been fairly involved and extensively consulted while planning for development of watershed. Self Help Groups with large number of women have increased in number and provided financial assistance to its members for improving their livelihood status. The rate of returns to investment at 40% on a very conservative estimate is one of the highest among various programmes implemented in India. It is a commendable effort over a relatively very short period in a very backward region. The

government and its officials who have been working under very difficult conditions must feel happy about the good work done and fruitful results obtained. Three major areas need concentration. They relate to i) planning and organization ii) capacity building and iii) sustainability

RECOMMENDATION

Planning and Organization: The programme has to be highly participatory for planning micro watershed development and its implementation. Planning must start from below with support from above. The first thing that should be done is to do away with the same cost norm of Rs. 6000/ha for each watershed irrespective of the nature and type and quantity of work to be done. With increase in daily minimum wage to Rs.70, the cost per ha will in any case increase. While the cost per ha norm could be fixed for watershed development in a district as a whole, cost could vary across projects depending upon the volume and nature of work.

After a good level of initial motivation is provided to potential beneficiaries, a joint (the people and the technical personnel) needs assessment and prioritization is necessary. Then plan for different phases should start in consultation with people. Costs should vary within a broadband and all resources available from various schemes should be pooled together to fully treat the entire watershed. Planning for cropping, planting of trees, fodder cultivation, and water-sharing should start along with physical planning and a project document prepared with the details including cost and who should be doing what and when. It should always be remembered that most benefits coming out of this exercise may not appear tangible to any particular beneficiary or even to a group of beneficiaries and therefore they may not be initially

interested to participate. The benefits of farm pond may not be very attractive to the farmer who has invested on it. However it has large benefits of ground water recharge. Benefits of plantation may not be known to farmers before watershed development. They need to be explained or demonstrated through electronic media, posters or field visits the advantages of various structures and management of watersheds to various livelihood groups in a watershed.

The next stage is to decide about the farming and/or agro-pastoral system to be adopted. This will again be an exercise between the expert groups coming from various disciplines (agriculture and horticulture, livestock, forestry, water management, marketing etc.) where options will be discussed. It should be remembered that water is the basic constraint in the whole exercise. Water available through the project should therefore be shared among maximum number of beneficiaries and not used for heavy water-intensive crops. Therefore "introduce irrigation component as an essential feature; but emphasize efficient use, rational allocation across crops, plants, fodder and drinking water for a larger section of the community. Similarly, provision of drinking water should be seen as an essential component."[4]

This should be treated as a base solution. As the benefits start flowing, there should be assessment by the people themselves (who would be provided training as to how to evaluate with simple techniques- even the illiterate can successfully evaluate through appropriate training) as to what is working and those not working. There should be provision for change as a continuous process. Orienting people and officials in this

[4] Amita Shah, " Watershed Programmes- Along Way to Go" Economic and Political Weekly, Aug-26-Sept.2, 2000

change process will substantially improve benefit accrual and sustainability.

Capacity Building: The implementation of the programme in diverse conditions of watersheds has itself provided enough knowledge through the process of 'Learning by Doing'. But it is not enough, neither for those who are implementing nor for those who are benefiting or losing. The team visiting Malkangiri was disappointed by the fact that the District Collector who heads development programmes for this very backward district is himself reportedly not convinced about water harvesting and small irrigation structures as he feels that this type of work should not be undertaken because it would lead to corruption and leakage. This is exactly 'throwing the baby with the bath water'. It is no wonder therefore that the watershed development in Malkangiri is the least effective. It is also not understood as to why the matter has not been brought to the notice of higher authorities despite the claim of regular reviews and efficient MIS. The mindset of authorities at district level should be changed and those opposing to development should be transferred elsewhere for priority development programmes that have potential to benefit large section of the population to achieve success.

Capacity building is required for officials on planning, implementation of physical and social-economic schemes and for the people to improve their capability for managing farming systems and credit-market link-up. This was found to be the weakest link in system for activity management at base as well as intermediate level. Risk management is another area that needs to be strengthened through appropriate training. How to obtain relevant information and disseminate them, whom to approach and how to

approach to deal with any risk related factors and how soon that would be attended to in the mission mode are some areas that should be included under capacity building and training.

Sustainability: Related to the above two important items is the sustainability issue. The initial enthusiasm of a programme may not be sustained over a long period as the incremental benefits may not grow at the same rate as in the initial years unless innovative methods are applied to the whole chain of activities. After project completion period (4-5 years), the project staff will leave and the responsibility will be handed over to the community. It is not always that the communities work in common interest. Local NGOs if capable may be recruited to help communities in carrying out operation and maintenance, providing training, synchronizing programme/scheme convergence and interacting with public officials for crop and area planning, helping in technology transfer and input intensification, measurement of ground water, marketing of products and a host of other activities. The communities, themselves, can also take up such works if sufficient capacity building takes place. Watershed Development Mission has a huge responsibility to ensure such capacity building and periodic supervision to attain programme sustainability over the project life.

CHAPTER-1

INTRODUCTION AND BACKGROUND

Introduction

From soil and water conservation to sustainable livelihood development through appropriate engineering and social interventions in watersheds is a long transition in thinking as well as in programme coverage. The change refers to a direction from above to consideration from below (by the users as groups) and technical help at various stages of planning and implementation. In a situation like Orissa where 65% of land is dependent on rainfall that had shown more spatial and intra-seasonal variations during the last two decades,[1] agriculture has become uneconomic and despite being the principal occupation of large majority of population, has become unattractive. Public investment on rainfed land has substantially gone down while private investment for rainfed agriculture has become too risky. High value crops on rainfed situations have led to indebtedness of farmers and impoverishment of farming households leading to large-scale suicides in many states. One of the most important factors in risk reduction is to provide alternatives to people living in watersheds that cannot substantially be provided with irrigation at economic costs, through appropriate management and technological interventions. Government of Orissa thought watershed development as a priority strategic intervention in rainfed areas. Because of the specific constraints faced by the KBK region as discussed in the following section, watershed was considered as a flagship scheme within the framework of a specific action plan called as the "Revised Long-Term Action Plan (RLTAP)" for disadvantage areas and socio-economic groups in the KBK sub-region covering eight districts.

Background: KBK in Brief

The KBK districts account for 19% (72.8 lakhs) of Orissa's population and nearly 31 percent of its geographical area (4764 Sq. Km). 91% of the people of this region still live in villages. Lower population density of 153 in comparison to 236 for Orissa is mainly

[1] Poverty Reducing Growth Strategy, DJRC, PTF Report, Government of Orissa

due to difficult living conditions in this underdeveloped area. As per 2001 census about 28 lakh (38.41%) people of these districts belong to scheduled tribe (ST) communities including four primitive tribal groups, i.e. Bonda, Dadai, Langia Soura and Dongaria Kandhas. In addition to this 16.26% (11.8 lakhs) of the population belongs to the schedule caste (SC) community. The total literacy of the KBK region is only 43.33%; female literacy being 29.10%. Some demographic and literacy indicators of the region are summarized in Annex-1.1.

As per the 1997 BPL Census about 16.52 lakh (71.79%) rural families were living Below the Poverty Line in this region. Other socio economic indicators including population composition and density, percentage of net area irrigated and connectivity of villages to growth centers and service centers are far from satisfactory.

The KBK districts have been endowed with rich forests and natural resources and a large majority of population specifically the tribal people very heavily depend upon forests for their livelihood. And forest resources are fast getting degraded constraining livelihood options for people dependent on them. Among the districts, Malkangiri has the highest forest coverage of 3355.88 Sq. Km (54%) and Sonepur, the lowest amounting to 415.78 Sq. Km. (18%). The total forest area of KBK is 16857.8 Sq. Km^2 accounting for 35.38% of the total geographical area of the region. Severe droughts and floods often visit the region and some areas in quick succession. Backwardness of various types viz. tribal backwardness, hilly area backwardness and backwardness due to natural calamities has been constraining development of the region for the past six decades despite several uncoordinated efforts made in the past. See annex-1.2 for district-wise rainfall information.

Most agricultural practices in KBK region are underdeveloped in comparison to average Orissa conditions. Irrigation covers only 26.7% of the gross cropped area in the region as compared to 33.2% for Orissa average. High fluctuations in rainfall lead to frequent and more severe droughts than experienced before. Use of productivity-augmenting inputs is still much lower than Orissa average and certainly much below the required levels.

[2] Orissa Agricultural Statistics, 2005-06

Table 1.1: **Key Indicators of KBK Region (2005-06)**

District	Rainfall (in mm)		Geo-graphical Area	Cultivated Area	Net Area Sown	Gross Cropped Area	Kharif Cropped Area	Rabi Cropped Area	Cropping Intensity (%)	Net Irrigated Area	Gross Irrigated Area	Kharif Paddy Area	Sugar cane	Fruits	Total Fertilizer cons. (Nutrient '000 mt)
	Normal	2005													
Bolangir	1289.8	1146.7	657	338	332	467.54	369.18	87.59	141	49.35	75.75	225.75	1.97	10.77	456.77
Sonepur	1418.5	1249.1	234	111	107	186.58	125.16	56.35	175	63.12	100.35	98.74	0.33	5.07	181.52
Kalahandi	1330.5	1398	836	371	360	582.97	404.76	165.08	162	126.22	208.12	236.87	1.37	13.13	569.83
Nuapada	1286.4	873.5	341	178	163	259.95	204.42	49.79	160	31.36	46.16	103.17	0.07	5.74	254.21
Malkangiri	1667.6	1384.8	619	141	127	198.39	160.98	30.18	156	39.11	48.83	95.02	0.01	7.23	191.16
Nawarangpur	1569.5	1599.6	529	216	208	306.64	246.22	38.78	148	12.06	28.43	167.4	4.43	21.64	285.00
Rayagada	1285.9	1222.9	758	194	143	229.33	168.76	45.38	160	32.71	55.70	46.38	0.21	15.19	214.14
Koraput	1567.2	1345	790	302	287	395.33	295.10	73.38	138	87.86	137.37	120.56	7.28	26.85	368.47
KBK			4764	1851	1727	2626.73	1974.58	546.53	152	441.79	700.71 (26.68%)	1093.89	15.67	105.62	2521.1
Orissa	1451.2	1519.5	15571	6165	5691	8928.39	6140.2	2410.42	157	1922.7	2965.49 (33.21%)	4153.77	36.71	377.77	8550.62

Area in ‘000 hectare
Source: Orissa Agriculture Statistics 2005-06

Of the total cropped area, uplands constitute 43.70 %, midland 31.05 % and low lands 25.26 %. Undulating nature of land, steep slopes, and heavy rainfall concentrated only in a few days of the year with long dry spells leads to heavy soil erosion. Irrigation development in uplands and in substantial portions of mid-land is uneconomic. Therefore varying level of intervention-mix in each micro watershed is the only answer to improve quality of land and land/crop productivity in the rainfed areas of KBK districts.

Districts in KBK frequently suffer from heavy crop loss (more than 50%) as could be seen from the following table. Droughts in consecutive years lead to depletion of assets and force the people to migrate under distressed conditions to earn their livelihood.

Table 1.2: **District-wise Concentration of Villages having Crop Loss of 50 Per cent and More**

Years	**Up to 25 per cent of total village**	**25-50 per cent of total village**	**50-75 per cent of total village**	**Above 75 per cent of total village**
1996-97	Nawarangpur and Rayagada	Kalahandi and Nuapada	Sonepur	Bolangir
1997-98	Nawarangpur, Sonepur and Rayagada	Malkangiri	Koraput	
1998-99	Kalahandi, Koraput and Nawarangpur		Bolangir and Sonepur	
2000-01	Koraput and Nawarangpur	Kalahandi and Sonepur	Malkangiri	Bolangir and Nuapada

Source: Orissa Human Development 2004, Government of Orissa, Table No. 7.6, page no. 167

Table 1.3: **District-wise Statement Showing Crop Loss of 50 Per cent or More Due to Drought (% of Affected Blocks, GPs and Villages of Different Districts)**

Districts	1996-97			1997-98			1998-99			1999-00		
	Blocks	GPs	Villages	Blocks	GPs	Villages	Blocks	GPs	Villages	Blocks	GPs	Villages
Bolangir	100	100	79.41				78.60	75.90	66.40	100	100	99.22
Kalahandi	84.62	63.08	45.68	15.38	11.28	1.00	76.90	55.40	23.90	61.54	49.74	26.99
Koraput				78.57	62.94	53.56	14.30	3.00	0.30	7.14	4.57	5.63
Malkangiri				100.00	98.70	32.48				85.71	89.61	71.15
Nawarangpur	10.00	8.78	7.02	30.00	5.41	1.45	40.00	8.80	3.00	20.00	14.19	7.04
Nuapada	100	60.22	37.73				60.00	23.70	9.30	100.00	97.85	82.02
Rayagada	90.91	51.43	21.29	54.55	26.43	4.79				90.91	72.86	34.12
Sonepur	100	65.00	69.87	33.33	37.50	19.61	66.70	60.00	61.00	100	36.25	28.05

Source: Orissa Human Development 2004, Government of Orissa, Table No. 7.7, page no. 168 & 169

Developments to Revised Long-term Action Plan (RLTAP)

In the year 1988 a special area programme, Area Development Approach for Poverty Termination (ADAPT) was formulated and implemented in 15 Blocks i.e. 8 Blocks in Kalahandi and 7 Blocks in Koraput district. But short-term strategies were not adequate to face the multi faceted backwardness of the total KBK region. Therefore a Long Term Action Plan (LTAP) for three undivided districts of KBK (Koraput, Bolangir and Kalahandi) was planned in the year 1993 with a fixed six-year term ranging from 1995-96 to 2001-02. The fund allocation was Rs. 4557.03 crore for drought and distress proofing, and poverty alleviation and development saturation. However, LTAP did not take off for want of availability of sufficient funds[3].

For the overall development of the KBK region the Government of India made a Revised Long Term Action Plan (RLTAP) in the year 1998, instead of Long Term Action Plan having a time period ranging from 1998-99 to 2006-07 with a fund allocation of Rs.6251.08 crore under different heads. The RLTAP was prepared in a sub-plan mode to address the peculiar socio economic problems of the backward region. Implementation of sub-plan was envisaged to lead to faster overall social and economic development of these districts to reduce the gap between these districts and developed regions of Orissa. Apart from normal fund flow to the KBK districts from various Centrally Sponsored Schemes, additional central assistance to the extent of Rs.6251.08 crore was to flow over a project period of 9 years (1998-99 to 2006-07) under different schemes of RLTAP.

The fund flow to KBK districts, under RLTAP covered Agriculture, Horticulture Development, Watershed Development, Afforestation, Rural Employment, Irrigation, Health, Emergency Feeding, Drinking Water Supply, Rural Connectivity and funds for the welfare of SC/STs. Out of the total project outlay of Rs.6251.08 crores, the central share is Rs. 5452.42 crores (87.22%) and state share is Rs.798.66 crores (12.78%). The total amount of Rs.2793.81 crores for the total 9-year period has been sanctioned for rural

[3] Downloaded from http://kbk.nic.in/background.htm

employment programme, which is the highest amount (44.69%), distributed among various schemes. The allocation is the lowest in the case of Horticultural Development amounting to Rs.74.14 crores (1.19%). Apart from the above, Rs. 84.94 crores (1.36%) have been sanctioned for Agriculture and Rs. 878.28 crores (14.05%) for Watershed Development programme. Rs. 88.50 crores (1.42%) and Rs.257.12 crores (4.11%) have been sanctioned for emergency feeding and welfare of SC/STs respectively.

A Scheme wise projected outlay under RLTAP for KBK districts for the period of 1998-99 to 2006-07 is given in table 1.2.

Table 1.4: **Project Outlay for RLTAP for KBK Districts 1998-99 to 2006-07**

Sl. No.	Scheme	Project Outlay (Rupees in crore)						
		Central Plan (cp)	Centrally Sponsored		Total Central Share	Total State Share	Grand Total (Rs. in crore)	% to Total Outlay
			Central	State				
1	Agriculture	44.74	30.19	10.01	74.93	10.01	84.94	1.36
2	Horticulture	66.17	6.35	1.62	72.52	1.62	74.14	1.19
3	Watershed Development	601.9	194.96	81.42	796.86	81.42	878.28	14.05
4	Afforestation	347.83	14.11	14.11	361.94	14.11	376.05	6.02
5	Rural Employment		2235.05	558.76	2235.05	558.76	2793.81	44.69
6	Irrigation	812.11			812.11		812.11	12.99
7	Health	150.95			150.95		150.95	2.41
8	Emergency Feeding	88.5			88.5		88.5	1.42
9	Drinking Water Supply		67.74	67.74	67.74	67.74	135.48	2.17
10	Rural Connectivity		534.7	65	534.7	65	599.7	9.59
11	Welfare of SC/ST	257.12			257.12		257.12	4.11
Total		2369.32	3083.1	798.66	5452.42 (87.22%)	798.66 (12.78%)	6251.08	

Source: Downloaded from website, http://kbk.nic.in/RLATP.htm

Watershed Development is a multi-objective programme[4]

The objectives are:

1. Developing wastelands/degraded lands, drought prone and desert areas on watershed basis, keeping in view the capacity of land site-conditions and local needs.
2. Promoting the overall economic development and improving the socio-economic condition of the resource poor and disadvantaged sections inhabiting the programme areas.
3. Mitigating the adverse effects of extreme climatic conditions such as drought and desertification on crops, human and livestock population for their overall improvement.
4. Restoring ecological balance by harnessing, conserving and developing natural resources i.e. land, water, vegetative cover.
5. Encouraging village community for
    - **a.** Sustained community action for the operation and maintenance of assets created and further development of the potential of the natural resources in the watershed.
    - **b.** Simple, easy and affordable technological solutions and institutional arrangements that make use of and build upon, local technical knowledge and available materials
6. Employment generation, poverty alleviation, community empowerment and development of human and other economic resources of the village.

Origin and Development

Although RLTAP is of recent origin, watershed development experience in Orissa relates to a much longer period beginning with river valley development in the state. Of the 21000 (approximate) micro watersheds that the State has, two thirds (14000) requires treatment. Till today only 2277 watersheds have received various degrees of treatment with support from Government of India ministries (Agriculture, Rural development, River Valley Projects, RLTAP funded ACA projects, DANIDA, IFAD and DFID (India). Also various voluntary organizations have taken up development works in watershed areas.

[4] Guidelines For Watershed Development (Revised-2001), Department of Land Resources, Ministry of Rural Development, Government of India.

Table 1.5: **District wise Number of Micro Watersheds (MWs) Identified and Treated**

District	No. of MWs identified by ORSAC, Bhubaneswar	No. of MWs Treated/Ongoing including ACA watersheds	Balance MWs to be Treated	Watershed implemented under RLTAP From 2002-03 to 2006-07
Koraput	1009	220	789	84
Rayagada	879	210	669	66
Nawarangpur	605	191	414	60
Malkangiri	686	161	525	42
Bolangir	770	571	199	28
Sonepur	260	116	144	08
Kalahandi	1063	523	540	16
Nuapada	465	285	180	10
KBK	5737	2277	3460	314

Source: Orissa Watershed Development Mission, Bhubaneswar

The Government of Orissa has introduced watershed development in the state under various programmes. Watersheds funded from the Additional Central Assistance (ACA) are implemented under the RLTAP programme. Along with ACA watersheds other major watershed programmes like National Watershed Development Programme for Rain-fed Areas (NWDPRA), Integrated Wasteland Development Programme (IWDP), Employment Assurance Scheme (EAS) and Western Orissa Rural Livelihood Projects (WORLP) are also implemented in KBK region. EAS programmes are already closed in the KBK districts[5] and the year 2006-07 is the termination year for the ACA watersheds also. The cost norms are different for different programmes. Per hectare treatment (Rs. 9500/hectare) is highest for WORLP watersheds whereas it is lowest (Rs. 4500/hectare) for NWPRA watersheds. While development work is more inclusive in WORLP projects, in NWDPRA it is much less; in other ACA and Non-ACA projects the structural and organizational inclusion is somewhere in between.

Table 1.6: **Cost Norm of Watershed Projects**

Scheme	Cost Norm Rs/Ha
ACA	6000
NWDPRA	4500
DPAP/IWDP/EAS	6000
WORLP	9500

[5] Orissa Watershed Development Mission, Bhubaneswar

Year-wise fund allocation and expenditure for ACA Watersheds under RLTAP from 2001-02 to 2006-07 is given below table 1.7

Table 1.7: **Year-wise Fund Allocation and Expenditure on ACA Watersheds (upto January, 2007)**

(Rs in Lakhs)

Year	No. of MWs	Project Outlay	Funds Released	Expenditure	% of Expenditure as against Funds Released	U.C. submitted	Area Treated (Ha)
2001-02	314	10056.96	233.69	0	0	0	0
2002-03	314		944.4	577.02	61	128.01	7227
2003-04	314		1066.375	1667.445	156	729.49	26773
2004-05	314		1580.45	1580.06	100	1644.516	26436
2005-06	314		1937.45	1166.61	60	1155.869	17539
2006-07	314		2000.00	1392.50	70	1623.91	21550
Total	314	10056.96	7761.975	6383.635	82	5281.795	99525

Source: Orissa Watershed Development Mission, Bhubaneswar

From Additional Central Assistance (ACA) provided by the Government of India since 2002-03, 314 micro watershed projects have been taken up in KBK region with a treatable area of 1.67 lakh hectares. The total project outlay of Rs.10057 lakhs has been estimated for this programme by Government of Orissa. The programme aims at drought proofing and improving the moisture regime in 314 micro watersheds with a view to development of agriculture. It was envisaged that the centrally sponsored watershed programmes would help in increasing agricultural production, employment generation, and livelihood development. It will also improve ecological balance of air, water and soil, with better natural resource management.

The integrated watershed management process includes establishing watershed management objectives, formulating and evaluating alternative resource management's actions including various tools and institutional management, choosing implements with a preferred course of action, monitoring of activities and outcomes and evaluating performance in terms of achievements.

