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A Case Study on Economic Impacts of Water Resource Development for Irrigation in the Dang District

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Abstract:
Planning commission (2003) has ranked the Dang number one among 447 districts of India as the most backward district. The Dang district had 94.6 % of tribal population (Census, 2011). Out of that 79% falls in the BPL category. In the Dang district mainly 13 tribes are there out of two third of the population consist of Bhils and Kokana. Along with this, there are Kotwalia, Kathodi and Kocha who are belongs to Primitive Tribe Group (PTG). The Dang receives an average annual rainfall 2491 mm (Annual rainfall from 1991 to 2012), highest 4613 mm and lowest 1431mm. The rainfall is spread over a period of about 120 days, from 15 June to 15 October.

Main source of irrigation is from well and group well, lift irrigation, mobile pump set and only 6% have flow irrigation. The Dang district Irrigated farmers had different source of income: Agriculture and other then agriculture: Total Net income from agriculture is 52% while from other source it was 48%. There is gross income of Rs. 86881 per household, out of that Rs. 44922 from agriculture, Rs.7059 from labour (migration). Almost 65% irrigated farmers had pada (Male Buffalo) for doing farming. They are very fond of television so 47% farmers had that. Only 12% farmers had bicycle due to undulating terrain. For traveling and transport 35% farmers had motor cycle, 6% had jeep and 6% had tractor. This is due to economic impact of irrigation.

Keywords: *Economic impact, Irrigation, The Dang district, Tribal, Water*

1. Introduction of the Dang district

The Dang district is tribal dominated district having 94 percent tribal community. In this paper tribal, water, irrigation and the Dang district had discuss in details. Ahwa is the administrative headquarters of the Dang district. The Dang district has three blocks Ahwa, Vaghai and Subir. The Dang district has 311 villages. According to Census (2011) the Dang has an area of 1764 km² and total population of 2, 28,291 amongst these 2, 16,073 are tribal that constitutes around 94.6% of the total population. The population growth rate over the decade 2001-2011 was 21.44% and a literacy rate of 76.8 %.

The majority tribes found are Bhil, Konkana , Varli, Kotwalia, Kathodi and Gamit. Prior to the advent of British rule the Bhil ruled the Dang (4 chiefs and 10 Naiks). In the first census of 1872, there were 7426 Bhil, 6517 Konkana, 2491 Varli and 302 Gamit counted. The Bhils have historically been residing in the Dang, whereas the other tribes came to the Dang in search of their livelihood. Tribes in Dang are acquainted with various languages however they speak Dangi, the local dialect. Dangi is a mixer of Gujarati, Marathi and Hindi languages.

Planning commission (2003) has ranked the Dang number one among 447 districts of India as the most backward district. They have used index with three parameters: 1) density of people belonging to Scheduled Castes and Scheduled Tribes, 2) agricultural wages and 3) output per agricultural worker. Government of Gujarat had also ranked it's blocks under backwardness to focus development effort; in 1966 out of most backward 25 blocks of Gujarat Dang ranked 8th, by Dr. I.G.Patel committee in 1984 Dang ranked 8th from 184 blocks of Gujarat, by Cowlagi committee in 2005, Dang ranked 9th from 225 blocks of Gujarat.

Almost 94.65 percentage people are tribal and of these 85 percentage people are depends upon agriculture for their livelihood. Out of that 74% falls in the BPL category. In this paper various ways of irrigation practice in the Dang district discussed and try to find out the economic impact on tribal people.

Chart. 1 Location: The Dang district, Gujarat State, India.

