

Performance of Irrigation and Agricultural Sector in Orissa: An Analysis of Missing Links

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ABSTRACT

Irrigation and agricultural sector performance in Orissa and their influences on economic development of the state are studied. In Orissa, annual investment in irrigation sector is remained consistently high with an average annual outlay about Rs. 600 crores during the past years since 2000-01. Agricultural growth rate of the state is hovering around one percent. In spite of increase in irrigation potential over the years, food grain production in Orissa has showed slower growth; it is yet to reach the production level of 1989-90 (7.97 million tonnes) with 7.54 and 7.36 million tonnes of food grain production during 2001-02 and 2005-06, respectively. Although the expected growth rate of irrigated agriculture has not reflected; however, assured irrigation supply has increased rice area during dry season by 60%. An increase in rice area during dry season that is 100% irrigated has resulted in higher production and productivity in last couple of years.

Key words: Growth in irrigation and agriculture; Water resource; Cropping pattern and production;

Over the last four decades the policy agenda of agriculture has evolved significantly from an initial focus on increasing food production to concerns for the environment, poverty and stakeholders' participation. Orissa is endowed with rich water resources both surface and ground water resources. Due to inadequate exploitation of these resources for income generation activities, Orissa ranks very low among the Indian states in terms of per capita income with highest proportion of population (47%) living below the poverty line (*Economic survey 2001-02*). Sustainable increase in crop production through increased cropping intensity and productivity has the potential to change this existing scenario. Water, as an input to agriculture, is critical for it. Annual investment in irrigation sector in Orissa is remained consistently high as compared to many other states. Scaled against ten major Indian canal commands by output impact per ha of irrigated area, Mahanadi command of Orissa ranked last. Also in output per unit of water in the above canal commands, Orissa is bottom of the list with 14 kg per ha cm (*Selvarajan et al, 2001*). Therefore, the water resources management assumes greater importance.

Canals are the dominating source of irrigation. Rice dominated cropping pattern, low irrigation efficiency and

coverage are the unique features of Orissa agriculture. Agricultural growth in Orissa is averaged just over one percent per annum over the last two decades. The reforms related to the people's participation in irrigation management and drainage measures have been major focus since last decade to address the problems related to operation and maintenance of irrigation systems and low irrigation efficiency (*Tanwar, 1998*). Despite some initiatives since mid nineties, impact of the reforms has not been fully realized (*Paroda and Mruthyunjaya, 2000*). Hence, it is important to study the relative performance of irrigation and agriculture sector in Orissa to find out the missing link.

METHODOLOGY

In case of irrigation institutional arrangement in Orissa, the formal macro level institutions are related mostly to canal based surface irrigation systems, where as most of the informal micro level institutions are mainly associated with ground water and tank irrigation systems. The analyses of irrigation and agriculture sectors were carried out through literature review, secondary data collection and group discussions with the functionaries. Trends were set to understand the growth in irrigation and agriculture sectors over a period. The data were collected from Economic Survey of

different years, Orissa Agricultural Statistics, Reports of Department of Water Resources and Department of Agriculture, Government of Orissa and analysed to draw a comparative scenario revealing the mismatch.

RESULTS AND DISCUSSION

Water resource and irrigated area: The estimated water resources of Orissa state is one of the highest in the country that is in order of 11% of the country's total surface water resources. The state has 6.56 million ha of cultivable land out of which 5.9 million ha can be brought under assured irrigation through different sources. It has also been assessed that about 7 million ha m of surface water (from 11 river basins inside the state) can irrigate about 4.92 million ha of land and 1.9 million ha m of ground water can irrigate 0.88 million ha (0.23 million ha through tube-well and 0.65 million ha through river lift) of land (*Water and Land Management Institute. 1991*). Out of total potential of 4.92 million ha of land that can be irrigated through surface flow, major & medium irrigation projects account for 3.95 million ha leaving a balance of 0.97 million ha from minor (flow) irrigation schemes. The assessment of the potential of minor (flow) irrigation schemes reveal that in total 5882 number of schemes can be constructed to irrigate 0.987 million ha land in *kharif* and 0.192 million ha land in *rabi* season; however, 393 proposed schemes await investigation. It has been assessed that with available utilizable ground water resources, there is ultimate scope for 1017 thousand dug-wells, 28400 filter point tube-wells and 11000 to 12000 shallow, medium

and deep tube-wells. Dug wells and filter point tube wells are taken up in private sector. On the other hand Orissa Lift Irrigation Corporation ensures setting up public sector lift irrigation projects (tube-wells and river lift pump units).