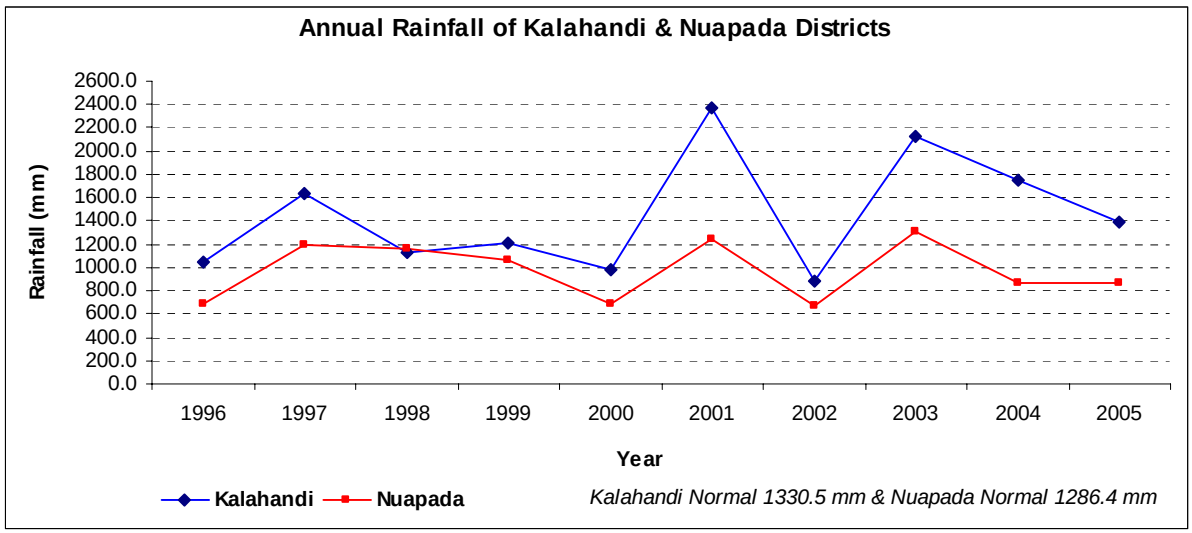
ANNEXURE

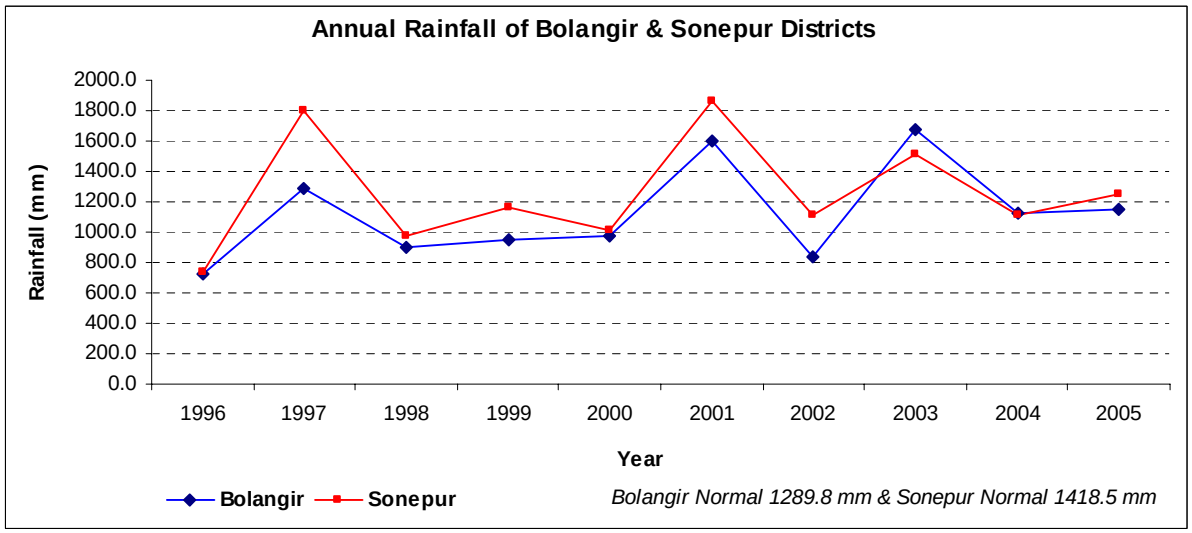
Annexure 1.1: **Demographic and Literacy Indicators in the KBK Districts**

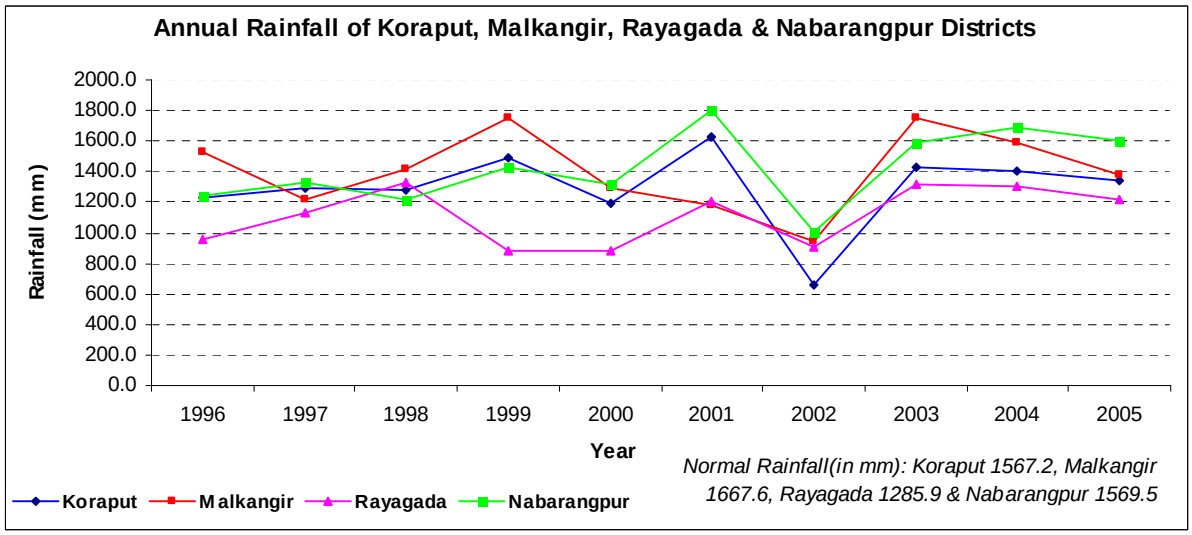
District	Population Indicators							Literacy Rate		
	Population density	Total population	% of Orissa	% of Female Population	% of Rural Population	% of ST Population	% of SC Population	Total	Female	Male
Koraput	134	1180637	3.21	49.96	83.19	49.62	13.04	35.72	24.26	47.20
Malkangiri	87	504198	1.37	49.92	93.13	57.43	21.35	30.53	20.91	40.14
Nawarangpur	194	1025766	2.79	49.78	94.22	55.03	14.10	33.93	20.67	47.04
Raygada	118	831109	2.26	50.69	86.11	55.76	13.92	36.15	24.56	48.18
Bolangir	203	1337194	3.63	49.60	88.46	20.63	16.92	55.70	39.51	71.67
Sonepur	232	541835	1.47	49.14	92.61	9.78	23.62	62.84	46.17	78.94
Kalahandi	169	1335494	3.63	50.02	92.50	28.65	17.67	45.94	29.28	62.66
Nuapada	138	530690	1.44	50.18	94.34	34.71	13.62	42.00	25.79	58.46
KBK	152	7286923	19.80	49.91	89.95	38.41	16.26	43.33	29.10	57.55
Orissa	236	36804660		49.30	85.01	22.13	16.53	63.08	50.51	75.35

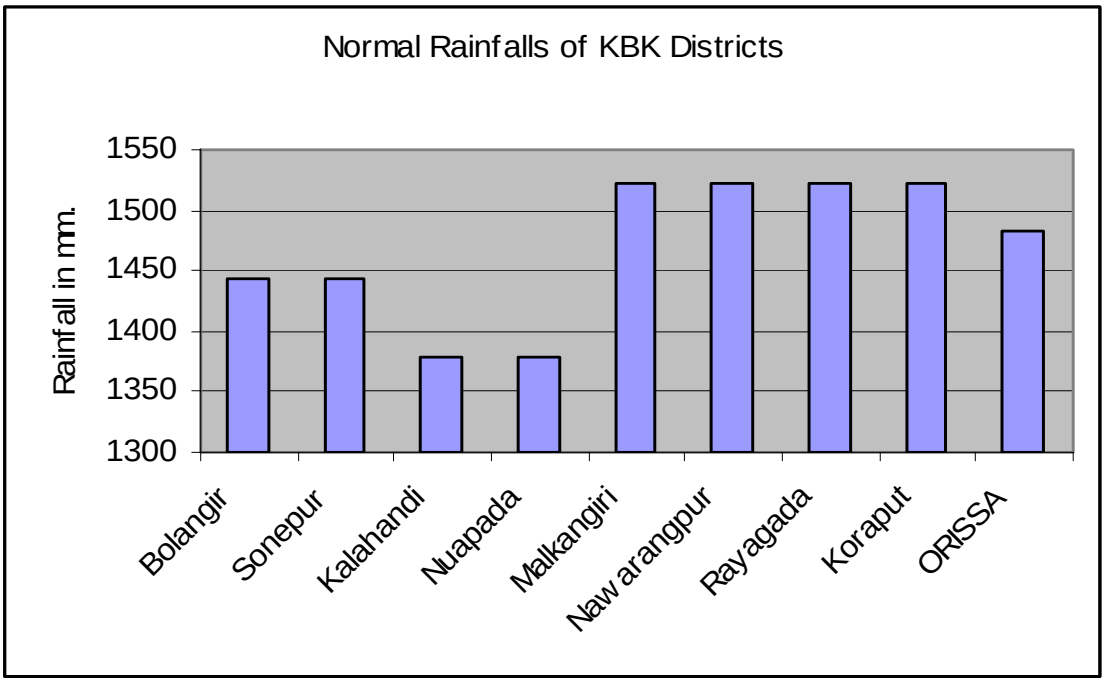
Source: Census of India, 2001

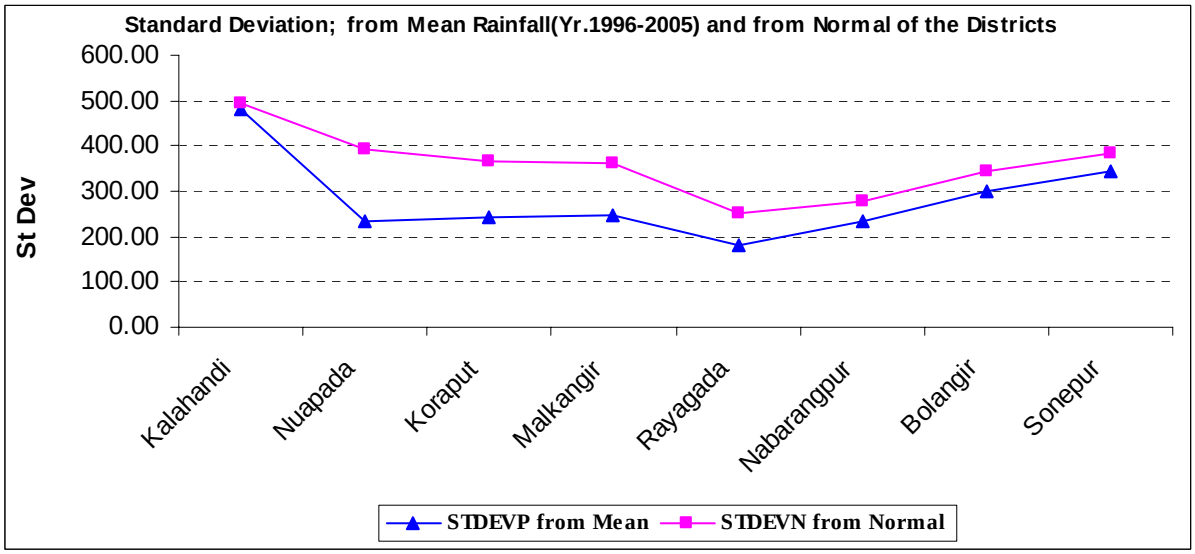
Annexure 1.2.: **District-wise Annual Rainfall**








Normal Rainfalls of KBK Districts
Rainfall in mm.
1550
1500
1450
1400
1350
1300
Bolangir
Sonepur
Kalahandi
Nuapada
Malkangiri
Nawarangpur
Rayagada
Koraput
ORISSA


Standard Deviation; from Mean Rainfall(Yr.1996-2005) and from Normal of the Districts
St Dev
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Kalahandi
Nuapada
Koraput
Malkangir
Rayagada
Nabarangpur
Bolangir
Sonepur
STDEVP from Mean
STDEVN from Normal

CHAPTER-2

OBJECTIVES AND METHODOLOGY

Objective of the study

- To evaluate the extent to which the objectives of the programme /schemes have been achieved.
- To identify the constraints faced by the implementing agency and the extent to which the achievements were affected by the constraints.
- To identify the constraints faced by the beneficiaries and the extent to which the constraints affected the benefits.
- To ascertain special efforts, if any made by the implementing agency to avoid shortfall and accelerate programme implementation.
- To identify "Best Practices" and the factors responsible for higher achievement
- To recommend special measures to improve outcomes/achievements of the programme.

Scope of the Study

The study is based on primary survey in selected watersheds covering nearly 25,000 ha with equal weights given to ACA and non-ACA projects from eight KBK districts. The study intends to inquire into principal factors contributing to different levels of development effectiveness of watershed intervention in the KBK areas. Organizational issues and options for the beneficiaries and future strategic interventions by the government and public-private cooperation are major areas of consideration of this study. It not only considers the agro-economic changes but also other major changes brought about in participatory planning and implementation and capacity building at base levels. While all out efforts are made to capture all the relevant aspects and minimize sampling and non-sampling errors, the usual weakness of recalling data and information from memory of the respondents still remain.

Methodology of the Study

Watershed development is complex right from its conceptualization to implementation. Other development programmes or schemes operating in the region also impact on watershed intervention. To capture all these factors, the study is based on secondary and primary data collected from different sources. The secondary data

based on physical and financial achievement till 2005-06 has been collected from project, District and State level.

Primary data have been collected from the base level through pretested questionnaire. The beneficiary questionnaire of the beneficiary deals with over all development of agriculture, increase in standard of living and expenditure pattern under different heads in pre and post period of watershed.

Sampling

For selecting the sample projects for the study, a stratified random sampling method has been adopted. From each KBK districts three blocks have been selected at random. Two watershed projects from each selected block have been selected by random sampling from the list of projects one from ACA watersheds and another from non-ACA on going schemes like NWDPRA, IWDP, DPAP, EAS and WORLP of that block. From each district six projects (3 from ACA and 3 from Non-ACA) are selected from randomly chosen Blocks. A Total of 49 watershed projects have been selected including some projects that could be rated under "Best Practice". In all these projects are spread over 135 villages.

From each watershed, 8 beneficiaries from three reaches of the watershed and 2 non-beneficiaries of the programme close to watershed with similar land characteristics have been randomly selected with appropriate representation from the list of available persons and data in structured questionnaires have been collected. PRA technique has also been used to have focus group discussion at watershed level.

From the sample projects, 384 beneficiaries and 96 non-beneficiaries were selected by the above procedure and schedules and questionnaires were canvassed. Key informants participating in discussion with the research team in each site also provided a wealth of information on project implementation and management aspects and various issues and options available. About 25% of the total number of beneficiaries i.e. 12 numbers of non-beneficiaries close to watershed areas were also selected and canvassed structured questionnaires to see the difference both before and after scenario and between beneficiary and non-beneficiary status.

Coffee plantation scheme has been in operation in two districts, Koraput and Rayagada. Considering the coverage in area and number of beneficiaries, three coffee plantation areas from Koraput district and two areas from Rayagada district were selected by random sampling. From each district 50 beneficiaries were selected, interviewed and data and information were collected in structured schedules and questionnaires for evaluation. In all five coffee plantation sites and 100 beneficiaries were selected depending upon availability and willingness of the respondents. Programme-wise number of micro watersheds selected is given below and details of Beneficiary and Non-Beneficiary Samples have been provided in Annex 2.1.

Table 2.1: **Programme wise Number of Micro-watersheds Selected**

District	ACA	DPAP	WORLP	NWDPRA	EAS	IWDP	Total
Bolangir	3	1	2	0	0	0	6
Kalahandi	3	1	0	2	0	0	6
Koraput	3	0	0	1	1	1	6
Malkangiri	4	0	0	2	0	0	6
Nawarangpur	3	0	0	1	0	2	6
Nuapada	3	3	0	0	0	0	6
Rayagada	4	0	0	0	1	1	6
Sonepur	2	1	0	2	0	2	7
KBK	25	6	2	8	2	6	49

Study limitations

There are certain limitations in the evaluation study.

1. The study period was between sowing and harvesting months and most of the farmers were busy in agricultural work. So it was difficult to meet and discuss with farmers during the daytime. Despite this, the farmers and other beneficiaries of the programmes unhesitatingly provided data and information to the research team.
2. The study was initiated during the monsoon months. Due to heavy rains and high floods in certain areas, the field research team could not continue to the randomly selected watershed project sites. The fieldwork was consequently delayed.

3. As random selections of sites were made, some areas randomly selected fell in extremist activated areas. Permission to visit some areas was not accorded in view of the safety of the research staff. However, suitable random substitution was made without losing the quality and quantity of information. These data and information, that reflect an unbiased selection of beneficiaries, have been analyzed in subsequent chapters to evaluate various aspects of watershed development and coffee plantation scheme in KBK districts.

ANNEXURE

Annex 2.1: **Details of Beneficiary and Non-Beneficiary Samples**

District	Blocks	Beneficiary			Non Beneficiary	Total Samples
		RLTAP Watershed	Other Watershed	Total		
Bolangir	Khaprakhol	8	8	16	4	20
	Patanagarah	8	8	16	4	20
	Tureikela	8	8	16	4	20
	Sub-Total	24	24	48	12	60
Kalahandi	Bhawanipatana	8	0	8	2	10
	Kesinga	8	8	16	4	20
	Lanjigarah	8	8	16	4	20
	Narla	0	8	8	2	10
	Sub-Total	24	24	48	12	60
Koraput	Boriguma	8	7	15	5	20
	Laxmipur	8	8	16	4	20
	Semiliguda	8	9	17	3	20
	Sub-Total	24	24	48	12	60
Malkangiri	Korkunda	8	8	16	3	19
	Malkangiri	8	8	16	5	21
	Mathli	8	8	16	4	20
	Sub-Total	24	24	48	12	60
Nawarangpur	Dabugaon	8	8	16	4	20
	Nawarangpur	8	0	8	2	10
	Papadahandi	0	8	8	2	10
	Umerkote	8	8	16	4	20
	Sub-Total	24	24	48	12	60
Nuapada	Boden	8	8	16	4	20
	Khariar	8	8	16	4	20
	Sinapalli	8	8	16	4	20
	Sub-Total	24	24	48	12	60
Rayagada	Kasipur	8	8	16	4	20
	Muniguida	8	0	8	2	10
	Ramanaguda	8	8	16	4	20
	Rayagada	8	0	8	2	10
	Sub-Total	32	16	48	12	60
Sonepur	Sonepur	0	18	18	5	23
	Tarava	8	8	16	4	20
	Ulunda	8	6	14	3	17
	Sub-Total	16	32	48	12	60
KBK	Grand Total	192	192	384	96	480

CHAPTER 3

ORGANISATION AND MANAGEMENT OF WATERSHEDS

Introduction

Success of any programme including its development effectiveness largely depends on organizational structure and institutions that plan implement its components. This is much more relevant for a programme like watershed development where beneficiary involvement is as important as coordination and involvement of several agencies working for the programme beneficiaries and non-beneficiaries, and programme convergence is a top priority. In this context the institutional arrangement for programme implementation is reviewed to determine the extent to which it has facilitated realization of project objectives.

Institutional Arrangements

The State Government accords high priority to implement watershed development programme on a mission mode. It established Orissa Watershed Development Mission (OWDM) in the year 2002 to provide technical guidance and institutional support for accelerated implementation of the watershed projects. More specifically, "the mandate of OWDM is to create enabling policy framework and necessary administrative support to all the watershed development projects in the state".[1] The organization has adequate number of technical experts and a well-established monitoring information system.

The organizational structure of OWDM and watershed implementation structure at district levels are presented in Chart 1 and Chart 2 respectively.

[1] Watershed Development: a Platform for Livelihoods Improvement in Orissa, Agriculture, IIPA Orissa. By G.B.Reddy

Chart 3.1: Organization Structure of Watershed Mission

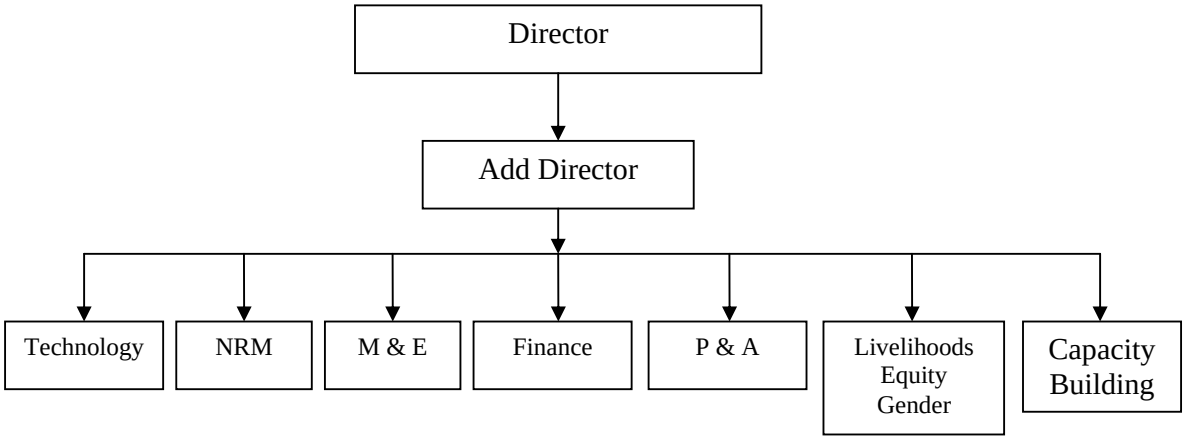
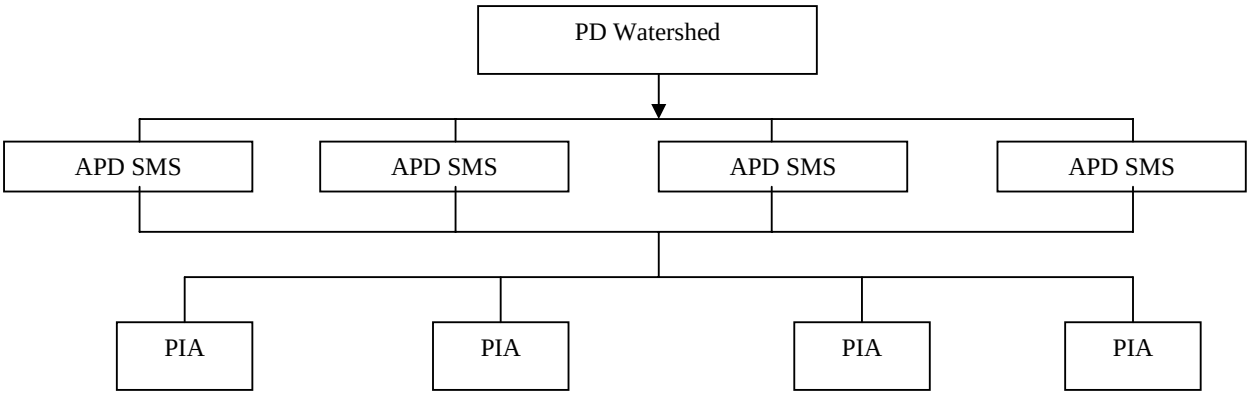


Chart 3.2: Organizational Structure at District Level



Recently Reddy[2] has brought out the characteristic differences of the normal watershed projects started earlier and the new watershed based livelihood projects` that encompass a number of other features for enhancing livelihood opportunities for the beneficiaries. Eventually, as we would examine in later chapters, the livelihood aspects would have to integrate into watershed activities through various programme convergence to get optimal benefits from the programme.