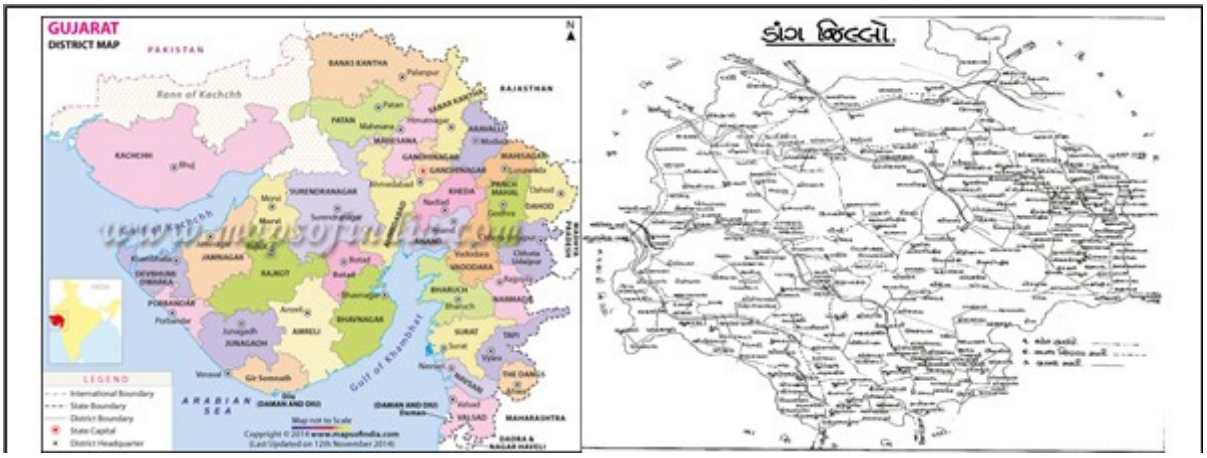


Table 1. Population in Dang (Census (2011):

Population density in the Dang		
Year	**Total population**	**Density (per sq.km.)**
1961	75652	43
1971	98784	56
1981	113664	64
1991	144091	83
2001	186729	108
2011	228291	129

The district comprises of 311 villages, 70 Panchayats. The villages are small in size. The average population of the villages is 600 persons and the village consists on an average of 117 households
In the Dang district mainly 13 tribes are there out of two third of the population consist of Bhils and Kokana. Along with this, there are Kotwalia, Kathodi and Kocha who are belongs to Primitive Tribe Group (PTG).

Table 2. Tribal groups of the Dang

Tribe	Percentage of population
Bhil	26 %
Konkana	51 %
Varli	15 %
Others (Kotwalia, Kathodi, Kocha etc.)	8 %

Cultivable land at the Dang district: In the Dang district average landholding per household is 1.31 hectare (Census, 2011). It was 1.58 hectare and an average land holding per cultivator was 1.07

hectare. (Census, 2001) The landholdings are small and hardly sufficient to support a livelihood of household.

Table 3. Demography of the Dang district: (Census, 2011)

Total population	228291
Males	113821
Females	114470
Sex ratio (Number of females per 1000 males)	1006
House holds	44699
BPL population (%)	79
Literacy rate (%)	77
Total worker population	118257
Main cultivator population person	54775
No of person in family	5.11

Looking towards the data, Dang is one of the poor districts having 79% population below poverty line and average family size is around 5.11 persons.

Table 4. Analysis of total population and tribal population with various levels

State/Country	Total population	ST population	ST population % of total population
India	1210569573	104545716	8.6
Gujarat	60439692	8917174	14.8
The Dang	228291	216073	94.6

In India almost 8.6% is schedule tribe population, while in Gujarat it is 14.8% and in the Dang district it is 94.6% (Census, 2011).

Table -5 Growth of Population: India, Gujarat and the Dang

Census Year	Population		
	India	Gujarat	The Dang
1901	23,83,96,327	90,94,748	18,333
1911	25,20,93,390	98,03,587	28,926
1921	25,13,21,213	1,01,74,989	24,142
1931	27,89,77,238	1,14,89,828	33,495
1941	31,86,60,580	1,37,01,551	40,236
1951	36,10,88,090	1,62,62,657	47,282
1961	43,92,34,771	2,06,33,350	71,567
1971	54,81,59,652	2,66,97,475	94,185
1981	68,33,29,097	3,40,85,799	1,13,664
1991	84,64,21,039	4,13,09,582	1,44,091
2001	1,02,87,37,436	5,06,71,017	1,86,729
2011	1,21,05,69,573	6,04,39,692	2,28,291

(Census 2011)

Looking towards the 110 years of the population trend at Country, State and The Dang district level, the trend is increasing in nature. But surprisingly the India population increased by 5.1 times, Gujarat population by 6.6 times while the Dang district population by 12.5 times. India population density is 382, Gujarat is 308 while in the Dang is 129.

