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Land degradation and integrated watershed management in India

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Abstract

In view of the stagnating productivity levels of irrigated agriculture, the contribution from rainfed agriculture should be increased to meet the requirements from the ever growing human and animal population of India. Land degradation is a major threat to our food and environment security and the extent of degradation problems are more pronounced in rainfed regions. Large potential of rainfed agriculture is untapped largely due to lack of enabling policy support and investments. In drought-prone rainfed areas, watershed management has shown the potential of doubling the agricultural productivity, increase in water availability, restoration of ecological balance in the degraded rainfed ecosystems by greening these areas and diversification of cropping farming systems. Impact of various watershed programmes can be substantially enhanced by developing new approaches and enabling policies new paradigm based on learnings over last 30 years for people-centric holistic watershed management involving convergence, collective action, consortium approach, capacity development to address equity, efficiency, environment and economic concerns is urgently needed. However, this can be used as entry point activity for improving livelihood for rural community.

It has been realized that for sustainable developments of degraded lands, involvement of people (land less and beneficiaries) is very much essential. For the last decade efforts have been made institutionalize the organizations of the community & beneficiaries and ensuring their involvement in planning project formulation, implementation and maintenance.

Government of India has launched various centre-sector, state-sector and foreign aided schemes for prevention of land degradation, reclamation of special problem areas for ensuring productivity of the land, preservation of land resources and improvement of ecology and environment. These schemes are being implemented on watershed basis in rainfed areas. Soil conservation measures and reclamation of degraded lands are decided considering the land capability and land uses. The efforts made so far resulted in enhancement of agricultural production and productivity of lands, increase in employment generation, improving the environment of the areas and socio-economic upgradation of the people. Integrated watershed management approach has been adopted as a key national strategy for sustainable development of rural areas. This has been proved by conducting monitoring and impact evaluation studies of the integrated watershed projects by external agencies.

Key Words: Land degradation, Soil and water conservation, Rainfed agriculture, Land productivity, Watershed, People's involvement, Reclamation, Monitoring & evaluation

1 Introduction

Among the major resources available in India, the most important is land comprising soil, water, associated flora and fauna involving the total eco-system. The demand for food, energy and other human requirements depends upon the preservation and improvement of the productivity of land. Land resources are finite. In the last few decades, there has been ceaseless pressure. Increasing human and animal population, diversion of land in fragile ecosystems for dams and roads, indiscriminate felling of trees, expansion of irrigation without adequate concern for the

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treatment of catchment and provision of drainage and improper agricultural practices on marginal lands have caused a serious level of degradation.

Land-cover/land-use changes occur both as a result of natural forces-wind and water erosion, changes in drainage, floods and droughts as well as due to human induced changes. Large-tracts of land have been cleared for agriculture, collection of fuelwood and for urban and industrial growth. Eco-systems have been transformed both in response to land-cover changes as well as a result of plants and animals brought from outside their native habitats, thereby introducing new pests, diseases and competitive species. Land uses influence the flow of water, nutrients and sediments in coastal areas.

Of the total geographical area of 329 million ha, the cultivated acreage, is about 156 million ha (49%). This includes 143 million ha of net sown area and 14 million ha of current fallow. Of the cultivated land, about 53 million ha (35%) is irrigated. The remaining 90 million ha is rainfed. The forest area is about 68 million ha (22%) and area not available for cultivation is about 41 million ha which includes urban land. The land use pattern is at Annexure-I.