[2] G.B.Reddy, Director of Orissa Watershed Development Mission

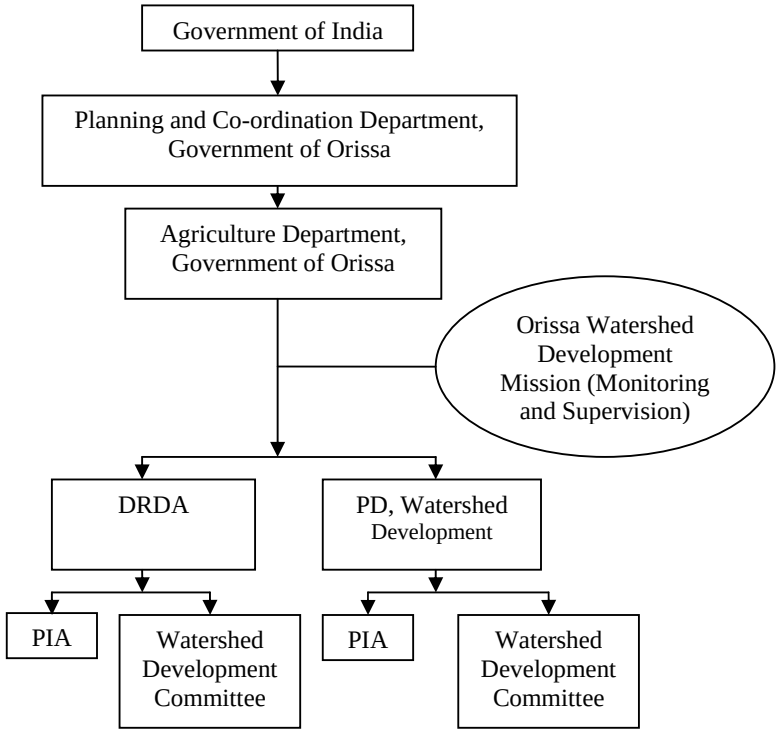
Table 3.1: **Characteristic of Normal Watershed Projects and Watershed Based Livelihood Projects**

Parameter	**Normal Watershed Projects**	**Watershed Based livelihoods projects**
Project Area Institution at State Level	Watershed Watershed Development Mission	Watershed Watershed Development Mission
Institution at District Level Institution at Project Level	Part of DRDA Project Implementing Agency	Independent Project Office Full Time Project Implementing Agency
Institution at village level	Watershed Committee, User Groups and Self Help groups	Gram Panchayat, Watershed Committee, Apex Institution of SHGs and Apex Institution of User Groups Plurality of Institutions
Support Systems	Only at some levels	At all levels
Project Components	Natural Resources Management	Natural Resources Management, Livelihoods, Productivity Enhancement
Budget for Livelihoods and Productivity Enhancement	Only for limited projects	To all projects
Capacity building support	In an ad hoc manner	Systematic manner, Clear Strategy for capacity building
Planning Processes	For NRM	For all components
Details of operational processes	No	Yes

Source: Agriculture, IIPA Orissa. Watershed Development: a Platform for Livelihoods Improvement in Orissa, By G.B.Reddy

Funds for watershed development are provided by the Government of India. Once the funds flow the P & C (Planning and Co-ordination), it releases required funds to Department of Agriculture, the nodal agency that in turn allocates resources to district headquarters. At district level, DRDA or District Watershed Committee (DWC) headed by the District Collector gets the programme implemented by allocating funds and providing overall guidance. The Watershed Development Mission monitors the programme. In 3 districts of KBK region i.e. Kalahandi, Nuapada and Bolangir, there are separate Project Directors to implement the projects and in other districts Project Director, DRDA is the authority to implement the projects. Further, the district level authorities select the Project Implementing Agency (PIA). In the KBK districts Assistant Soil Conservation Officer (ASCO), Junior Soil Conservation Officers (JSCO), Junior Engineers (JE) and Block Development Officers (BDO) are selected as PIA. Under each PIA there are 10 to 15 watershed projects.

Chart 3.3: **Watershed Organization and Resource Flow**



At each watershed level, a watershed committee (WC), specifically formed, directly gets funds form the district nodal agency to develop physical components of watershed while the fund required for administration cost is retained by the district nodal agency itself. In each watershed committee there are 10 to 12 members including 30% female members selected by all the eligible voters (beneficiaries) of the watershed area. From these members a president and a secretary selected by the members of the committee duly supervised by the Project Implementing Agency (PIA).

As discussed with the nodal officers regarding the long channel of resource flow, it takes three to four months or some times six months to get funds at the PIA or Committee level after release from state government. This delay hampers the works at the project area of the watershed and delays the submission of utilization certificate.

Selection Criteria of Watershed Projects

After approval of the watershed projects to be implemented in different districts by the state watershed mission, DWDC (District Watershed Development Committee) finalizes the list of watershed projects to be implemented under different programmes. This committee headed by the District Collector comprises of Project Director DRDA, Project Director of Watershed, Deputy Director of Agriculture, Soil Conservation Officer, District Horticulturist, District Forest Officer, Zilla Parishad members and representatives of other line departments, members of some leading NGOs of the district.

Topographic maps from Orissa Remote Sensing Application Centre (ORSAC) are taken into consideration while selecting the watershed for implementation. In district topographic map watershed according to drainage system is divided into different categories such as Macro watershed, sub-watershed, mini-watersheds and micro watersheds. The micro-watersheds are selected according to programme guidelines. In all the watershed programmes a minimum of 500 hectares of geographical area is taken. In KBK districts all the watersheds are coded and prioritized taking into account different criteria from a set.

In KBK districts the watersheds are prioritized according to 10-point selection criteria.

1. a. Percentage of wasteland and degraded land
   b. Drainage density
2. Frequency of drought in rural village/watershed
3. Percentage of irrigated area
4. Contiguity of treated/proposed watershed
5. Percentage of SC/ST population
6. Number of small and marginal farmers.
7. Problem of drinking water
8. Availability of common lands
9. Infant mortality rate (IMR)
10. Percentage of landless households

While the above factors form the criteria, other overriding factors are also considered in the event practical problems arise while selecting the micro-watersheds. At times, the district authorities select a project according to the convenience and response of the people so as to have a smooth project implementation. In Bolangir district, projects that were being implemented from other funds but were incomplete and (or) those not treated due to some unprecedented causes, got priority in selection so that the drainage system of a mini-watershed could be fully completed and subsequently the drainage channel of the macro-watershed. If a village was only partially covered under a watershed, then the entire village was also selected irrespective of boundary of the micro-watershed in the map.

Entry Point Activities

Before the project implementation started in watershed area, the villagers were taken into confidence by taking up some activities for development of the community. A maximum of 3% funds were earmarked to create rapport or take up confidence-building activities after having discussion with the watershed dwellers to elicit information on immediate needs felt by the largest number of stake holders. In the entry point activities installation of hand pumps, renovation of village ponds and bathing ghats, community centres, boundary walls of schools, repairing of school buildings, roads, meeting pendals etc. were taken up in KBK districts. These activities helped the officials involved to get general support of the watershed community in executing the NRM (Natural Resource Management) and other activities for all round development of the watershed area.

Transparency

Establishment of closer honesty between villagers and service providers by opening and operating joint accounts is a landmark strategy of sustainable participatory development in KBK districts. Feed back from projects implemented by different PIAs has revealed high empowerment of community and assuming of greater responsibilities. To have a clear picture of watershed, a transparency board installed at village pendals, vikas kutiras and other suitable locations where everyone has easy access of information regarding project outlay, year wise expenditure of funds in different works, beneficiaries covered, area of coverage, area to be treated and other brief achievements of the project.

Beneficiary Contribution

Farmers or users are expected to bear 10 percent cost of different activities on private land and 5 percent on common land. The contribution rate of SC/STs on individually oriented activities ranges form 5 to 35 percent and 5 percent on common activities. This strategy facilitates implementation of farmers' prioritized activities and in that process develops a greater sense of belonging. Since most of the farmers are poor and economically backward in the KBK region they contribute mostly in the form of labour. In some cases Rs. 10 to 15 per day are reduced from their wages and converted into shares of the workers. In some cases it is practically very difficult for the PIAs to collect contribution share in KBK districts. Due to high illiteracy among tribals it is very difficult to motivate the farmers towards contribution.

Watershed Development Fund (WDF)

When work is undertaken on a beneficiary's land he has to contribute 10% of the total costs incurred either in form of cash or in terms of labour. The amount collected from the beneficiaries is deposited in Watershed Development Fund (WDF). The amount deposited in WDF can be utilized when allocation of funds from the government eventually stops or on termination of the project period. A total amount of Rs. 389.74 lakhs has been collected as beneficiaries' contribution towards WDF in ACA watershed development programme. District wise status of watershed development fund is given below.

Table 3.2: **People's Contribution towards Watershed Development Fund (WDF)**

District	**People's contribution (Rs. in Lakh)**
Koraput	136.54
Rayagada	59.494
Malkangiri	27.33
Nawarangpur	93.76
Bolangir	30.66
Sonepur	12.143
Kalahandi	19.26
Nuapada	10.35
KBK	389.74

Source: Orissa Watershed Development Mission, Bhubaneswar

Programme Coverage

Under RLTAP scheme 314 micro watershed projects are functioning with a total geographical area of 210951.21 Ha and treatable area of 167616 Ha in the entire KBK region. Implementation of all these projects started in 2002-03 though the fund was released in 2001-02. In Koraput district the highest number (84) of watershed projects was taken up followed by Rayagada (66), Nawarangpur (60), Malkangiri (42), Bolangir (28), Kalahandi (16), Nuapada (10) and Sonepur (8).

Table 3.3: **Physical Achievement of Watershed Projects under RLTAP up to June 2006**

Area in Ha

Sl. No.	District	No. of MWs	Total Geographical Area	Treatable Area	Area treated so far	% of Area Treated to Treatable area
1	Koraput	84	52018	41401	27247	65.81
2	Rayagada	66	44489.65	37733	13906	36.85
3	Nawarangpur	60	37282.6	29558	16751	56.67
4	Malkangiri	42	35804.1	25184	12329	48.96
5	Bolangir	28	18259	14000	6556	46.83
6	Sonepur	8	5303	4637	2403	51.82
7	Kalahandi	16	10029	9049	4431	48.97
8	Nuapada	10	7765	6054	2323	38.37
Total		314	210951.2	167616	85946	51.28

Source: Orissa Watershed Development Mission, Bhubaneswar

Taking all the projects together 85946 ha of area had been treated till June 2006, which is 51.82% of total treatable area. In Koraput district 27247 ha (66%) of area has been treated from the net treatable area of 41401 ha followed by Nawarangpur (56.67%) and Sonepur (51.82%). Treatment of area under watersheds in the remaining 5 districts is below 50% of net treatable area with Rayagada having the lowest area (36.85%) treated.

Financial Achievement

Year wise fund flow figures show that for ACA watershed projects Rs.5761.975 lakhs (57%) have been released till June 2006 as against the outlay of Rs. 10056.96 lakhs for all 8 districts of KBK region. In the year 2006 no funds have been released from the Government for implementation of the projects in KBK region till June 2006. Out of the total funds released an expenditure of Rs.5186.192 lakhs (90.01%) has been

made and Utilisation Certificate (UC) of Rs.3983.746 lakhs (76.81%) has been submitted to the Government.

Table 3.4: **Status on SCA/ACA funds under RLTAP for KBK Districts up to June 2006**

(Rs. in Lakh)

Year	No. of MWs	Project Outlay	Funds Released	Expenditure	U.C. submitted
2001-02	314	10056.96	233.69	0	0
2002-03	314		944.4	577.02	128.01
2003-04	314		1066.375	1667.445	729.49
2004-05	314		1580.45	1580.06	1644.516
2005-06	314		1937.45	1166.61	1214.74
2006-07	314		0	195.06	266.99
Total	314	10056.96	5761.975 (57% of Project Outlay)	5186.192 (90.01% of funds released)	3983.746 (76.81% of expenditure)

Source: Orissa Watershed Development Mission, Bhubaneswar

Table 3.5: **Achievements in KBK Districts under Additional Central Assistance (ACA): till June 2006**

(Rs. in Lakh)

Sl. No.	District	No. of MWs	Project Outlay	Funds Released	% of release against outlay	Expenditure	% of Expenditure against Release
1	Koraput	84	2484.06	1644.85	66	1585.89	96.42
2	Rayagada	66	2263.98	1051.89	46	929.17	88.33
3	Nawarangpur	60	1773.48	1187.38	67	1056.269	88.96
4	Malkangiri	42	1511.04	824.43	55	694.853	84.28
5	Bolangir	28	840	460.78	55	363.69	78.93
6	Sonepur	08	278.22	151.03	54	144.23	95.50
7	Kalahandi	16	542.94	278.41	51	264.23	94.91
8	Nuapada	10	363.24	163.21	45	147.86	90.59
	Total	314	10056.96	5761.98	57	5186.192	90.01

Source: Orissa Watershed Development Mission, Bhubaneswar

Release of funds against outlay is highest in Nawarangpur district with 67% followed by Koraput district (66%). The funds released to other districts till June 2006 ranged from 45% to 55%. District wise expenditure figures show that in Koraput, Sonepur, Kalahandi and Nuapada districts more than 90% percentage of funds has been utilized against the release. Percentage of expenditure against release is lowest in case of Bolangir district (78.93%). Expenditure in Nawarangpur, Rayagada and Malkangiri districts against release of funds are 88.96%, 88.33% and 84.28% respectively.

Along with ACA watershed projects Drought Prone Area Programme (DPAP), Integrated Watershed Development Programme (IWDP), Western Orissa Rural Livelihood Development Project (WORLP) and National Watershed Development Programme for Rainfed Areas (NWDPRA) are also being implemented in KBK region.

Table 3.6: **Achievements in KBK Districts Under Drought Prone Area Programme (DPAP): June 2006**

(Rs. In Lakhs/ Area in Ha)

Sl. No.	Name of the district	No. of MWs	Project Cost	Treatable Area	Release including interest	Expenditure	Area Treated
1	Kalahandi	260	7745.16	132086	2835.716	2596.426	44380
2	Nuapada	136	4099.06	65904	1318.1375	1149.46	18128
3	Bolangir	208	6110.96	103819	1866.8	1433.1	27489
4	Sonepur	56	1650	28000	814.165	668.55	11592
	KBK	660	19605.18	329809	6834.82 (34.86 % of Project Cost)	5847.54 (85.56% of Release)	101589 (30.80% of Treatable area)

Source: Orissa Watershed Development Mission, Bhubaneswar

A total of 660 projects are going on in the four districts namely Kalahandi (260), Nuapada (136), Bolangir (208) and Sonepur (56) under DPAP. Total treatable area of the projects under this programme is 329809 ha with project outlay of Rs. 19605.18 lakhs. This programme started in 2001-02 and till June 2006 only Rs.6834.82 lakhs (34.86%) has been released. An expenditure of Rs. 5847.54 lakhs (85.56%) has taken place and 101589 ha (30.80) of area has been treated so far.

Table 3.7: **Achievements in KBK Districts under Integrated Watershed Development Programme (IWDP) : June 2006**

(Rs. in Lakhs/ Area in Ha)

Sl. No.	Name of the district	No. of MWs	Project Cost	Treatable Area	Release including interest	Expenditure	Area Treated
1	Kalahandi	52	1562.14	28835	1111.87	1085.13	20836
2	Bolangir	38	1135.02	22234	706.55	613.06	16511
3	Koraput	32	1060.26	20919	872.02	872.02	17555
4	Nawarangpur	44	1568.52	24943	944.08	710.8	9239
5	Sonepur	18	664.86	11081	363.52	299.44	4910
6	Rayagada	56	1923.24	32054	786.1	611.43	9397
7	Malkangiri	35	1120.17	18655	324.55	275.89	5422

Sl. No.	Name of the district	No. of MWs	Project Cost	Treatable Area	Release including interest	Expenditure	Area Treated
	KBK	275	9034.21	158721	5108.69 (56.55% of Project Cost)	4467.77 (87.45% of Release)	83870 (52.84% of Treatable area)

Source: Orissa Watershed Development Mission, Bhubaneswar

A total of 275 projects are going on in seven KBK districts (except Nuapada) under IWDP. Total treatable area of the projects under this programme is 158721 ha with project outlay of Rs. 9034.21 lakhs. Till June 2006 only Rs.5108.69 lakhs (56.55%) has been released, expenditure of Rs.4467.77 lakhs (87.45%) has been made and 83870 ha (52.84%) of area has been treated so far.

Table 3.8: **Achievements in KBK Districts under Western Orissa Rural Livelihood Project (WORLP) : June 2006**

(Rs. in Lakhs/ Area in Ha)

Sl. No.	District	No. of MWs	Treatable Area	Release including interest	Expenditure	Area treated
1	Bolangir	140	73852	32.49	22.5	20406
2	Kalahandi	60	27250	4.28	0.86	0
3	Nuapada	50	28015	10.4	5.39	5444
	KBK	250	129117	47.17	28.75 (60.25% of Release)	25850 (20.02% of Treatable Area)

Source: Orissa Watershed Development Mission, Bhubaneswar

A total of 250 projects are on going in the three districts of KBK region namely Bolangir (140), Kalahandi (60) and Nuapada (50) under WORLP. Total treatable area of the projects under this programme is 129117 ha. This programme started in 2003-04 and till June 2006, Rs.47.17 lakhs has been released, expenditure of Rs.28.75 lakhs (60.25%) has been made and 25850 ha (20.02) of area has been treated so far.

In case of IWDP and DPAP watershed projects the administrative as well as implementing and monitoring set up is the same as that of watershed projects under RLTAP i.e. ACA watershed projects. In the WORLP watershed projects institutional arrangement up to PIA level is same, as IWDP, DPAP and ACA but some local and active NGOs of the districts have been selected as PIA along with officers of Soil Conservation Department.

Watershed projects under NWDPRA are implemented by Soil conservation directorate of Agriculture Department at state level. At district level District Soil Conservation Officer (SCO) is the nodal agency and Assistant Soil Conservation Officers acts as heads of Project Implementing Agency at project level in the KBK region. The various organizations from the base level upwards do contribute to implementation.

CHAPTER 4

IMPACT ASSESSMENT OF WATERSHED DEVELOPMENT PROGRAMME

Introduction

Proper assessment of a multi-objective programme like watershed development, where concept and coverage have been changing overtime requires a thorough understanding of the process as well as the products and their outcome in the context of socio-economic development of the people living in the watersheds. Both the direct and indirect effects and impacts need to be taken into consideration for this type of assessment. The review has become slightly difficult and a little more complicated because of the fact that the programme implementation under RLATP and some other livelihood supported watershed programmes has just been over and benefits have started flowing while the programme was still under implementation. The assessment therefore is preliminary as over the life of the project, many changes are likely to occur impacting on socio-economic profile of the beneficiaries as well as non-beneficiaries and influencing the ex-post internal rate of return to investment under the programme. Taking into consideration the above factors an attempt is made to make an objective assessment of the programme through this very large sample survey taken in all the KBK districts.

Land Development

Developing wastelands/degraded lands are one of the basic objectives of the watershed development programme. As discussed in previous chapters, most of the people in KBK region are dependent on agriculture and allied activities. Apart from development of small-scale irrigation land development is very important for agriculture. Most of the watershed projects in KBK districts have been selected in the hilly, undulating and dry areas where the rainfall is erratic and its distribution is uneven.

Land Capability

Land productivity depends among others on land capability. Watershed projects have a major objective of improving the quality and capability of land so that appropriate

cropping pattern changes can be effected with increase in land and crop productivity. Within the framework of watershed development programme a number of measures have been taken for land development with soil and water conservation. Taking into consideration the type of land with variations in slope and depth of soil different low cost technical measures have been taken for treatment at different reaches of the watershed areas. At upper and middle reaches of the watershed run-off storage structures, water harvesting and/or water conservation structures, gully plugging, contour and graded bonding, contour trenches, periphery bonding to check the ravines, loose bolder check dams, dug out sunken ponds, plantations and in some cases masonry check dams have been constructed. Various measures for plantation of fruit trees, nuts and trees for firewood have also been taken up at all reaches. At lower reaches field bonding, farm ponds, dug wells and tube wells have been constructed.

The study reveals that the above measures have had substantial beneficial impact on land development, soil and water conservation. District wise achievements with respect to land quality improvement are shown in the table below. Overall the sample watersheds have improved 51% of cultivated land area. In Nuapada district land development benefit is highest among the KBK areas with 60% of land showing improvement in treated watershed areas. Kalahandi (55%), Sonepur (52.11%) and Nawarangpur (50%) are districts that experienced 50% or more of the total cultivated land showing improvement in quality. Even in other four districts Bolangir, Rayagada, Malkangiri and Koraput districts substantial land quality improvement is substantial (49%, 48%, 45% and 41% respectively).

Table 4.1: **Land Improvement after Implementation of Watershed Project**

District	Irrigated land generated (in %)	Area developed with better moisture (in %)	Land degradation halted (in %)	Land quality improved (in %)
Bolangir	29.72	44.45	37.61	49.12
Kalahandi	39.85	40.39	35.24	54.59
Koraput	7.87	26.82	27.97	40.60
Malkangiri	28.91	43.17	37.28	45.42
Nawarangpur	40.63	50.26	47.54	50.26
Nuapada	46.44	55.33	41.88	59.65
Rayagada	30.13	33.69	41.47	47.76
Sonepur	33.57	38.21	27.95	52.11
KBK	33.07	42.19	36.45	50.70

Soil moisture improvement status has been based on the perception of the beneficiary farmers and agricultural officers operating in the region. Nuapada has shown the best results in terms of moisture improvement with about 55% of cultivated land area showing such development. In Nawarangpur 50% of the cultivated land has shown increase in moisture content, as compared to 42% for the KBK region as a whole. In Bolangir, Kalahandi, Malkangiri, Sonepur and Rayagada districts moisture content has improved in 30% to 45% of land areas. In Koraput only in 27% of land moisture content improvement was reported.

Although the moisture improvement has shown in almost all projects, it has wide spatial as well as inter and intra-seasonal variations in its intensity. For the farmers and the agricultural extension officials this is an opportunity as well as challenge, how to measure the intensity and what crops to grow in which reaches so that the crops do not experience get moisture stress. Till now, it has been trial and error and some conjecture. Yet based upon previous experiences about moisture retention quality of different soils (which are changing fast after intervention), cropping pattern changes are occurring in the project areas (to be seen later). While moisture improvement has acted as protective for several crops in Kharif, it has acted as a potent productive factor during early Rabi crops.

The experience of soil moisture improvement is short after full treatment of watershed, which completed only this year. The improvement has to be seen in the context of generally increasing trend of temperature in KBK region. In the next five years or so a comprehensive evaluation study is likely to throw more light on this aspect if scientific data are merged with socio-economic information to do further analysis on the subject.

Decelerating Land Degradation

Arresting high rate of land degradation experienced in KBK region was to be given very high priority in planning. It is observed that land treatment under watershed development programmes has halted land degradation to some extent. In the sample projects about 36% of land has experienced deceleration in land degradation earlier caused by gully erosion and soil erosion due to heavy rains. Some of these lands have in fact improved in quality and have now become suitable for agriculture purposes.

Crop diversification and Changes in Cropping Pattern

According to Agriculture Census 2004-05 more than 80% of cultivated lands in KBK region are high or medium lands. Only 19% of total cultivated land is low land in this region. Most of the crops cultivated in this region are upland crops. Rate of soil erosion and land degradation is much higher in this area. As it has been discussed above there have been certain improvements in land quality in these areas after implementation of watershed projects. Positive impact in terms of crop area coverage, yield and production has also been observed. From the primary survey data it is found that in the sample areas of KBK region crop area on beneficiary farms has increased by 7.4%. The increases in cropped area in terms of high land, mid land and low land are 2.7%, 7.3% and 10.6% respectively. Lower percentage increase in cropped area in upper reaches is technically tenable as substantial proportion of land is used for structures that arrest natural resource degradation and improves quality of land resulting in improvement in land quality, productivity increase and improvements in farm income.

Table 4.2: **District wise Cultivated Area during 2005-06**

Area in '000 hectares

District	Cultivated Land						
	Total Land	High Land	% of High land to Total land	Medium Land	% of Medium land to Total land	Low Land	% of Low land to Total land
Bolangir	338	191	56.51	63	18.64	84	24.85
Sonepur	111	28	25.23	44	39.64	39	35.14
Kalahandi	371	232	62.53	71	19.14	68	18.33
Nuapada	178	80	44.94	70	39.33	28	15.73
Malkangiri	141	78	55.32	40	28.37	23	16.31
Nawarangpur	216	145	67.13	42	19.44	29	13.43
Rayagada	194	129	66.49	43	22.16	22	11.34
Koraput	302	166	54.97	78	25.83	58	19.21
KBK	1851	1049	56.67	451	24.37	351	18.96
Orissa	6165	2694	43.70	1914	31.05	1557	25.26

Source: Orissa Agriculture Statistics, 2005-06

Continuous cultivation of uplands for cereals mostly paddy depletes soils of nutrition. Without substantial proportion being put to nitrogen fixing crops (legumes), land quality degradation was the order of the day. The significant favourable change observed is that cereals as a proportion of gross cropped area has come down from

74.22% to 68.33 %. Low value millets have been neglected in favour of high value crops. Area under pulses has gone up by 10% as compared to pre-watershed development. Oilseed, a deficit item for Orissa has experienced area increase of 34% while area coverage under vegetables has gone up by more than 100 percent in post-implementation period.