Table 6. Land use classification in the Dang district -(Area in hectare.) (CEE- 2006)

Sr. No.	Land Use	Area in Hectare
1	Total geographical area	172,356
2	Forest area	101,329
6	Cultivable land	57,843
7	Agricultural land	53,949
8	Uncultivable area	3894
9	Total area under irrigation	7500
4	Permanent pasture and other grazing land	262
5	Waste land	1524

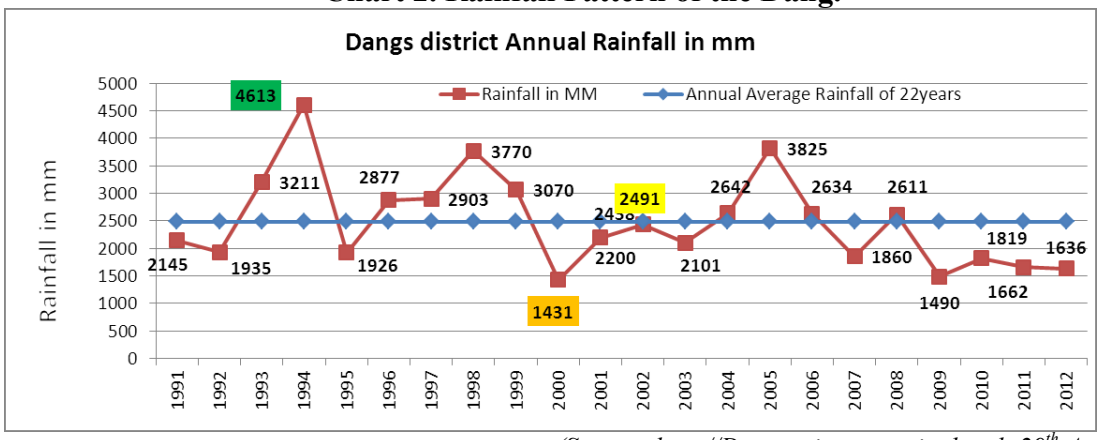
1.1 Water

Water is important for livelihood. Drinking water is critical during summer even though good rains (average annual rainfall 2491 mm) in monsoon. Dang is hilly and undulating terrain. Due to high runoff and basalt rock formation water recharge is negligible. Depth of river (from bank to bottom of river) is varies in some area from 2 to 3 meters and some of the area from 150 to 200 meters. Due to heavy rainfall in monsoon, high runoff the intensity of the flood is very high.

1.2 Water resources of The Dang

There are four major rivers in the Dang namely Ambika, Gira, Khapri and Purna. All four rivers originate from the north-eastern part of the Dang and flow towards the south-west. The drainage of the rivers mostly follows the south west direction. The Gira ultimately meet Purna and the Khapri ultimately meet Ambika. The Ambika and Purna meet the Arabian Sea. The Gira and Khapri are major tributaries of Purna and Ambika respectively. In spite of high rainfall and many rivulets there is crisis of water during summer both for irrigation and drinking water due to an undulating terrain. The lack of adequate water storage, ground water recharges and water management are the main reasons for this lack of water. The importance of water act as catalyst for the development of the Dang.

Chart 2. Rainfall Pattern of the Dang.



(Source: http://Dang.gujarat.gov.in dated: 29th August, 2013)

The Dang receives an average annual rainfall 2491 mm (Annual rainfall from 1991 to 2012), highest 4613 mm and lowest 1431mm. The rainfall is spread over a period of about 120 days, from 15 June to 15 October. Almost 85 % of the population is dependent on agriculture for their livelihood, which makes this part of the population even more dependent on water. Even though the Dang has a high annual rainfall 2491mm compared with the average rainfall of the whole of Gujarat state is 853 mm.

The lack of assertive planning, implementation and management of watershed work for harvest, conserve and recharge water ultimately Dang suffer from water scarcity during summer. Water plays important role in livelihood of Dang people.

2. Irrigation in the Dang district

The average landholding of the household is 1.3 hectare. (Census, 2011). The Dang is predominantly dependent on rain fed agriculture and has the lowest percentage of irrigated land in Gujarat.