As evident from Table 1, by the end of 10th Plan, net irrigation potential of 2.192 million ha has been created through major, medium and minor irrigation projects by using surface and ground water resources. In addition to the above, 0.567 million ha of net irrigation potential created through unconventional sources like dug-well, water harvesting structures, small check dams etc. Minor Irrigation (Flow) project has its own importance due to low gestation, less investment and quick benefit. By the end of March 2007, irrigation potential of 0.519 million ha has been created. At present, Minor Irrigation organization is looking after construction, operation & maintenance of Minor Irrigation (flow) projects having ayacut above 40 ha. The minor irrigation projects (MIPs) below 40 ha are looked after by Panchayati Raj Department. Therefore, some of the MIPs earlier constructed having ayacut below 40 ha were transferred to *Panchayati Raj* Department. Further, some old MIPs which cannot be revived at all are also deleted from the account. At the end of 10th plan total no. of MIPs in the state is 3646 out of which 2082 are fully functioning, 844 are partly derelict, 540 are completely derelict and 180 are ongoing projects. Minor (lift) irrigation potential as on March 2007 is 0.422 million ha with 18028 lift irrigation points out of which 9039 and 8989 are operable and defunct, respectively.

Table 1. Source wise net irrigation potential (area in million ha) in Orissa

Irrigation Source	Net irrigation potential	Irrigation potential created at end of 9th Plan (2001-02)	Irrigation potential created at end of 10th Plan (2006- 07)
Major & Medium	3.95	1.19	1.251
Minor (Flow)	0.97	0.456	0.519
Minor (Lift)	0.98	0.339	0.422
Other Sources		0.558	0.567
Total	59.0	2.543	2.759

Source: Economic Survey, Directorate of Economics & Statistics, Govt. of Orissa

In Orissa, gross irrigated area from surface irrigation sources accounts for about 65% of irrigation potential created. It is observed that irrigation potential of different irrigation sources is largely restricted to *kharif* season. *Rabi* irrigation potential is less than half of the *kharif* potential (Table 2). Minor irrigation is

mainly providing protective irrigation in *kharif*. Major & medium irrigation and lift irrigation sources have potential to provide irrigation in *rabi* season to more than 0.5 and 0.2 million ha area, respectively. Irrigation potential created under major & medium irrigation projects for *kharif* and *rabi* season during plan periods is shown in Fig. 1.

Table 2: Season wise irrigation potential (in thousand ha) by different irrigation sources

Year	Major & medium irrigation		Minor irrigation		Lift irrigation		Total irrigation	
	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>
1998-99	1118	470	439	070	324	194	1881	734
1999-00	1156	467	441	070	331	197	1928	734
2000-01	1176	500	450	070	336	202	1962	772
2001-02	1190	536	456	071	337	202	1983	809
2002-03	1205	536	464	071	347	208	2016	815
2004-05	1238	563	497	073	364	218	2099	852
2005-06	1250	563	519	071	421	234	2190	868

Source: Economic Survey of different years, Directorate of Economics & Statistics, Govt. of Orissa.