With better soil moisture and water availability in mostly kharif season for some patches of land, it was envisaged that there would be area diversification towards other crops requiring less water than cereals and mostly paddy. From the point of view of farmers, cereals are the main crop to provide food security. Despite fall in area under cereals after watershed development, it is heartening to observe that the basic food availability to the beneficiary households has been positively influenced due to increase in yield level as well as total production of cereals.

Table 4.3: **Percentage Change in Cereal Yield and Production**

(Figures in %)

District	**Area**	**Production**	**Yield**	**Value of Output (Rs)**
Bolangir	0.59	33.77	32.99	54.44
Kalahandi	-1.44	39.06	41.09	46.79
Koraput	-2.23	46.85	50.21	58.23
Malkangiri	1.53	37.73	35.65	47.24
Nawarangpur	-9.04	32.74	45.94	44.33
Nuapada	-0.93	52.92	54.35	77.06
Rayagada	-5.99	37.95	46.74	48.72
Sonepur	3.18	47.31	42.77	54.45
KBK	-1.12	41.58	43.19	54.18

From the above table it is shown that in Bolangir, Malkangiri and in Sonepur districts the area under cereals increased marginally by 0.59%, 1.53% and 3.18% respectively. But in case of Kalahandi, Koraput, Nawarangapur, Nuapada and Raygada the coverage area of cereals have gone down by 1.44%, 2.23%, 9.04%, 0.93% and 5.99% respectively. It is viewed that decrease in the coverage area did not hamper production of the cereals. Rather it increased by 39%, 47%, 33%, 53%, and 38% respectively. The yield rate of the cereals also increased in the remaining KBK districts. In case of KBK the area coverage under the cereal cultivation has decreased by 1.12% with an increase in production and yield by 41.58% and 43.19% respectively. In all the

districts along with the KBK status there is an increase in the value of agricultural output.

Among districts, wide variation in the crop coverage is observed from pre to post implementation. While overall, area under pulses has increased, in Bolangir and Nawarangpur coverage under pulses has decreased by 11% and 71 % respectively. While for the former district the area not covered under pulses has been shifted to oilseeds, in case of Nawarangpur, in addition to pulses, some area found suitable has been utilized for growing high value vegetables. Although area and yield under pulses have increased by 34% and 21 % respectively, value of output realized has gone up only by about 18% indicating thereby the fact that very small producers sell their oilseeds at farm gates getting much lower than the market price.

Area under vegetables has gone up in treated watershed areas of six KBK districts (except for Bolangir where the area remained the same as before and Nuapada with a marginal decrease of 4%) varying within a range of 100% to 521% increase. Koraput experienced increase in area under condiments and spices. It is interesting to observe that other minor crops, that suit the soil and climatic conditions, have substantially improved their status as their proportion in GCA has gone up from 3.88% to 6.08%. Such levels of change need to be considered in the context of very short period after full-scale treatment and still mostly under rainfed farming.

Table 4.4: **Percentage of Gross Cropped Area under in Watershed Areas before and after Implementation of Watershed Project**

(Figures in %)

Districts/Crops	Cereals		Pulses		Oilseeds		Vegetables		Others	
	Before	After	Before	After	Before	After	Before	After	Before	After
Bolangir	67.39	65.15	17.74	15.22	0.64	3.97	4.60	4.42	9.64	11.24
Kalahandi	80.16	76.81	12.99	13.19	0.00	0.99	0.58	1.25	6.28	7.75
Koraput	80.74	70.15	3.87	4.81	5.77	4.44	4.95	14.91	4.67	5.68
Malkangiri	73.53	70.32	4.96	8.07	20.98	20.61	0.53	1.00	0.00	0.00
Nawarangpur	79.25	71.02	5.30	1.54	0.00	1.84	2.06	3.50	13.40	22.11
Nuapada	67.34	66.24	22.11	22.59	3.30	3.64	6.88	6.54	0.37	0.98
Rayagada	80.74	70.10	6.70	6.87	3.72	6.01	1.40	2.75	7.44	14.26
Sonepur	72.99	60.93	23.22	25.32	0.00	0.98	2.30	11.57	1.49	1.20
KBK	74.23	68.33	13.69	14.01	3.96	4.94	3.09	6.01	5.04	6.70

Crop Production

Among cereals the highest increase in production is seen in the case of Nuapada at about 53%. Sonepur and Koraput both show percentage increase in cereal production in their high forties. In rest of the districts the change has been below 40%. In the case of the pulses there are wide fluctuations in production change among the KBK districts. Sonepur shows the highest increase in production of pulses at 104.62%, followed by Kalahandi (97%) and Malkangiri (79.49 %). In contrast, pulses production in Nawarangpur has declined by nearly 49 % as the area under pulses has now been diverted towards vegetables. Oilseed production has increased more than three times in Bolangir whereas it has declined by more than 12% in Koraput. In Rayagada the production has doubled. Vegetable production has increased in 7 KBK districts, the percentage of increase varying from 35% in the case of Nuapada to a high of 412% in the case of Sonepur. Bolangir is an exception with the vegetable production declining by 82%. Millets production has increased five times in the case of Koraput and doubled in Rayagada. In Bolangir Millet production has declined by over 66%. Among condiments and spices the only change has been in the case of Koraput where the production has increased by over 54.17%. Among other miscellaneous crops the KBK region as a whole shows an increase by 209.63% in terms of production.

Table 4.5: **Percentage Change in Production of Different Crops After Implementation of Watershed Projects**

(Figures in %)

District	Cereals	Pulses	Oilseeds	Vegetables	Millets	Condiments & Spices	Others
Bolangir	33.77	15.72	223.08	-82.03	-66.10		477.50
Kalahandi	39.06	97.00	-	328.57			148.08
Koraput	46.85	13.17	-12.11	191.46	400.00	54.17	
Malkangiri	37.73	79.49	23.27	300.00			
Nawarangpur	32.74	-48.98	-	167.33			119.02
Nuapada	52.92	46.65	69.23	34.94	0.00		
Rayagada	37.95	28.00	100.00	112.50	100.00		1018.75
Sonepur	47.31	104.62	-	411.59			0.00
KBK	41.58	51.90	61.87	74.14	-48.13	54.17	209.63

Crop Yield

Improving yield under dry-land technology is one of the major objectives of dry-land agriculture. Cereal yields, which are generally low in KBK districts, and specifically

in dry land areas can be improved through proper rainwater and moisture management being tried in watersheds with some degree of success. It is observed that there has been an increase of 43% in cereal yield (see annex 4.3) in post-watershed implementation period. In case of pulses, where the pre-watershed yield was too low, i.e., 301 kg per ha and in post-implementation period, yield has gone up by 38% even without any additional input use. In case of oilseeds, yield has improved by 21% while for spices and condiments 31% increase has been recorded. In case of vegetables, however, there has been a decrease of 17% in yield although, it would not be fair to compare the yields before and after because of changes in composition of vegetables.

Output Value

Value of agricultural commodities has been estimated taking into consideration prices received by the sample farmers for their products sold at different points; farm gate, middlemen at their centres, nearby Mandi, and local markets. The additional value of output per ha of gross area under crops has increased from Rs. 7092 to Rs. 11959 an increase of 69%. District-wise percentage changes in net value of output are given below.

Table 4.6: **Percentage Change in Value of Agricultural Output/ha**

District	Percentage Change in Value of Agricultural Output/ha
Bolangir	69.15
Kalahandi	60.76
Koraput	75.63
Malkangiri	39.95
Nawarangpur	94.02
Nuapada	75.73
Raygada	73.51
Sonepur	62.53
KBK	68.63

Value of Output by Land Category

Uplands, before project implementation, were experiencing severe water stress leading to wilting crops and poor output and very low-value realization. After implementation, there has been two important changes; from a change over from low value cereals to pulses, oilseeds, other crops (varieties of vegetables) including plantation having higher values, and increase in yield of these crops. As a result,

uplands benefited by watersheds have increased the value of output by 100%, whereas in case of midland and lowlands, increase in value of output of 80% and 73% has been recorded. It is interesting that although lowlands get higher benefits in terms of getting higher proportion of water harvested, the uplands have benefited the most followed by midlands. This largely fulfils a major objective of watershed intervention in KBK districts. District-wise area and value of output given in Annex-4.1

Table 4.7: **Changes in Area and Value of Output in Watershed Project Areas of KBK Region**
(Figures in %)

Land type	Area	Value Output
Up land	2.70	100.13
Mid land	7.28	79.79
Low land	10.58	73.10
Total Land	7.41	81.13

Inter-District Variations

Bolangir: There has been a 4.39% decrease in area under cultivation. It is primarily because of diversification towards plantation and the aggregation of some of the upland area with midland area. The seemingly increase in value of crop output in spite of a decrease in area is mainly because diversification towards cash crops that has taken place having higher market value. In terms of midlands and lowlands there has been a 13.2% and 1.4% increase in area respectively.

Kalahandi: There is no change in the status of area under cultivation in uplands though the value output has gone up by 76% due to increase in productivity of crops in general. There also has been marginal increase in area under cultivation in Midlands. Lowlands show a 5% increase in the area under cultivation with substantial increase in value of output of the order of 63.55%. Overall there has been a 2.85% increase in area and 65% in increase in value of output taking all the three categories of land into consideration.

Koraput: In the uplands of Koraput there has been diversification from minor millets towards plantations of mango, cashew nut, jatropha and silver oak. Though the area under crop cultivation has decreased the value of output, due to diversification towards high income generating plantations has increased by 82% percent. There has been 23% increase in the area under cultivation in the midlands and a 136.11% increase in value of output due to the increase in cultivation of pulses, oilseeds, and

high value cash crops like onion, chilli and spices like turmeric. The low lands have experienced high percentage increase in area (32%) This has resulted in 89% increase in value of out put per ha. of various crops

Malkangiri: The area under cultivation has increased by over 10% in the case of uplands and marginally in the case of midlands and lowlands. In comparison to other districts of the KBK region barring Bolangir, the increase in value of output has been modest. Value of output has increased by 42.75%, 48.86% and 54.67% in upland, medium land and low lands respectively. This increase is due to increase in area and yield of pulses, oilseed and vegetables. There is also an increase in yield rate of paddy in the watershed areas.

Nawarangpur: This district is marked by 128.5% increase in value of output in uplands despite a miniscule decrease in area under cultivation. This is due to diversification towards cashew nut plantation, oilseeds, maize and sugarcane cultivation. Midlands show 6% increase in area leading to 80% increase in value of output. The area under cultivation in the case of lowlands although marginal has resulted in 58% increase in value of output. Overall there has been only 1.5% increase in crop area and 84% increase in value of output.

Nuapada: Overall there is only marginal increase in area (0.72%) under crops with a slight decrease in midland area which is compensated by a 0.5% and 1.9% increase in upland and lowland areas. The highest increase in value of output is in the case of lowlands at 94% is due to diversification towards vegetables, pulses and production of paddy.

Rayagada: There has been a marginal increase in area under cultivation in the case of Uplands and Midlands and substantial increase (27.78%) in the case of lowlands. There has been diversification towards pulses and oilseeds in the uplands leading to an increase in value of output by 132%. The increase in value of output in lowland areas has been due to diversification into cash crops like tobacco, sunflower and cotton.

Sonepur: In Sonepur the increase in value of output taking into consideration all types of land is highest (101%) among all the KBK districts. Further, the increase in

value of output is highest (244%) in the case of uplands. This 3 ½ fold increase in value is due to diversification towards high value vegetables and pulses.

In the Kharif season the area under cereals has increased marginally in the case of Sonepur, Bolangir and Malkangiri while it has declined in the remaining 5 districts. In Koraput diversification has occurred in terms of vegetables, condiments and spices with a 10 to 13 percent increase in area under cultivation. Very little diversification is evident from Bolangir and Kalahandi districts. In Malkangiri district there has been a 40 percent increase in the area under pulses during the Kharif season. Conversely in Nawarangpur district there has been a decline in the area under pulses to the order of 67 percent. In Nuapada the area under oilseeds has doubled whereas in Rayagada the increase is by 50 percent. In Rayagada diversification has occurred in the case of millets and vegetables with a 100 percent and 47 percent increase in the area under cultivation. Sonepur is marked by a 59.52 percent increase in area under pulses. Change in area, yield and value of output of the KBK districts has been provided in Annex- 4.2.

Input Intensity

Water being the critical constraint before project implementation farmers were avoiding risk of using inputs like fertilizers or even high-yielding seeds. With better moisture availability and irrigation facility, fertilizers and high yielding seeds use has increased. But due to general increase in awareness in the area on account of several related programmes on agriculture (like agricultural diversification, horticulture etc), even non-beneficiaries have increased input use, which by itself is a welcome change. It is observed that in case of non-beneficiaries of watershed development cost of cultivation has increased by 44%, where as in case of beneficiaries, it has gone up by 56%. This is a significant development considering the fact that the small and marginal farmers are resource deficient. But once the expected income increase is high even the former risk averters become risk takers.

Effects on Agricultural Income

Income from agricultural operations has substantially gone up for the beneficiaries. Net income per ha has increased from Rs. 4551 to Rs 7987, an increase of Rs. 3436, i.e., 75.5% increase. In case of non-beneficiaries, the net income increase per ha has been Rs.1743, i.e. 36%. So the increase in case of beneficiaries is almost double that

of non-beneficiaries. For cost-benefit purposes, this additional benefit has to be considered in relation to the investment made in watershed treatment and maintenance cost. Even at the current rate of additional benefit accrual from watersheds, the entire cost is recovered within a maximum period of four years. This by any standards is a remarkable achievement and must be kept in mind while planning for future investment in watersheds for consolidating benefit realization.

Table 4.8: **District-wise Expenditure on Cultivation, Value of Output and Net Benefit (per Ha) Pre and Post Implementation of Watershed Development Programme Beneficiaries**

(Figures in Rs.)

District	Before			After			Net Additional Benefit	% of Increase in Net Benefit
	Per ha. Expenditure on Cultivation	Per ha. VO	Net Benefit	Per ha. Expenditure on Cultivation	Per ha. VO	Net Benefit (Per Ha)		
Bolangir	2028	5277	3249	3398	8926	5528	2279	70
Kalahandi	2217	7501	5285	3597	12059	8463	3178	60
Koraput	3714	9156	5442	5382	16080	10698	5256	97
Malkangiri	1875	4708	2832	2639	6588	3950	1118	39
Nawarangpur	3880	9107	5227	6747	16550	9803	4576	88
Nuapada	1945	6312	4367	3204	11093	7888	3521	81
Rayagada	3140	8372	5232	5044	14526	9482	4250	81
Sonepur	2761	8319	5558	3799	13520	9721	4163	75
KBK	2541	7092	4551	3972	11959	7987	3436	75.5

Wide inter-district variation in net benefits from agricultural operations is observed in post implementation period. In case of beneficiary, it is lowest in Malkangiri (Rs.3950/ha) and highest in Koraput (Rs. 10698). While these variations also reflect the cropping pattern changes (from low value to high value crops) and the difference in input use, the quality of investment and coverage of items of infrastructure has also played a very important role. During investigation in sample areas, it was found that in Malkangiri, watersheds are deficient in water harvesting structures, a critical input to increase benefits. A district that is probably the least developed should have concentrated more on water harvesting structure to reap maximum benefit from watersheds. Enquires revealed that the District Collector, is not in favour of small water harvesting structures because he feels that nothing much could be achieved while it will lead to substantial corruption.

Table 4.9: **District wise Expenditure on Cultivation, Value of Output and Net Benefit Pre and Post Implementation of Watershed Development Programme Non- Beneficiaries**

(Figures in Rs./ ha.)

District	Before			After			Net Additional Benefit	% of Increase in Net Benefit
	Expenditure on Cultivation	Value of Output	Net Benefit	Expenditure on Cultivation	Value of Output	Net Benefit		
Bolangir	2107	5860	3754	3826	10392	6566	2812	75
Kalahandi	2564	7911	5347	4006	10930	6924	1577	29
Koraput	2290	6113	3823	2820	7830	5010	1187	31
Malkangiri	1799	4188	2389	2695	6201	3507	1118	47
Nawarangpur	5467	13264	7797	6706	17168	10462	2665	34
Nuapada	1936	5605	3668	2653	8626	5973	2305	63
Rayagada	2681	8050	5369	3803	10237	6434	1065	20
Sonepur	3076	9664	6589	4246	11977	7731	1142	17
KBK	2654	7530	4875	3824	10442	6618	1743	36

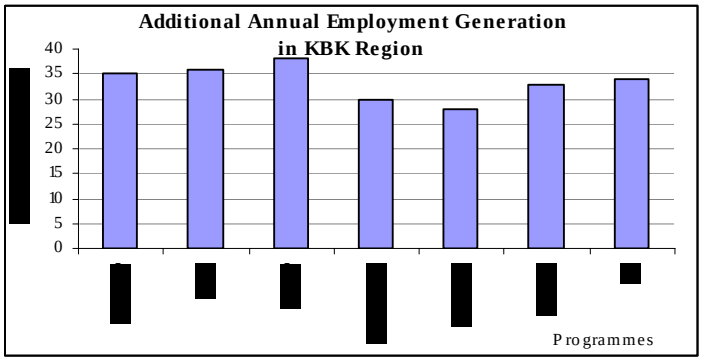
Employment Generation

In addition to the employment generated in construction works, positive changes in cropping pattern, increase in cropping intensity, inclusion of more labour intensive crops (vegetables for example), have contributed to more effective use of family labour and use of hired workers. Overall, 34 days of additional employment is generated per ha in watershed areas. Variations in per ha additional labour are observed among districts; Kalahandi, Koraput, Nuapada, Raygada and Sonepur having almost same number of days of additional employment per ha where as Malkangiri (20 days) and Nawarangpur (41 days) showing extreme conditions. Here again Malkangiri is getting the least employment benefit among districts.

Table 4.10: **Additional Employment Generated in Watershed Areas**

District	Man-days per Ha/Year
Bolangir	30
Kalahandi	36
Koraput	37
Malkangiri	20
Nawarangpur	41
Nuapada	37
Rayagada	36
Sonepur	37
KBK	34

Among projects benefited from various programmes, maximum employment benefit is derived from IWDP and minimum from WORLP. Low employment generation from WORLP does not reflect its potential. Rather it is too early to make an assessment of a project which has just started. From the quality of intervention that ensures inclusiveness, it is expected that employment generation will be much higher than the present situation indicates.



District wise Family income from different sources

KBK has bountiful natural resources, but their use is not optimal. Government gives special importance to utilize the natural resources for development of the backward communities. Development of natural resources will ultimately create permanent assets and other livelihood options for the people. After implementation of watershed projects, there has been increase in land area under cultivation and improvement in land quality. Scope for agricultural crop diversification has increased. Through the watershed projects people are getting more works in their villages. Now it has become possible to provide a minimum of 100 days of work to each labourer household. Since the works in the watershed areas are done through participatory method and people associate belongingness towards the assets created by the programme, the quality of work has also improved.

Table 4.11: **Percentage of Households in Different Livelihood Activity** (Figures in %)

District	Cultivators	Daily Labourer	Artisans	Self employed
Bolangir	98	2	0	0
Kalahandi	92	8	0	0
Koraput	94	4	2	0
Malkangiri	90	10	0	0
Nawarangpur	96	4	0	0
Nuapada	96	4	0	0
Rayagada	90	8	0	2
Sonepur	85	8	4	2
KBK	92	6	1	1

It has been observed from the study that as high as 92% of the people in the watershed areas are small and marginal farmers having small pieces of land mostly of high and medium type. A high proportion of farmers are engaged in agriculture as their primary activity mostly for food security measures. After cultivation they also work as labourers in local areas or migrate outside. About 8% of households do not have any landed property; depends upon wage or earning from artisanship and self-employment activities.

In the work component of watershed projects different manual labour works have been taken up in order to treat the area for soil and moisture conservation. Construction of contour bonding, gully plugging, field bonding, sunken ponds etc. provide income to the people who work in these activities. In the initial stages of the watershed projects the above activities have been taken up on larger scale and after the treatment a permanent land asset is being created for cultivation and plantation purposes. This will again lead to requirement of agricultural labourers to work in the cultivated land. Subsequently, a sustainable income source has been created for the farmers and labourers during the project implementation period.

Table 4.12: **District wise Status of Family Income (Beneficiary)**

(Income in Rs.)

District	Before WS Project			After WS Project			% Change in Income
	Per HH Annual Income	Per capita Annual Income	Per capita Monthly Income	Per HH Annual Income	Per capita Annual Income	Per capita Monthly Income	
Bolangir	14803	2547	212	24811	4269	356	67.61
Kalahandi	22886	4145	345	33492	6067	506	46.35
Koraput	17145	3690	308	30330	6528	544	76.90
Malkangiri	13508	2366	197	19415	3401	283	43.73
Nawarangpur	13615	2475	206	23567	4285	357	73.10
Nuapada	15465	2900	242	24716	4634	386	59.82
Rayagada	13111	2633	219	19729	3962	330	50.47
Sonepur	19249	3288	274	37277	6368	531	93.66
KBK	16223	2994	249	26667	4921	410	64.38

It has been found that the per capita monthly income has increased by 64 % in the watershed areas of KBK region. Before implementation of the project average monthly per capita income was only Rs. 249 (below ‘poverty line’) and now it has

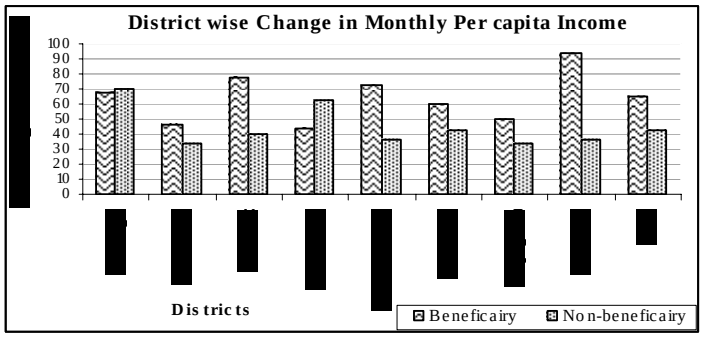
increased to Rs. 410 much above the cut-off poverty level. In the Sonepur district, change in monthly per capita income is highest at 94%. In Koraput and Nawarangpur districts the increase in monthly per capita income is below that of Sonepur. Bolangir district also shows a substantial increase in income (68%). In Kalahandi and Malkangiri districts the increase is about 46% and 44% respectively. Though Malkangiri shows a 44% increase, the average income level is still below the poverty line. The saving grace is that the average per capita income is very close to the poverty line (Rs.283 after the implementation of watershed projects). Rayagada and Nuapada districts also show more than 50% increase in per capita monthly income. The above analysis shows that there is very positive impact of watershed development programmes on the income of the people, basically those who are poor and below the poverty line. Through this programme it has become possible to have a sustainable income source through natural resource management.

Table 4.13: **District wise Status of Family Income (Non Beneficiary)**

(Income in Rs.)

District	Before WS Project			After WS Project			% Change in Income
	Per HH Annual Income	Per capita Annual Income	Per capita Monthly Income	Per HH Annual Income	Per capita Annual Income	Per capita Monthly Income	
Bolangir	13389	2472	206	22762	4202	350	70.00
Kalahandi	24117	3759	313	32326	5038	420	34.04
Koraput	13408	2682	223	18740	3748	312	39.76
Malkangiri	9376	1520	127	15293	2480	207	63.11
Nawarangpur	13608	2816	235	18513	3830	319	36.04
Nuapada	12397	2156	180	17645	3069	256	42.34
Rayagada	14905	2592	216	19993	3477	290	34.14
Sonepur	27279	5196	433	37228	7091	591	36.47
KBK	16060	2882	240	22813	4093	341	42.05

It has been found that the people not covered under the benefits of watershed programmes also show an increase in income primarily due to the programmes



other than watershed management. But there is gap of 22% point between the change in income with and without the watershed programme in the KBK region. The difference in percentage increase in income between beneficiaries and non-beneficiaries shows that the contribution of watershed programmes is more than the contribution from all other programmes operating in the KBK region.

