GOVERNMENT OF KARNATAKA

DEPARTMENT OF AGRICULTURE

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

DISTRICT IRRIGATION PLAN

DHARWAD DISTRICT

Prepared by : PLUS TRUST (R), BENGALURU - 2016

GOVERNMENT OF KARNATAKA

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Foreword

"His Excellency President of India in his address to the Joint Session of Parliament of 16th Lok Sabha indicated that each drop of water is precious and launched Pradhana Mantri Krishi Sinchayee Yojana (PMKSY), with a major objective to achieve convergence of investments in irrigation at the field level, expand cultivable area under assured irrigation, improve on-farm water use efficiency to reduce wastage of water, enhance the adoption of precision irrigation and other water saving technologies. It will complete the long pending irrigation projects on priority. Micro-irrigation will be popularized to ensure Per Drop More Crop.

The rainfall vastly differs in the district. Heavy rain fall taluk of Kalaghatagi receives annual mean precipitation of 981 mm in 73 rainy days, while transitional taluks of Dharwad and Hubli receive 744 to 792 mm in a typical bimodal rainfall pattern in 57-61 rainy days. This has offered excellent scope to establish two crop sequences under rainfed conditions. But, dry taluks of Navalgund and Kundagol receive mean annual rainfall of 616-676 mm in 42-52 rainy days.

The net sown area of the district is 3.60 lakh ha, of which only 16.0% (58449 ha) is partial irrigated and the rest (84.0%) is rainfed. The irrigation source in the district is mainly Canals (41869 ha) and tube wells (16580 ha). Horticulture crops are cultivated in an area of 70,000 ha in the district.

The present planning should give impetus on utilizing water for expansion of irrigated area, establishment of new industriesand creation of special economic zone, so that the district can be model to the entire State. This provides additional job opportunities leading to economic growth of the district.

Under PMKSY, it is proposed to create an additional irrigation potential of 134746 ha. in the district by 2020, with a budgetary support of Rs.24964.38 crores. This will help in intensive cultivation of crops, taking up of multiple crops, judicious use of water, change of cropping pattern, which will create additional employment to farming community and additional income.

At the outset, I appreciate the efforts of the Department Agriculture of particularly Joint Director of Agriculture and their team, in collection of information from various departments and organizing District Level meetings, which has led to finalize this report. I thank all the line department officials for providing timely information on their concerned templates. I also express my deep sense of gratitude to Sri Vinay Kulkarni, Hon'ble Minister for Mines and Geology, Govt. of Karnataka and Dharwad District Incharge Minister, for chairing the final meeting and providing valuable suggestions. I also thank all Members of Legislative Assembly of the district who have also given useful suggestions in this meeting.

I also thank the President and members of PLUS TRUST, Bangalore for compilation, analysis and printing of the District Irrigation Plan in an exhaustive and excellent manner.

I hope this report will be useful in planning and efficient management of precious water resource of Dharwad district.

Date :

Deputy Commissioner, Dharwad.

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PRADHAN MANTRI KRISHI SINCHAYEE YOJANA (PMKSY)

I. Introduction:

The major objective of PMKSY is to achieve convergence of investments in irrigation at the field level, expand cultivable area under assured irrigation, improve on-farm water use efficiency to reduce wastage of water, enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop), enhance recharge of aquifers and introduce sustainable water conservation practices by exploring the feasibility of reusing treated municipal waste water for peri-urban agriculture and attract greater private investment in precision irrigation system.

PMKSY has been conceived amalgamating ongoing schemes *viz*., Accelerated Irrigation Benefit Programme (AIBP) of the Ministry of Water Resources, River Development & Ganga Rejuvenation (MoWR, RD & GR), Integrated Watershed Management Programme (IWMP) of Department of Land Resources (DoLR) and the On Farm Water Management (OFWM) of Department of Agriculture and Cooperation (DAC). The scheme will be implemented by Ministry of Agriculture, Water Resources and Rural Development. Ministry of Rural Development is to mainly undertake rain water conservation, construction of farm pond, water harvesting structures, small check dams and contour bunding etc., MoWR, RD &GR, is to undertake various measures for creation of assured irrigation source, construction of diversion canals, field channels, water diversion/lift irrigation, including development of water distribution systems. Ministry of Agriculture will promote efficient water conveyance and precision water application devices like drips, sprinklers, pivots, rain-guns in the farm "(Jal Sinchan)", construction of micro-irrigation structures to supplement source creation activities, extension

activities for promotion of scientific moisture conservation and agronomic measures.

Programme architecture of PMKSY will be to adopt a 'decentralized State level planning and projectised execution' structure that will allow States to draw up their own irrigation development plans based on District Irrigation Plan (DIP) and State Irrigation Plan (SIP). It will be operative as convergence platform for all water sector activities including drinking water & sanitation, MGNREGA, application of science & technology etc., through comprehensive plan. State Level Sanctioning Committee (SLSC) chaired by the Chief Secretary of the State with the authority to oversee its implementation and sanction of projects.

The programme will be supervised and monitored by an Inter-Ministerial National Steering Committee (NSC) will be constituted under the Chairmanship of Prime Minister with Union Ministers from concerned Ministries. A National Executive Committee (NEC) constituted under the Chairmanship of Vice Chairman, NITI Aayog to oversee programme implementation, allocation of resources, inter-ministerial coordination, monitoring &performance assessment, addressing administrative issues etc.,

Components and responsible Ministries/ Departments are as follows:

1. AIBP by MoWR, RD &GR: To focus on faster completion of on-going Major and Medium Irrigation including National Projects.

2. PMKSY (Har Khet Ko Pani) by MoWR, RD & GR: Creation of new water sources through Minor Irrigation (both surface and ground water), Repair, restoration and renovation of water bodies; strengthening carrying capacity of traditional water sources, construction rain water harvesting structures (Jal Sanchan); Command area development, strengthening and creation of distribution network from source to the farm. Improvement in water management and distribution system for water bodies to take advantage of

available source, which is not utilised to its fullest capacity (deriving benefits from low hanging fruits).

3. PMKSY (Watershed) by Dept. of Land Resources, MoRD Water harvesting structures such as check dams, nala bund, farm ponds, tanks etc. Capacity building, entry point activities, ridge area treatment, drainage line treatment, soil and moisture conservation, nursery raising, afforestation, horticulture, fodder development, livelihood activities for the asset-less persons and production system & microenterprises for small and marginal farmers etc., Effective rainfall management like field bunding, contour bunding/trenching, staggered trenching, land levelling, mulching etc.,

4. PMKSY (Per drop more crop) by Dept. of Agriculture & Cooperation, MoA Programme management, preparation of State/District Irrigation Plan, approval of annual action plan, Monitoring etc., Promoting efficient water conveyance and precision water application devices like drips, sprinklers, pivots, rain-guns in the farm (Jal Sinchay). Topping up of input cost particularly under civil construction beyond permissible limit (40%), under MGNREGA for activities like lining inlet, outlet, silt traps distribution systematic.

Construction of micro irrigation structures to supplement source creation activities including tube wells and dug wells (in areas where ground water is available and not under semi critical /critical /over exploited category of development) which are not supported under PMKSY (WR), PMKSY (Watershed) and MGNREGA.

Secondary storage structures at tail end of canal system to store water when available in abundance (rainy season) or from perennial sources like streams for use during dry periods through effective on-farm water management Water lifting devices like diesel/ electric/ solar pumpsets including water carrying pipes.

Extension activities for promotion of scientific moisture conservation and agronomic measures including cropping alignment to maximize use of available water including rainfall and minimise irrigation requirement (Jal samrankshan)

Capacity building, training for encouraging potential use water source through technological, agronomic and management practices including community irrigation awareness campaign on water saving technologies, practices, programmes etc., organisation of workshops, conferences, publication of booklets, pamphlets, success stories, documentary, advertisements etc. Improved/innovative distribution system like pipe and box outlet system with controlled outlet and other activities of enhancing water use efficiency.

District Irrigation Plans (DIPs):

District Irrigation Plan (DIP) shall be the cornerstone for planning and implementation of PMKSY. DIP will identify the gaps in irrigation infrastructure after taking into consideration the District Agriculture Plans (DAPs) already prepared for Rashtriya Krishi Vikas Yojana (RKVY) vis-à-vis irrigation infrastructure currently available and resources that would be added during XII Plan from other ongoing schemes (both State and Central), like Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA), Rashtriya Krishi Vikash Yojana (RKVY), Rural Infrastructure Development Fund (RIDF), Member of Parliament Local Area Development (MPLAD) Scheme, Member of Legislative Assembly Local Area Development (MLALAD) Scheme, Local body funds etc. The gaps identified under Strategic Research & Extension Plan (SREP) be used in preparation of DIP. DIPs will present holistic irrigation development perspective of the district outlining medium to long term development plans integrating three components viz., water sources, distribution network and water use applications incorporating all

usage of water like drinking & domestic use, irrigation and industry. Preparation of DIP will be taken up as joint exercise of all participating departments. DIP will form the compendium of all existing and proposed water resource network system in the district.

The DIPs may be prepared at two levels, the block and the district. Keeping in view the convenience of map preparation and data collection, the work would be primarily done at block level. Block wise irrigation plan is to be prepared depending on the available and potential water resources and water requirement for agriculture sector prioritizing the activities based on socio-economic and location specific requirement. In case of planning is made based on basin/sub basin level, the comprehensive irrigation plan may cover more than one district. The activities identified in the basin/sub-basin plan can be further segregated into district/block level action plans.

i. Background

Hon'ble President in his address to the joint Session of the Parliament of 16th Lok Sabha indicated that "Each drop of water is precious. Government is committed to giving high priority to water security. It will complete the long pending irrigation projects on priority and launch the 'Pradhan Mantri Krishi Sinchayee Yojana' with the motto of 'Har Khet Ko Paani'.

There is a need for seriously considering all options including linking of rivers, where feasible; for ensuring optimal use of our water resources to prevent the recurrence of floods and drought. By harnessing rain water through 'Jal Sanchay' and 'Jal Sinchan', we will nurture water conservation and ground water recharge. Micro irrigation will be to ensure 'Per drop-More crop'. Out of about 141 ml ha of net area sown in the country, about 65 million hectare (or 45%) is presently covered under irrigation. Substantial dependency on rainfall makes cultivation in unirrigated areas a high risk, less productive

profession. Empirical evidences suggest that assured or protective irrigation encourages farmers to invest more in farming technology and inputs leading to productivity enhancement and increased farm income. The overreaching vision of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) will be to ensure access to some means of protective irrigation to all agricultural farms in the country, to produce 'per drop more crop', thus bringing much desired rural prosperity.

ii. Vision

To utilize the available water resources in the district to the maximum extent in an efficient way to meet the basic needs of every living being and enhancing the livelihoods of rural population to the maximum extent thus alleviating poverty in a sustainable way without compromising the interests of future generations.

iii. Objective

Following are the objectives:

A. Enhance the physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet ko pani).

B. Integration of water source, distribution and its efficient use, to make best use of water through appropriate technologies and practices.

C. Improve on-farm water use efficiency to reduce wastage and increase availability both in duration and extent.

D. Enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop).

- ❑ Enhance the physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet ko pani).
- ❑ Integration of water source, distribution and its efficient use, to make best use of water through appropriate technologies and practices.
- ❑ Improve on-farm water use efficiency to reduce wastage and increase availability both in duration and extent.

- ❑ Enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop).
- ❑ Enhance recharge of aquifers and introduce sustainable water conservation practices.
- ❑ Ensure the integrated development of rain fed areas using the watershed approach towards soil and water conservation, regeneration of ground water and arresting runoff.
- ❑ Promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries.
- ❑ Explore the feasibility of reusing treated municipal wastewater for peri-urban agriculture.

iii. Strategy /approach

- ❑ Creation of new water sources; repair, restoration and renovation of defunct water sources; construction of water harvesting structures, secondary & micro storage, ground water development
- ❑ Developing/augmenting distribution network where irrigation sources (both assured and protective) are available or created;
- ❑ Promotion of scientific moisture conservation and run off control measures to improve ground water recharge so as to create opportunities for farmer to access recharged water through shallow tube/dug wells;
- ❑ Promoting efficient water conveyance and field application devices within the farm *viz.*, underground piping system, Drip & Sprinklers
- ❑ Encouraging community irrigation through registered user groups.