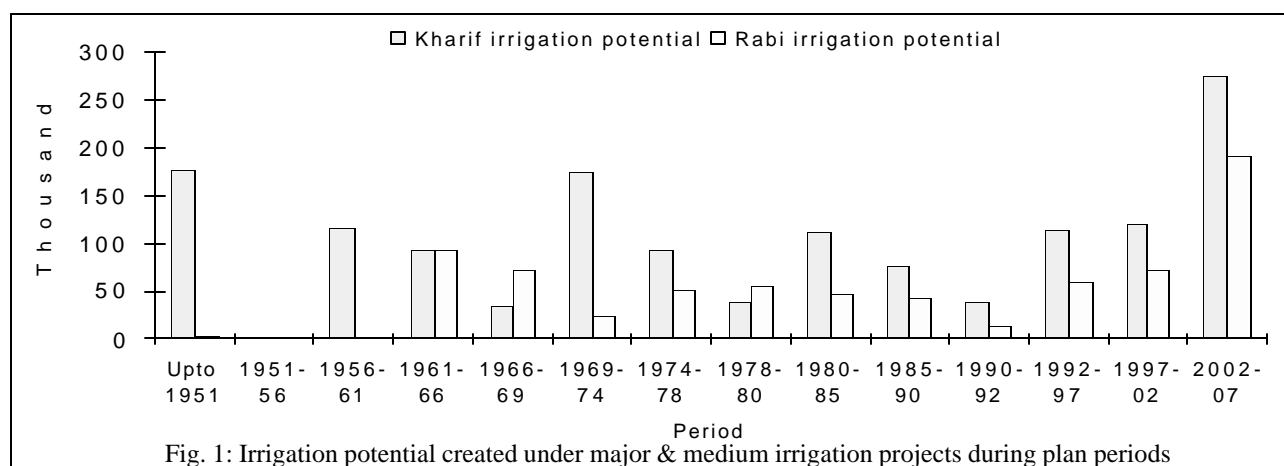


Fig. 1: Irrigation potential created under major & medium irrigation projects during plan periods

Table 3. Selected crop/season-wise irrigated area (in thousand ha) in Orissa

Crop	<i>Kharif</i>			<i>Rabi</i>			Total Area	Annual Total			% of irrigated area to total irrigated
	Total Area	Area Irrigated	%	Total Area	Area Irrigated	%		Total Area	Area Irrigated	% area irrigated	
Paddy	4154	1611	39	325	325	100	-	4479	1936	43	65.30
Other Cereals	400	36	9	30	29	97	-	430	65	15	2.19
Pulses	689	33	5	1191	105	9	-	1880	138	7	4.65
Oilseeds	454	21	5	370	91	25	-	824	112	14	3.78
Fibers	98	5	5	-	-	-	-	98	5	5	0.17
Vegetables	273	194	71	379	379	100	-	652	573	88	19.33
Sugarcane	-	-	-	37	37	100	-	37	37	100	1.25
Tobacco	-	-	-	4	4	100	-	4	4	100	0.13
Spices	72	023	32	74	72	97	-	146	95	65	3.20
Fruits	-	-	-	-	-	-	378	378	-	-	0.00
Total	6140	1923	31	2410	1042	43	378	8928	2965	33	100

Source: Directorate of Agriculture and Food Production, 2005-06, Govt. of Orissa.

Paddy is the predominant crop occupying 65% irrigated area to total irrigated area followed by vegetables (Table 3). During *kharif* about 6.1 million ha area is cultivated out of which about 1.9 million ha is irrigated (31%). Lack of assured irrigation compels majority of the farmers to keep their land fallow during *rabi* season. Only about 2.4 million ha area is put under cultivation during *rabi* season including the pulse crops

grown in half of the total cultivated area mostly under residual soil moisture condition. Only 1.042 million ha area receives irrigation.

Therefore, irrigation scenario in Orissa is mostly protective irrigation in *kharif* rather than productive irrigation in *rabi* season. However, irrigated area in *rabi* season has been doubled since the end of 9th plan (2001-02).

Gaps between the irrigation potential, created potential and utilized potential at the end of 10th plan was evident. It is mentioned below:

Cultivable area:	6.5 million ha
Net cultivated area:	6.1 million ha
Ultimate net irrigation potential:	5.9 million ha
Created net irrigation potential:	2.7 million ha
Net irrigated area:	1.9 million ha
Gross cultivated area:	8.9 million ha
Ultimate gross irrigation potential:	8.8 million ha
Created gross irrigation potential:	3.5 million ha
Gross irrigated area:	3.0 million ha

According to Orissa Agricultural Statistics (2006-07), the gap between potential created and utilized exists even at the end of 10th plan (Fig. 2).

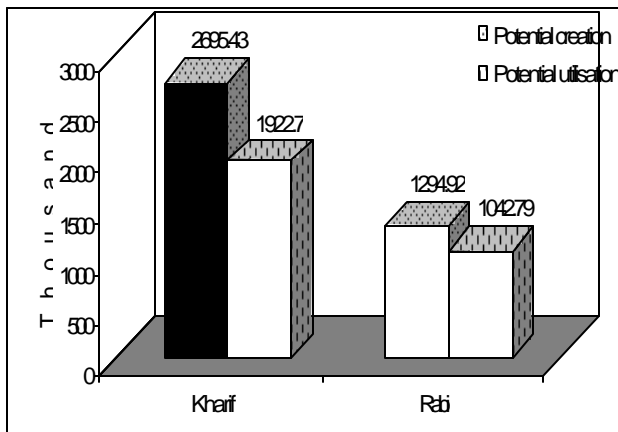


Fig. 2 Gap between irrigation potential creation and utilization

Despite annual expansion in the created potential and capital investments in irrigation sector in Orissa, the area irrigated by the major, medium and minor irrigation systems has been either stagnating or declining during 1990s (Selvarajan, 2001). In many irrigation commands, effective irrigated area has declined due to deterioration in the distribution infrastructure. Annual