Poverty Reduction

On the basis of monthly per capita income of the beneficiaries of watershed development programme, an estimate has been made to find out the percentage of households that crossed the poverty line. In the studied watershed areas of KBK region it has been found that around 76% of the households were living Below Poverty Line before watershed implementation. After the implementation of watershed programmes this ratio has come down to 42.19% which shows there is increase of household income through the programme. Over a period of three to four years a 34% reduction is highly significant specifically when poverty reduction in Rural Orissa between 1999-2000 and 2004-05 is a meager 1 percentage point plus.

Table: 4.14: **Poverty Reduction of Beneficiary Households (All Watershed Programmes Together)**

(Figures: % of Households)

District	Before*	After**	Poverty Reduction
Bolangir	89.58	45.83	43.75
Kalahandi	60.42	29.17	31.25
Koraput	60.42	29.17	31.25
Malkangiri	91.67	68.75	22.92
Nawarangpur	89.58	41.67	47.92
Nuapada	75.00	37.50	37.50
Rayagada	77.08	50.00	27.08
Sonepur	66.67	35.42	31.25
KBK	76.30	42.19	34.11

*Poverty threshold per capita per month Rs.320

** Poverty threshold per capita per month Rs.332 based on the latest estimate by NSSO (Rs.325.65 for the year 2004/5 for Orissa–Rural Poverty Line), EPW, Feb-10, 2007

Source: DJRC Primary Survey

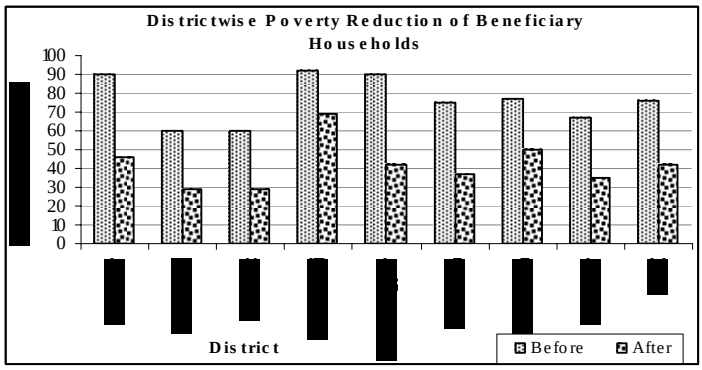


Table 4.15: **Change in Poverty Head Count Ratio (HCR) in Watershed Project Area of RLTAP and Non-RLTAP Beneficiary Households**

(Figures: % of Households)

District	Before <320*		After <332**		Poverty Reduction % Points	
	RLTAP	Non-RLTAP	RLTAP	Non-RLTAP	RLTAP	Non-RLTAP
Bolangir	87.50	91.67	50.00	41.67	37.50	50.00
Kalahandi	62.50	58.33	33.33	25.00	29.17	33.33
Koraput	50.00	70.83	29.17	29.17	20.83	41.67
Malkangiri	90.63	93.75	71.88	62.50	18.75	31.25
Nawarangpur	100.00	79.17	33.33	50.00	66.67	29.17
Nuapada	66.67	83.33	37.50	37.50	29.17	45.83
Rayagada	78.13	75.00	50.00	50.00	28.13	25.00
Sonepur	62.50	68.75	37.50	34.38	25.00	34.38
KBK	76.00	76.63	44.5	39.67	31.5	36.96

*Poverty threshold per capita per month Rs.320 at 2002/3 (Source PTF Study by DJRC)
** Poverty threshold per capita per month estimated at Rs.332 in 2006/7; estimates made on the base 2004/5 for Rural Orissa at Rs. 325.65.
Source: EPW, Feb-10, 2007

Since in watershed project more importance is given to soil and water conservation activity the production and productivity of crops has also increased. The total change in income mostly depends upon cultivation. The above table shows that change in income from cultivation is about 94% in the KBK region. In terms of income from cultivation the highest change is in the case of Sonepur where income from agriculture has increased by 146%. The change in income from labour is highest in the case of Nawarangpur where there has been an increase of 41 percent. Similarly increase in income from Business is highest in the case of Kalahandi at 163 percent. Change in income from other sources was highest in the case of Nuapada at 149%.

Table 4.16: **District-wise Status of Family Income from Different Source (Rs.) % Change in Income after Implementation of Watershed Projects**

District	% of increase or decrease in Income				
	Cultivation	Labour	Business	Others	Total
Bolangir	90.16	15.93	153.45	98.46	67.61
Kalahandi	65.79	9.63	162.96	6.99	46.35
Koraput	126.73	11.15	84.17	15.80	76.90
Malkangiri	52.39	37.65	158.82	18.86	43.73
Nawarangpur	100.28	41.51	91.56	38.19	73.10
Nuapada	67.11	27.63	0.52	149.29	59.82
Rayagada	98.62	29.76	46.43	-2.87	50.47
Sonepur	146.04	28.41	60.47	16.08	93.66
KBK	94.49	25.13	85.66	25.69	64.38

Household Expenditure

The intensity of backwardness and poverty in the KBK is so high that it is difficult for people to meet their minimum food requirements. Rice and Ragi are the main food of the people and the nutritional content in these crops is not satisfactory. Apart from this, they are mostly dependant on the forest to collect tubers and fruits to cope with food scarcity. Though the government has been providing food support to the backward people, some of them are still unable to derive the benefit of such support due to low purchasing power. However, the condition of the people, who mostly belong to scheduled castes and scheduled tribes, has changed after the introduction of the watershed programme in their areas. The cultivated areas have been developed and people are growing different crops to mitigate food scarcity. Before, most of the income of rural people was diverted towards expenditure on food items. Now this scenario is changing.

The table below shows the district wise status of monthly per capita expenditure on food and non-food items in pre and post watershed scenarios. The evaluation study found that for the tribal community in Bolangir district under the watershed project, the consumption level has gone up in comparison to before. Before the implementation of the watershed programme monthly per capita expenditure on food was Rs.148 but after the implementation of the watershed programme, monthly per capita expenditure has increased to Rs. 189 amounting to an increase above 28 percent. Similarly the expenditure on non-foods pre and post implementation was Rs. 136 and Rs 219 per month respectively. This amounts to an increase of around 61 percent. It shows that people of Bolangir district are spending more on non-food items than food. People in Nuapada district used to spend more on food items pre implementation. But now the gap between expenditure on food and non-food items has narrowed to the extent that it varies only by a little over a rupee. However pre and post implementation statistics show that with a rise in income the expenditure on food items has increased by 38 percent. Thus it is clear that the income of the tribal community has increased after the implementation of the watershed programme. The expenditure on non-food items in Sonepur district has increased by about 68% whereas with regard to food items the increase is only 22%. This data shows the over all increase in the welfare of the beneficiary under the watershed project.

Table 4.17: **District-wise Percentage Change in Monthly Per capita Expenditure on Food and Non Food Items (Beneficiary)**

District	Before			After			Percentage Change		
	Food	Non Food	Total	Food	Non Food	Total	Food	Non Food	Total
Bolangir	147.54	136.18	283.72	189.05	219.03	408.08	28.13	60.84	43.83
Kalahandi	194.41	165.55	359.95	233.74	250.27	484.01	20.23	51.18	34.46
Koraput	161.98	175.18	337.16	197.18	261.26	458.44	21.73	49.14	35.97
Malkangiri	127.00	106.55	233.55	152.65	148.44	301.09	20.19	39.32	28.92
Nawarangpur	138.34	132.94	271.28	176.76	214.31	391.07	27.77	61.21	44.16
Nuapada	144.18	122.23	266.42	199.07	200.27	399.34	38.06	63.84	49.89
Rayagada	148.80	98.68	247.49	177.19	154.18	331.38	19.08	56.24	33.90
Sonepur	181.30	158.68	339.97	221.61	267.33	488.93	22.23	68.47	43.81
KBK	155.47	136.80	292.28	193.53	214.41	407.93	24.47	56.73	39.57
Percentage	53.19	46.79	100	47.44	52.56	100			

Marketing

The facility for marketing of different agricultural products is very important for the farmers in the watershed areas in terms of agricultural income. Since there has been an increase in production of different crops, marketing of these products depends upon the type of market facility available, market price of the products, transportation, storage and other facilities. In KBK districts farmers sell their crops mostly at farm gates or at the local markets. For paddy and cotton the Government has opened mandies. The study shows that in the watershed areas of KBK region about 84% of the farmers are selling their products whereas 16% are producing for their own consumption. About 30% of the farmers are selling their crops at their respective farm gates to middlemen so as to immediately get cash. Those who want to sell their product at a higher rate have to go to the nearby market. Very few farmers (about 4%) are selling their products at the mandi. Very small and marginal farmers, about 32% whose output is low, prefer to sell their product at their local markets. 34% of the farmers have access to both the local market and the nearby mandies in addition to the option of selling their crops at the farm gate taking into consideration the value and nature of the crops.

Analyzing the district-wise figures collected from different watershed areas, it is observed that farmers of Kalahandi, Bolangir, Nuapada and Sonepur districts have more access to different marketing places than other districts of KBK region. The districts where farmers sell their crops mostly at the farm gate include Rayagada

(56%), Nawarangpur (55%) and Koraput (43%). Farmers of Malkangiri (14%) and Kalahandi (12%) districts have greater access to Mandies in comparison to other districts.

Apart from food grain crops there has been diversification into commercial crop plants like Zafra, Jatropha and Simorabha. It has been observed that in all the watersheds of Bolangir and Nuapada districts Jatropha plantation has been taken up. These plants are at their 2nd or 3rd year of growth at different watersheds and have also started fruiting in some places. But due to lack of knowledge regarding the value and marketability prospects of these plants, people have not shown much interest in taking care of these plants properly. Similarly in Rayagada district Zafra which is used for making dye and has a good market value of about Rs.120 to Rs.150 per kg, has been introduced widely in watershed areas. But as in the case of Jatropha people don't know where to sell the Zafra seeds.

Table 4.18: **Market Share of Agricultural Produce**

District	% of Farmers Selling their Products	Only at Farm gate	Only at Mandi	Only at Local Market	Local Market/ Mandi/ Farm Gate
Bolangir	72	9	0	38	53
Kalahandi	98	26	12	7	56
Koraput	93	43	0	29	29
Malkangiri	67	10	14	62	14
Nawarangpur	83	55	5	24	16
Nuapada	83	8	0	42	50
Rayagada	84	56	3	28	14
Sonepur	90	24	3	41	32
KBK	84	30	4	32	34

Marketing of crops will be effective through convergence with the Agriculture Department and by creating awareness among farmers regarding market value of different crops, marketability and processing of the product. This measure in turn will help in providing additional value to the products etc.

In mandies the price of various crops is fixed through negotiation between agencies willing to buy the produce and the Regulated Marketing Committee (RMC), which is headed by the collector of the respective district. Conversely, local markets are unregulated and prices vary as per demand and supply. Though prices are higher in mandies in comparison to local markets, immediate necessity of cash forces many

farmers to sell their produce at the local markets. Further a district has on an average 3 to 4 mandies. Thus, those farmers whose villages are not in proximity to a mandi prefer to sell at local markets to avoid high rural transportation costs. In addition mandies are not organized on a regular basis. The uncertainty of disposing of commodities at a fair price combined with lack of storage facilities prompts many farmers to dispose of their produce at the local markets.

In some cases farmers have to wait for their turn for many days when auctioning of crops taking place at a mandi. As there are no storage facilities at the mandi the farmers find this delay very troublesome. In addition, they also lose time. If they have to wait for several days the quality of their produce runs the risk of becoming poor. Buyers shun such commodities or pay a very low price. In cases where this risk materializes the produce does not have any buyers. Thus, the entire effort of waiting for several days, the expenditure incurred on food and non-food items during the waiting period and the cost involved in transporting the produce back to their villages make the mandies an unviable option for selling most agricultural produce. There are also fluctuations in the rate fixed by the RMC on a weekly basis depending on agencies with which the nodal departments have negotiated. This further adds to the risk of selling at mandies as the farmers fear the price may go down within 7 days.

Indebtedness

It has been observed that the implementation of watershed programme had a positive impact on reduction of rural indebtedness of the beneficiaries as compared to non-beneficiaries. While overall nearly 36% of the households were indebted among the non-beneficiaries, it was around 32 % among beneficiary households. The latter had higher level of access to credit but also experienced better capacity to repay the loans. The beneficiaries also invested about 10 to 15% of their additional income in agriculture and other business activities. Wide variations in indebtedness were observed among beneficiaries of

Table 4.19: **Percentage of Households found Indebted During the Implementation of Watershed Programme**

District	Beneficiaries	Non beneficiaries
Bolangir	25.00	41.67
Kalahandi	29.17	16.67
Koraput	39.58	33.33
Malkangiri	39.58	41.67
Nawarangpur	43.75	50.00
Nuapada	27.08	58.33
Rayagada	20.83	8.33
Sonepur	29.17	33.33
KBK	31.77	35.42

various districts, from 21% in Rayagada to 43% in Nawarangpur. Among non-beneficiaries the range was still higher from 17% in Kalahandi to more than 58% in Nuapada.

Since beneficiaries of the watershed programmes are getting benefits from the programme in terms of wage employment, facility of subsidized seeds, inputs for agriculture and assistance for other livelihood activities, they also invest a proportion of their additional income on farm reducing their dependence on credit. It is also seen that both beneficiaries and non-beneficiaries mostly use their credit for agriculture purpose.

Table 4.20: **Purpose-wise Loan Distribution**

Purpose of Loan	% of Beneficiary	% Non Beneficiary
Agriculture	87.70	85.29
Business	2.46	5.88
Livestock	5.74	5.88
Personal	4.10	2.94

Formation of User Groups and Self Help Group (SHG)

Under RLTAP watershed development programme there are 8682 numbers of users groups comprising of 70810 enrolled persons getting direct benefits from the watershed development programme in the KBK regions.

Table 4.21: **Status of User Groups and SHGs under ACA Watershed Development Programme in KBK Districts**

District	User Group		SHG				
	No. of User Groups	Persons enrolled	No. of SHG	No. of Persons enrolled	Savings Amount (Rs. in Lakh)	No. of SHGs linked with Bank	% of SHGs linked with Bank
Koraput	2399	14243	930	11170	114.02	715	76.88
Rayagada	955	8851	472	6390	51.79	267	56.57
Malkangiri	263	3610	291	3725	19.64	210	72.16
Nawarangpur	3487	27871	717	8187	53.66	336	46.86
Bolangir	722	5795	299	3786	26.19	82	27.42
Sonepur	274	3194	82	853	4.7200	37	45.12
Kalahandi	385	3848	210	2484	20.51	88	41.90
Nuapada	197	3398	132	1567	22.19	71	53.79
KBK	8682	70810	3133	38162	312.72	1806	57.64

Source: Orissa Watershed Development Mission, Bhubaneswar

The participation of user groups is higher in Nawarangpur district and least in Nuapada. By contributing 10% of the total expenditure on the work component either by labour or by cash, the beneficiaries become the owner of that component. There

are 3133 numbers of SHGs formed with 38162 persons enrolled in them. Koraput district has the highest of SHGs at 930, where as Sonepur has the least i.e. 82 numbers of SHGs. Out of the total SHGs formed about 58% of them were linked with banks to avail credit facility for income generating activities like vegetable cultivation and vending, pisciculture, poultry, goatery, selling of different crops, processing food and other household units.

Migration

The term human migration relates to the spatial mobility of an individual or a group of individuals from one geographical location to another location. The term migration is used with reference to movement from the area of origin of the migrant to the area of destination. Migration constitutes an important livelihood option in KBK Region. This in turn shapes their lives differently. Migration is implicit in the rural sector where the people have adopted it in their life. Socio-economic factors played a considerable role in migration. In the following table district-wise migration status in the sample watershed household areas discussed has been furnished.

The KBK districts are economically, geographically and socially less developed than other districts of Orissa. A large portion of the population in these districts is tribal and mostly dependent on agriculture for their livelihood. The areas of KBK are frequently affected by droughts due to low and erratic rainfall. It has been observed during this study that a large number of people who fail to earn for their daily requirement from their income generating in their native places migrate in search of work, elsewhere. Though the government launched National Rural Employment Guarantee Schemes (NREGS) to provide 100 days of work to the rural BPL families yet it does not appear to be adequate to provide types of work in which people would like to work. Even now people are migrating to other states in search of work.

Watershed Development Programmes have been taken up in the KBK region to improve the land, to facilitate irrigation and create employment opportunity for the labourers. After the implementation of the watershed development programme under various schemes it has been possible to check migration up to some extent in the watershed project areas. In the watershed areas of KBK region there has been 48% reduction in labour migration.

Table 4.22: **Status of Migration in Sample Watershed Area**

Total Population of watershed villages	Before Project Migration	% of Before Migration	After Project Migration	% of After Migration	Reduction in Migration (%)
25355	1295	5	623	2	48

Reduction of migration in Bolangir district is more than other districts. Most of the migration in Bolangir district was seasonal and distressed migration. After harvesting paddy people start leaving their village from December and again comeback before the sowing period i.e. in the month of May. People were migrating to Hyderabad, Raipur, Chhattisgarh, Sambalpur, Rourkela and Berhempur etc. for wage labour in the brick kilns, factories etc. Now due to development of land and increase in crop production and availability of labour work through watershed development programme migration has been checked substantially.

Table 4.23: **Status of Migration (in %) in the Watershed Project Areas**

District	**Before**	**After**
Bolangir	17	3
Kalahandi	7	1
Koraput	5	2
Malkangiri	4	1
Nawarangpur	-	3
Nuapada	2	5
Raygada	-	1
Sonepur	-	1
KBK	5	2

In Kalahandi district people were migrating to Mumbai to work as masons or labourers in building construction. They also migrate to other districts of Orissa, like Bargarh, and Sambalpur to work as labourers in two periods; August and September and February to June. In Koraput district it has been found that people are migrating more within the district and also to some parts of the neighbouring Nawarangpur district.

After the harvesting of paddy, people are not able to cultivate their fields due to lack of water. Therefore, people of Nuapada district migrated to other states and cities; Chhattisgarh, Andhra Pradesh, and Mumbai as seasonal and casual migrants. Some also migrated for a long period of six months i.e. from December to May. This practice gave them a means of earning some money during the off-season. In Raygada districts people are migrating in the off-season to the near by blocks. Farmers who have access to water in Rabi and Summer cultivate light duty crops or

some vegetables to earn some money. Farmers from Sonepur district also migrate to other states specifically to Chhattisgarh and near by blocks of the district. From the above discussion it is seen that the tribal and poor people of the KBK region belong to internal, seasonal, and casual category of migrants. All forms of migration have been checked to a certain extent in watershed development areas.

Table 4.24: **Status of Migration in the KBK districts**

Districts	**Place of migration**			Types of work	Season of migration
	Out State	Within the State	Within the districts		
Kalahandi	Mumbai	Bargarh, Sambalpur		Labour	Summer
Koraput	Andhra Pradesh		Near by block	Labour	Summer
Malkangiri	Andhra Pradesh, Chhattisgarh			Labour	Summer
Nawarangpur			Near by block	Labour	Summer/Winter
Nuapada	Chhattisgarh, J&K,AP, Raipur,Mumbai, Hyderabad			Labour	Summer
Raygada			Kasipur	Labour	Summer
Sonepur	Chhattisgarh		Near by block	Labour	Summer
Bolangir	Andhra Pradesh, Chhattisgarh, Mumbi	Bhubaneswar, Rourakela and Sambalpur		Labour	Summer

Cost-Benefit of Watershed Investment

The benefits of watershed development in relation to the massive investment made under the programme have been variously measured in several parts of India.[1] Diverse location, components, quality of physical work, changes in agronomic practices, crops covered and most importantly the organizational structure[2] both to implement projects and carry out agricultural operations and finally market forces lead to difference in benefit realization.[3] For the purpose of cost-benefit analysis in KBK districts, the direct costs and benefits at market prices have been taken into consideration.

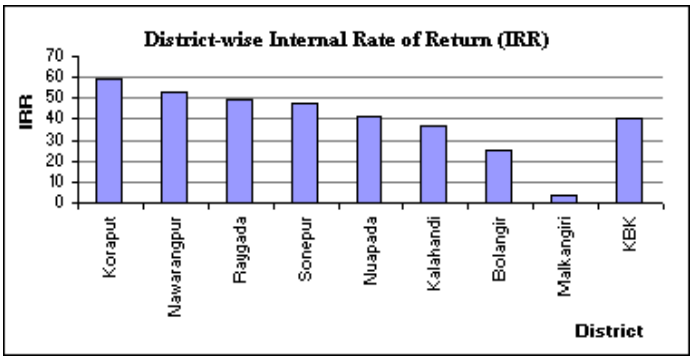
[1] V Ratna Reddy (2000), "Sustainable Watershed Management-Institutional Approach", Economic and Political Weekly, September 16.

[2] Amita Shah (2000)," Watershed Programmes, A long Way to Go", Economic and Political Weekly, August26-september 2.

[3] See, C.H. Hanumantha Rao (2000), "Watershed Development in India, Recent Experience and Emerging Issues", Economic and Political Weekly, November 4.

Table 4.25: **District-wise Cost and Benefit Analysis of Watershed Development Programme form the Year 2002-03 to 2022-23**

Districts	IRR
Bolangir	25
Kalahandi	37
Koraput	59
Malkangiri	4
Nawarangpur	53
Nuapada	41
Raygada	49
Sonepur	48
KBK	40



Any investment on a programme entails cost and benefits not only for the implementation period but also in the future years. Assuming the project life of 20 years the costs and benefit flows have been shown. In addition to investment cost, the cost of operation and maintenance from the fifth year of project has been estimated for every year at 10% of investment cost. This level of maintenance will ensure quality of maintenance and flow of additional benefits estimated. Without maintenance, benefits will go down. Further, there is no guarantee that benefit level will remain the same as assumed. It may increase or decrease depending on the market conditions about the crop prices, and relative changes in costs of inputs and outputs. Benefits could also increase if the management standards both for crop as well as organizations go up.

Under the existing conditions, the Internal Rate of Return (IRR) to investment on capital cost and additional cost of cultivation and maintenance has been calculated. The cost benefit analysis shows very high returns to investment at around 40% in the KBK region. For some of the districts like Koraput and Nawarangpur, IRR is found to be more than 50%. In Malkangiri district the IRR is lowest at only 4%, since it has been observed that land development and water conservation works in the district has not been taken up with priority and these items do make a lot of influence to change cropping pattern and productivity. The IRR figures show that the land and water management works taken up in all KBK districts except Malkangiri are successful interventions. With higher than current level of involvement of both beneficiaries and implementing agencies, WSD has the potential to further increase returns to investment.