The per capita availability of land declined from 0.89 ha in 1951 to 0.37 ha in the mid 1990s and is estimated to reduce further to 0.19 ha by 2035. As far as agricultural land is concerned, the per capita availability of land is 0.48 ha. Land degradation has deteriorated the quality of land and it is now estimated that about 175 million ha (53%) of the total area suffers from degradation in some form such as water erosion (107.12 million ha), wind erosion (17.79 million ha), ravines (3.97 million ha) salt-affected areas (7.61 million ha), water logging (8.52 million ha), shifting cultivation (4.91 million ha), degraded forests (19.49 million ha) and special problems (2.73 million ha). Today, nearly two-thirds of the area requires special treatment to restore such lands to productive & profitable use. It is also estimated that about 6,000 million tonnes of top soil are lost annually along with valuable plant nutrients such as Nitrogen, Phosphorus and Potassium and micro nutrients. As a result of the loss of top soil along with nutrients, there is low agricultural production of about 2.7 million tonnes annually. Thus, the management of basic natural resources of soil, land and water assumes special importance and plays a vital role, in improving the country's economy and environment.

At the national and state levels various schemes (central sector, state sector and foreign aided) have been launched for prevention of land degradation, reclamation of special problem areas for increasing productivity of the land, preservation of land resources and improvement of ecology and environment. These schemes are being implemented on watershed basis, i. e. taking small independent hydrological units of about 500 – 2,000 ha areas. The soil conservation measures and reclamation of the degraded lands are decided considering the land capability and land uses. The developments of degraded lands have resulted in increasing the productivity of this land, reduction of unemployment, improving the environment of the areas, social and economic upliftment of then people, etc. The evaluation studies conducted by various agencies have confirmed these positive responses and have recommended the active involvement of local people and beneficiaries under the programmes.

2 Agricultural Lands: Thrust on rainfed farming

It is important to recognize that the Green Revolution was largely confined to the irrigated areas which account for about 35% of the total cultivated area. Rainfed areas account for two-thirds of the total cultivated land of 142 million ha in fact, the rainfed region at around 90 million ha is almost twice that of the irrigated tract. Yet, the irrigated area, about 52 million ha (34%) accounts for 55% of total food-grain production whereas the rainfed region, nearly 90 million ha (66%) contributes only 45%.

Rainfed agriculture is characterized by low levels of productivity and low input usage. Being dependent on rainfall, crop production is subjected to considerable instability from year to year. More than 200 million of the rural poor live in the rainfed regions. These risk prone areas exhibit a wide variation and instability in yields. The gaps between yield potential and actual yields are very high compared to the irrigated areas. India's agriculture has now entered a Post Green Revolution stage of development that requires new strategies to enhance agricultural growth and reduce rural poverty. However, the speed and extend of such a change and its impacts on rural development through multiplier effects would depend on the availability and adoption of improved technologies, re-structuring of public institutions, supporting infrastructure and developing appropriate policy environment.

3 Watershed approaching to rainfed farming

Watershed approach is central to the development of rainfed areas, inclusive of various special problem areas,

namely, saline and waterlogged lands, ravines, hill areas, coastal and desert eco-systems. Some of the broad-based development objectives under these projects are:

- Attainment of targeted level of foodgrain production in a given time-frame in a sustainable manner.
- Restoring ecological balance in the degraded and fragile rainfed ecosystems by greening these areas through approximate mix of trees, shrubs and grasses.
- Reducing regional disparity between irrigated and vast rainfed areas.
- Creation of sustained employment opportunities for the rural poor.

4 Types and extent of land degradation

The main types of land degradation in the country are: (ⅰ) gullied and ranvious land; (ⅱ) upland with or without scrub; (ⅲ) water logging; (ⅳ) salinity and alkalinity; (ⅴ) shifting cultivation; (ⅵ) soil erosion die to water and wind; (ⅶ) degraded pasture and grazing land; (ⅷ) sands, deserts (inland and coastal); (ⅸ) barren/rocky/stony areas; and (ⅹ) snow cover and glaciers. The extent of areas affected under these categories is as follows:

4.1 *Gullied and ravinous land*

Gullies are formed as a result of localised surface runoff affecting the unconsolidated material resulting in the formation of perceptible channels causing undulated terrain. Gullies are the first stage of excessive land dissection followed by their networking which lead to the development of ravinous land. The word ravine is usually associated with a network of gullies formed generally in deep alluvium and entering nearby river, flowing much lower than the surrounding table lands. About 4.0 million ha are affected in this category mostly in the state of Gujarat, Madhya Pradesh, Rajasthan and Uttar Pradesh.