Table-7 Status of Water Resource Development at the Dang district

No of Villages	Numbers	311
Check dams	Numbers	877
	Irrigation Potential (In hectare)	3846
Tanks	Numbers	300
	Irrigation Potential (In hectare)	4482
Lift Irrigation	Numbers	65
	Irrigation Potential (In hectare)	1370
Wells	Numbers	152
	Irrigation Potential (In hectare)	745
Small Lift irrigation on Wells	Numbers	86
	Irrigation Potential (In hectare)	547
Total Irrigation Potential (In Hectare)	Irrigation Potential (In hectare)	10990

(Source: The Dang, Panchayat Irrigation, Government of Gujarat, 2012)

From the record of the Panchayat Irrigation, the Dang district had mention that there was 10990 hectare irrigation potential was created. This irrigation potential created by constructing check dams, tanks and wells. Diesel/ kerosene or electric motor will able to lift water from these sources and irrigate the field. Due to hilly- undulating terrain and forest area there is no canal irrigation development take place.

The rolling and very steeply sloped terrain in the Dang limits the development of surface water harvesting sources. Due to typical geological formation of basal rock and high runoff limiting the ground water recharge. Currently check dams and check walls, followed by a limited opportunity for the creation of ponds harvest surface water.

Large numbers of check dams and check walls have been constructed in the recent past as part of various employment generation and water harvesting schemes and programmes of the government. For communities the main benefit of the creation of check dams mostly has been the amount of labour generated. Check dams and check walls based in gullies have served farmers to create more fertile land, which is an important opportunity given the small landholdings per household in the Dang. Check dams and check walls have also served to meet the water requirement for domestic and irrigation use, but only in a limited way. There are three types of irrigation practice exist in the Dang, i) individual own and do irrigation, ii) individual own and group of people do irrigation, iii) group of people own and do irrigation. Irrigation facilities can enhanced to provide secure livelihoods to the community and to overcome the uncertainties of monsoon

Table 8. Density of population

Density (No of person per Square Kilometre Area)	
Country	**Year 2011**
India	382
Gujarat	308
The Dang	129
Bihar	1,102
Delhi	11,297

(Census, 2011)

India density is 382, Gujarat is 308 while in the Dang is 129. The Dang is less density because of 65 percent area under forest and undulating land. It is also far away from the state capital. It is on the boarder of the Gujarat and Maharashtra.

Table 9. Sex ratio

Sex Ratio (Females per 1000 Males)	
Country	**Year 2011**
India	940
Gujarat	918
The Dang	1006
Kerala	1084
USA	1026
Australia	1011
World	984

India had sex ratio 940 while Gujarat had 918 which is lower than national sex ratio. Kerala had 1084 while The Dang had 1006 which is better than Gujarat State and National sex ratio. The World sex ratio was 984 while USA had 1026 and Australia had 1011.

In the Gujarat State census 2011 data shows that Dohad- 17.73%, Vadodara- 12.9% , Valsad- 10.12% and Surat 9.61% of the ST population of the state ST population. The Dang district had 94.65% ST population of the district total population. Work participation rate 2011 for the Dang is 52.54%.

The Dang has recorded the highest 94.65 percent of its population as Scheduled Tribe, although its' share is small 2.3 per cent of the total ST population in the state. Besides The Dang district, Narmada (81.55 %), Dohad (74.32 %) and Valsad (52.93 %) have recorded more than half of the total population of the district as Scheduled Tribe. Amreli, Bhavnagar, Rajkot, Jamnagar, Mahesana, Junagadh, and Surendranagar have ST population less than one per cent of the district's total population.

Table 10. Gujarat State S T Population by Major STs. (2001 Census)

Sr. No.	Name of the Scheduled Tribe	Total Population	Proportion to the total ST population (%)
1	Bhil	3441945	46
2	Dubla	596865	8
3	Dhodia	589108	8
4	Rathawa	535284	7
5	Naikda	393024	5
6	Gamit	354362	5
7	Kokna	329496	4
8	Chaudhri	282392	4
9	Varli	255271	3
10	Dhanka	252637	3
11	Patelia	109390	1
12	Koli	95655	1
13	Others STs	245731	3
All Scheduled Tribes		7481160	100

The Bhil represents majority of the total ST population of the state (46%). Dubla (8%), Dhodia (7.9%), Rathawa (7.2%) and Naikda (5.3%) are the other major STs each having a sizable population. Along

with Bhil they constitute about 74.3 per cent of the state's total ST population. Gamit, Kokna, Chaudhri, Varli, and Dhanka account for 3-4 per cent each of state's ST population.