ANNEXURE

Annexure 4.1: **Changes in Area and Value of Output in Watershed Project Areas of KBK Region**

(Figures in %)

District	Land type	Area	Value Output
Bolangir	Up land	-4.39	63.87
	Mid land	13.17	99.20
	Low land	1.39	59.55
	Total Land	4.05	75.99
Kalahandi	Up land	0.00	75.98
	Mid land	0.40	66.45
	Low land	5.12	63.55
	Total Land	2.85	65.34
Koraput	Up land	-12.09	82.30
	Mid land	22.75	136.11
	Low land	31.80	88.57
	Total Land	12.53	97.63
Malkangiri	Up land	10.74	42.75
	Mid land	2.63	48.86
	Low land	1.85	54.67
	Total Land	6.17	48.59
Nawarangpur	Up land	-0.38	128.57
	Mid land	6.09	80.36
	Low land	0.15	57.95
	Total Land	1.50	84.44
Nuapada	Up land	0.46	43.05
	Mid land	-0.91	69.80
	Low land	1.92	93.66
	Total Land	0.72	76.99
Rayagada	Up land	1.84	131.80
	Mid land	2.62	72.81
	Low land	27.78	94.14
	Total Land	8.28	87.87
Sonepur	Up land	28.00	243.64
	Mid land	12.90	70.99
	Low land	30.93	75.51
	Total Land	23.61	100.89
KBK	Up land	2.70	100.13
	Mid land	7.28	79.79
	Low land	10.58	73.10
	Total Land	7.41	81.13

Annexure 4.2: **District-wise Change in Area Yield and Value of Output After the Watershed Project Being Implemented in Kharif Season**

(Figures in %)

District	Crop	Area	Yield	Value Output/Ha
Bolangir	Cereals	0.59	32.99	53.53
	Vegetables	0.00	-33.33	47.22
	Millets	-69.02	9.43	26.99
	Others	108.06	177.56	97.77
	Total	5.41	38.19	75.56
Kalahandi	Cereals	-1.44	41.05	48.88
	Pulses	0.00	150.00	184.09
	Oilseeds	0.00	0.00	0.00
	Vegetables	0.00	144.90	148.15
	Others	27.03	95.29	109.17
	Total	1.21	41.19	59.74
Koraput	Cereals	-5.48	49.35	60.55
	Pulses	0.00	-35.71	-66.15
	Oilseeds	-17.86	-2.61	18.15
	Vegetables	12.50	14.43	65.71
	Millets	-60.00	1150.00	250.00
	Condiments & Spices	10.91	28.81	34.15
	Others	62.50	41.05	75.01
	Total	-3.87	50.06	69.16
Malkangiri	Cereals	1.53	35.65	45.01
	Pulses	40.00	-40.48	-20.51
	Oilseeds	4.49	17.55	12.67
	Vegetables	2.56	67.14	211.42
	Total	2.62	33.42	40.57
Nawarangpur	Cereals	-9.04	45.94	58.69
	Pulses	-66.67	71.43	102.82
	Vegetables	20.00	100.00	183.07
	Others	62.79	34.34	60.48
	Total	0.89	54.90	75.21
Nuapada	Cereals	-1.09	54.31	78.38
	Pulses	0.00	42.86	82.83
	Oilseeds	100.00	-12.50	-9.03
	Millets	0.00	0.00	10.00
	Total	0.37	52.52	81.75
Rayagada	Cereals	-10.37	48.54	59.98
	Pulses	-14.81	32.84	60.68
	Oilseeds	50.00	-23.81	9.47
	Vegetables	46.67	-1.14	22.73
	Millets	100.00	0.00	44.44
	Others	108.57	436.39	59.91
	Total	1.84	78.14	75.88
Sonepur	Cereals	4.13	41.57	48.10
	Pulses	59.52	76.61	-5.60
	Vegetables	11.11	38.91	41.34
	Others	0.00	0.00	0.00
	Total	7.14	38.86	44.00

District	Crop	Area	Yield	Value Output/Ha
KBK Beneficiary	Cereals	-1.67	42.92	55.51
	Pulses	17.32	34.68	-3.94
	Oilseeds	19.36	23.95	20.85
	Vegetables	9.63	32.73	70.74
	Millets	-55.04	15.38	28.02
	Condiments & Spices	10.91	28.81	34.15
	Others	66.69	85.63	82.81

Annexure 4.3: **Percentage Change in Yield Rate of Different Crop Groups After Implementation of Watershed Projects**

District	Crop Group	Before WS Project		After WS Project		% Change	
		Area (Ha)	Yield	Area (Ha)	Yield	Area	Yield
Bolangir	Cereals	85.93	12.75	86.44	16.95	0.59	32.99
	Pulses	22.62	3.57	20.19	4.63	-10.74	29.64
	Oilseeds	0.81	16.06	5.26	7.98	550.00	-50.30
	Vegetables	5.86	84.95	5.86	15.27	0.00	-82.03
	Millets	6.01	4.91	1.86	5.37	-69.02	9.43
	Others	6.28	6.37	13.06	17.69	108.06	177.56
	Total	127.51		132.68		4.05	
Kalahandi	Cereals	95.67	17.21	94.29	24.28	-1.44	41.09
	Pulses	15.51	2.26	16.19	4.26	4.44	88.63
	Oilseeds	0.00		1.21	5.35		
	Vegetables	0.69	7.12	1.54	13.65	123.53	91.73
	Others	7.49	6.94	9.51	13.56	27.03	95.29
	Total	119.35		122.75		2.85	
Koraput	Cereals	63.40	16.09	61.98	24.17	-2.23	50.21
	Pulses	3.04	5.50	4.25	4.45	40.00	-19.16
	Oilseeds	4.53	4.19	3.93	4.25	-13.39	1.49
	Vegetables	3.89	40.65	13.18	34.94	239.06	-14.04
	Millets	0.20	0.99	0.08	12.35	-60.00	1150.00
	Condiments & Spices	1.52	15.81	1.78	20.77	17.33	31.39
	Others	1.94	37.44	3.16	52.80	62.50	41.05
	Total	78.52		88.36		12.53	
Malkangiri	Cereals	65.99	10.85	67.00	14.72	1.53	35.65
	Pulses	4.45	1.75	7.69	1.82	72.73	3.91
	Oilseeds	18.83	3.15	19.64	3.72	4.30	18.19
	Vegetables	0.47	14.78	0.95	29.43	100.85	99.15
	Total	89.74		95.28		6.17	
Nawarangpur	Cereals	51.48	17.53	46.82	25.59	-9.04	45.94
	Pulses	3.44	2.85	1.01	4.94	-70.59	73.47
	Oilseeds	0.00		1.21	3.29		
	Vegetables	1.34	45.36	2.31	70.20	72.73	54.77
	Others	8.70	35.04	14.57	45.83	67.44	30.80

District	Crop Group	Before WS Project		After WS Project		% Change	
		Area (Ha)	Yield	Area (Ha)	Yield	Area	Yield
	Total	64.96	19.67	65.93	30.90	1.50	57.05
Nuapada	Cereals	74.29	13.76	73.60	21.24	-0.93	54.35
	Pulses	24.39	3.30	25.10	4.71	2.90	42.51
	Oilseeds	3.64	3.57	4.05	5.43	11.11	52.31
	Vegetables	7.59	20.55	7.27	28.97	-4.27	40.95
	Millets	0.40	7.41	0.40	7.41	0.00	0.00
	Others	0.00		0.69	7.26		
	Total	110.32		111.11		0.72	
Rayagada	Cereals	35.14	16.55	33.04	24.28	-5.99	46.74
	Pulses	2.91	3.43	3.24	3.95	11.11	15.20
	Oilseeds	1.62	2.16	2.83	2.47	75.00	14.29
	Vegetables	0.61	65.87	1.30	65.61	113.33	-0.39
	Millets	0.40	4.94	0.81	4.94	100.00	0.00
	Others	2.83	11.29	5.91	60.57	108.57	436.39
	Total	43.52		47.13		8.28	
Sonepur	Cereals	79.55	18.87	82.09	26.94	3.18	42.77
	Pulses	25.30	2.57	34.11	3.90	34.80	51.79
	Oilseeds	0.00		1.32	2.43		
	Vegetables	2.51	65.34	15.59	53.83	520.97	-17.61
	Others	1.62	1.24	1.62	1.24	0.00	0.00
	Total	108.99		134.72		23.61	
KBK	Cereals	551.46	15.39	545.26	22.03	-1.12	43.19
	Pulses	101.67	3.01	111.79	4.15	9.96	38.14
	Oilseeds	29.43	3.66	39.45	4.42	34.04	20.76
	Vegetables	22.96	47.42	47.99	39.50	109.05	-16.70
	Millets	7.02	4.94	3.16	5.70	-55.04	15.38
	Condiments & Spices	1.52	15.81	1.78	20.77	17.33	31.39
	Others	28.87	17.45	48.52	32.15	68.09	84.20
	Total	742.93		797.96		7.41	

CHAPTER 5

COFFEE PLANTATION: ACHIEVEMENTS AND BENEFITS

Introduction

Along with the watershed development programme the state government has made an attempt to take up large-scale coffee plantation by involving small and marginal farmers in two districts - Koraput and Rayagada of KBK region. These two districts were selected because of suitable climate for coffee growing. The scheduled tribe (ST) and scheduled caste (SC) population are involved in this venture.

The broad objectives of this programme are[1]

i) Improve livelihood through gainful employment of tribal and BPL households through coffee plantation

ii) Conversion of barren and waste lands to productive systems and also restoring land ecology devastated due to "PODU" cultivation

iii) Accrual of multiple benefits of soil and water conservation through creation of green cover

iv) Optimum utilization of land for gainful production through crop diversification by way increased earnings from coffee.

For the purpose of evaluation both quantitative and qualitative information were collected from primary and secondary sources. The methodology used while sampling areas and respondents are detailed below.

Sampling Method

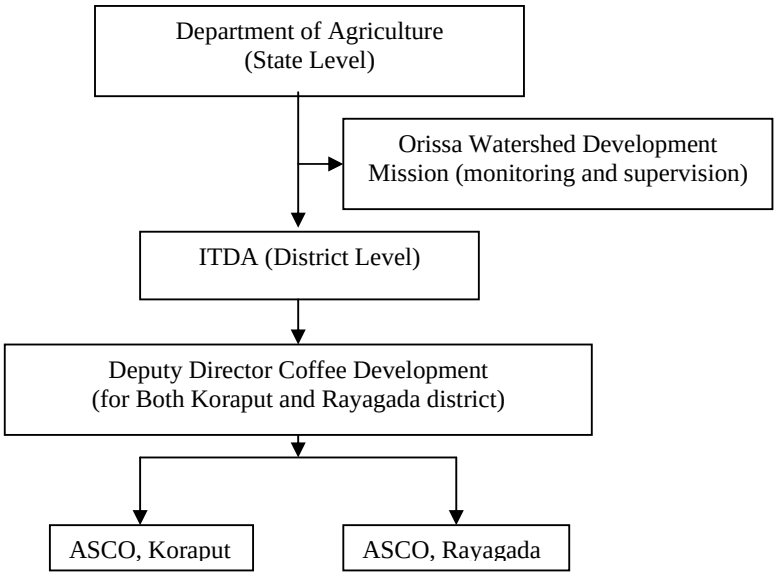
Form each programme covered district, Koraput and Rayagada, 50 beneficiaries were randomly selected form different areas of coffee plantation. In Koraput district samples covered 3 Blocks (Laxmipur, Nandapur and Pottangi) and 5 villages; 3 from Laxmipur and one each from the remaining two Blocks. In Rayagada district, Kasipur the lone Block covered under plantation was selected. From Kasipur two areas having concentration were selected. In total 100 samples were selected for the evaluation of coffee plantation scheme. Details regarding the number of samples from respective villages are provided in the Annex 5.1.

[1] Guidelines for Coffee Plantation Phase-1 under RLTAP for KBK Districts, Agriculture Department Government of Orissa

Implementing Agency (IA)

Agriculture Department is the nodal department to implement this programme through Orissa Watershed Development Mission at the state level. At district level Integrated Tribal Development Agency (ITDA) works as the nodal agency for planning, supervision and monitoring the programme. Through ITDA funds for the programme are being provided. For implementation of the programme a separate coffee division in Koraput along with two subdivisions headed by Assistant Soil Conservation Officer (ASCO) one at Koraput and another at Rayagada have been set up under Soil Conservation Organization of Agriculture Department.

Chart 5.1: **Organisation Chart**



Financial Achievements

Coffee plantation initiative has been taken in KBK region since 2002-03 with a targeted area of 2238 ha in phase-I and 4000 ha. in phase-II. Upto 2006/7, Rs. 855 lakh (46.72% of outlay) has been released as against the outlay of Rs. 1829.98 lakh. Of the total release Rs. 766.131 lakh has been utilized which is about 90% of the released amount. Utilisation certificate of Rs. 612.4 lakh (80% of expenditure) has been submitted till Jan-2007. Year-wise and District-wise financial achievement details are provided in the tables below.

Table 5.1: **Year-wise SCA/ACA Funds Released and Utilized RLTAP For KBK districts: Up to January, 2007**

Rs. in Lakh

Scheme	Year	Area (in Ha)	Project Outlay	Funds Released	Expenditure	U.C. submitted
1	2	3	4	5	6	7
Coffee - I	2002-03	2238	1429.98	82.60	38.23	0
	2003-04	2238		5000	140.80	112.72
	2004-05	2238		234.23	113.59	98.27
	2005-06	2238		127.785	49.43	114.498
	2006-07			0	65.81	0
	Total	2238	1429.98	494.615 (34.59%)	407.861 (82.46%)	325.488 (79.80%)
Coffee- II	2004-05	4000	400.00	288.72	288.20	286.91
	2005-06	4000		71.28	55.64	0
	2006-07			0	14.43	0
	Total	4000	400.00	360.00 (90%)	358.27 (99.51%)	286.91 (80.08)
Total (Coffee – I & II)		6238	1829.98	854.615 (46.72%)	766.131 (89.65%)	612.398 (79.93%)

Source: Orissa Watershed Development Mission, Bhubaneswar

Table 5.2: **Phase-wise Financial Achievement (Rs. in Lakhs) up to October -2006**

District	Item of Work	Approved Target			Expenditure Made			% of Expen diture
		RLTAP	Coffee Board	Total	RLTAP	Coffee Board	Total	
Phase-I								
Koraput	Shade Plants for coffee	122.79	-	122.79	101.98	-	101.98	83.05
	Coffee Plantation over existing shade	110.92	43.21	154.13	106.07	27.36	133.43	86.57
	Coffee Plantation over new shade	170.78	60.00	230.78	60.40	-	60.40	26.17
Rayagada	Shade Plants for coffee	109.86	-	109.86	76.30	-	76.30	69.45
	Coffee Plantation over existing shade	57.75	22.50	80.25	42.54	13.50	56.04	69.83
	Coffee Plantation over new shade	32.73	12.75	45.48	13.06	-	13.06	28.72
Sub Total Phase-I		604.83	138.46	743.29	400.35	40.86	441.21	59.36
Phase-II								
Koraput	Shade Plants for coffee	180	20*	200	178.05	20*	198.05	99.03
Rayagada	Shade Plants for coffee	180	20*	200	178.54	20*	198.54	99.27
Sub Total Phase-II		360.00	40*	400	356.59	40*	396.59	99.15
Grand Total		964.83	138.46+ 40.00*	1143.29	756.94	40.86+ 40.00*	837.80	73.28

* Beneficiary Contribution

Source: Deputy Director, Coffee Development, Koraput

During phase-I of coffee plantation, the entire amount of expenditure was met from RLTAP fund without any provision of contribution from the beneficiary farmers but in the phase-II the farmers are to contribute 20% of the total cost in terms of labour.

Physical Achievement

In the 1st phase of the programme, 1238 ha.in Koraput and 1000 ha in Rayagada i.e. a total of 2238 ha was targeted to be covered under coffee plantation. Project outlay for the 1st phase was Rs.1429.98 lakh. In Koraput district during 2002-03, 288.1 ha of coffee plantation and in 2003-04, 950 ha of shade plantation were taken up. In 2005-06, 396 ha were covered under coffee plantation under the new shade. So in total 684.1 ha of land has been covered under coffee plantation till 2005-06.

In Rayagada district 850 ha of shade plantation in 2003-04 and 150 ha of coffee plantation over existing shade in 2004-05 were taken up. Coffee plantation over 60 ha area was completed over new shade in 2003-04. So in total 210 ha has been covered under coffee plantation till 2005-06. Coffee plantation, therefore, has covered an area of 894.1ha (72.22% of the target) in both the districts. The remaining 344 ha of shade plantation area is yet to be covered under coffee plantation.

In the 2nd phase it was targeted to cover a total of 4000 ha under shade trees and coffee plantation, 2000 ha each in Koraput and Rayagada district from 2004-05 to 2005-06. While plantation of shade trees has been fully completed in 2000 ha in each district, coffee plantation is yet to take place.

Table 5.3: **Physical Achievement of Coffee Plantation Programme: Phase-I**

Districts	Item of Work	Year of execution		Physical Target (in Ha)	Physical Achievement (in Ha)	% of Achievement
		From	To			
Phase-I						
Koraput	Shade Plants for coffee	2003-04	2004-05	950	950	100
	Coffee Plantation over existing shade	2002-03	2006-07	288.1	288.1	100
	Coffee Plantation over new shade	2005-06	2009-10	400	396	99
Rayagada	Shade Plants for coffee	2003-04	2005-06	850	850	100
	Coffee Plantation over existing shade	2004-05	2007-08	150	150	100
	Coffee Plantation over new shade	2003-04	2007-08	85	60	71
Phase-II						
Koraput	Shade Plants for coffee	2004-05	2005-06	2000	2000	100
Rayagada	Shade Plants for coffee	2004-05	2005-06	2000	2000	100

Source: Deputy Director, Coffee Development, Koraput

A total of 1344 number of beneficiaries have benefited under this programme; 1056 in Koraput district and 288 in Rayagada district. All the beneficiaries belong to Below Poverty Line (BPL) category. Among the beneficiaries 1218 are Schedule Tribes (ST), 86 are Schedule Castes (SC) and only 40 people are of Other Castes (OC) category.

Table 5.4: **Number of Beneficiaries Covered under Coffee Plantation**

District	Phase	SC	ST	OC	Total
Koraput	Phase-I	84	932	40	1056
	Phase-II	0	0	0	0
Rayagada	Phase-I	2	286	0	288
	Phase-II	0	0	0	0
Total		86	1218	40	1344

Source: Deputy Director, Coffee Development, Koraput

Site Selection

Coffee plantation is undertaken in hilly areas to check shifting cultivation and to provide livelihood support to the SC/STs and other backward people in order to increase their income. In the tribal districts of Koraput and Raygada coffee plantation programme was initiated in the hilly areas. The area for coffee plantation was selected under the supervision of the district Collector, Tahasildar and BDO of the concerned block. Proposed beneficiaries were consulted. Plantation has been taken up in Government land (free from forest land). After coffee plantation the land has been settled in favour of the landless, BPL and SC, ST people. They are provided with "Tree Patta" as temporary owners of the land and plants.

Plantation of Shade Trees

Coffee plants grow well under shade tress as they need a balance between hot and cool atmosphere. Shade plantation creates such a setting. As such in new areas shade tree plantation precedes coffee plantation. Shade trees were planted with a gap of 7 feet from row to row and column to column. Around 900 trees have been planted per acre of land.

Selection of the Shade Trees

For the shade plantation "Silver oak" was chosen to give sufficient support for the development of the coffee plants. The silver oak trees are selected due to some of their unique characteristics, stated below.

a. This tree grows fast in a short duration.
b. These trees check passage of direct sunlight by 50%, which is suitable for the coffee plants.
c. Leaves of the silver oak trees take a lot of time to dry, which makes them appropriate for hutting the coffee plants at the initial stages of plantation.
d. The trunk of the silver oak tree is rough and helps in the growth of the intercropped plant i.e. black pepper.
e. Though plants like Neem are also suitable for shading purposes yet Silver Oaks are preferred because of their multiple benefits

Permission to cut existing trees in the planted areas was given only in the rarest of cases.

Selection of the Beneficiaries

Beneficiary selection was thorough and highly justified both for the process and choice. The Block Development Officer (BDO) worked as the selecting authority of beneficiaries for coffee plantation. The beneficiaries were basically from tribal, landless and BPL category. People were selected from nearby and adjacent villages of the selected coffee plantation site by the Pallisabha in the presence of the government officials. The main aim of the government was to benefit the landless people and to improve their standard of living through their full involvement in coffee plantation. Each selected family was allotted between 1 to 2 acres of land according to their capacity to operate. The concerned BDO provided the beneficiary list to the Tahasildar concerned for issuing permissive possession of trees i.e. tree patta, in 'temporary' category. The overall control on land and trees is vested in the Government. The work of the beneficiaries is to maintain the trees and sell the coffee fruits. Not a single tree is allowed to be cut by the beneficiary from his/her land without the permission of the concerned office.

Coffee Plantation

After 2 years of the shade plantation coffee plantation began in the shaded areas. Coffee plantation work was carried out by soil conservation department. Arabika variety of coffee was used for plantation. About 1800 to 2000 coffee plants were planted per ha of shaded area. As in the case of shade trees, coffee plants were also planted with a gap of 7 feet from row to row and column to column. Generally coffee production starts from the fifth year of planting but it has been seen that in the fourth year, fruiting started in Padwa area of Nandapur Block of Koraput district. It was

ascertained that because of proper care of the beneficiary and guidance of the officers engaged for coffee development, coffee fruiting started earlier than expected in certain areas. The plantation will provide from the 5th year onwards around 300 to 400 kgs of coffee beans per acre, the value of output at current rate varying between Rs.20000 to Rs.30000 and Rs.30000 to Rs.60000 per beneficiary per year.

Selection of the Coffee Variety

Basically coffee is of 3 types i.e. Robusta, Arabika, and Kaveri and each type has some unique qualities as discussed below.

Robusta: is a high quality variety of coffee, which is produced in Brazil. The KBK districts do not have a suitable atmosphere to grow this variety.

Kaveri : is another variety of coffee plant which provides more fruits but less leaves. The sustainability of this type of plant is very low. In Laxmipur block of Koraput district some patches have been taken up under this variety of plantation, purely on experimental basis.

Arabika: The most improved variety of the coffee plant is Arabica, which fulfills all the characteristics necessary for long-term sustainability. This variety yields adequate number of fruits and leaves and is suitable for growing in the agro climatic conditions of Koraput and Rayagada districts. These planting materials were imported from Bangalore after the failure of the Kaveri variety in the above districts. Coffee plant starts fruiting after the 4th year of its plantation and continues to do so up to 35 years.

Intercropping in Coffee Plantation

As coffee production is a long term process and the benefits come on a long term basis so the Coffee Board introduced black pepper as an intercrop. Black pepper grows quickly with the help of the shade plants and provides output in a short period. The market value of black pepper is high, and since black peeper is easily marketed the beneficiaries earn additional income apart from coffee sale, where fruiting has taken place. Farmers also inter crop mango and cashew plants in their fields. Initially farmers had a belief that the government will cut the trees from their fields, but now after getting the *Tree Patta* they are more interested in plantations.

Rights of Beneficiary on Coffee Plantation

Each beneficiary derives benefits on a temporary basis of 35 years on the fruits of the coffee. But the beneficiary has no right on the planted land, shade plants and coffee plants. The beneficiary will not cut a single tree from the land under plantation. If it is absolutely necessary to cut trees from the land then the beneficiary has to seek the permission of the Government of Orissa (The patta given to the beneficiary shows the rights and benefits of the beneficiary).

Income and Expenditure

Beneficiary households were getting meager income from shifting cultivation under rainfed agriculture prior to coffee plantation. It was even below their subsistence level. Coverage under plantation has eliminated 'the hand to mouth' subsistence from this small income. Instead, they have been getting jobs as workers and caretakers of plantation and getting minimum wages for their job. In some limited areas, coffee fruiting was observed in the fourth year and farmers sold this coffee to middlemen mostly coming from neighbouring Andhra Pradesh. As a result, their family income on a per-month basis has gone up by 34% in Koraput and 36 % in Raygada district. Similarly monthly per capita income in beneficiary households has increased by 61% in Koraput and 63% in Raygada.

Table 5.5: **District wise Monthly Average and per capita Income of Coffee Households**

(Figures in Rs.)

District	Monthly Average			Monthly Per capita		
	Before	After	% Change	Before	After	% Change
Koraput	812	1090	34	177	286	61
Raygada	843	1148	36	196	320	63

Although the increases in terms of percentages appear substantial, all the households are still BPL. In Koraput district monthly per capita income of the beneficiaries has increased by 61% but it is still far 'below the poverty line' threshold of Orissa.