Farmer oriented activities like capacity building, training and exposure visits, demonstrations, farm schools, skill development in efficient water and crop management practices (crop alignment) including large scale awareness on more crop per drop of water through mass media campaign, exhibitions, field days, and extension activities through short animation films etc.

CHAPTER I

GENERAL INFORMATION OF THE DISTRICT

1.1. District profile:

Historical evidences suggest that Dharwad was a popular seat of human habitation even during Paleolithic Age, but was ruled regularly by various Dynasties from 5th century onwards by Badami's Chalukyas, Kalyan dynasty, Rashtrakutas, Vijayanaga dynasty, Adilshahi rule, Mysore Kingdom and Peshwa of Pune. During Peswha regime, Dharwad was heavily influenced by Marathi language and Marathi culture. However, Kannada language gained prominence during British regime, which also made Dharwad as centre of educational activities.

The district lies between $15^0$19' to $15^0$41' North and $74^0$43' to $75^0$15' East at an average altitude of around 790 M above MSL, with a geographical area of 4.27 lakh ha, accounting 4.5 % of the state's geographical area. The district has no major river and no dam. The district is divided into Malnad, semi malnad and Maidan regions, depending on topography and rainfall. Hilly terrain with high rainfall are common in Malnad region, while scanty rainfall with plain terrain are common in Maidan region, semi - malnad occupying mid position, Malnad region of the district has thick forest area, with tall perennial evergreen species. The share of forest is negligible in Maidan region. Dharwad (1.12 lakh ha) and Navalgund (1.08 lakh ha) are relatively bigger taluks, while other taluks are almost similar in their sizes (65000 to 74000 ha).

Dharwad has five taluks namely, Dharwad, Navalgund, Hubli, Kundagol and Kalaghatagi, has 14 hoblies, 127 gram panchayats and 379 villages. There are 6 urban centers, 1 each in all the taluks, except Navalgund, which has 2 urban centers. HDMC corporation is most popular thickly populated urban

centre in the district. The total geographical area of the district is 4.27 lakh ha with a net cultivated area of 2.86 lakh ha.

Fig 1.1

Dharwad and Hubli taluks are part of Northern Transitional Zone with typical bimodal rainfall of around 744- 800 mm, while Kalaghatagi taluk receives an annual rainfall of 980 mm in unimodal distribution. Other two taluks are in Northern Dry Zone with a typical rabi dominated unimodal rainfall of 616-676 mm. The Northern Dry Zone has characteristics of low annual unimodal rainfall, medium to deep black soil with mean maximum temperatures touching 40-42 ^{o} C during summer and moderate 30-32^{o} C during other months. But, transitional zone has more uniformly distributed rainfall (57-61days) compared to dry zone. Low temperatures can touch even 13-15^{o}C for brief period during winter, otherwise winters are less severe.

Major part of the district is covered by entisols and inceptisols and small area covered by alfisols. Soils of Navalgund taluk and half of Hubli taluk,

where vertisols are predominant, are saline (pH> 8.5) and other taluks in the district have neutral soils. while organic carbon status in most part of district is above 0.5%, sufficient available phosphorus (>5 ppm) and sufficient available zinc (> 0.5 ppm), while Navalgund, Kundagol and half of Hubli taluk have soils with poor organic carbon (< 0.5 %), poor available zinc (< 0.75 ppm) poor available phosphorus (< 5 ppm). The soils of major part of Dharwad taluk and Kalaghatagi taluk district are deficient in available sulphur (<10 ppm), while available boron (>0.58ppm) is sufficient in all the taluks, except Kalaghatagi taluk.

The district is primarily agrarian, because major economic activity is agriculture and allied activities involving about 43% of district's population settled in rural areas. Major land use in the district is for cultivation and other allied activities. Horticulture, sericulture, animal husbandry and fisheries are major allied activities supplementary to agricultural activities. Most common crops in the district include Jowar, Wheat, Bajra, Gram, Tur, green gram, soybean, groundnut, sunflower, sesamum & other Oilseeds, Cotton, Sugarcane and chillies and forage crops. Important plantation/ horticultural crops of the district include banana, mango, sapota , guava and coconut. Allied sectors have added to income of the farmers and there by sustaining the livelihood of the farmers in rural areas. Large numbers of farmers heavily depend on allied activity like dairying on regular basis to generate additional income throughout the year.

Table 1.1: District Profile

1.	District Code	580001
2.	Latitude and Longitude	$15^0$19’ to $15^0$41’ North Latitude and $74^0$43’ to $75^0$15’ East Longitude
3.	Total Number of block	5
4.	Total Number of Grama Panchayat	127
5.	Total No. of Hoblies	14
6.	Total Number of Villages	379
7.	Total Population	1847023
8.	Total Male Population	937206
9.	Total Female Population	909817
10.	Total Child population	219942
11.	Total SC Population	177855
12.	Total ST Population	87548
13.	Geographical Area	427329 ha
14.	Net Sown Area	285716 ha
15.	Gross Cropped Area	463447 ha
16.	Net Irrigated	58449 ha
17.	Area under Forest	35235 ha
18.	Total livestock	412676
19.	Total poultry	904421

1.2. Demography:

1.2.1: Population:

The Total population of Dharwad district is 1847023. The Male population of the district is 937206 and Female population is 909817. Hubli-Dharwad Municipal Corporation has the highest population of 943788 (51.1%%).

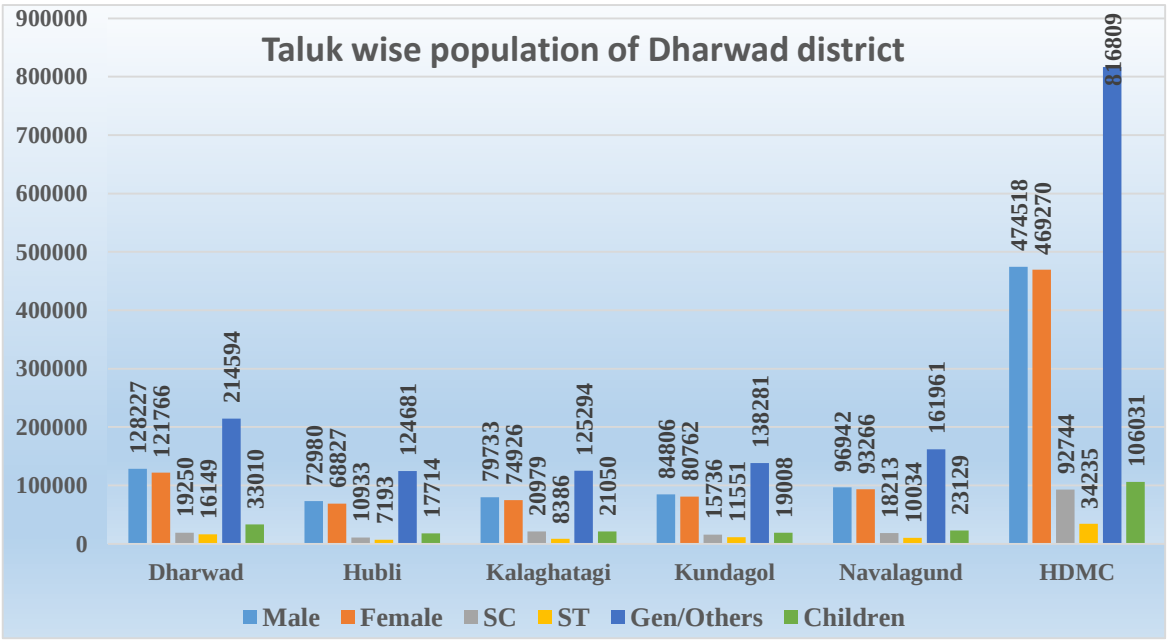
Among the taluks, Dharwad has the highest population in the district, 249993 (13.5%), followed by Navalagund, 190208 (10.3%), Kundagol 165568 (8.9%) and Kalaghatgi with 154659 (8.4%). Hubli taluk has the lowest population of 142807 (7.7%). Schedule Caste population in the district is 177855 (9.6%) and that of Schedule Tribe population is 87548 (4.7%). Schedule Caste population is the highest in Hubli-Dharwad Municipal Corporation (92744) and the lowest in Hubli taluk (10933), whereas Schedule Tribe population is also highest in Hubli-Dharwad Municipal Corporation (34235) and lowest in Hubli taluk (7193) (Table 1.2).

Table 1.2: Taluk wise population of Dharwad district

Sl. No.	Block/Taluk	Population			SC	ST	Gen/ Others	Children
		Male	Female	Total				
1	Dharwad	128227	121766	249993	19250	16149	214594	33010
2	Hubli	72980	68827	142807	10933	7193	124681	17714
3	Kalaghatagi	79733	74926	154659	20979	8386	125294	21050
4	Kundagol	84806	80762	165568	15736	11551	138281	19008
5	Navalagund	96942	93266	190208	18213	10034	161961	23129
6	HDMC	474518	469270	943788	92744	34235	816809	106031
Total		**937206**	**908816**	**1847023**	**177855**	**87548**	**1581620**	**219942**

Source: 2011 Census report

Fig.1.2



1.2.2: Rural and Urban Population:

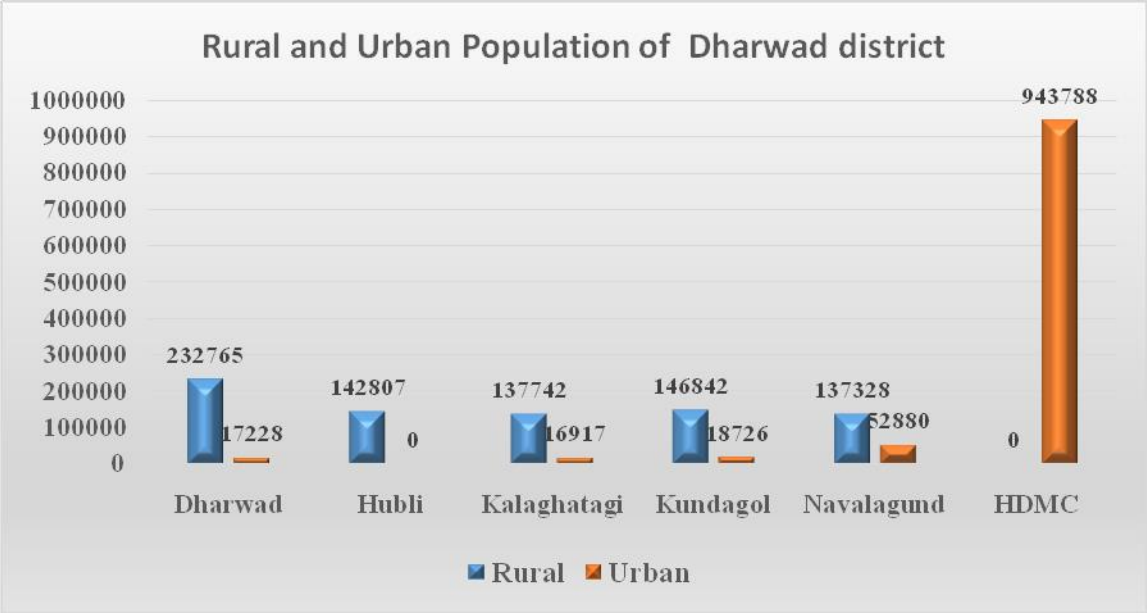
The district is having a Rural population of 797484 (43.2%) and the Urban population is 1049539 (56.8%). Dharwad taluk has the highest rural population of 232765, followed by Kundagol (146842), Hubli (142807) and Kalaghatagi (137742). Lowest Rural population is in Navalagund taluk (137328). Urban population is highest in Hubli-Dharwad Municipal Corporation (943788). Among the taluks, highest Urban population is in Navalagund (52880), followed by Kundagol (18726) and Dharwad (17228). The lowest urban population is in Kalaghatagi (16917). Details are furnished in Table 1.3.