3. Economic Impact

The impacts of irrigation on poverty reduction are both direct and indirect. Direct benefits of irrigation include higher farm productivity through crop yield increases and diversification of cropping patterns and crop technologies. These in turn result in higher household income, consumption and employment. To the extent that irrigation results in higher marketed surpluses and increased employment opportunities, it also indirectly benefits the landless through higher wages). Finally irrigation may lead to lower food price which is especially beneficial to the poor since they spend a disproportionally large share of their income on food. (World Bank, 2012)

Access to irrigation water is widely credited to be one of the major underlying factors for the substantial productivity gains obtained during the Green Revolution in Asia in the 1960s and 1970s (Pingali et al. 1997; Bhattarai et al. 2002)

Crop yields everywhere in the developing world are consistently higher in irrigated areas than in rain fed areas (Rosegrant and Perez 1997; Ringler et al. 2000; Hussain and Hanjra 2004; Lipton et al. 2005).

About 17% of global agricultural land is irrigated contributing about 40% to the world's production of cereal crops (WCD 2000).

3.1 India

A strong correlation between irrigation and poverty was identified in almost all case studies. Poverty incidences are 20-30 percent less in settings with irrigation compared to those without irrigation. Irrigation is positively correlated with agricultural productivity as both annual gross revenue per acre of land and annual net revenue per acre of land are lowest for rain fed plots in almost all states.7 According to the NCAER data, the national average of annual gross revenue per acre of land is 15,415 Rupees for rain fed plots, significantly below the 22,376 Rupees, 21,143 Rupees and 24,960 Rupees, respectively for plots with private irrigation, plots with public irrigation and plots with both types of irrigation. (World Bank, 2012)

In terms of percentage increases, compared to rain fed plots, annual gross revenues per acre for plots with access to public irrigation systems, for plots with private irrigation only, and for plots with both public and private irrigation, respectively are 51 percent, 56 per cent, and 69 percent higher than that for plots without any irrigation access. There are two potential avenues through which irrigation increases annual crop revenues. First, irrigation increases annual revenue per acre of land through its direct positive effect on total crop production in a given cropping season. Second, irrigation may allow a plot to be planted for an extra crop season for a given year.

3.2 Irrigation and input use

It is widely argued that irrigation tends to increase the responsiveness of agricultural output to inputs and therefore is likely to be positively correlated with input use intensity. The descriptive evidence based on the NCAER data tends to support this argument. At a national average of Rs. 5,186 (accounting for 1/3 of total revenue), the annual cost of production per acre for rain fed plots is the lowest among all the plots in most states. In spite of the higher annual cost of irrigated agriculture compared to rain fed agricultural production, the higher annual net revenue of irrigated plots implies that the more intensive input use yields net positive returns.

A comprehensive review of World Bank-assisted irrigation projects during 1994-2004 (IEG 2006) and a review of irrigation projects in Asia that received assistance from the International Water

Management Institute (ADB/IWMI 2005) confirmed the significant role that irrigation plays in poverty reduction and economic growth.

Planning commission (2003) has ranked the Dang number one among 447 districts of India as the most backward district. They have used index with three parameters: 1) density of people belonging to Scheduled Castes and Scheduled Tribes, 2) agricultural wages and 3) output per agricultural worker. Government of Gujarat had also ranked it's blocks under backwardness to focus development effort; in 1966 out of most backward 25 blocks of Gujarat Dang ranked 8th, by Dr. I.G.Patel committee in 1984 Dang ranked 8th from 184 blocks of Gujarat, by Cowlagi committee in 2005, Dang ranked 9th from 225 blocks of Gujarat.

Almost 95 percentage people are tribal and of these 85 percentage people are depends upon agriculture for their livelihood. Researcher had identified that water can play major role to enhance the livelihood of poor tribal people in Dang district. Researcher has worked for more than 26 years in the area of rural water resource development in tribal area. In this study documents various ways of irrigation practice in the Dang district and try to find out the economic impact on tribal people of the Dang district.