Table 5.6: **Monthly per capita Expenditure on Food and Non Food Items**

District	Before (in Rs.)			After (in Rs.)			% Change		
	Food	Non Food	Total	Food	Non Food	Total	Food	Non Food	Total
Koraput	131	57	188	155	74	229	18.32	29.82	21.81
Raygada	139	62	201	166	84	248	19.42	35.48	23.38

As income increased there is also increase in monthly expenditure of the beneficiaries. In Koraput district there is an increase of 22% in the monthly per capita total expenditure with both increase in food (18%) and non-food (30%) expenditure. Percentage increase in non-food items is more than the food items because of more expenditure on clothing, health and entertainment. In Rayagada district increase in expenditure is slightly more than that of Koraput at 23% the expenditure on food and non-food increasing by 20% and 35% respectively.

Maintenance of Coffee Plants

Before the allocation of the tree patta for the maintenance (cleaning, digging and watering) of the coffee plants, Rs. 55.00 was given to the beneficiary as daily wage. But after the allocation of the tree patta an account has been opened in the name of the beneficiary and Rs. 1800 are deposited as yearly wage per acre of land. The Soil Conservation Range Officer maintains the details about working days of the beneficiary and according to the wage rate he gives permission to withdraw money from the farmer's account. Apart from this, the Government has provided fertilizers and pesticides for the maintenance of the coffee plants.

Training Programme / Exposure Visit

As coffee plantation is a new concept in Koraput and Rayagada districts it is necessary to include training and exposure visits of farmers to other states to see how coffee plantation is managed, products are marketed and improvement in the standard of living of the growers takes place. Although some of the farmers have visited the coffee plantation sites of the near by Blocks where coffee is being currently produced, their interaction does not appear to be good enough to provide adequate knowledge and motivation to the new farmers now engaged in coffee plantation. Ideally the training of proposed beneficiaries should start long before they take up plantation activities. During the discussion with some filed staffs in Rayagada districts also expressed the opinion that not only farmers but also all the technical and administrative officials should make field visits in currently coffee growing areas both inside and outside the state to have adequate knowledge about different aspects of coffee plantation, processing and marketing, including maintenance methods, risks involved so as to have value addition and maximum return to investment in coffee plantation. Providing intensive training to farmers as well as involved authorities will

lead to sustainable growth and output of the coffee production in those districts of Orissa.

Marketing of the Coffee

Officially coffee marketing in these areas has not started. However, one of the major problems facing the coffee production in areas earlier covered under other programmes is marketing. There is no market facility for the sale of coffee fruits at a reasonable price. Due to lack of marketing facilities businessmen from Andhra Pradesh are able to purchase coffee fruits at a low price from the farmers. However, from 2006 the Coffee Board has made certain restrictions on sale of coffee to the middlemen and has decided to collect the coffee from the beneficiaries at reasonable price for their products. Some farmers are selling coffee at Rs 50 to Rs 70 per kg to the middlemen, whereas the market price of the coffee is Rs 90 per kg.

Constraints in Coffee Plantation

Coffee plantation has just taken roots and limited production has started only in certain areas. However, a few constraints have been identified by management to develop operational guidelines for better performance of the project. Some of these` constraints are detailed below:

Awareness of the People

As coffee plantation is a new concept for the tribal people they have not developed full awareness about the coffee plantation programme. People are not fully aware about the package of practices, input use, primary processing methods to add value, and how to market their products to get reasonable income.

Wage Rate

Now the per day wage rate is Rs. 70 where as the beneficiary of the coffee lands are getting Rs 55 per day. This de-motivates them and hence people prefer to work as daily labourers where the wage rate is optimal.

Training and Exposure Visit

Lack of proper training and exposure visits leads to poor understanding and management of the plantation. Apart from the above constraints there are some natural constraints faced by both the coffee department and the beneficiaries.

Heavy Rain

In some years, heavy rain leads to damage of the coffee plants and delays their maturation period. Unless proper care is taken it could lead to high mortality of coffee plants.

Conclusion

Coffee plantation target has been achieved and it has been ascertained that the tribal and SC farmers have slowly been getting initiated in the programme. With coffee production coming into full swing from next year and thereafter, the farmers would get substantial benefits provided marketing is taken care of and reasonable prices are ensured. They should also be covered under a suitable insurance policy to minimize their risk of low production and/or fluctuation in market prices. Small-scale processing of high quality coffee in production areas could be thought of to meet any 'niche' market and for high income realization by the poor producers. Further, training of coffee farmers, officials and staff, and coffee processors will help in achieving programme objectives.

Annexure

Annex 5.1: District wise Sample Details of Coffee Households

District	Block	Gram Panchayat	Village	Sample Households
Koraput	Laximipur	Laxmipur	Marbaiguda	13
			Punjisil	
		Panchada	Kindriguda	
	Nandapur	Padawa	Kundapada	23
			Padawa	
	Potangi	Potangi	Karanjaguda	14
	Sub Total			50
Raygada	Kasipur	Bankamba	Makadjhola	17
		Talajhari	Uperjhori	33
	Sub Total			50
Total				100

WATERSHED BRINGS GOLD LINING TO LIFE

SOME BEST PRACTICES

Subarnarekha Micro Watershed
Block- Patanaragh,
District- Bolangir,
Programme- ACA (RLTAP)

Subarnarekha micro watershed situated in Patanagarh block of Malkangiri district was initiated in the year 2002-03. This project was identified by the district watershed mission in consultation with ORSAC. The Junior Soil Conservation Officer (JSCO) is the head of Project Implementing Agency (PIA) for this project. The distance of the project area from the block headquarters is 17 km. The watershed covers 2 villages (Tamian and Bhatpalli) under ACA programme with a geographical area of 714.99 hectares and a treatable area of 500 hectares. There are 252 households (all BPL) in the watershed area. An amount of Rs 12.55 lakh has been received by Watershed Committee for work component till September 2006 against the financial estimate of Rs. 21 lakh.

Soil and Moisture Conservation Works: Soil and moisture conservation works have been given top priority as a result the targets in terms of contour trenches, gully plugging, contour bund, and gabion structure have been substantially realized (100%, 60%, 60% and 40% respectively).

WHS: To solve the problem of drinking water scarcity in summer about 14 wells have been renovated and because of recharging of wells in addition to drinking water availability, vegetable production has also gone up. Through work components of the watershed development 37 small water harvesting structures, 12 number of percolation tanks, 20 loose bolder check dams have been constructed and 300 ha of land covered with earthen nallah bandha. These works help farmers in cultivation and save crops from drought.

Afforestation: About 27 ha miscellaneous tree plantations have been done on private (20ha), community (5ha) and revenue land (10ha).

Formation of User's Group: Apart from the watershed development committee there are also 17 users groups functioning under the programme. Different works components like Gully Plugging, Plantation, Bonding, Sunken Pit, Loose boulder, etc have been carried out through the programme with beneficiary contribution equal to 10% of the estimated costs of the work component either in the form of labour or in terms of money. This arrangement has been successfully working.

Improvement in the Ground Water Level: Within the three years of implementation of the project there has been substantial increase in ground water level in different months at different reaches. During the summer season, when there is scarcity of water in Bolangir district, ground water level has increased after implementation of the project In the month of March it has been observed that at Upper, Middle and Lower reaches of the watershed ground water level has increased by 1.1mt., 0.8mt. and 0.8mt respectively. Ground water level has also increased in the month of May at Upper (0.6 mt.), Middle (0.9) and Lower (1.2 mt.) reaches. Increasing the ground water level also facilitate the drinking water availability up to 80% both for the domestic animals as well as wild life with a adequate availability of fodder for animals.

Table 6.1: **Ground Water level (in Mt)**

Reach	Before Project				After Project				Improvement After Project			
	Nov.	Jan.	Mar.	May	Nov.	Jan.	Mar.	May	Nov.	Jan.	Mar.	May
Upper	3.2	4.1	5.3	7.2	2.7	3.3	4.2	6.6	0.5	0.8	1.1	0.6
Middle	3.1	4.2	5	6	2.3	3.3	4.2	5.1	0.8	0.9	0.8	0.9
Lower	1.2	1.4	1.9	3	0.6	0.8	1.1	1.8	0.6	0.6	0.8	1.2

Before implementation these villages faced frequent droughts almost occurring every alternate year and farmers were always in fear of loosing their crops. Now with the implementation of the programme water availability has substantially improved and farmers are assured of at least one seasonal crop. Farmers are now optimistic and exude a lot of confidence. Initial diffidence about low investment watershed to provide a reasonable level of income and standard of living has vanished. They now

feel exuberant after experiencing the results of their own intervention with government help.

Change in Cropping Pattern: Before the implementation of the watershed project the area under Khariff crops was 270 ha, Rabi crops was 115 ha and Summer crops was covering 100ha. After three years of implementation of the watershed project substantial increase in acreage has been observed; 320ha, 170ha, and 147 ha in Khariff, Rabi and Summer respectively. In the pre watershed development programme most of the cultivated area was under Kharrif paddy with small coverage in other crops such as moong, groundnut, vegetables and sugarcane. In the up land the paddy, moong, and groundnut coverage area was 48 hectare, 8ha and 4ha respectively. But in the post watershed programme there has been a major diversification from paddy towards pulses and oilseeds as a result of which paddy coverage area has reduced to 5ha and moong and groundnut coverage has increased to 34ha and 44ha respectively. After project implementation cotton coverage in high land is about 12 ha. Before project implementation the coverage of paddy in mid land and low land was 82 hectares and 115 hectares respectively. In contrast the area under sugarcane and vegetables is only 5 ha and 8 ha respectively. But after the functioning of the watershed the coverage of paddy increased along with a substantial increase in the area of sugarcane and vegetable.

In Rabi season farmers are cultivating vegetables (50ha), pulses (60ha) and sugarcane (5ha). But now area under pulses has increased to 104ha, sugarcane 15ha and marginal increase in pulses (51ha). In summer season area under vegetable was 72 ha but now it has increased to 117ha. And paddy, sugarcane are the two crops which are now cultivated during summer with coverage of area of 15ha each.

Community Organization: The community was approached with a number of non-formal meetings, group discussions, awareness camps and awareness trainings. There are now 16 SHGs and 17 Users groups functioning for the development of the community, social activities like anti-satta and anti-liquor campaigns as well as road cleaning and repairing programmes are taken up on a regular basis. The watershed committee has 12 members, 8 males and 4 females; 6 are from User groups, 4 from SHGs, one is a ward member of the GP and one is a WDT member. In the watershed committee 4 ST persons have also been represented. To lead the committee the

members have selected one president from among themselves. One secretary has also been appointed for supervision and measurement of works by the UGs, maintenance of records and accounts.

SHG Formation: During 2002-03, with the introduction of the watershed concept, the people gradually became aware of livelihood options and they grouped themselves into 16 SHGs and started saving on a monthly basis. Through the community organization process, their capacity was built up with skill development training and practical exposure visits. As a result they could start small businesses with their savings through interlinking process.

Subsequently, these 16 SHGs with the assistance of revolving funds from watershed association were able to expand their businesses. Five SHGs have been linked to Bolangir Anchalika Gramya Bank (BAGB) to get more financial assistance for the development of their livelihood activities. They already have internalized the concept of livelihood development process. and can feel that they can live and develop with their own capability. These 16 SHGs have also taken up income generating activities such as vegetable cultivation and vending, seasonal business, vending rice, pisciculture, goatery and handloom weaving work. Their standard of living has considerably improved, they are sufficiently motivated to regularly send their children to school, constructing *pucca, semi-pucca* houses and regularly contributing through *sramadan* (physical labour) in watershed villages. A Grain Bank to save rice has opened and has been working successfully.

Maa Parbati SHG was formed in 2003 with 14 members. Initially they started saving of Rs.20 per member per month. After one year they were provided Rs. 5000 from the revolving fund of Watershed Development Committee. They started rice vending. Within six months the SHG paid back the money taken from the watershed committee. Last year the SHG was linked with Bolangir Anchalika Gramya Bank (BAGB) with a loan of Rs 45000. With this money they started goatery. They also took up pisciculture in the village pond. Now each member of the SHG group is getting an additional income of about Rs.800 per month and their social as well as economic status has improved.

Other Economic Activities: To increase the standard of living of the people and to provide livelihood support various efforts have made in terms of providing additional employment through handicraft activities, poultry farming, dairy farming and

pisciculture. Through watershed programme two families are engaged in dairy farming, 14 families in poultry, 42 families in pisciculture and 32 families in handicraft activities. Apart from the above 35 families are also engaged in bamboo crafts. Through these activities income level of the families has gone up.

Migration: Before implementation of the watershed programme about 256 numbers of the people migrated from the watershed area to cities outside the state like Hyderabad and Mumbai, in between the month from January to May. But after the implementation of the programme migration has been substantially checked as the number people migrating to cities outside the state has gone down to 54. Now more work is available in the areas around the project and people who were earlier migrating are able to find employment near their villages and earn a decent income.

Training Programmes: A number of training programmes organized for capacity building of the User's groups, SHGs, watershed committee, and farmers have increased their awareness and improved adoption rate. At village and block level training programmes have been conducted by the PIA on components of watershed development programme like natural resource management, farm production, and livelihood support activities as well as survey, planning, implementation, monitoring and evaluation of watershed activities by the watershed community through formation of watershed association and watershed committee.

Baradei-1 Micro Watershed Project
Block: Papadahandi
District: Nawarangpur
Programme: IWDP-IIs

Baradei-1 Micro Watershed in the Papadahandi Block of Nabarangpur district, under IWDP programme, covers 2 revenue villages (Baradei and Cherchetta) and 4 hamlets with a geographical area of 572.95 ha. The total 269 households with 1129 population (all are BPL) are living in this watershed area. This Project was initiated in the year 2002-03. The Assistant Soil Conservation Officer (ASCO) heads the Project Implementing Agency (PIA) of this project. This watershed has been identified by the technical study consulting with ORSAC map. Out of the total sanctioned amount of Rs. 23.87391 lakhs Rs. 22.63 lakhs (94%) has been utilized until 2006-07.

Soil and Moisture Conservation Works: Soil and moisture conservation work is a component of watershed development for the conservation of soil and moisture different components have been done through watershed that are 65 units small earthen structure, 12 units of gully control, 47 ha of field bonding and 2742 mt. of diversion bond have been constructed.

WHS: Under work component, some activities have been categorized as water harvesting structure. Those are farm pond (4), sunken pit (10), and tube well recharge, dig out sunken pond(35), run off management structure(2) by renovation of old existing ponds, with expenditure of low amount this watershed achieved its target, which shows the technical management of fund and land.

Horticultural Activities and Afforestation Programmes: In the horticultural activities, a community horticultural nursery has been setup in 2ha of land by spending Rs 80,000. Hundred numbers of vegetable mini kits have been supplied to the farmers. Lemon, Papaya and Drumstick seedling have been raised up through watershed for distribution. Mango ginger amounting to 80 kg has also been given to the farmers. Apart from it, afforestation programme like miscellaneous tree plantation in 4ha, avenue plantation and miscellaneous seedling distribution both on private and community land achieved the 100% of its targeted area. Fruit trees plantation and mango plantation have been made through it.

Veterinary Activity: In the veterinary activities, animal health camps have been organized four times through the watershed. One Travix fixation has also been made. Mineral mixture supplement to 56 animals have been administered.

Pisciculture: For the development of pisciculture 10 units of fingerlings amounting to Rs.5000 have been supplied both to the SHGs and other people through the watershed.

Formation of the Users Groups: Apart from the watershed development committee, there are 79 numbers of Users Groups working under this watershed. Total number of 652 people has been enrolled under it. Different works like small dugout sunken pond, sunken pit, contour bonding, diversion bond, grafted cashew plantation, miscellaneous tree plantation and fruit trees plantation have been taken place through watershed development programme and Rs 1.59083 lakh collected as Users fees. Beneficiaries contribute 10% of the estimated cost of the work on different activities stated above. Watershed gives more emphasis to the marginal and small farmers to increase their standard of living.

Improvement in the Ground Water Level: Watershed also fulfills its objectives by increasing the ground water level with facility in the drinking water. Before the implementation of the watershed the ground water level was 2.75, 5.10, and 8.00 fit in the month of January in upper, mid and low reach respectively. However, after the implementation of the watershed the ground water level increased by 0.35, 0.55 and 0.50 in different reaches respectively. Apart from it the ground water level increases the drinking water availability both for the domestic and wild life with availability in the fodder 70% to 80%. Watershed increases the overall development in water availability in different angle.

Agricultural Development and Change in the Cropping Pattern: For the agricultural development, 68 units of paddy demonstration has been made through the watershed development programme. Training programmes has been organized through the watershed for the development in the agriculture. There are 20 numbers of K.B. (Krushak Bandhu) pumps supplied to the farmers (with 10% deposit on the total cost) for irrigation. Apart from it farm ponds, dug out sunken ponds and water

harvesting structures have been taken up. Paddy is the major crop cultivated under this watershed area. Before the implementation of the watershed development programme the coverage of khariff paddy was 22.5 ha, 34.6ha, 85.4ha in highlands, midlands and lowlands respectively. It is seen that after the implementation of the watershed development programme the coverage has increased to 35.6ha, 45.5ha and 124.3ha respectively. Now farmers are also able to cultivate paddy in the rabi season. An area of 20.5 ha has been covered under paddy cultivation in the rabi season in the post watershed programme. After paddy, maize is the second most intensively cultivated crop in this area. Prior to watershed programme the coverage of maize was 5 hectares and that too in the midlands. But in the post watershed development programme a significant change has been seen in area under maize cultivation. Now the coverage area of maize is 45.5ha and 30.5ha in highlands and midlands respectively. The area under vegetable cultivation increased from 2ha to 8ha. Apart from this, some rabi crops, like niger, mustard, and sesamum have been newly introduced with a coverage of 5ha, 4ha and 7ha in terms of highlands, midlands and lowlands respectively.

Community Organization: A watershed development committee has been functioning for the development of the watershed. Eleven members of which four members are females, are working from the two villages under the watershed development programme, out Mandatory female weightage of at least 33% has been given due place as per the guidelines. These members have selected a secretary among themselves to lead the committee and the secretary is being paid a salary on a monthly basis of Rs 800.00. In the watershed committee, women participation plays a very significant role in overall development of the watershed. These women are actively participating in the watershed meetings and give their suggestion regarding the development of the watershed. Apart from it they give labour i.e. SRAMADAN for the development of the watershed. The watershed committee takes decisions about the work components, supervision of the work, and provides suggestions for the smooth implementation of the components in different villages under the watershed. Apart from supervision, monitoring and decision-making, the watershed committee members contribute Rs.10 each per month as their contribution which is deposited in the watershed development fund. The deposited amount can be withdrawn after the

termination of the watershed for the maintenance of components constructed through the watershed.

SHG Formation: There are 25 SHGs have been working in the watershed area and a total of 187 people have been enrolled in these groups. These SHGs are engaged in various types of activities like vegetable cultivation and vending, pisciculture and seasonal business. The PIA consulting with the watershed development committee has advanced Rs.70, 000 to the SHGs as an additional assistance for the development of their activities. Out of the 25 SHGs, 15 SHGs have received training for the above livelihood activities for their sustainability in their work through watershed development. The members of the SHGs are earning Rs 800 to 900 per month. Watershed committee also links these groups with co-operative and commercial banks by generating awareness among them regarding credit facilities available from these institutions. Moreover, it is found that all the groups have borrow in between Rs 50,000 to 1 lakh on credit from co-operative and commercial banks near to their villages. It has been found that till date all the SHGs have repaid 50% of their debts with a regular payment in debt. From the above discussion, it has seen that SHGs functioning actively by the help of the watershed committee.

Other Economic Activities: To increase the standard of living of the people watershed development programme has made various attempts by providing livelihood support to them. Through watershed, 170 families are engaged in dairy farming, 100 numbers of families are engaged in poultry. Banaraj chicks have been supplied to the families for livelihood support. In these villages 15 families are engaged in pisciculture, and 12 families are engaged in piggery, which gives additional support to their income. Forty numbers of sheep have also been provided through the watershed. Apart from this, 3 families have been provided support for handcraft business.

Migration: Before the implementation of the watershed programme people under the area of this watershed migrated to near by blocks, other districts and out of the state in search of work. There was no irrigation facility in rabi season. So most of the people migrated after the harvesting of paddy. But implementation of the watershed programme has changed the traditional concept and the people are able to earn a

regular income in their own villages directly or indirectly. It has been observed that watershed is able to check the migration level up to 70 % in the watershed areas.

Special Efforts: Apart from the guideline of the watershed programme, there are some developmental activities have been taken up by the special efforts of the PIA with the cooperation of the people under it by diversifying some amount of fund out of the total sanctioned fund. Two developmental activities like “Vikas Kutir” and a community Nursery have been developed amounting of Rs. 1.00 lakh and 0.80 lakh respectively. Vikas Kutir helps in organizing meeting at village or community level and rest shed and place of discussion for visitors from out side and people working in the watershed project. It also helps in keeping the raw material and other implements as a storehouse. Through nursery, different type of vegetative, medicinal and flower plant have been growing for the watershed area to be treated and for selling purpose.

CONSTRAINTS AND PROSPECTS

Benefits of watershed development have been experienced by the watershed community, project administrators and planners at the district and state level. As observed in the previous chapter, these benefits widely vary across districts, within the district across projects and within projects among beneficiaries. These differences arise not only due to spatial locations of the project and parcels of lands of the beneficiary but also due to difference in approach and actual implementation of watershed and the resource position of beneficiaries and their motivation. Although overall the programme has shown remarkable impact on income generation, quality of land and moisture improvement, location specific organizational process innovation, yet there are a number of constraints that need to be urgently attended to improve programme prospect and provide better options for the beneficiaries.

Major Constraints

Watershed development is conceived as a highly participative programme. Most implementing agencies find it extremely difficult to initially introduce this concept to the potential participants. The heads of implementing agencies themselves are not properly trained how to convince the intricacies of peoples participation where the community as a whole is perceived to gain while some individuals may gain and others lose. The mechanism by which everybody can gain over a short time horizon is not easy to find. It requires a lot of training and expertise to be made available to each PIA, which at current level of development is highly inadequate.

Irregular Fund Flow: Implementing agencies faced severe financial crunch in the first year as for most projects the funds started flowing only in the second year. After receiving funds from the Government of India the Planning and Co-ordination (P&C) department released as per requirement to the Agriculture Department, the state level nodal agency. Funds were subsequently released to the Soil Conservation Directorate and to the Project Director (Watershed) in the case of Bolangir, Kalahandi and Nuapada and in rest of the districts to the Project Director, DRDA. The Project Directors then allocated fund to each PIA. Out of the total fund 15% are allocated to

the Project Implementing Authority as administrative cost. 85% of the funds are allocated to the watershed development committee for the overall development of the project. From the enquiry it was found that 49% of the PIAs received initial fund in the second year, thereby delaying project execution by one year.

Often times, allocation of funds was made without taking into consideration the requirements of the concerned watershed leading to a scarcity of funds in the case of some projects. From the evaluation it is found that out of 49 watershed projects, 20 PIAs complained that the fund supplied to them was not adequate for the entire watershed to be fully treated. This led to delay in developmental work and caused de-motivation among implementing agency and watershed community. The loss of a year in the supply of funds made it difficult for the PIAs to complete the work in the allotted time period. Sometimes the funds provided in a year was much in excess of demand leading to huge sum being available in a year. The PIAs are unable to decide as to how to spend this fund. This calls for a demand and time based supply of funds.