Table 1.3: Rural and Urban Population of Dharwad district

Sl. No.	Block/Taluk	Population		
		Rural	Urban	Total
1	Dharwad	232765	17228	249993
2	Hubli	142807	-	142807
3	Kalaghatagi	137742	16917	154659
4	Kundagol	146842	18726	165568
5	Navalagund	137328	52880	190208
6	HDMC	-	943788	943788
Total		**797484**	**1049539**	**1847023**

Source: 2011 Census report

Fig.1.3



1.2.3. House Holds in Dharwad district.

The total number of households in the district is 382700. Rural households are 160674 (42%) and the Urban households are 222026. Dharwad has the highest No. of Rural households with 46493 (12.1%), followed by Kundagol with 29950 (7.8%), Hubli with 29199 (7.6%) and Kalaghatagi with 27965 (7.3%). Navalgund taluk has the lowest no. of rural households- 27067 (7.1%). Hubli (HDMC) has the highest No. of

Urban households-200418 (90.3%) and Dharwad taluk has the lowest 9326 (4.2%). Details are furnished at Table 1.4

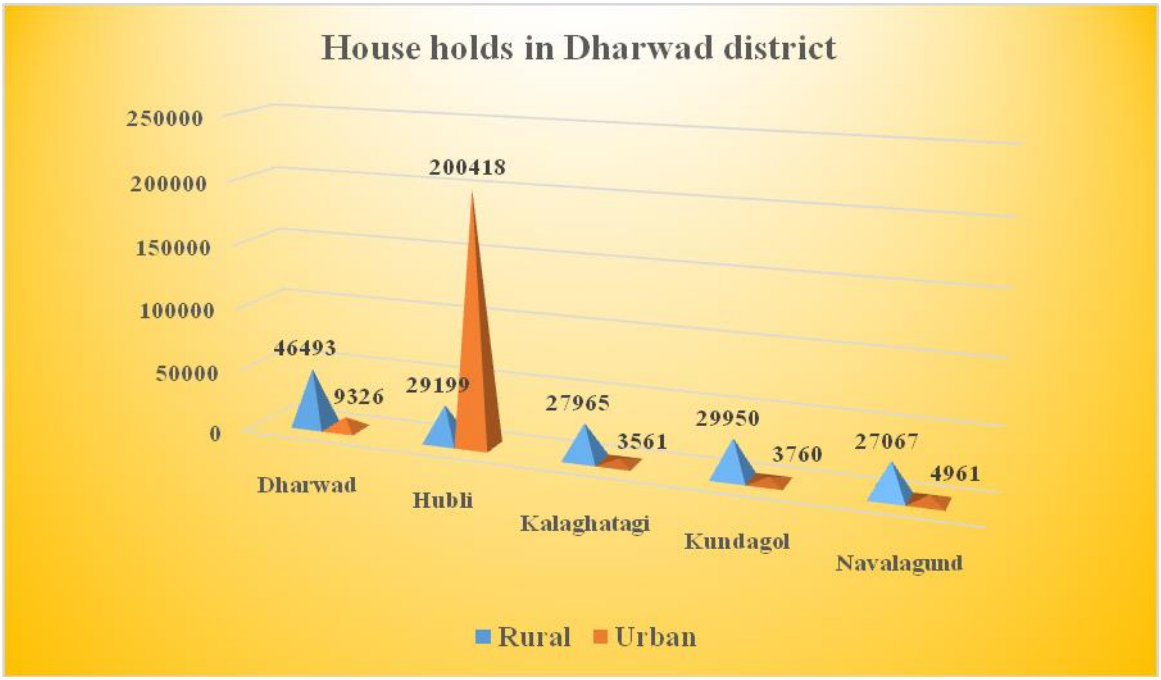
Table.1.4 Details of households in Dharwad district

Sl. No.	Taluk	Rural	Urban	Total
1	Dharwad	46493	9326	**55819**
2	Hubli*	29199	200418	**229617**
3	Kalaghatagi	27965	3561	**31526**
4	Kundagol	29950	3760	**33710**
5	Navalagund	27067	4961	**32028**
	Total	**160674**	**222026**	**382700**

Source: 2011 Census report

NOTE: *: Includes HDMC Urban Population

Fig. 1.4



1.3. Biomass and Livestock:

The total cattle population in the district is 193781(70.9%) and buffaloes' population is 79513(29.1%). Dharwad taluk has the highest cattle and buffaloes population of 84420 (30.9%), followed by Kalaghatagi with 60232 (22.0%), Hubli with 55076 (20.1%) and Navalagund with 41140

(15.1%). Kundagol has the lowest cattle and buffaloes' population of 32426 (11.9%) in the district.

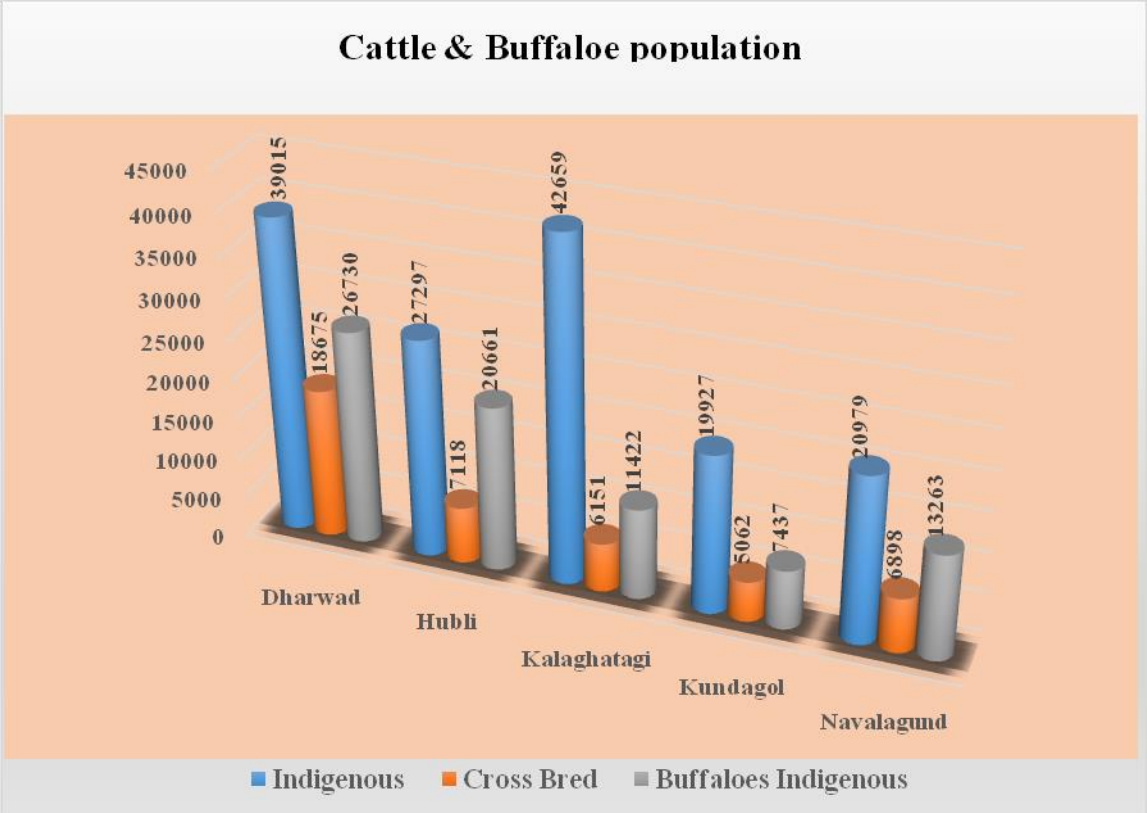
Table. 1.5 : Cattle & Buffaloe population

In Numbers

Sl. No.	Taluk	Cattle			Buffaloes Indigenous	Total- Cattle & Buffaloes
		Indigenous	Cross Bred	Total		
1	Dharwad	39015	18675	57690	26730	84420
2	Hubli	27297	7118	34415	20661	55076
3	Kalaghatagi	42659	6151	48810	11422	60232
4	Kundagol	19927	5062	24989	7437	32426
5	Navalagund	20979	6898	27877	13263	41140
	Total	**149877**	**43904**	**193781**	**79513**	**273294**

Source: District at a glance

Fig.1.5



The district has totally, 139382 Small animals viz., Sheep, Goat, Pigs etc., and 904421 poultry birds. Navalagund taluk has the highest Small animals

44630 (32.0%), followed by Dharwad with 39679 (28.5%), Hubli with 25363 (18.2%), Kundagol with 18104 (13%). Kalaghatagi has the lowest Small animal population of 211746 (28%). Whereas, Dharwad taluk has the highest poultry 4238954 (46.9%), followed by Kalaghatagi with 271406 (30%), Hubli with 190391 (21.1%) and Kundagol with 9722 (1.1%). Navalagund has the lowest poultry population of 9007 (1%). Taluka wise details are furnished at Table No.1.6.

Table :1.6 Small animals in Dharwad district

In Numbers

Sl. No.	Block/ Taluk	Sheep-Indigenous	Goats-Indigenous	Pigs	Other Small Animals	Total Small Animals	Poultry
1	Dharwad	23445	14519	1697	18	39679	423895
2	Hubli	7607	17753	0	3	25363	190391
3	Kalaghatagi	2744	8622	240	0	11606	271406
4	Kundagol	10975	7026	74	29	18104	9722
5	Navalagund	29211	14220	1151	48	44630	9007
	Total	**73982**	**62140**	**3162**	**98**	**139382**	**904421**