4.2 *Upland with or without scrub*

The lands, which are generally prone to deterioration due to erosion may or may not have scrub cover belong to this category. Such lands occupy relatively high topographic locations. About 13.57 million ha(6.67%) of geographical area comes in this category.

4.3 *Water logging*

Water-logged lands are those where the water is at/or near the surface and water stands for most of the year. Nearly 8.53 million ha of lands is subjected to serious water logging problem. Water logging results in restriction of the normal circulation of air inside the soil. When the water table rises up to 2 m and above below to ground surface, problems of water logging are felt. Immediately after the monsoon rains, vast tracts of land are subjected to surface flooding. In irrigated areas of 37 major irrigation projects situated in 15 states, water logging is felt in 0.74 million ha.

4.4 *Salinity and alkalinity*

Saline ground water, high water table, ingress of sea and irrigation without the provision of drainage result in salinization in arid, semiarid and coastal areas. As per 1986-1985 statistics, 5.50 million ha of land is subjected to soil salinity. The alkali soils, occur in Indo-Gangetic plains and parts of Madhya Pradesh covering nearly 3.58 million ha.

4.5 *Areas with shifting cultivation*

The areas with shifting cultivation are developed due to cyclical land use consisting of felling of trees and burning of forest areas for growing crops without any management. After one or two crop seasons as yields decrease, new forest areas are cleared for the purpose, leaving the earlier area to the vagaries of nature causing serious soil erosion. The allotment of lands for shifting cultivation depends on the tribe in the region. About 4.91 million ha of land has been subjected to degradation due to shifting cultivation practiced mainly in the hilly areas of the northeastern states of India.

4.6 *Soil erosion by water and wind*

The causes of soil erosion are deforestation, over-grazing increasing agricultural practices in undulated lands, improper cropping pattern and other kinds of poor and unscientific lands management practices. As a result of soil erosion by water, recharge of ground water gets reduced, low lands are flooded and sedimentation of water harvesting tanks and reservoirs occurs. It has been estimated that about 124 million ha of land is degraded due to water

(107.12 million ha) and wind (17.79 million ha). At many locations other forms of degraded lands also overlap this area.

4.7 *Degraded pasture and grazing land*

Due to a large animal population, the traditional pasture and grazing land have been degraded as they are over exploited. The study of 241 districts has indicated that about 1.34 million ha equivalent to 0.66% of the geographical area is covered under this category. One district, i.e. Bhilwara in Rajasthan accounts the maximum area under this category. More than 10% of the geographical area of the district is affected.

4.8 *Sands, deserts (inland and coastal)*

Sandy areas are those areas which have developed due to accumulation of sands, in coastal, riverine or inland areas. The Indian desert situated in the northwest occupies about 28.6 million ha area falling in Rajasthan, Gujarat and Punjab. Nearly 70% of the desert region is covered by wind eroded sandy soils, sands, loamy sand and sand dunes. India has also a long coastline of 5,600 km. Sand dunes occupy large areas, and during cyclone periods, there is blowing and shifting of sands causing damage to standing crops in the neighbouring areas.

4.9 *Barren rocky/stony area*

Substantial land still remains as barren (un-utilised) and stony/rocky in the country. Most of these areas are found in the mountainous regions of the country. The main problems in such regions are serious soil erosion, mining activities in stony/rocky areas, landslides, grazing, etc. According to an estimate, about 2.58 million ha(1.26% of geographical area) comes in this category.

4.10 *Snow cover and glaciers*

A large area of the Great Himalayas remain covered with snow and affected by glaciers. This category accounts for 0.46 million ha equivalent to 0.23% of the geographical area. The states viz. Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh have lands which belongs to this category.