Resolving site selection issues: Each micro-watershed covers two to four villages. While selecting items of work to be taken up potential beneficiaries staked their claim before the PIA to have as many number of interventions in their village boundary as possible. Unfortunately funds available did not permit taking up all the physical activities identified by the villages. Similarly selecting site for water-harvesting structures that covered two villages or more with benefits not exactly commensurate in proportion to the area allocated from each village also created dissention among beneficiaries and sometimes led to conflicts. Out of the 49 watersheds in 5 watersheds PIA faced major problems in site selection. The PIAs, however took the help of watershed development committee to resolve the issues although the process delayed final selection of sites and physical implementation. Simultaneous demands for personal constructions (say a farm pond) by villagers are difficult to meet because of paucity of resources. If many villagers demand the construction of a farm pond on their land by paying just 10% of the total cost, the PIA is not in a position to prioritize the requirements of so many people with the limited funds available despite the fact that the demands are genuine and can enhance benefits significantly.

Problems in supervision: There are more than 12 watersheds functioning under a single PIA. Further a particular PIA also has to monitor Non-ACA watersheds in

addition to the ACA watersheds. As a consequence, in some cases, more than 20 watersheds are functioning under a particular PIA. Further, all the watersheds under the PIA are not necessarily in the same Block. A PIA finds it difficult to visit all the watersheds under its supervision with limited supervision staff. Another obstacle in the smooth functioning under such a set up is the lack of proper communication between the PIA and the watershed community.

High turnover of field officials: As in other developmental work in KBK districts, the field officials do not like to continue working under harsh conditions for the watershed work execution, a number of small works scattered over a large area. High turnover and frequent transfer of officials were reported from the field negatively affecting quality of work and timeliness of completion.

Cutting of trees for firewood: Forests are vital in maintaining the ecological balance in all watershed projects. Despite awareness campaign regarding importance of trees in the watershed, people cut trees and shrubs because of fuel wood shortage. This leads to decline in forest coverage making the ecological balance in certain areas unstable.

Difficulty of motivating people: During the initial stages of the project it is not easy for PIAs to motivate people due to illiteracy and lack of awareness about the benefits that would accrue to them in the future. People can be involved more if entry point activities such as installation of hand pumps, renovation of village ponds and bathing ghats, community centres, boundary walls of schools, repairing of school buildings, roads, meeting pandals, village mandaps and construction of school boundaries are taken up extensively. Out of the 49 watersheds in all most all the PIA of the watershed complained that peoples' participation was low at the initiation stage of watershed project.

Per hectare cost norm is low: Per hectare cost norm varies according to the schemes. Both RLTAP and Non-RLTAP schemes are in operation in the KBK districts with 2 to 3 schemes operating in a particular block. The development of the project is going on according to its cost norm. For ACA watersheds per hectare cost norm is Rs.6000, where as for Non-ACA watersheds per hectare cost norm is Rs.4500 to Rs.6000. Under WORLP watersheds per hectare cost norm is Rs.9500. These

norms are adhered to irrespective of the required structures in any watershed. Those watersheds which require more funds to carry out the full range of interventions compromise on quality or reduce the number of interventions. Further as the minimum wage rate has increased it would be necessary to make a revision in the cost norm.

Work extending beyond guidelines: Each project has a guideline, according to which it is implemented. If the project is extended beyond the guideline people lose faith in the PIA and become suspicious of malpractice. In Malkangiri District the district head postponed all the manual work done under watersheds to check the malpractice occurring in watershed projects. This postponement is not in accordance with the guidelines. Hence, the PIAs have difficulty in engendering cooperation of the people to work in the field.

Area-wise treatments: According to the guidelines the area should be treated from upper reach to lower reach. As the watershed covers more than 2 to 3 villages, it is very difficult for a PIA to treat all the areas according to the guideline (i.e. from upper reach to lower reach), because every villager demands initiation of the manual work from his village.

Short project implementation period: The time period given for a project to be implemented by the PIA is insufficient. Planning to fund flow takes one year. Within the four-year period left, along with irregular fund flow, it is difficult for a PIA to achieve its target. Another main constraint for a PIA is to implement the work according to the demands of the people, which is not incorporated in the guidelines. As watershed is a new concept for the tribal people it takes a lot of time to sensitize them about the working of the project.

Loss of land: By digging a farm pond in their own fields the beneficiaries do not get benefits as per their expectations. The farm pond provides protective irrigation only during the Kharif season. In Rabi season cultivation of crops is not taken usually taken up by the farmers who own farm pond due to scarcity of water. Although farmers recharge ground water and some additional investment will yield water to grow crops in Rabi, farmers who have just been initiated into the programme have not learnt it. They also need additional resources to deepen farm pond or have a bore-well

to access ground water. Sometimes the farmers feel that there is no major difference in their water resource status after the digging the farm pond. Thus the returns on their investment (10% of the total expenditure) in terms of labour and money is not as per their expectations. It is necessary to change the size and depth of the farm pond to retain more water for cultivation in Rabi and if possible in summer after accessing ground water reserve.

Inadequate water: Farmers feel that the water harvesting structures are constructed to store enough water for irrigated agriculture around the storage. They still feel this water should be used like in any other public irrigation scheme. There is little realization that water is a scarce commodity and should be used in the most economical manner. Farmers have not been sensitized how to make optimal use of water to get maximum benefits changing the cropping pattern and by conjunctive use of surface and ground water. In water scarce situation, as far as possible, ground water recharged by the water harvesting structure should be used avoiding use of surface water.

Under finance for livelihood support: Watershed programme provides for livelihood support under two heads; financial support of Rs.1000 to professional workers and artisans, like carpenters, cycle repairers, potters etc. and providing livestock and small stock to SHGs and beneficiaries of watershed. However the financial provision of rupees 1000 per person is not enough to support the skilled workers at the initial stages of their ventures. In the case of small stock, the quality of goats provided appears to be low in a large number of cases.

Inadequate training: The training that is provided is too short to have a lasting impression on the people and does not focus on cash crops. The demonstrations are also not so eye-catching. It is necessary to extend the time period of the training programmes. Further, the training should be on a demonstration basis for better acceptance by the farmers. Training should be given to them in their own language. They should be trained not only in paddy cultivation, but also in other cash crops like sugarcane, cotton, maize and mushroom for better income. From the evaluation it is found that the training given to the farmers under different watersheds is only for one to two days.

Inadequate marketing and storage for newly introduced crops: Watershed should try to develop the market facility for the farmers to get fair price for their agri-products. It is very essential to increase the marketability for newly introduced crops like zafra, cotton, simorava (an oil seed plant) and zatropha. Watershed introduced these crops among the farmers to be cultivated as cash crops but did not provide any market facility to sell these products. As watershed enhances the agricultural production of the farmers, the farmer needs storage facility of their products out of their consumption.

Inadequate bank linkage: Even though cooperative banks are operating at the block level people are indifferent towards borrowing from these institutions due to the uncooperative attitude of the bank personnel and lack of knowledge about interest rates. Lack of awareness coupled with illiteracy leads to dependence on traditional money lenders (mahajans and landlords) who charge high interest rates. Although some changes have occurred due to involvement of SHGs, there is need for more credit-market linked commercial crop cultivation in the watershed area. A total of 8682 SHGs are functioning in the KBK districts and out of it 1806 are linked with different financial institutions like State Bank of India, Anchalika Gramya Bank and other Cooperative Societies. In Koraput district highest percentage i.e. 72% SHGs are linked with banks whereas the least i.e. 27% SHGs are linked with banks in Bolangir districts.

CHAPTER 8

CONCLUSION AND RECOMMENDATION

CONCLUSION

The programme has made substantial positive difference to the lands and the people who mostly depend on them for their principal source of livelihood. Quality of land has improved, soil moisture and irrigation status enhanced, drinking water availability improved, cropping pattern diversified, productivity increased and additional net income derived by the beneficiaries has substantially reduced poverty. People have been fairly involved and extensively consulted while planning for development of watershed. Self Help Groups with large number of women have increased in number and provided financial assistance to its members for improving their livelihood status. The rate of returns to investment at 40% on a very conservative estimate is one of the highest among various programmes implemented in India. It is a commendable effort over a relatively very short period in a very backward region. The government and its officials who have been working under very difficult conditions must feel happy about the good work done and fruitful results obtained.

RECOMMENDATION

Three major areas need concentration. They relate to i) planning and organization ii) capacity building and iii) sustainability

Planning and Organization: The programme has to be highly participatory for planning micro watershed development and its implementation. Planning must start from below with support from above. The first thing that should be done is to do away with the same cost norm of Rs.6000/ha for each watershed irrespective of the nature and type and quantity of work to be done. With increase in daily minimum wage to Rs.70, the cost per ha will in any case increase. While the cost per ha norm could be fixed for watershed development in a district as a whole, cost could vary across projects depending upon the volume and nature of work.

After a good level of initial motivation is provided to potential beneficiaries, a joint (the people and the technical personnel) needs assessment and prioritization is

necessary. Then plan for different phases should start in consultation with people. Costs should vary within a broadband and all resources available from various schemes should be pooled together to fully treat the entire watershed. Planning for cropping, planting of trees, fodder cultivation, and water-sharing should start along with physical planning and a project document prepared with the details including cost and who should be doing what and when. It should always be remembered that most benefits coming out of this exercise may not appear tangible to any particular beneficiary or even to a group of beneficiaries and therefore they may not be initially interested to participate. The benefits of farm pond may not be very attractive to the farmer who has invested on it. However it has large benefits of ground water recharge. Benefits of plantation may not be known to farmers before watershed development. They need to be explained or demonstrated through electronic media, posters or field visits the advantages of various structures and management of watersheds to various livelihood groups in a watershed.

The next stage is to decide about the farming and/or agro-pastoral system to be adopted. This will again be an exercise between the expert group coming from various disciplines (agriculture and horticulture, livestock, forestry, water management, marketing etc) where options will be discussed. It should be remembered that water is the basic constraint in the whole exercise. Water available through the project should therefore be shared among maximum number of beneficiaries and not used for heavy water-intensive crops. Therefore "introduce irrigation component as an essential feature; but emphasize efficient use, rational allocation across crops, plants, fodder and drinking water for a larger section of the community. Similarly, provision of drinking water should be seen as an essential component."[1]

This should be treated as a base solution. As the benefits start flowing, there should be assessment by the people themselves (who would be provided training as to how to evaluate with simple techniques- even the illiterate can successfully evaluate through appropriate training) as to what is working and those not working. There should be provision for change as a continuous process. Orienting people and officials in this change process will substantially improve benefit accrual and sustainability.

[1] Amita Shah, " Watershed Programmes- Along Way to Go" Economic and Political Weekly, Aug-26-Sept.2, 2000

Capacity Building: The implementation of the programme in diverse conditions of watersheds has itself provided enough knowledge through the process of 'Learning by Doing'. But it is not enough, neither for those who are implementing nor for those who are benefiting or losing. The team visiting Malkangiri was disappointed by the fact that the District Collector who heads development programmes for this very backward district is himself reportedly not convinced about water harvesting and small irrigation structures as he feels that this type of work should not be undertaken because it would lead to corruption and leakage. This is exactly 'throwing the baby with the bath water'. It is no wonder therefore that the watershed development in Malkangiri is the least effective. It is also not understood as to why the matter has not been brought to the notice of higher authorities despite the claim of regular reviews and efficient MIS. The mindset of authorities at district level should be changed and those opposing to development should be transferred elsewhere for priority development programmes that have potential to benefit large section of the population to achieve success.

Capacity building is required for officials on planning, implementation of physical and social-economic schemes and for the people to improve their capability for managing farming systems and credit-market link-up. This was found to be the weakest link in system for activity management at base as well as intermediate level. Risk management is another area that needs to be strengthened through appropriate training. How to obtain relevant information and disseminate them, whom to approach and how to approach to deal with any risk related factors and how soon that would be attended to in the mission mode are some areas that should be included under capacity building and training.

Sustainability: Related to the above two important items is the sustainability issue. The initial enthusiasm of a programme may not be sustained over a long period as the incremental benefits may not grow at the same rate as in the initial years unless innovative methods are applied to the whole chain of activities. After project completion period (4-5years), the project staff will leave and the responsibility will be handed over to the community. It is not always that the communities work in common interest. Local NGOs if capable may be recruited to help communities in carrying out operation and maintenance, providing training, synchronizing programme/scheme

convergence and interacting with public officials for crop and area planning, helping in technology transfer and input intensification, measurement of ground water, marketing of products and a host of other activities. The communities, themselves, can also take up such works if sufficient capacity building takes place. Watershed Development Mission has a huge responsibility to ensure such capacity building and periodic supervision to attain programme sustainability over the project life.

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Annexure-B

Information on Micro Watershed Projects Taken up under ACA in KBK Districts

District: Kalahandhi

SI. No.	Name of the Block	Name of the Micro Watersheds	Watershed Code No.	Name of the villages covered	Geographical area (in ha)	Treatable area (in ha.)	Area treated (in ha.)	Funds released (Rs. lakhs)	Funds utilised (Rs. lakhs)	Completed on going	Remarks
	1	2	3	4	6	7	8	9	10	11	12
1	Bhawanipatna	Sardhapur	2-08070203	Sardhapur, Kurlubhata	566	520	400	24.642	24.642	On going	
		Dorapadar	2-08070201	Dorapadar, Gudelipadar, Borguda, Salebhata	567	506	400	24.508	24.508	On going	
2	Kesinga	Kundabandha	2-08100102	Kundubandha, Dumermunda, Chhanagaon	820.71	660	422	25.336	25.336	On going	
		Gaudtola	2-08110201	Gaudtola, Gurjimunda	570.61	463	393	23.4448	23.4448	On going	
3	Narla	Sripali	2-06270203	Sripali	753	700	453	27.215	27.215	On going	
		Dengsargi	2-06270102	Dengsargi, Bhatel	783	700	454	27.255	27.255	On going	
4	Lanjigarh	Sikerkupa	2-07090102	Sikerkupa, Kauguda, Kiding, Madibandha, Baghinipadar	752	700	467	27.82	27.82	On going	
		Gopalpur	2-07100202	Gopalpur, Patbhaler, Bhaluchanchara	712	660	515	30.94	30.94	On going	

SI. No.	Name of the Block	Name of the Micro Watersheds	Watershed Code No.	Name of the villages covered	Geographical area (in ha)	Treatable area (in ha.)	Area treated (in ha.)	Funds released (Rs. lakhs)	Funds utilised (Rs. lakhs)	Completed on going	Remarks
	1	2	3	4	6	7	8	9	10	11	12
5	M. Rampur	Podagudi	2-04040101	Antaria, Gopalpur, Jharandunguri, M>Tukuda, Badpitamal, Sanpitamal	572.73	650	440	26.31	26.31	On going	
		Kadambadunguri	2-04040102	Dumerguda, Dangabahal, Kusumel, Borbhata, Padelkona, Belgubha	637.59	600	450	27.041	27.041	On going	
6	Th. Rampur	Raj khandual	5-03010102	Bhataguda	307.97	300	300	18	18	Completed	
		Maa Manikeswari	11-06010102	thuamul	305.26	300	300	18	18	Completed	
7	Koksara	Bongomunda	5-06070101	Bangomunda, Bobaria	740	600	450	26.9915	26.9915	On going	
		Badpodaguda	5-06070101	Badpodaguda (part)	964	500	464	27.847	27.847	On going	
8	Golamunda	Siba Sakti	5-01030204	Udesung, Dangariguda	780.62	700	530	31.8854	31.88544	On going	
		Bordi - Kuhura	5-01060201	Bordi, Kuhura	650	600	512	30.7439	30.7439	On going	

Source: Project Director (Watershed), Office of the Project Director, Watersheds, Kalahandi, Bhawanipatna

District: Bolangir

Block	Name of the PIA	Name of the MWS	GP	Villages Covered	W.S.Code No	No. of villages covered	Treatable area (in hect.)	Project out-lay
1	2	3	4	5	6	7	8	9
Agalpur	A.Mohanty, JSCO	Trinath, Bhoipali	Budula	Purapaar, Bhoipali, Buromunda,		3	600	36.00
		Maa Binapani, Bindhapali	Bharsuja	Bindhapali, Gohirapadar,		2	400	24.00
Bolangir	M.Kar, JSCO	Kagaon	Mirdhapali, Chandabahti	Kagaon, Badighor	1-01-07-01-01	2	500	30.00
		Tulandi	Mirdhapali	Mirdhapali, Tulandi	1-01-07-02-01	2	400	24.00
Loisingha	A.Mohanty, JSCO	Dadhibamana, Kutrapali	Jharmunda, Kusmel	Luchkibahal, Kutrapali, Maharpali, Sadhupali	3-06-06-01-01	4	700	42.00
		Sri Jagannath, Badimunda	Jharmunda Badimunda	Pardhiapali, Badimunda	3-06-06-01-01	2	400	24.00
Puintala	D.C.Biswal,JESC	Swapneswar, Bileikani	Mahimunda, Patharla	Bileikani, Duhel, Patharla,	1-01-14-02-03	3	500	30.00
		Trimurti, Watershed	Daspur, Mahimunda	Bihibandh, Medhipali, Kutenpali,	1-01-14-01-02	3	500	30.00
Deogaon	ASCO, Balangir	Mursing,	Kuturla	Mursing	1-03-06-01-01(A)	1	500	30.00
		Dhabaleswar, Tepren	Bandhpara, Brahmanijor	Tepren, Sandhijore,	1-03-02-02-02	2	500	30.00
Gudvela	RCDC,CCD, Bolangir	BhalugudaWA, Tebdamunda	Badangomunda	Dangapathar,Tebdamunda, Sindrabahal	1-03-14-01-01	3	450	27.00
		Gangeswari, Barla	Tusura, Rusuda	Likhiria, Barla	1-03-11-01-01	2	500	30.00

Block	Name of the PIA	Name of the MWS	GP	Villages Covered	W.S.Code No	No. of villages covered	Treatable area (in hect.)	Project out-lay
1	2	3	4	5	6	7	8	9
Titlagarh	S.C.Behera,JESC	Maa Mauli, Adabahal	Adabahal	Adabahal, Chantipala, Ainlabhata	1-07-09-01-02	3	450	27.00
		Radhakrushna, Patharla	Kholan	Patharla, Gandhargala	1-07-10-02-01(B)	2	550	33.00
Saintala	S.S.Swain, JSCO	Maa Dwarseni, Makri	Dharapgarh	Makri, Jamkhunta	1-04-16-02-02	2	450	27.00
		Radhakrushna, Kuikeda	Kuikeda	Kuikeda, Kamarlaga	1-04-17-01-02	2	550	33.00
Muribahal	B.B.Mishra, JSCO	Maa Bastren, Salepada	Ganrei, Gudighat	Salepada, Balikhamar	1-04-02-01-03	2	500	30.00
		Jai maa Khambeswari, Ghusuramunda	Gudighat	Ghusuramunda	1-04-02-01-02	1	500	30.00
Bangomunda	Gram Vikash, Balangir	Bagartipada, Alanda	Alanda	Bagartipada, Alanda, Tentulipada, Bahalgubha, Banjupadar	1-07-05-02-01	5	550	33.00
		Ranipur, Ranipur Jharial	Jharial	Ranipur, Jharial, Bakhamar	1-07-05-01-03	3	500	30.00
Turekela	B.N.Mantry, JSCO	Sri Ganesh, Laljhar	Khagsa	Malpamunda, Laljhar	1-08-03-01-03	2	350	21.00
		Dhamandanga Birna	Karumunda, Damandanga	Birna, Dhamandanga	1-08-06-01-01	2	650	39.00
Patnagarh	S.N.Sahu, JSCO	Subarnarekha, Bhatpali	Tamian	Tamian, Bhatpali	1-02-18-02-03	2	500	30.00
		JagabaliaWA,	Tamian	Ainatunga, Bagbahali	1-02-18-02-02	2	500	30.00
Belpara	L.M.Patra, JSCO	Oilipoli, Beheramunda	Beheramunda	Beheramunda	1-05-11-01-01	1	500	30.00
		Chaurasidevi, Mundgaon	Beheramunda	Mundagaon	1-05-11-01-02	1	500	30.00

Block	Name of the PIA	Name of the MWS	GP	Villages Covered	W.S.Code No	No. of villages covered	Treatable area (in hect.)	Project out-lay
1	2	3	4	5	6	7	8	9
Khaprakhol	R.C.Singh, JE	Banjipali,	Dhabdamunda	Banjipali	1-05-02-01-02(B)	1	400	24.00
		Jabahar, Dhandamunda	Dhabdamunda	Dhandamunda	1-05-02-01-02	1	600	36.00

Source: Project Director (Watershed), Office of the Project Director, Watersheds, Bolangir

District: Nuapada

Sl. No.	Name of the Block	Name of the Micro Watershed	W.S. Code No	Name of the Village Covered	Name of the Hamlets Covered	Geographical Area (in.Ha)	Treatable Area (in Ha)	Area Treated (in Ha)	Funds Released (Rs in Lakhs)	Funds Utilised (Rs. in Lakhs)	Completed/ Ongoing
1	Nuapada	Tileijhar	03-09-05-01-03	Tileijhar	Tileijhar	529.67	406.35	340	22.87, 28 MT Rice	22.87, 28 MT Rice	Ongoing
		Kotenchuan	03-09-05-02-02	Kotenchuan	Kotenchuan	654.83	594.92	380	33.62, 28 MT Rice	33.62, 28 MT Rice	Ongoing
2	Komna	Barandapat	01-09-05-01-02	Balondapat	Balondapat	756.96	556.20	381	31.51, 28 MT Rice	31.52, 28 MT Rice	Ongoing
		Chakpada, Daldali	01-09-05-01-02	Chakpada, Daldali	Chakpada, Daldali	612.29	584.00	354	33.04, 28 MT Rice	33.04, 28 MT Rice	Ongoing
3	Khariar	Kendupati	01-08-15-01-03	Kendupati	Kendupati	571.92	316.00	288	17.73, 28 MT Rice	16.73, 28 MT Rice	Ongoing
		Kusumal	01-08-15-01-03	Kusumal	Kusumal	741.19	540.00	297	28.61, 28 MT Rice	16.26, 28 MT Rice	Ongoing
4	Boden	Farsara	04-07-01-07-01-21-01-02	Farsara	Farsara	716.80	500.00	400.75	28.47, 28 MT Rice	24.66, 28 MT Rice	Ongoing
		Makarabirili	04-07-01-06-09-23-01-02	Makarabirili	Makarabirili	448.00	430.00	383.2	24.15, 28 MT Rice	22.69, 28 MT Rice	Ongoing
5	Sinapalli	Litiguda	05-01-12-02-02	Litiguda	Litiguda	521.84	423.00	411	23.28, 28 MT Rice	23.28, 28 MT Rice	Ongoing
		Barapadar	05-01-12-02-01	Barapadar	Barapadar	559.88	438.00	434	24.41, 28 MT Rice	24.41, 28 MT Rice	Ongoing
Total						6113.38	4788.47	3668.95	267.69, 280 MT Rice	248.08, 280 MT Rice	Ongoing

Source: Project Director (Watershed), Office of the Project Director, Watersheds, Nuapada

Arabika coffee in the fourth year of the plantation, since last year beneficiaries are plucking coffee from the plants in certain areas.

Kaveri coffee plant; less leaf and more fruit but unsuitable for Koraput and Raygada

Multi cropping of Mango, Banana, Nilagiri and varieties of vegetables to spread risk while maximize benefits.

It is one of the rain water harvesting structures of Koraput district. Rain water from the roof of Vikash Kendra is collected and stored in a pond to recharge ground water in the area.

Nawarangapur District: This photograph shows a vermi compost shade where high quality compost is prepared and used in adjacent areas.

Farm Pond of Gurjimunda

Run off Management Structure (Guide Bond -1) Goudtala

Jujhari, Borigumma Block, Koraput Dist

Dukurigudi Micro-Watershed Goudtala Masonary Surplus, Kalahandi; Collecting surplus rain water for agriculture and ground water recharge.

Farmers are using Manual Winnowing Fan rented (Rs.10/- per day) from their village SHG to reduce cost and improve quality of harvested grains

Self Help Group: Learning Self Help in Childhood from mothers is a great experience