Source: District at a glance

Fig 1.6

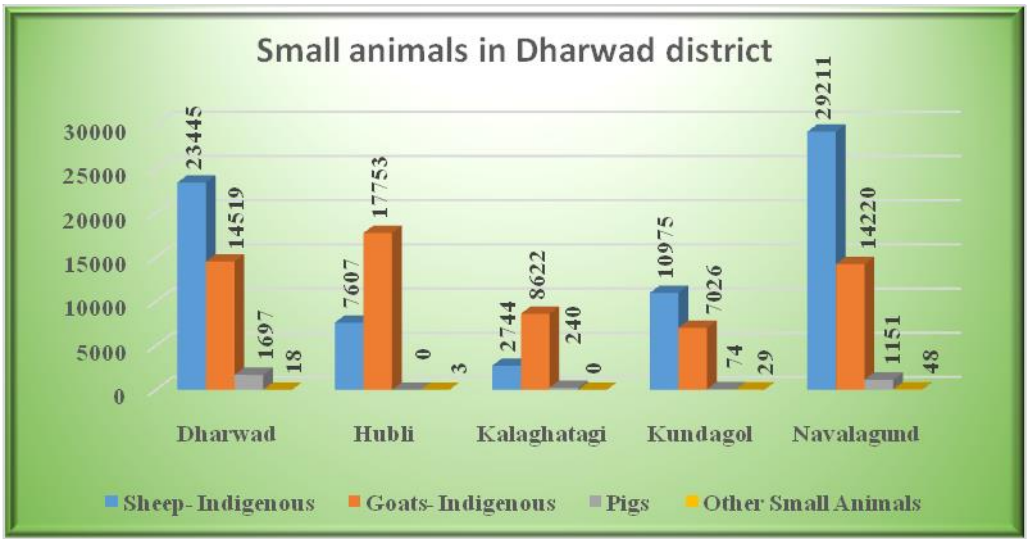
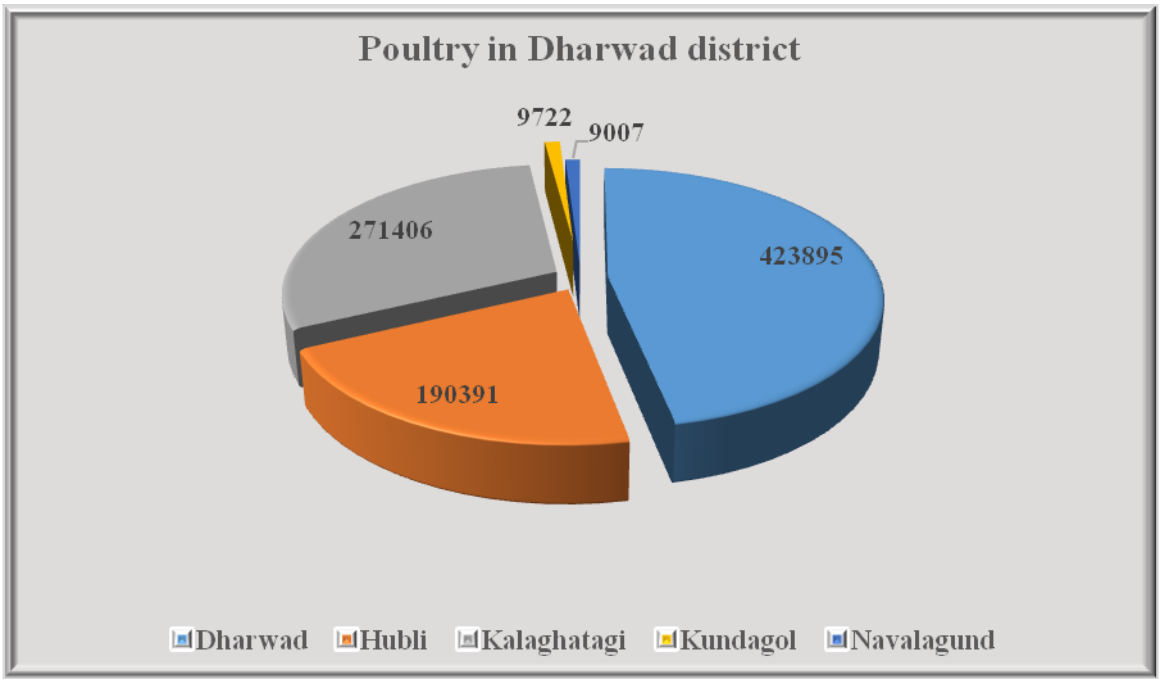


Fig 1.7



1.4 Agro-Ecology, Climate, Hydrology and Topography:

1.4.1 Agro-ecology

Dharwad and Hubli taluks are part of Northern Transitional Zone with typical bimodal rainfall of around 744- 800 mm, while Kalaghatagi taluk receives an annual rainfall of 980 mm in unimodal distribution. Other two

taluks are in Northern Dry Zone with a typical rabi dominated unimodal rainfall of 616-676mm . The northern dry zone has characteristics such as low annual unimodal rainfall, medium to deep black soil mean maximum temperatures touching 40-42 ^{o} C during summer and moderate 30-32 ^{o} C during other months. But, transitional zone has more uniformly distributed rainfall (57-61days) compared to dry zone. Low temperatures can touch even 13-15^{o}C for brief period during winter, otherwise winters are less severe.

1.4.2 Climate

The rainfall vastly differs in the district. Heavy rainfall taluk of Kalaghatagi receives annual mean precipitation of 981 mm in 73 rainy days, while transitional taluks of Dharwad and Hubli receive 744 to 792 mm in a typical bimodal peak rainfall invariably achieved June and September, in 57-61 rainy days. This has offered excellent scope to establish two crop sequences under rainfed conditions. But, dry taluks of Navalgund and Kundagol receive mean annual rainfall of 616- 676 mm in 42-52 rainy days. The whole district represents un- uniform rainfall pattern. The cropping in kharif is more assured in the whole district, except in Navalgund taluk, which is open to the risk of moisture deficits.

Table 1.7. Data on Weather

Sl. No.	Taluk	Rainfall		Temperature		Humidity (%)	
		No. of rainy days	Average rainfall (mm)	Min. ^{0}C	Max. ^{0}C	Min	Max
1	Dharwad	61	792	20	33	58	76
2	Hubli	57	744	20	33	58	76
3	Kalaghatagi	73	981	22	32	63	79
4	Kundagol	52	676	22	32	63	79
5	Navalagund	42	616	20	33	58	76
Total		57	**761.8**	**20.6**	**32.6**	**60.2**	**77.2**

Source: KSNDMC

1.4.3 Hydrology

Main rock formations in the area are the Gneissic-granites and Schists, the secondary structures like joints, fissures and faults present in them act as a porous media-the Aquifer. The lateritic layer overlying in moderate thickness and alluvium occurs along the river banks in less than 3.00 meters thickness acts as an aquifer locally. Ground water in the aquifer generally occurs under unconfined/phreatic and semi-confined conditions. The unconfined condition prevails within the depth range of 17.00 to 40.00mbgl. About 32 exploratory bore wells have been drilled at select places within the depth range of 150 to 200 mbgl reveals the presence of fractured zones; they are occasionally saturated between 20.00 and 150mbgl depths. Generally, the schistose formation has deeper ground water potential zones. The top porous part in the water table aquifer constitutes approximately 3% of volume of formation. The specific capacity of dug wells in the district ranges from 6.90 to 65.03 m^3/m/dd and the aquifer transmissivity estimated in the order of 1.07 to 113.69 m^2/day. While the transmissivity of the deeper aquifers estimated in the order of 11 to 40 m^2/day and that of yield ranges from 2 to 5 lps. The specific capacity of exploratory bore wells falls in the range of 32 to 65 lpm/m/d water levels. The decadal mean depth to groundwater level (DTW) record reveals shallower water level in the west-central stretch of the district especially in Dharwad and Kalghatgi taluks. The general levels recorded in the range of 6.00 to 9.0 mbgl in May-2006 and are recorded between 4.50 and 7.00 mbgl during November-2006. The water level is deeper as between 10 to 20 mbgl in major part of Kundgol, parts of Navalgund and bordering Dharwad, Hubli taluks. The water level trend for the month May shows a general fall of 0.5 to 1.5 m, with a few isolated pockets at rising (+ fluctuation) trend in the order of 1.0 to 5.0 m. A general declining trend recorded in November month i.e., post monsoon period

and an appreciable rise of about 1.00 m/year noticed in few patches of western hilly region. Generally the water table contour fall along the regional topography as it flows towards the major river courses depicting a gentle water table gradient. The contour traced also exhibits the ground water divide along the watershed boundaries (Malaprabha and Kali rivers). The ground water flow seems to be converged down to the deeper level in the eastern region. The water table traced show in the altitude range of < 515.15 to 686.26 above mean sea level (amsl) and <514.85 to 682.70 amsl, respectively during post-monsoon and pre-monsoon period of 2013.

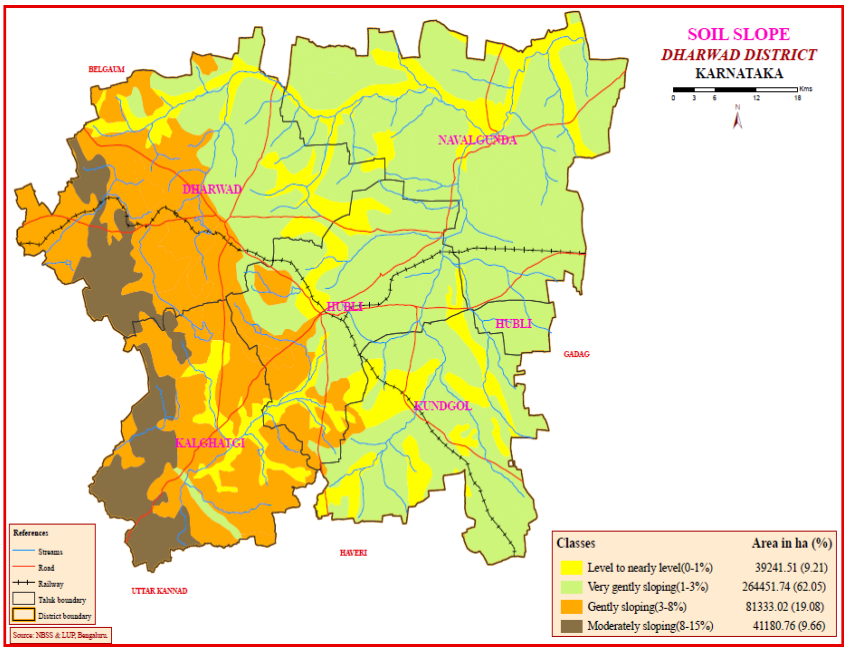
The main known source of groundwater in the district is recharge by annual precipitation (rainfall). The ground water potential reveals the annual resource as 31961.81 Ha M for the year 2004, as a replenishable /dynamic resource. The annual groundwater drawal in Dharwad-taluk accounts for 3441.18 ha m and minimum of 937.38 Ha m in Kundgol taluk. Due to the prevailing socio-economical condition and an uneven distribution of potential aquifers about 2610.35 ha m have been used for drinking and 9551.88 ha m both for industrial purpose and irrigation purpose with a total draft of 11059.94 ha m.

1.4.4 : Topography:

The lands of the district can be broadly divided into three soil slope classes i) level to nearly level lands (0-1% slope), ii) very gently sloping lands (1-3% slope) and iii) gently sloping lands (3-8% slopes). Lands in Kundgol, Hubli, Navalgund and Dharwad taluks are mainly very gently sloping and in parts of Kalghatgi, Lands that are gently sloping occur mainly in Dharwad and Kalghatgi and parts of Hubli and Kundgol, moderately sloping lands occur in Khalghatgi and Dharwad taluks were as level to nearly level

lands in valleys are mainly found in Kalghatgi, Kundagol, Hubli and Navalgund taluks and parts of Dharwad taluk. The lands of the district that are very gently sloping cover an area of 264451.74 ha (62.05%) followed by gently sloping lands which are spread over an area of 81333 ha (19.08 %), moderately sloping lands occur over an area of 41180 ha (9.66 %) and level to nearly level lands in the valleys occur in an area of 39241.51 ha (9.21 %).

Fig 1.8.