investment in irrigation sector remained consistently high as compared to many other states during the past. Canals are the dominating source of irrigation in Orissa. The reason of low utilization of irrigation potential is attributed to many factors, but the main reason is attributed to defunct lift irrigation projects, minor irrigation projects and deterioration of distribution systems in the irrigated commands. Future growth in agriculture depends critically on better performance of irrigation infrastructure in the state.

Agricultural scenario : Agriculture plays a dominant role in the state of Orissa and provides direct and in-direct employment to around 65% of the total work force as per 2001 census. During recent years annual average food grain production is about 7.2 million tones, out of which more than 90% accounts for rice production. Paddy is principal food crop of the State. The crop distribution as % gross cropped areas are paddy (76.4%), pulses (12.2%), oilseeds (5.2%), cash crops like sugarcane, potato, chilly (2.0%) and others (4.2%). The agriculture in Orissa is characterized by low productivity due to traditional agricultural practices, in-adequate irrigation infrastructure, small size of holding, and low investment/ capital formation in agriculture. Nearly 60% of the cultivable land is rainfed and exposed to the vagaries of monsoons. Out of the total number of operational holding about 82% (4 million) is held by small and marginal farmers (as per last Agriculture Census 1995-96).

As evident from Fig. 3, rice-fallow is the dominating cropping pattern covering more than half of the net sown area. About 80% of net sown area remains fallow during dry season, which is largely due to lack of assured irrigation facility. Pulse crops are grown under residual

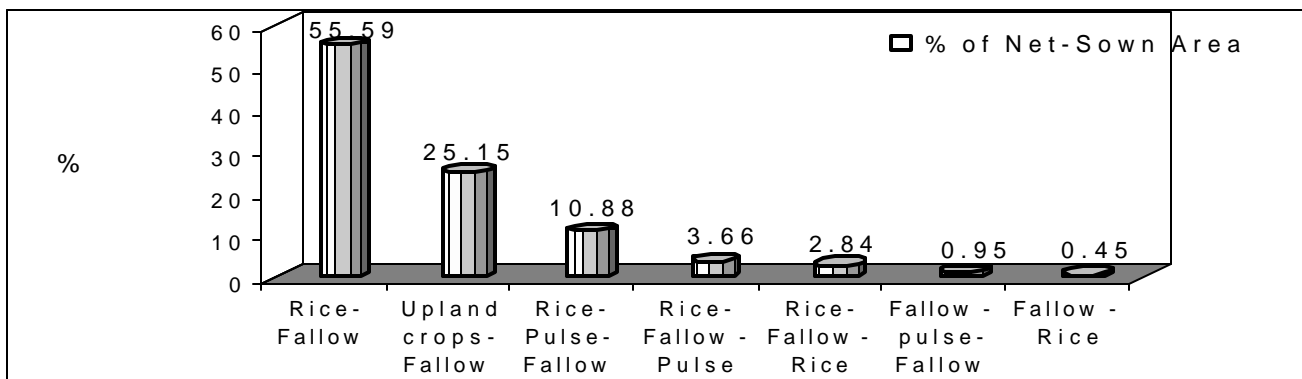


Fig. 3: Cropping pattern in Orissa

soil moisture condition to certain area that is about 10% of net sown area. Food grain production has been fluctuating over the years showing either stagnation or decline. In fact, production of food grain has not yet exceeded the level achieved during 1989-90. Food grain production growth has been negative in the nineties. Food grain production in Orissa has showed low or no growth for a long period with 7.54 and 7.36 million tones of food grain production on 2001-02 and 2005-06, respectively.