5 Soil conservation and watershed management programmes

A number of programmes have been launched under the state and central sectors since the First Five－year－plan after independence. Under the state sector, the major programmes are aimed at providing treatments to agricultural lands for control of erosion and conservation of moisture, so that improved crop husbandry could be practiced. Specific measures have also been aimed to restore some of the degrade lands. Reclamation of alkali soils through application of amendments and better cropping pattern have also been in progress in the states of Punjab, Haryana and Uttar Pradesh. Under the central sector, the major programmes are as follows:

5.1 *Soil conservation in the catchments of river valley projects and flood prone rivers*

The Centrally Sponsored Scheme of River Valley Projects (RVP) is being implemented in 31 catchments spread over 18 states and flood prone (FPR) spread over in ten catchments in 9 states. The scheme aims at controlling the premature siltation of reservoirs, enhancing productivity of catchment areas through integrated planning of watersheds by appropriate measures such vegetative hedges, contour/graded bunding, agro-forestry, horticulture plantation, silvi-pasture developments, pasture development, afforestation, drainage line treatments, water harvesting structures percolation tanks, sediments detention dams, etc., covering all land uses, i.e. agricultural land, forest lands and wastelands based on scientific lines. Only "Very High" and "High" categories of watersheds identified by Soil and Land Use Survey of India (SLUSI) formerly known as All India Soil & Land Use Survey (AISLUS) are taken for treatment under the scheme. Till 2011－2012, about 7.76 million ha have been covered under RVP and FPR.

5.2 *Reclamation and development of alkali & acid soils*

The Centrally Sponsored Scheme of Reclamation and Development of Alkaline and Acid soil was launched during the 7th Five-year-plan and is continuing in the states of Haryana, Punjab and Uttar Pradesh. It aims to improve physical conditions and productivity status of alkaline soils for restoring crop production. The major components include assured irrigation water on farm development works like land levelling, bunding and deep ploughing, community drainage systems, application of soil amendment, organic manure, etc. So far about 0.50 million ha has been covered. Till 2011－2012, about 0.89 million ha area under this scheme has been covered.

5.3 *Watershed Development Project in shifting cultivation areas*

The scheme for watershed development in shifting cultivation areas was launched during 1987 – 1988 covering all seven states of the north eastern region and in the states of Andhra Pradesh and Orissa with 100% central assistance. The scheme aimed of 25, 000 Jhumia families by appropriate measures of soil conservation and watershed management in affected areas. These measures have helped in stabilizing the affected areas. The area covered under this scheme till 2011 – 2012 is 0. 59 million ha.

5.4 *National Watershed Development Project for Rainfed Areas* (*NWDPRA*)

The scheme of National Watershed Development Project for Rainfed Areas (NWDPRA) was launched in 1990 – 1991 in 25 states and 2 union territories based on twin concepts of integrated watershed management and sustainable farming systems. The scheme of NWDPRA has been subsumed under the Scheme for Macro Management of Agriculture (MMA) from 2000 – 2001. At present, this scheme is being implemented in 28 states and 2 union territories. Till 2011 – 2012, an area of 10. 86 million ha has been developed.

5.5 *Drought Prone Area Programme* (*DPAP*) *and Desert Development Programme* (*DDP*)

Drought Prone Area Programme (DPAP), Desert Development Programme (DDP) and food for work programme were initiated in 1972 – 1973. These programmes adopted the watershed approach in 1987. An area of 15. 2 million ha under DPAP and 9. 0 million ha under DDP were covered since inception to 2011 – 2012.

5.6 *Integrated Wasteland Development Project*

The Integrated Wasteland Development Projects Scheme (IWDP) taken up by the National Wasteland Development Board in 1989 also aimed at developing wastelands on a watershed basis. An area of 10. 2 million ha was covered under IWDP since inception to 2011 – 2012.

5.7 *Externally funded projects*

In addition to national watershed programmes, various watershed programmes have been under implementation through external funding agencies such as the World Bank, SDC, DANIDA, DFID and the KFW. An area of 0. 5 million ha covered under EAPs. The scheme wise progress on degraded lands developed under various watershed programmes, since inception upto XI (2011 – 2012) Plan is at Annexure-Ⅱ.