Almost 85 % of the population is dependent on agriculture for their livelihood, which makes this part of the population even more dependent on water. Even though the Dang has a high annual rainfall 2491mm compared with the average rainfall of the whole of Gujarat state is 853 mm. The lack of assertive planning, implementation and management of watershed work for conserve, recharge and harvest rainwater ultimately the Dang suffer from water scarcity during summer. Water can play very important role in enhancing livelihood of the Dang people.

3.3 Crops and productivity

Agriculture is mainly rain fed, and irrigation is marginal among villages in the Dang. The majority of the villages do not have any land under irrigation. The cropping pattern of the Dang is conditioned to rain fed nature of agriculture and lack of irrigation. Most of the cultivation is being done during monsoon and the farmers take only one crop. Only one third of the villages cultivate a winter crop. The main crops during winter are chickpeas and pigeon pea (tuver). In summer on a marginal scale water melon is cultivated on the river beds. Of the total land currently used for agriculture 14% is irrigated. (CEE 2005). Open wells and rivers are the sources of irrigation, most frequently used. Out of the crops that are grown during monsoon rice is the most important crop in the Dang occupying 40 per cent of the total area. Other crops like ragi, varai and jovar are grown in small areas comprising six, three and four percent of the total cultivated land during monsoon.

3.3.1 Comparing productivity and cropping pattern of Gujarat State with the Dang district

Table 12. Gujarat state and The Dang agriculture product data

Area in 00 Ha., Production in 00 M.T., Yield in Kg/Ha												
Name of crop/ District/ State	2008-09			2009-10			2010-11			Average		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
RICE IRRIGATED												
DANG	0	0	0	0	0	0	0	0	0	0	0	0
Gujarat State	4518	9155	2026	4121	10038	2436	4667	11020	2361	4435	10071	2271
RICE UNIRRIGATED												
DANG	179	227	1270	158	174	1101	180	234	1298	172	212	1228
GUJARAT STATE	2703	3100	1147	2464	2246	912	2616	3218	1230	2594	2855	1100

Area in 00 Ha., Production in 00 M.T., Yield in Kg/Ha												
Name of crop/ District/ State	2008-09			2009-10			2010-11			Average		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
KHARIF JOWAR												
DANG	36	50	1405	23	32	1401	23	24	1043	27	35	1293
GUJARAT STATE	1242	1653	1331	1118	1184	1059	764	807	1056	1041	1215	1166
KHARIF MAIZE												
DANG	31	44	1439	33	32	964	27	44	1638	30	40	1319
GUJARAT STATE	4189	6026	1439	4117	3966	963	4225	6921	1638	4177	5638	1350
KHARIF RAGI												
DANG	97	111	1140	50	41	819	104	70	678	84	74	884
GUJARAT STATE	194	200	1031	147	110	748	200	139	695	180	150	830
OTHER KHARIF CEREALS												
DANG	47	26	552	15	9	610	23	14	627	28	16	581
GUJARAT STATE	126	71	563	263	159	605	80	51	634	156	94	598
KHARIF TUR												
DANG	40	42	1035	37	32	861	29	12	417	35	29	811
GUJARAT STATE	2661	2627	987	2666	2415	906	2767	2729	986	2698	2590	960
GRAM												
DANG	12	12	1008	14	13	944	15	21	1380	14	15	1122
GUJARAT STATE	1754	1768	1008	1322	1249	945	1755	1998	1138	1610	1672	1038
TOTAL UDAD												
DANG	42	31	733	46	33	727	53	35	660	47	33	702
GUJARAT STATE	955	641	671	979	505	516	1091	733	672	1008	626	621
KHARIF GROUNDNUT												
DANG	46	63	1369	43	40	926	33	61	1864	41	55	1344
GUJARAT STATE	17954	24560	1368	17576	16332	929	16912	31591	1868	17481	24161	1382
SUMMER GROUNDNUT												
DANG	6	11	1829	6	12	1902	7	12	1777	6	12	1842
Gujarat State	1120	2049	1829	650	1237	1903	2305	4159	1804	1358	2482	1827