Share of rice crop's area in food grain area is fourth highest among the 16 major states at 82.9 %, against the national average of 35.8%. But rice productivity is lower at about 1.5 t per ha as compared to national average of 2.1 t per ha. Fertilizer consumption is also fourth lowest among the 16 major states at 40 kg per ha as compared to the national average of 90 kg per ha. Rice is the principal food crop occupying about 4.5 million ha (Table 4). The *kharif* paddy area is 4.2 million ha, which consists of 0.85 million ha of high land, 0.18

Table 4. Area, production and productivity of *kharif* and *rabi* rice in Orissa

Year	Area in million ha			Production in million tonnes			Productivity in tones per ha		
	<i>Kharif</i>	<i>Rabi</i>	Total	<i>Kharif</i>	<i>Rabi</i>	Total	<i>Kharif</i>	<i>Rabi</i>	Total
2002-03	4.09	0.18	4.27	2.82	0.42	3.24	690	2352	759
2003-04	4.25	0.25	4.50	6.20	0.53	6.73	1459	2112	1496
2004-05	4.20	0.29	4.49	5.88	0.65	6.53	1401	2230	1455
2005-06	4.15	0.33	4.48	6.25	0.71	6.96	1504	2193	1554
2006-07	4.18	0.30	4.48	6.24	0.75	6.99	1491	2500	1559

Source: Padhee (2007), Director, Directorate of Agriculture and Food Production, Govt. of Orissa

Table 5. Irrigation investment (Rs. in crore) during plan periods (1951-2007) in Orissa

Plan period	Investment made for major & medium irrigation projects	Investment made for minor (flow & lift) irrigation projects	Total investment
1st Plan (1951-56)	55.28	--	55.28
2nd Plan (1956-61)	20.00	1.65	21.65
3rd Plan (1961-66)	26.22	6.22	32.44
Annual Plans (1966-69)	20.44	7.95	28.39
4th Plan (1969-74)	20.89	18.88	39.77
5th Plan (1974-78)	70.63	31.00	101.63
Annual Plans (1978-80)	67.81	28.30	96.11
6th Plan (1980-85)	360.00	85.00	445.00
7th Plan (1985-90)	623.61	177.15	800.76
Annual Plans (1990-92)	404.74	103.50	508.24
8th Plan (1992-97)	2276.00	323.40	2599.40*
9th Plan (1997-02)	--	--	2382.59**
10th Plan (2002-07)	2334.02	427.54	2761.56***

* This amount is out of the total outlay of Rs. 3079.18crore under irrigation and flood control sector

** Provisional expenditure under irrigation and flood control sector

*** This amount is out of the total outlay of Rs. 4109.21 crore under irrigation and flood control sector

Source: Economic Survey of different years, Directorate of Economics & Statistics, Govt. of Orissa.

million ha of medium and 1.55 million ha of low land. The entire *rabi* rice area of 0.3 million ha is irrigated and covered by high yielding paddy where as only 36% of *kharif* paddy area is under irrigation.

According to an estimate unveiled in *Orissa State*

water Policy 2007, there is a gap in food demand and production. Average farm size, irrigation coverage and fertilizer consumption are all below the national average. The cumulative impact of these factors is low productivity; a per hectare yield of food grains significantly below the

national average. The gap between demand and production of cereals has been narrowed in recent years; however, it is stationary in case of pulses and oilseeds. Poor coverage of area under crop during *rabi* season due to lack of irrigation water availability has restricted the production of pulses and oilseed crops.

Comparative irrigation and agricultural growth with influence on economic development : Understandably water economy plays a critical role in the overall structure of state economy. Being a monsoon-dependent state, water resources availability in Orissa displays a wide variation across time and space. Notably a 3/4th of rainfall is received just in four months during June-September. In Orissa, annual investments in irrigation sector remained consistently high (Table 5).

Since 1950, public investment Rs. 88100 crore has been made to provide irrigation infrastructure with a 91 million ha irrigated potential. India's irrigation infrastructure is expending by 1.8 million ha of irrigation potential with a public outlay of Rs. 7000 crore/annum. In Orissa average annual outlay for irrigation sector was 619 crore for the triennium 2000'2. But, poor irrigation service often not matching with the crop water requirements over space and time, results in low productivity of crops and income to the irrigators/farmers. Resultant dissatisfaction coupled with weak institutional linkage leads to under assessment of demand for water rates as well as low recovery of whatever is assured. Progressive fall in the cost recovery increases revenue deficit causing adverse impact on operation and maintenance funding for irrigation systems led to fresher deterioration of its physical service.