6 Constraints to more optimal utilization of resources and proposed future strategies

While it is evident that the national and externally aided projects have achieved significant results in the area of watershed management for sustainable agricultural development in both potential and problematic rainfed areas, these projects, nonetheless, are still confronted with several constraints. Some of the strategies to address these constrains are as follows:

6.1 *Strengthening people's participation in watershed development*

People's participation and beneficiary involvement is mandated in almost all project designs but it has not been proved very significant in practice. Most interventions usually focus on the physical environment and upon measures to solve technical problems.

6.2 *Focus on appropriate technologies for watersheds*

Experience suggest that farmers' own innovations with low cost technologies contribute to increasing input efficiency and is a valuable resource. This local knowledge, reposed with farm households and communities in rainfed areas includes indigenous or traditional knowledge.

6.3 *Research aspect of watershed technology and management*

In the field of agricultural research, the most spectacular successes have been in evolving high yielding varieties of wheat and rice. There is need for greater research in rainfed crops as well as in watershed technology. The farming systems approach needs to be followed both for technology generation and dissemination for rainfed regions.

6.4 *Resource mobilization for watershed development*

There is need for a much larger and expanded programme in Watershed Development. The 65 million ha of rainfed areas which will need to be treated as estimated in the 25 year Perspective Plan has a very long gestation

period and will require heavy investments. Resources for such an expanded programme will be mobilized largely through public funds.

6.5 *Capacity building and human resource development*

There is a far greater need for capacity building and human resource development in rainfed areas than envisaged hitherto. Community of watershed users should be provided with training and taken on exposure visits to successful watershed projects.

6.6 *Financial sustainability of projects*

Once the project has ended, the maintenance of community assets becomes the responsibility of the watershed community. A corpus fund is provided into the watershed community bank account as a revolving fund. This fund needs to be periodically replenished by the beneficiaries. The self help groups organized as part of the project activities can also play a vital role in sustaining the activities. Recovering costs of the planting material developed in the composite nurseries is also a means of making the project financially viable.

6.7 *Monitoring evaluation and impact assessment*

A concurrent monitoring and evaluation system through independent agencies in the field will improve the quality of feedback regarding programme.

6.8 *Strengthening linkages between conservation and production systems*

There is a need for dovetailing of existing production programmes of both the National and State levels in agriculture, horticulture and marketing with the watershed programme.

6.9 *Reclamation of other problem soils*

There is a need to address the problem soils and to prevent further degradation for enhancing productivity.

7 Monitoring and evaluation studies

For monitoring the effectiveness of soil conservation measures a few studies have been carried out by the external agencies which are not engaged in implementation such as the Administrative Staff College of India, Hyderabad, Agricultural Finance Corporation, Bombay and Indian Institute of Management, Ahmadabad in the catchments of Machkhund, Pochampad, Nizamsagar, Ukai, Matatilla and Sahibi. Similar studies have also been completed for the catchments of Sutlej, Beas, Ramganga, Kundah, Hirakud and Chambal—through the Administrative Staff College of India, Hyderabad and the Agro-Economic Research Centres at Jabalpur, Madras and Waltair. Some of the major benefits identified and quantified under evaluation studies are as follows:

7.1 *Productive and restorative benefits*

These include reduction in silt load in the streams of small watersheds, reduction of silt inflow in the reservoirs, restoration reclamation of degraded lands, etc. A few illustrative results are as follows:

- The increase in treatment of catchments areas has resulted in declining trend of sediment production in respect of Bhakra, Maithon, Panchet, Machkund, Hirakud, Matatilla Nizamsagar, Ukai, ramganga, Tawa and Tungabhadra reservoirs. The extent of decrease ranged from 49% in respect of Tawa to 22% in case of Bhakra.
- Silt load form small watersheds in the catchments of Chambal, Hirakud, Damodar-Barakar, Machkund, Mayurkashi, Mahi-Kadana and Tungbhadra have been studied applying moving average and progressive average series besides normal time series. The trend analysis made in respect of Chambal watersheds in Rajasthan showed decline in sediment production rates with increasing watershed treatments ranged from 0.62 to 1.65 million ha/100 sq. km. per year.
- In Odisha, nearly 37, 957 ha land could be rehabilitated by planting cashewnut and other trees, 1, 150 ha by planting sisal and 29, 343 ha protected by erosion control-cum-water harvesting structures in the 3 catchments of Hirakud.
- In Machkund Sileru catchment, about 37% of additional area could be brought under cultivation in Andhra Pradesh and 22% in Odisha.