(Source: Directorate of Agriculture, Government of Gujarat, (2011). Gujarat State District-wise Area, Production and Yield of Important Food & Non-food Crops in Gujarat State (Year: 2008-09, 2009-10 and 2010-11)

Rice is main crop of the Dang area and staple for the Dangi people. The irrigated rice productivity state average is 2271kg/ hectare while unirrigated rice productivity in the Dang is 1228 kg/hectare and the state average is 1100 kg/ hectare. If irrigation is available to the Dang then they can also go for irrigated rice and get better yield. Same for the Groundnut crop, kharif groundnut average yield of the state is 1382 kg/hectare while the Dang is 1344 kg/hectare. But summer groundnut state average is 1827 kg/hectare. Ragi productivity in the Dang is 884 kg/hectare and Gujarat state is 830kg/hectare. Udad productivity in the Dang is 702 kg/hectare and Gujarat state is 621kg/hectare. Both Ragi and Udad productivity is higher in the Dang than the Gujarat State average productivity.

4. Findings of Pilot Study of the Dang District

There was two type of respondent in this study, 53% belongs to Kokana and 47% belongs to Bhill tribe. There are various methods adopted by these tribes for irrigation, it describe as follows. Respondent education varies from 3rd standard to graduate, average education is 9th standard.

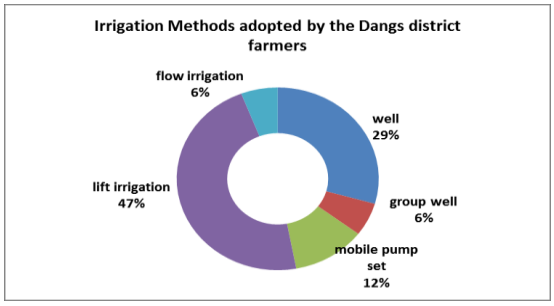


Chart: 3 Irrigation Methods

Main source of irrigation is from well and group well, lift irrigation, mobile pump set and only 6% have flow irrigation.

There was seasonal migration from irrigated farmers house hold to had additional income.

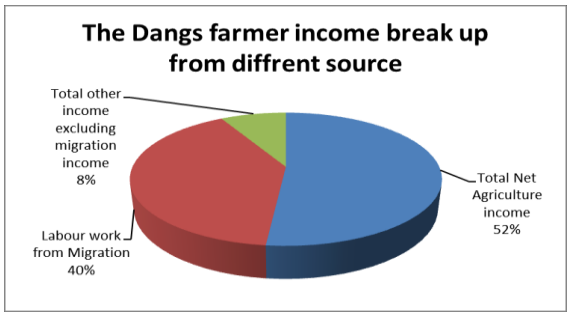


Chart-4. Sour of Income

The Dang district Irrigated farmers had different source of income: Agriculture and other then agriculture: Total Net income from agriculture is 52% while from other source it was 48%.

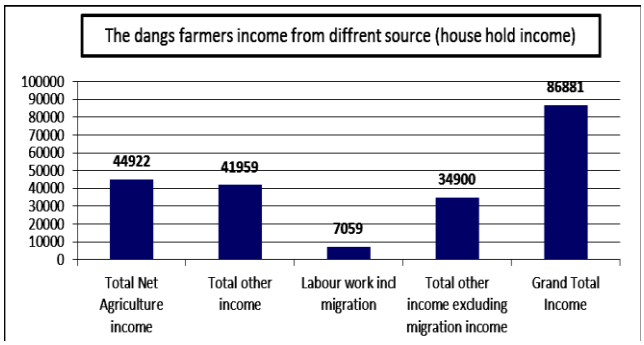


Chart 6.Irrigated farmers' income per household from different source

The above graph we can see that there are considerable income from the dairy and services. The dairy is depends on the irrigated agriculture (fodder) and irrigated agriculture need fertilizer (dung).