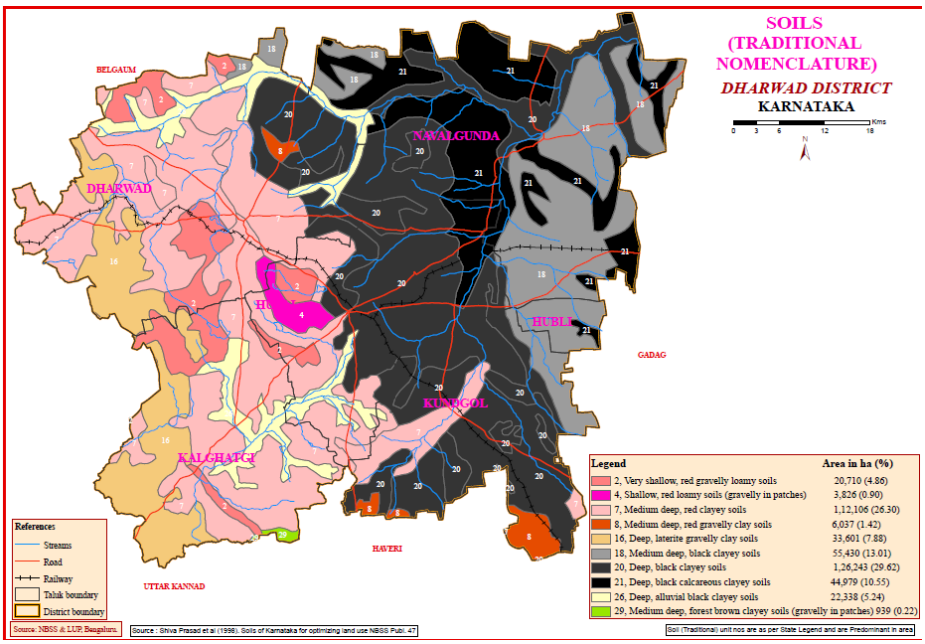


1.5 Soil Profile

The soils in the western half of Dharwad district are black soils where as the eastern half of the district is having red soils. The area under black soils is 249929 ha (58.66 %) and that under the red soils I 176280 ha (41.36 %). Deep black clayey soil (193560 ha (45.42 %) are mainly in Navalgund, Hubli and Kundagol taluks, in parts of Dharwar and Kalghatgi taluks; in Navalgund taluk they are calcareous. The area under medium deep black clayey soils is 55430 ha (13.01 %) mainly in Navalgund and Kundgol. While the area under medium deep red clayey soils is mainly in Dharwad, Hubli and Kalghatgi taluks 118143

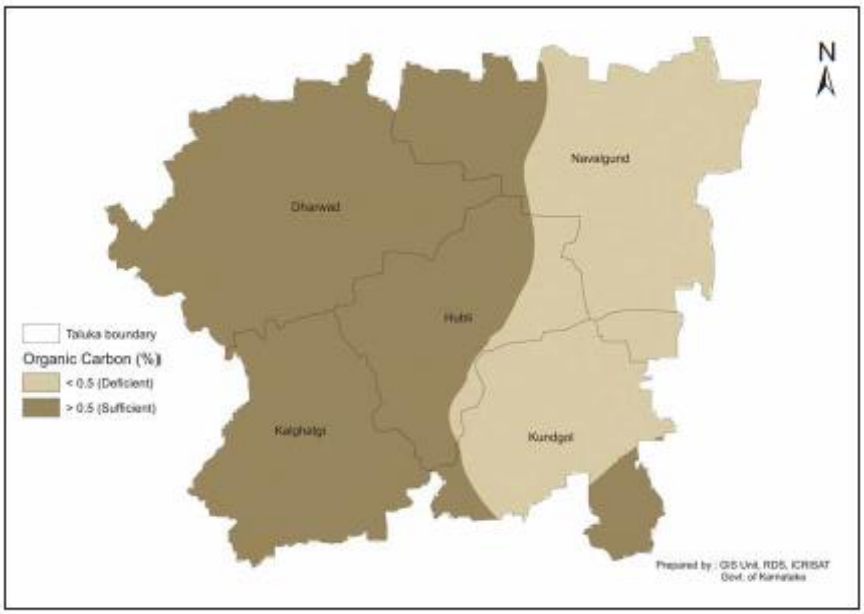
(27.72 %) of which 6037 ha is gravelly clay in texture occurring in Kundgol and Dharwad taluks. Very shallow to shallow red gravelly loamy to loamy soils are in an area of 24536 ha (5.76 %) are mainly in Dharwad and Hubli taluks. While the area under deep laterite gravelly clayey soils is 33430 ha (7.88 %) in Kalghatgi and Dharwad taluks.

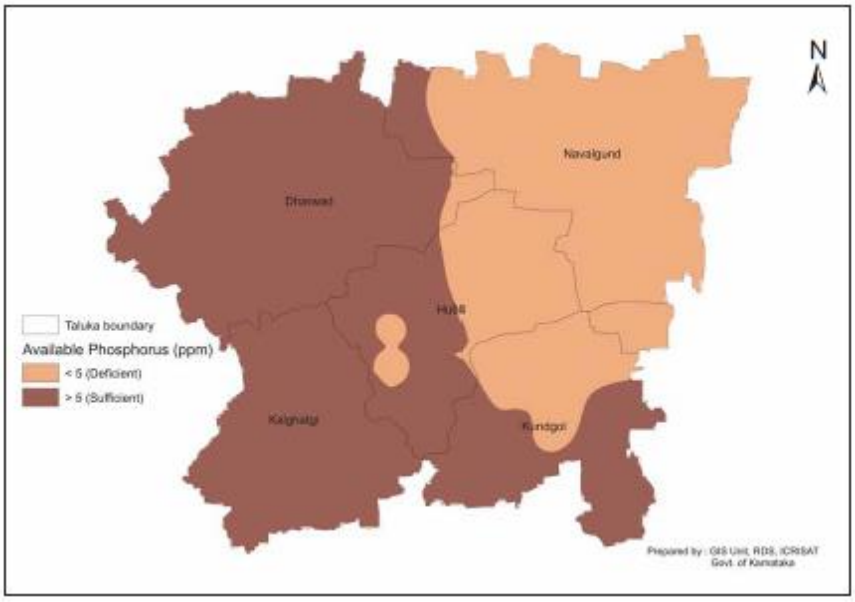
Fig 1.9

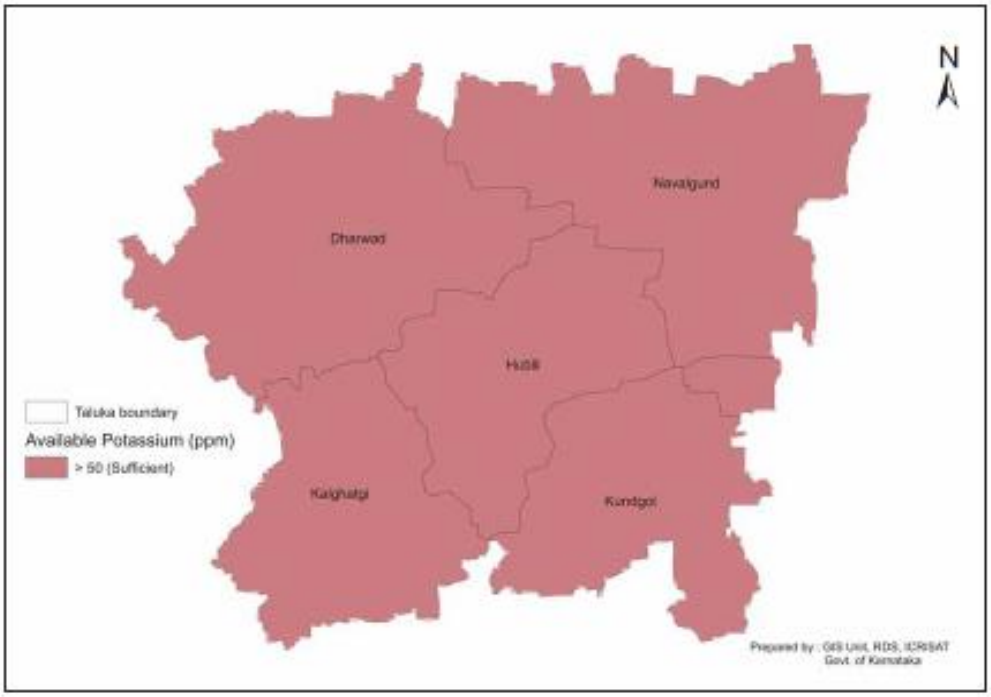


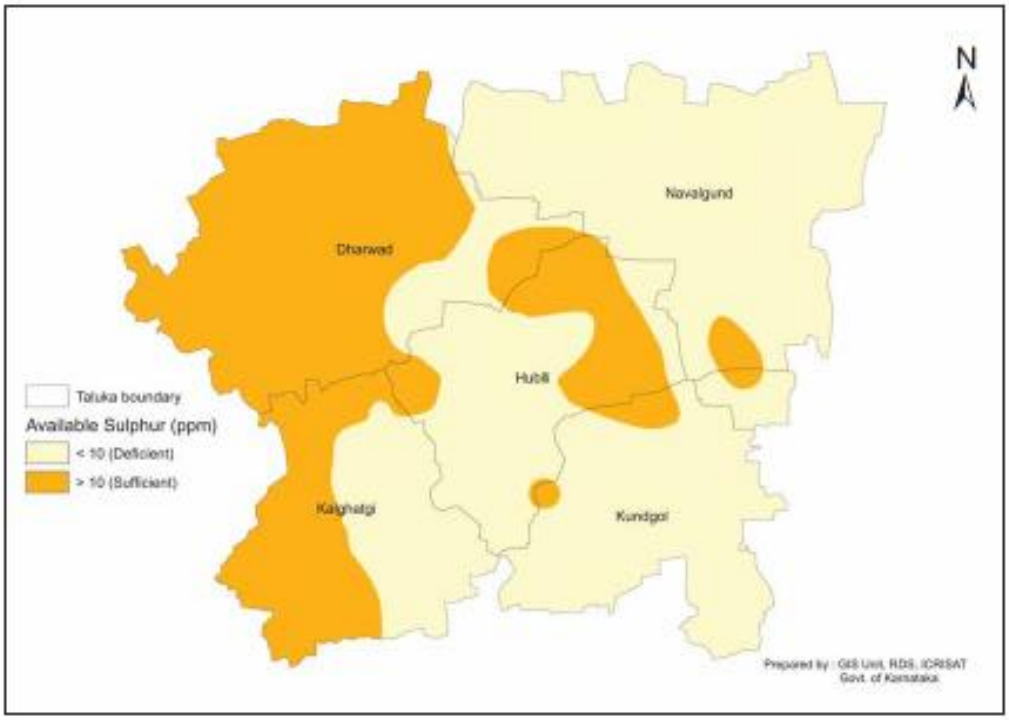
Soils of Navalgund taluk and half of Hubli taluk, where vertisols are predominant, are saline (pH> 8.5) and other taluks in the district have neutral soils. While organic carbon status in most part of district is above 0.5%, sufficient available phosphorus (>5 ppm) and sufficient available zinc (> 0.5 ppm), Navalgund, Kundagol and half of Hubli taluk have soils with poor organic carbon (< 0.5 %), poor available zinc (< 0.75 ppm), poor available phosphorus (< 5 ppm). The soils of major part of Dharwad taluk and Kalaghatagi taluk district are deficient in available sulphur (<10 ppm), while available boron (>0.58ppm) is sufficient in all the taluks, except Kalaghatagi taluk.

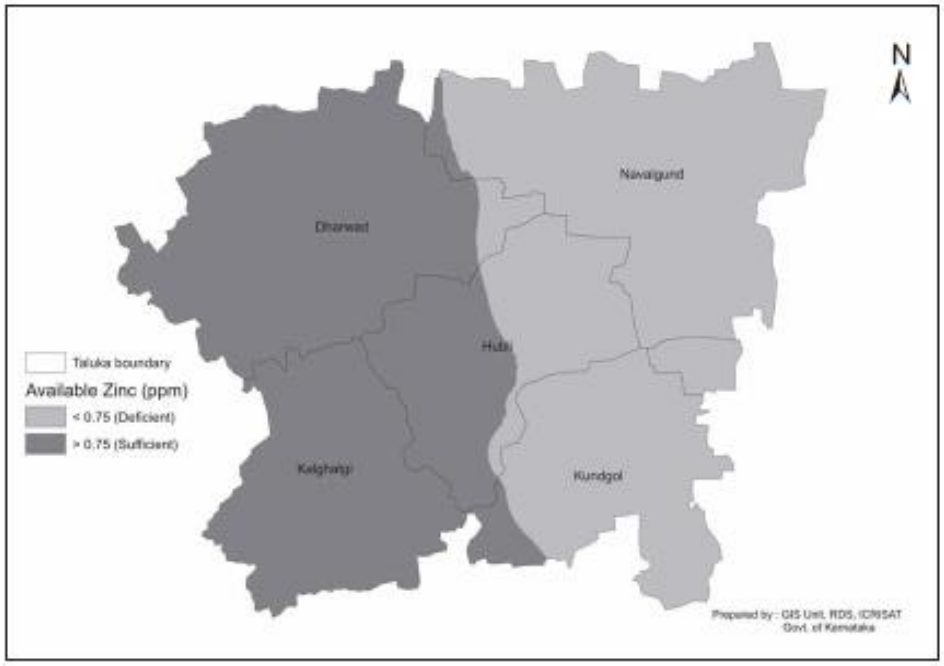
Fig 1.10 : Soil fertility Maps of Dharwad district