7.2 *Water harvesting, ground water recharge and reuse of water*

Soil conservation structures generally have multiple objectives such as arresting soil erosion and encroachment of land by gullies and stream banks; intercepting eroded materials from depositing into streams and reservoirs; storing water to provide supplementary irrigation, recharge ground water and soil profile. Illustrative results are as follows:

- An area of 8, 595 ha in Hirakud and 1, 521 ha in Rengali Mandira in Odisha have been irrigated through thousands of small water harvesting structures.
- In the sample watersheds in Matatilla catchments, 390 trap-cum-bunds have stored rain water for supplementary irrigation in 21, 734 ha.
- Seventy six erosion control-cum-water harvesting structures in Damodar Barakar with aggregate micro-irrigation potential of 300 ha metre served for many intensive land husbandry operations at micro level including drought proofing.

7.3 *Protective benefits*

Some conservation programmes aim at increasing total bio-mass production of crops, fodder, forest and vegetation by bringing additional area under cultivation, improvement in cropping pattern/intensity, increase in fodder and forest produce, etc. Some of the achievements under the programme.

- Yield from agricultural land per ha increased by 0. 6 to 7. 3 quintals (100 kg) for paddy, minor millets, maize and groundnut in the catchments of Damodar-Barakar, Hirakud, Machkund Slieru, Matatilla, Nizamsagar and Ukai.
- Average yield of potato in Lower Bhawani catchment (Tamil Nadu) increased by 5. 11 tonne per ha (27. 2% increase) through bench terracing. Yields of maize grain and straw increased by 1. 34 quintals per ha(11. 3%) and 15. 7 tonne per ha(51%) respectively by contour bunding.
- In Nizamsagar catchment due to 6, 692 nala bunds (water cropping Harvesting structures), intensity increased by 13. 6% for Kharif and crop yield by 2. 7% to 11. 3%.
- The crease due to tree cover (canopy) in 7 completed watersheds of Matatilla catchment has been 34%.

7.4 *People's involvement in the programmes*

It has been realised that for sustainable development of degraded lands, involvement of people (landless and beneficiaries) is very essential. For the last five years, efforts have been made to institutionalize the organisation of community and beneficiaries and ensuring their involvement in planning, project formulation, implementation and maintenance. People's participation is focussed on consultation for identifying treatment measures, for securing consent and commitment for protection of common resources, training and orientation programmes for improved farming techniques and land uses. There have been successes of such organisation in the states of Maharashtra, Tamil Nadu, Karnataka, etc. It needs special thrust in future development plans.

8 Summary and conclusions

The soil conservation programmes implemented in the last 30 – 40 years in the country have generated vast experience for treatment of various types of degraded lands in the country. The package for the treatment of degraded lands need to be refined keeping in view the research findings with active involvement of beneficiaries. The research centres of Indian Council of Agricultural Research and State Agricultural Universities have evolved suitable packages for treatment suited to regional needs. A combination of research, experience and effective involvement of people would ensure success.