Canals are the dominating source of irrigation. 30-60% of the canal command farmers don't get adequate and timely water supplies. Output/unit of water in Mahandi command of Orissa is reported 14 kg of ha-cm; second lowest productivity is of Jayakwadi command of Maharashtra (26 kg/ha-cm). The mismatch between growth of created potential and agriculture is evident. To meet the four percent growth rate of agriculture as targeted in 10th five-year plan, irrigated agriculture should have achieved growth rate of five percent assuming one percent growth rate for rainfed agriculture. Although the expected growth rate of irrigated agriculture has not reflected assuming that of rainfed agriculture is constant over the years, it is

heartening to find that the rice area during *rabi* season has increased by about 60% during past five years that is mainly because of assured irrigation. An increase in rice area during *rabi* season that is 100% irrigated has resulted in higher production and productivity in last couple of years. Therefore, utilization of irrigation potential has been reflecting enhanced agricultural production since recent years.

Orissa comprises 4.7% of India's landmass and with 36.7 million people (2001 census), 3.57% of the population of the country. Nearly 87% of its population lives in rural areas. Agriculture dominates Orissa's economy. A comparison of per capita real GSDP for Orissa and per capita real GDP for India reveals that India has outgrown Orissa and more importantly during 1990s the disparity has further widened. Per capita real output annual growth rate for all India over the period of 1980-81 to 1999-00 was 3.4% while that of Orissa over the same period was only 1.9%. There is a strong link between the poverty reduction and output growth. The link is strong in case of agricultural growth; therefore, to reduce the poverty in Orissa, it will be crucial to lift agricultural growth.

Orissa's growth over last two decades has been below the national average. Annual growth rate during 1980-81 to 1999-00 was 3.4% for all India and 1.9% for Orissa

The main reason for this slow growth is because of slow agricultural growth. The statistics show no growth at all for Orissa during the recent decades that is an alarming sign given the dependence of Orissa's economic growth on agriculture. In fact, the agricultural growth of Orissa during 1981-82 to 1985-86 was higher than the national average; however, during the subsequent periods, agricultural growth in Orissa has been substantially lower than the national average (Table 6).

Table 6. Annual average growth rate (%) of GSDP and agricultural sector

Year	Orissa		India	
	GSDP	Agri.	GSDP	Agri.
81-82 to 85-86	4.37	4.74	4.58	2.84
85-86 to 90-91	3.75	0.32	5.85	3.40
90-91 to 95-96	1.43	-1.72	5.34	3.24
95-96 to 99-00	4.33	-0.18	6.16	2.47
81-82 to 90-91	3.32	0.89	5.30	3.44
90-91 to 99-00	2.84	-0.98	5.58	2.59
2000-01 to 05-06	4.45	1.02	8.00	3.00

The volatility of agriculture in Orissa is mainly attributed to low irrigation coverage, an erratic climate (deviations of rainfall of 20% or more every third year for the last 40 years) and a very high degree of dependence of any state on a single crop (rice). Given the water intensive nature of rice cultivation, such reliance on it when neither nature nor irrigation can be depended on for water is risky indeed. Looking at recent years, agriculture output declined every year during 1990s except 1991/92, 1993/94 and 1997/98. In fact in the nineties, agricultural output has not exceeded its 1989-90 level, in real terms. Even a rebound year like 1997-98 failed to reach 1989/90 levels. Food grain production growth has also been negative in the nineties. Mismatch between the growth of water and agriculture sector reflects on the economic development.

Agriculture continues to be the mainstay of the state's economy. The agriculture alone provides direct and indirect employment to around 65 percent of the total workforce of the state as per 2001 census. Nevertheless, the sector is continued to be characterized by low productivity. Nearly 62 percent of the cultivable land is rainfed and exposed to the vagaries of the monsoon. The per capita availability of cultivated land, which was 0.39 ha in 1950-51, has declined to 0.17 ha in 2001-02. Out of the total number of operational

holdings of 3.966 million, small and marginal farmers hold 81.98 percent. Most of the small and marginal farmers do not have the means to make adequate investment in agriculture due to poverty. Although the contribution of agriculture to GSDP has significantly declined, the percentage of work force engaged in agriculture has remained somewhat unchanged. This implies that there has been an overcrowding in agriculture without any perceptible increase in production.

CONCLUSION

Agricultural growth holds the key to the overall development of Orissa state by way of creating employment, generating income, providing raw materials to the industrial sector and last but not the least ensuring self-reliance in food production and food security. However, the agricultural growth is slow as compared to growth in irrigation sector. The gap between potential created and potential utilised is to be bridged to provide the benefits to farmers. Irrigation is to be viewed as a service to the farmers for enhancing the farm production and income. The linkage between irrigation and agriculture functionaries needs to be strengthened to tap the potential and bring about improvement in farming, livelihood of farmers and state's economy.

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