N
Navalgund
Dharwad
Hubli
Taluka boundary
Available Potassium (ppm)
> 50 (Sufficient)
Kalghatgi
Kundgol
Prepared by : GIS Unit, RDS, ICRISAT
Govt. of Karnataka


N
Navalgund
Dharwad
Hubli
Taluka boundary
Available Sulphur (ppm)
< 10 (Deficient)
> 10 (Sufficient)
Kalghatgi
Kundgol
Prepared by : GIS Unit, RDS, ICRISAT
Govt. of Karnataka



1.6 :Soil Erosion and Runoff Status:

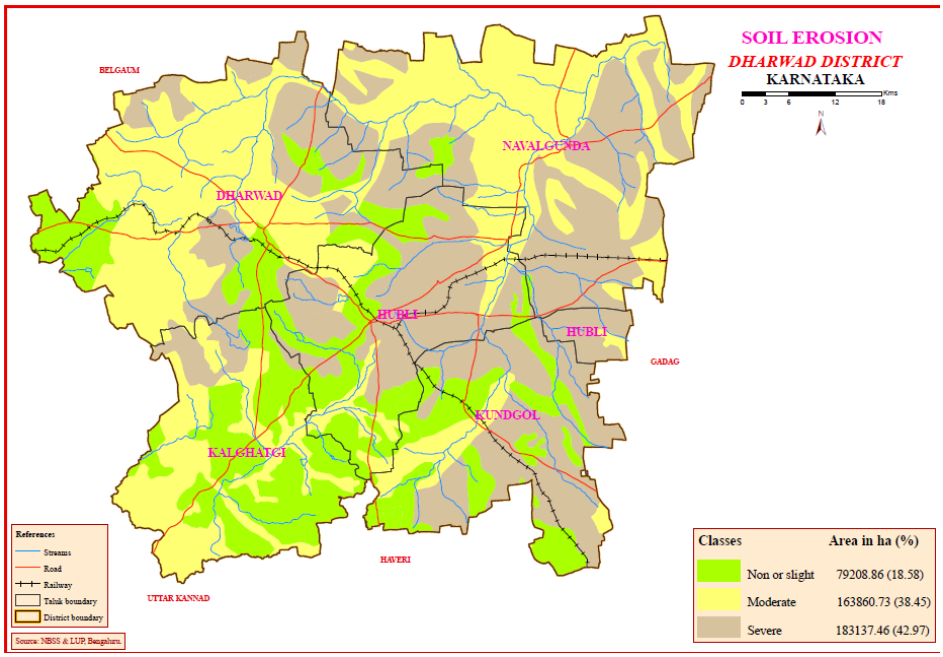
Soil erosion which occurs at varying rates is a widespread threat to sustainable resource management. Major causes of soil erosion were cultivation without proper soil and water conservation measures in area not suitable for crops, denuded areas without vegetation, cultivated fallow on moderate slopes, degraded forests/pastures on steep slopes and poorly managed forest cover. Appropriate soil conservation and land management techniques for the different soil erosion classes were suggested. It is generally associated with agricultural practices, leading to decline in soil fertility, bringing in a series of negative environmental impacts and has become a threat to sustainable agricultural production and water quality.

Soil erosion is one form of soil degradation. Soil erosion is a naturally occurring process on all land. The agents of soil erosion are water and wind, each contributing a significant amount of soil loss each year. Soil erosion may

be a slow process that continues relatively unnoticed, or it may occur at an alarming rate causing serious loss of top soil. The loss of soil from farmland may be reflected in reduced crop production potential, lower surface water quality and damaged drainage networks.

The soils of Dharwad district are classified mainly under non or slight erosion, moderately eroded and severely eroded classes. The soils of the district that are severely eroded are mainly in Hubli, Navalgund, Kundgol and in parts of Dharwad and Kalghatgiin on an area of 183137.46 ha (42.97 %); the area under moderately eroded soils is 163860.73 ha (38.45 %) mainly in the taluks of Dharwad, Navalgund and Kalghatgi and in parts of Hubli and Kundgol, while soils with none to slight erosion occur mainly in Kalghatgi and Kundgol taluks and parts of Dharwad, Hubli and Navalgund taluks in an area of 79208.86 (18.58%). Surface runoff is high in nearly 81.42% of the area that is moderately eroded to severely eroded, resulting in loss of water, soil fertility and top soil. Necessary water conservation measures are needed to be taken up to conserve water and soil in the district.

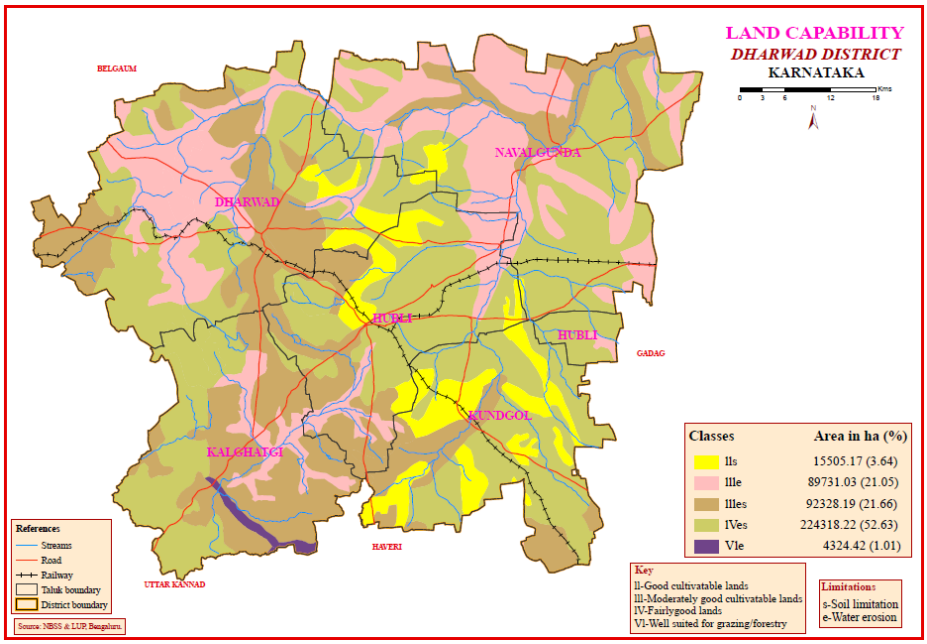
Fig.1.11



1.6.1. Land Capability classes:

The lands of the district are classified under the land capability classes II, III, IV, and VI. Lands of Kundgol, Hubli, Kalghatgi and parts of Dharwad and Navalgund taluks are classified as Class IV lands which are fairly good lands with limitation of soils erosion, suited for occasional or limited cultivation. These lands are found in an area of 224318.22 ha (52.63 %), followed by lands under Class III which are moderately good cultivable lands with limitations of soil and erosion spread over an area of 182059.92 ha (42.66 %) and are mainly found in all the taluks; Class II are good cultivable lands with minor limitation of soil occur in an area of 15505 ha (3.64%) mainly in Kundgol, Dharwad and Hubli taluks, while lands of Class VI lands are well suited for grazing or forestry with limitation of erosion are not arable in an area of 4324.42 ha (1.01 %) in Kalghatgi taluk.

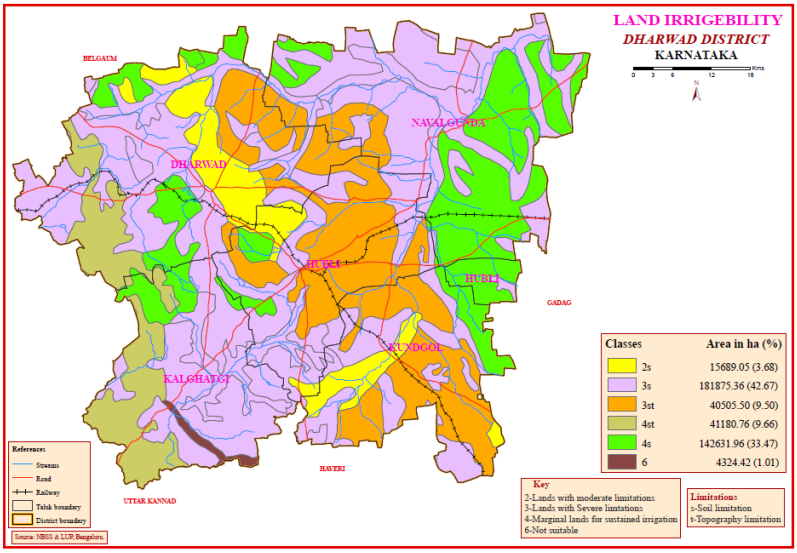
Fig 1.12



1.6.2. Land Irrigability classes:

Lands of Dharwad district are classified under the Land Irrigability Classes 2, 3, 4 and 6. The lands that have severe limitations for sustained use under irrigation is mainly found in all the taluks in an area of 222380.06 ha (52.17 %), having soil and topographic limitations. Lands that have moderate limitation for sustained use under irrigation – Class 2 lands, are in Dharwad, Hubli and Kundgol taluks over an area of 15689.05 ha (1.01 %). Class 4 lands are marginal for sustained use under irrigation because of very severe limitations mainly soil limitation are found in Dharwad, Hubli and Kundgol taluks and in parts of Navalgund and Kalghatgi taluks in an area of 183812.72 ha (43.12 %), while lands coming under Class 6 are lands not suitable for sustained use under irrigation are found in Kalghatgi taluk in 4324.42 ha (1.01%).

Fig 1.13



1.7 : Land Use pattern:

Of the geographical area of 427329 ha, the net sown area is 285716 ha (66.8%), area sown more than once is 177731 ha and the cropping intensity is 162.2%. The forest area in the district is 35235 ha (8.2%) area, under waste

land is 79005 ha (18.5%) and the area and other uses account for 27373 ha (6.4%).

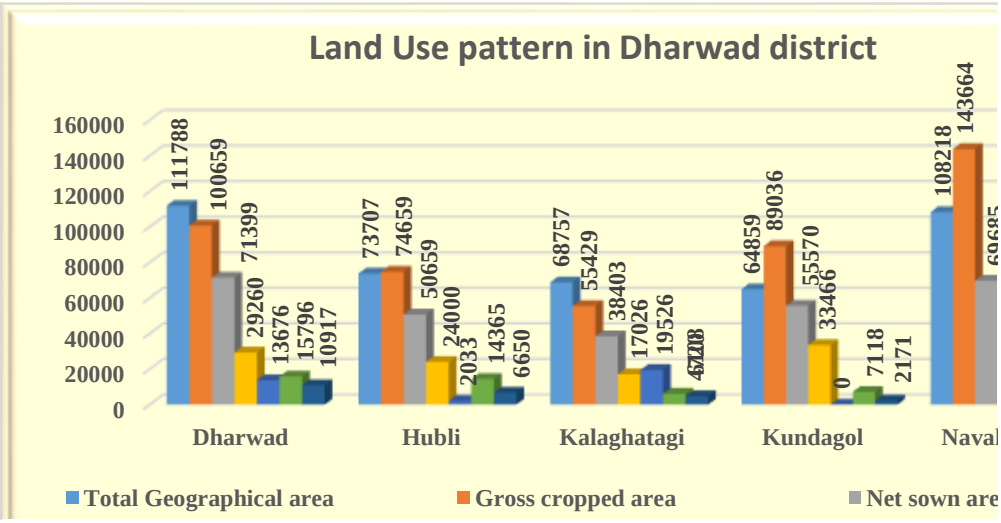
Among the taluks, Net area sown is highest (71399 ha) in Dharwad taluk, followed by Navalagund taluk(69685 ha), Kundagol (55570) and Hubli (50659). Lowest net area (38403 ha) is in Kalaghatagi taluk. Area under forest land is the highest (19526 ha) in Kalaghatagi taluk, followed by Dharwad (13676) and Hubli (2033 ha). Kundagol and Navalagund do not have forest area.