Annexure – I **Land use classification**

Sl. No.	Classification	Area in 2004 – 2005 (million ha)	Sl. No.	Classification	Area in 2004 – 2005 (million ha)
Ⅰ	Geographical Area	328. 23	4	Fallow Lands (A + B)	23. 20
Ⅱ	Reporting Area for Land Utilization	304. 87		A. Fallow land not current Fallow	9. 77
1	Forests	68. 39		B. Current Fallow	13. 53
2	Not available for cultivation (A + B)	41. 28	5	Net Area Sown (6-7)	142. 82
	A. Area under non-agricultural uses	22. 51	6	Gross Cropped Area	188. 15
	B. Barren & Uncultivable Land	18. 77	7	Area Sown more than once	45. 33
3	Other Uncultivated land (A + B + C)	29. 07	8	Cropping intensity	131. 73
	A. Permanent Pastures	11. 23	Ⅲ	Net Irrigated Area	53. 00
	B. Land Under Tree Crops	3. 63	Ⅳ	Gross Irrigated Area	70. 64
	C. Cultivable Waste	14. 21			

Annexure – Ⅱ Degraded lands developed under various watershed programmes, since inception upto X Plan, during XI Plan & since inception upto XI (2011 – 2012) Plan

(Area in lakh hectare and Expenditure in Rs. Crore)

S. No.	Name of Ministry/ Scheme and year of start	Progress upto X Plan		Progress during XI Plan (2007 – 2012)		Progress since inception upto XI (2011 – 2012) Plan	
		Area	Expr.	Area	Expr.	Area	Expr.
(A) Department of Agriculture & Cooperation, Ministry of Agriculture							
1	NWDPRA(1990 – 1991)	93. 92	3, 034. 66	12. 08	1, 065. 31	106. 00	4, 099. 97
2	RVP &FPR(1961-1962)	65. 30	2, 263. 07	10. 57	993. 67	75. 87	3, 256. 74
3	WDPSCA(1992 – 1993) **	3. 92	294. 18	1. 56	161. 62	5. 48	455. 79
4	RADAS (1985 – 1986)	7. 37	118. 51	1. 21	49. 35	8. 58	167. 86
5	WDF(1999 – 2000)	0. 59	26. 02	0. 00	0. 00	0. 59	26. 02
6	EAPs	18. 15	3, 778. 22	0. 00	0. 00	18. 15	3, 778. 22
Sub Total (A)		189. 25	9, 514. 65	25. 42	2, 269. 95	214. 67	11, 784. 60
(B) Department of Rural Development, Ministry of Rural Development							
1	DPAP(1973 – 1974)	137. 27	4, 842. 50	15. 38 *	1, 701. 58	152. 65	6, 544. 08
2	DDP(1977 – 1978)	78. 73	1, 949. 88	11. 35 *	1, 332. 23	90. 08	3, 282. 11
3	IWDP(1988 – 1989)	99. 56	2, 438. 15	2. 48 *	2, 020. 88	102. 04	4, 459. 03
4	EAPs	5. 00	292. 67	0. 00	0. 00	5. 00	292. 67
5	IWMP(2009 – 2010)	DPAP, DDP, & IWDP are merged under IWMP in 2009 – 2010		6. 63 *	1, 145. 13	6. 63	3, 864. 23
Sub Total (B)		320. 56	9, 523. 20	35. 84 *	6, 199. 82	356. 40	15, 723. 02
Total (A + B)		509. 81	19, 037. 85	307. 09	8, 469. 77	571. 07	27, 507. 62

* Includes targeted area of 35. 84 lakh hectare of 7, 167 number of projects (each project comprises of area of 500 hectare) being developed under watersheds programmes of MoRD.

** As per decision of Planning Commission, WDPSCA scheme has been closed wef 31st March, 2012.

Abbreviations

NWDPRA – National Watershed Development Project for Rainfed Area
RVP-FPR – River Valley Project & Flood Prone River
WDPSCA – Watershed Development Project in Shifting Cultivation Areas
RADAS – Reclamation and Development of Alkali & Acid Soils
WDF – Watershed Development Fund
EAPs – Externally Aided Projects
DPAP – Drought Prone Area Programme
DDP – Desert Development Programme
IWDP – Integrated Wasteland Development Project
IWMP – Integrated Watershed Management Programme
Source: Ministry of Agriculture (MOA) and Ministry of Rural Development (MoRD)

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