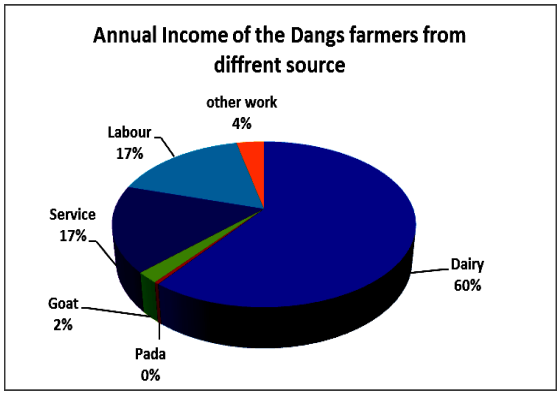
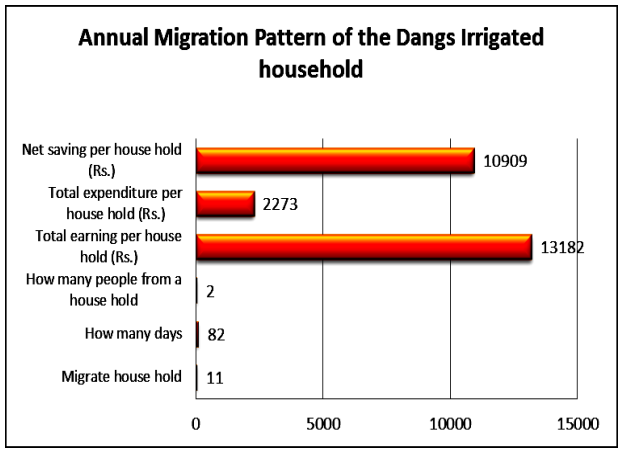


Chart 5. Other income (Excluding agriculture income)

There is gross income of Rs. 86881 per household, out of that Rs. 44922 from agriculture, Rs.7059 from labour (migration). Detail study had conducted of 11 households. There was Rs. 10909 had saved annually per household from labour work during migration. From each household two family migrate annually. Each household migrate average 82 annually. During this period they had spent average Rs.2273.



Almost 65% irrigated farmers had pada (Male Buffalo) for doing farming. They are very fond of television so 47% farmers had that. Only 12% farmers had bicycle due to undulating terrain. For traveling and transport 35% farmers had motor cycle, 6% had jeep and 6% had tractor. This is due to economic impact of irrigation. Irrigated farmer had one house having three rooms, on and average one pakka room and two kacha rooms.

5. Conclusion

The Dang had undulating terrain and have four major rivers namely Ambika, Gira, Khapri and Purna. The Dang receives an average annual rainfall 2491 mm (Annual rainfall from 1991 to 2012), highest 4613

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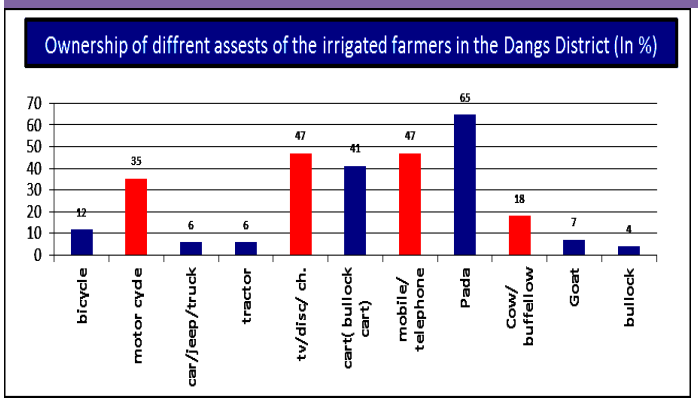

Chart 8. Irrigated farmers own different assets which are describe as follows

mm and lowest 1431mm. The rainfall is spread over a period of about 120 days, from 15 June to 15 October. This will provide immense potential for rainwater harvesting. Water ultimately leads to have more area under irrigation. There is need to promote soil water conservation measures by constructing farm bund, land levelling and gabions and to store more water in deferent part of Dang by constructing good check dams and ponds.

There are potential to develop irrigation by adopting various options i.e. mobile pump sets, mini lift irrigations can be constructed on rivulet, individual wells and group wells and flow irrigation. This study also brought out interesting result that there is gross income of Rs. 86881 per household, out of that Rs. 44922 from agriculture, Rs.7059 from labour (migration). There is considerable income from the dairy. The dairy is depends on the irrigated agriculture (fodder and crop residue) and irrigated agriculture needs fertilizer (dung), which complements each other. The Dang needs community based integrated development effort.

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