Table 1.8. Land Use pattern

Sl. No	Taluk	Total Geographical area	Gross cropped area	Net sown area	Area sown more than once	Cropping intensity (%)	Area under Forest	Area under waste land	Area under other uses
1	Dharwad	111788	100659	71399	29260	141.0	13676	15796	10917
2	Hubli	73707	74659	50659	24000	147.4	2033	14365	6650
3	Kalaghatagi	68757	55429	38403	17026	144.3	19526	6108	4720
4	Kundagol	64859	89036	55570	33466	160.2	0	7118	2171
5	Navalagund	108218	143664	69685	73979	206.2	0	35618	2915
Total		**427329**	**463447**	**285716**	**177731**	**162.2**	**35235**	**79005**	**27373**

Source: District at a glance

Fig 1.14



CHAPTER II
DISTRICT WATER PROFILE

2.1. Area Wise, Crop Wise irrigation status:

Taluk wise**,** Season wise, Category wise - Irrigated and Rainfed area details in Dharwad district are furnished at Appendix 2.1. Totally agriculture and horticulture crops are cultivated in an area of 433935 ha. Under irrigated condition, crops are cultivated in an area of 55,449 ha (12.8%) and 378,486 ha (86.6 %) area under rainfed condition. Agriculture crops are cultivated in an area of 386087 ha (87.2%) and horticulture crops in an area of 50848 ha (11.6%).

During Kharif season, agricultural crops are cultivated in an area of 298547 ha (77.3%), during rabi season in an area of 79,607 ha (20.6%) and during summer season in an area of 7933 ha (2.1%). Cereal crops are grown on larger area of 124,714 ha (32.3% of total), while cotton is grown on an area of 97,184 ha (25.2%). Pulse crops are sown in an area of 86,413 ha (22.4%) and oilseeds in an area of 68,450 ha (17.7%).

Among horticulture crops, vegetables are grown in an area of 39,690 ha, whereas fruit crops are grown in an area of 11,158 ha.

2.2. Production and productivity of major crops:

Production and productivity of major crops of the district are furnished in Appendix 2.2.

During Kharif season, total cereal crops' production in the district is 181413 MT, whereas total pulses' production is 33,744 MT. However, the oilseed production of the district is 58,140 MT. Average productivity in case of Cereals is higher in maize (2273 kg/ha), followed by Paddy (1028 kg/ha). The

average productivity of pulses - avare is relatively higher (1014 kg/ha), followed by tur (669 kg/ha), while it is lower in cowpea (191 kg/ha). Among oilseeds, the productivity in safflower (1075 kg/ha) is relatively higher, followed by moderate productivity in groundnut (891 kg//ha) and soybean (805 kg/ha), whereas the productivity of sesamum and niger (258 kg/ha each) is lower. Cotton crop showed an average productivity of 277 bales/ha, whereas sugarcane showed a productivity of 63 t/ha.

Among taluks, the area of crops, production and productivity of crops are higher in Dharwad and Navalagund taluks owing to more area under irrigation. Even horticulture crops are also more in these two taluks as compared to other taluks as a consequence of more area under irrigation.

2.3. Irrigation based classification:

Dharwad district lacks in major rivers. However, Navalgund taluk has canal irrigated area from Malaprabha dam in Saundatti. Hubli taluk has also some area under canal irrigation. Other than canal irrigation, all the taluks of the district are dependent on rainfall or bore wells.

The gross irrigated area of the district is 66,383 ha, whereas net irrigated area is 58,449. Net irrigated area is highest in Navalagund taluk (40089 ha), followed by Dharwad (9529 ha), Kalaghatagi (5025 ha), and Hubli (3657 ha). The lowest area under irrigation is in Kundagol (149 ha).

CHAPTER III

WATER AVAILABILITY

3.1. Status of Water availability:

The ground water estimation is worked out based on the methodology recommended by Ground Water Estimation Committee. The ground water resource of the entire State has been computed by Central Ground Water Board (CGWB, 2013). The salient features of the ground water resources are given below. The data has been computed Block-wise. The areas having slopes of >20 % have been excluded from the recharge computation. Further, the ground water recharge and draft has been computed separately for command and non-command areas. The information has been calculated separately for each taluk.

Dharwad district is principally representing a dryland eco-system with an annual average rainfall of 761.8 mm and average rainy days of 57. The two taluks of the district, Navalagund and Hubli are mainly depending on Canal Irrigation and to some extent through tube wells, whereas other three taluks Dharwad, Kundgol and Kalaghatagi are mainly depending on tube wells. Surface water provided for irrigation through Malaprabha Right Bank Canal (Naragund and Navalagund branch) is 0.11872 BCM (4.24 TMC), of which 0.071232 BCM is available for Kharif season crops (Table 3.1).

Table 3.1.Status of Water availability (BCM)

Sl. No	Source	Kharif	Rabi	Summer	Total
	Surface Irrigation				
i	Canal (Major & Medium Irrigation)				
	Malaprabha Right Bank Canal, Navalagund	0.071232	0.047488	0	0.11872
	Malaprabha Right Bank Canal, Naragund branch canal				
	Total	0.071232	0.047488		**0.11872**
ii	Minor Irrigation tanks			--	--
iii	Lift Irrigation / Diversion	--	--	--	--
iv	Various Water Bodies including Rain Water Harvesting	--	--	--	--
v	Treated Effluent Received from STP	--	--	--	--
vi	Untreated Effluent	--	--	--	--
vii	perennial Sources of water	--	--	--	--

Source: Executive Engineer, MRBCC Division No.1, Naragund

3.2 Status of Ground water availability:

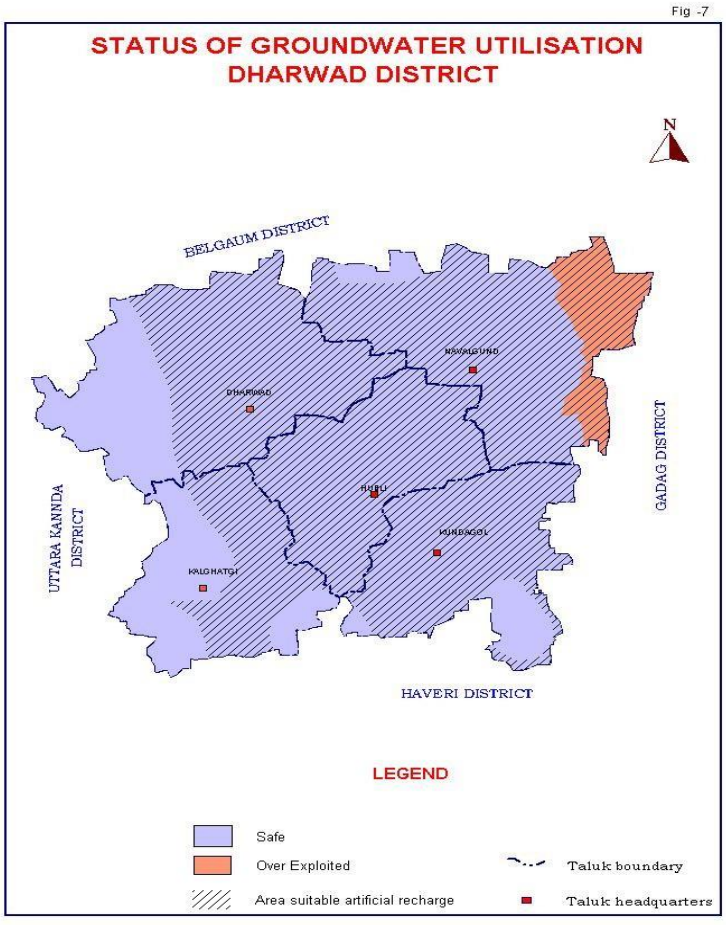
In general, the ground water development has been found to be 45% to 75% over the taluks since the water levels in the area as a whole has not shown any appreciable decline, the district is categorized as “safe” category in terms of development. An area of about 15% in Navalgund taluk has been identified as over exploited, because of significant decline during post-monsoon water level. Due to significant decline in water levels, an area of 50% in Dharwad taluk and 20% in Hubli taluk has shown as semi-critical. The net annual underground water available ranges from 0.02883 BCM in Kundagol to 0.06185 BCM in Navalgund taluk (Table 3.2).

Table 3.2 Status of ground water in Dharwad district

Taluk	Status of ground water exploitation- taluk wise (% area in each taluk)				Status of ground water draft/ availability (BCM)		
	Safe	Semi critical	Critical	Over exploit-ed	Ne Annual available water, BCM	Existing gross water draft for irrigation, BCM	Existing gross water draft for all uses, BCM
Dharwad	50	50	--	--	0.05101	0.03214	0.03801
Hubli	80	20	--	--	0.03152	0.01156	0.01461
Kalaghatagi	100	--	--	--	0.04909	0.01988	0.02199
Kundagol	100	--	--	--	0.02883	0.03878	0.01114
Navalagund	85	--	--	15	0.06185	0.11038	0.04515

(Adapted from CGWB Brochure of Dharwad District- 2013) * Calculated considering the natural recharge from all sources ** Calculated after considering other sector's needs.

Fig 3.1



The district has nearly 9409 bore-wells. The bore-wells are mainly dug in dry taluks of Dharwad, Kalaghatagi and Hubli. Canal irrigation in the district is mainly in Navalagund (39983 ha) and Hubli (1886 ha). The number of bore wells in Dharwad (4318), Kalaghatagi (2798), Hubli (1509), Kundagol (503) and Navalgund (281) taluks, totally irrigating an area of around 16580 ha. Though there are 1231 tanks and 1113 Open wells, no area is irrigated from these two sources.

3.3. Status of Command area:

In Dharwad district, Navalgund and Hubli taluks are irrigated by Malaprabha Right Bank Canal. Totally an area of 41,869 ha is irrigated through MRB canal, comprising 39983 ha in Navalgund taluk and 1886 ha in Hubli taluk. Dharwad, Kalaghatagi and Kundagol taluks have no canal irrigated area. The net percentage of area irrigated through canal is 71.63 % of the total irrigated area. The average irrigation intensity in Dharwad district works out to 104% indicating the canal water availability in the two taluks for both the seasons is to a limited extent only. Hence, the double cropping system in these taluks under command area cannot be adopted (Table 3.3).

3.3. STATUS OF COMMAND AREA (existing) AREA IN HA

Sl. No	Name of the Command Area	Command Area			Total developed area
		Total Area	Developed Area	Un-developed Area	
1	Malaprabha Right Bank Canal				
2	-Navalagund	39983	39983	-	39983
3	-Hubli	1886	1886	-	1886
Total		**41869**	**41869**	**-**	**41869**

3.4. Existing type of irrigation:

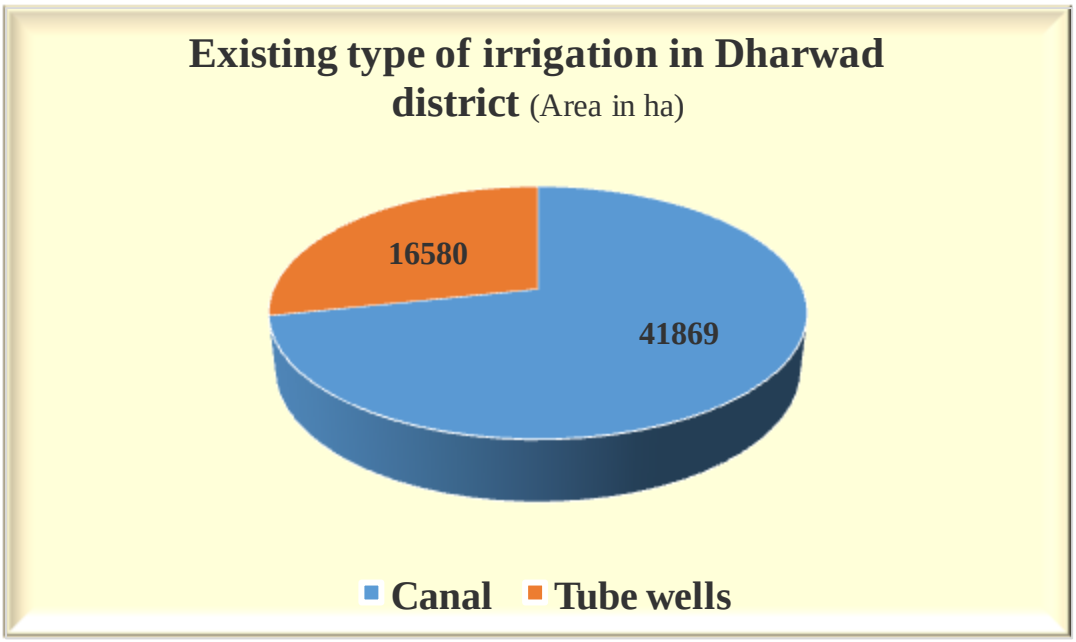
The total net irrigated in the district is to the tune of 58449 ha. This is mainly distributed in Navalagund taluk (40089 ha), Dharwad taluk (9529 ha), Kalaghatagi taluk (5025 ha), Hubli taluk (3657 ha) and Kundgol (149 ha). Canal irrigated area is in Navalagund taluk (39983 ha) and Hubli taluk (1886ha). The major tube well irrigated area is in the taluks of Dharwad (9529 ha), Kalaghatagi (5025 ha), Hubli (1771 ha), Kundgol (149 ha) and Navalagund (106 ha). Though there are 1231 tanks and 1113 open wells, no area is irrigated from these two sources (Table 3.4, Fig. 3.2).

3.4. Status of Existing type of irrigation (Net area irrigated).

Area in hectares

Sl. No	Taluk	Canal	Tanks	Open wells	Tube wells	Lift irrigation	Others	Total
1	Dharwad	0	0	0	9529	0	0	9529
2	Hubli	1886	0	0	1771	0	0	3657
3	Kalaghatagi	0	0	0	5025	0	0	5025
4	Kundagol	0	0	0	149	0	0	149
5	Navalagund	39983	0	0	106	0	0	40089
Total		**41869**	**0**	**0**	**16580**		**0**	**58449**

Fig. 3.2.



3.5 Water available from various sources:

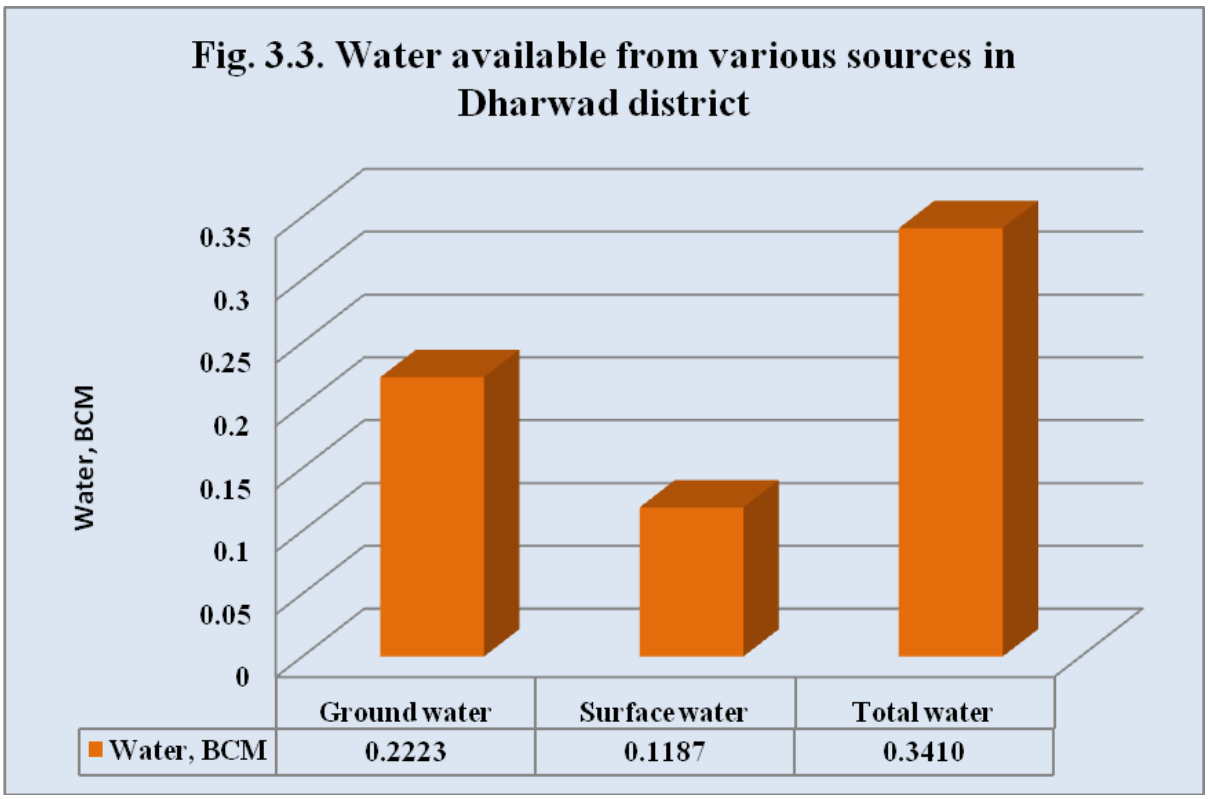
Water is available from underground water (as per Central underground Board Booklet, 2012) and canals (major and medium) and tanks. Total water available for the district from underground tube wells is 0.2223 BCM and these wells are safe in most of the taluks except Navalgund (15% is overexploited). There is less scope for further improvement unless proper recharge structures are created. Water from irrigation canals (Major and medium), minor irrigation tanks (maintained by Zilla Panchayats and Minor Irrigation Departments), lift irrigation and other water bodies is not available. Here also, efforts are to be made to recharge these tanks for utilization – mostly for drinking, industrial or other purposes (Table 3.4). Further, water from canals is providing drinking water facility to some of the taluks.

The total water available from various sources for Dharwad district is 1.302848754 BCM (Table 3.5, Fig. 3.3).

Table 3.5. Rainwater and other water distribution in Dharwad district

Taluks	Under ground water, BCM #	Surface water from canals & other sources##	Total
Dharwad	0.05101	0.11872	
Hubli	0.03152		
Kalghatgi	0.4909		
Kundagol	0.02883		
Navalgund	0.06185		
Total	**0.2223**	**0.11872**	**0.34102**

- Central Underground Water Board Booklet, Dharwad district- 2013; ## - Surface water from canals (major and medium)- Malaprabha Right Bank Canal (Naragund Branch and Navalgund Branch); No water is available from minor irrigation tanks, lift irrigation and water bodies from anecut, barrage**;** Executive Engineer, MRBCC Division No.1, Naragund.



CHAPTER IV

WATER REQUIREMENT/ DEMAND - DHARWAD DISTRICT, KARNATAKA

Water is a precious natural resource provided by nature to mankind for usage in various activities. Life does not exist without water. All living organisms depend on water for performing various vital functions for survival. Major portion of water is used for agriculture all over India and that too in Karnataka. Although water is renewable resource, it is quite dynamic and becoming scarce due to spatial and temporal variation in rainfall. Water is needed to ensure food security, feed livestock, maintain organic life (sustain lifestyle of human beings, living creatures, conserve biodiversity and environment), industrial use, etc. However, with reckless abuse and increasing demand due to growing population and undesirable lifestyle, many states are facing severe water crisis. It is not only due to rapid population growth alone, but also on account of many other factors such as rise in per capita water demand arising out of continuous upward movement of living standards, increased reliance on irrigated agriculture, massive urbanization and industrialization etc. The available utilizable water resource of the country is considered insufficient to meet all future needs. Under such a situation, in order to face the challenge of water deficit, apart from accelerating pace of development of available utilizable water resources, all out efforts, on the part of people from every walk of life, would need to be made to conserve every drop of water and improve efficiency in all areas of water use.

The National Commission on Agriculture in 1976 estimated water resources in the country for 1974 and projected for 2000 and 2025 based on certain empirical formulae and assumptions related to runoff characteristics of soil, rainfall events and vegetation cover. India is a vast country with a geographical area of 328 Mha and receiving annual precipitation of 1194 mm.

This amounts to availability of 400 Mha-m (million hectare meter) of water to India. Out of this, 17.5% goes as immediate evaporation (70 Mha-m), 53.8% as precipitation into soil (215 Mha-m) and 28.7% as surface runoff (115 Mha-m, which includes 10 Mha-m as snowfall). Further, total precipitation received on the soil is divided into 41.3% (165 Mha-m) as soil moisture available for crops and 12.5% as ground water (50 Mha-m). Water is lost through evaporation to an extent of 20% in medium and major reservoirs and 40% in tanks. This assumption is followed for Karnataka (Bhaskar *et al*., 2016).

Karnataka has total geographical area of 19.20 million ha receiving an annual precipitation of 1133.3 mm (average of 55 years from 1960 to 2014). About 71% of rainfall is received during south west monsoon (June to September), while north east monsoon contributes 17% (October to December) and early showers by 12%. The south west monsoon sustains agricultural activity in most parts of the state, as large proportion of agriculture is rainfed farming. Taking geographical area and rainfall into consideration, available water due to precipitation is 21.76 Mha-m to Karnataka (215.2864 BCM or 7688.8 TMC). Following NCA 1976 recommendation, out of 215.2864 BCM (7688.8 TMC) of water, 53.8% percolates into soil (115.822 BCM or 4136.57 TMC), 17.5% as immediate evaporation loss (37.674 BCM or 1345.54 TMC), and 28.7% as surface water runoff (61.7876 BCM or 2206.69 TMC).

The average annual rainfall in Karnataka is 1133.3 mm. The state is divided into four meteorological divisions viz., North Interior Karnataka, South Interior Karnataka, Malnad and Coastal Karnataka. Coastal Karnataka with an average annual rainfall of 3456 mm is one of the rainiest regions in the country. Contrasting this, the region of South Interior Karnataka and North Interior Karnataka receive only 1286 and 731 mm of average annual rainfall. (https://en.wikipedia.org/wiki/Rainfall_in_Karnataka).

Karnataka accounts for about six percent of the country's surface water resources. Around 60% of this is provided by the west flowing rivers, while the remaining comes from the east flowing rivers. There are seven river basins in all formed by the Godavari, Cauvery, Krishna, the west-flowing rivers, North Pennar River, South Pennar, and Palar.

(http://waterresources.kar.nic.in/river_systems.htm);
https://en.wikipedia.org/wiki/Geography_of_Karnataka).

Dharwad district has a total geographical area of 4,27,329 ha receiving an annual precipitation of 78.7 cm. Hubli, Dharwad and Kalaghatagi taluks receive higher rainfall of 75.4 to 100.4 cm, while the rainfall is relatively lower in Navalgund and Kundagol taluks (64.9 to 69.8 cm). Most of the rain (63.5%) is received during south west monsoon (June to September), followed by rains during October to December (north-east rains - 19.3%). The south west monsoon sustains agricultural activity in most parts of the state, as large proportion of agriculture is rainfed farming. Taking geographical area and rainfall into consideration, available water due to precipitation is 3.3513197 BCM to Dharwad. Following NCA 1976 recommendation, out of 3.3513197 BCM of water, 53.8% percolates into soil (1.8030099 BCM), 17.5% as immediate evaporation loss (0.5864809 BCM), 28.7% as surface water runoff (0.96182754 BCM) and 12.5% as underground water (0.418915 BCM). Dharwad taluk has more water available through rainfall, followed by Navalgund and Kalaghatagi taluks, while it is relatively lower in taluks of Hubli and Kundagol.

4.1. Water Demand for domestic need:

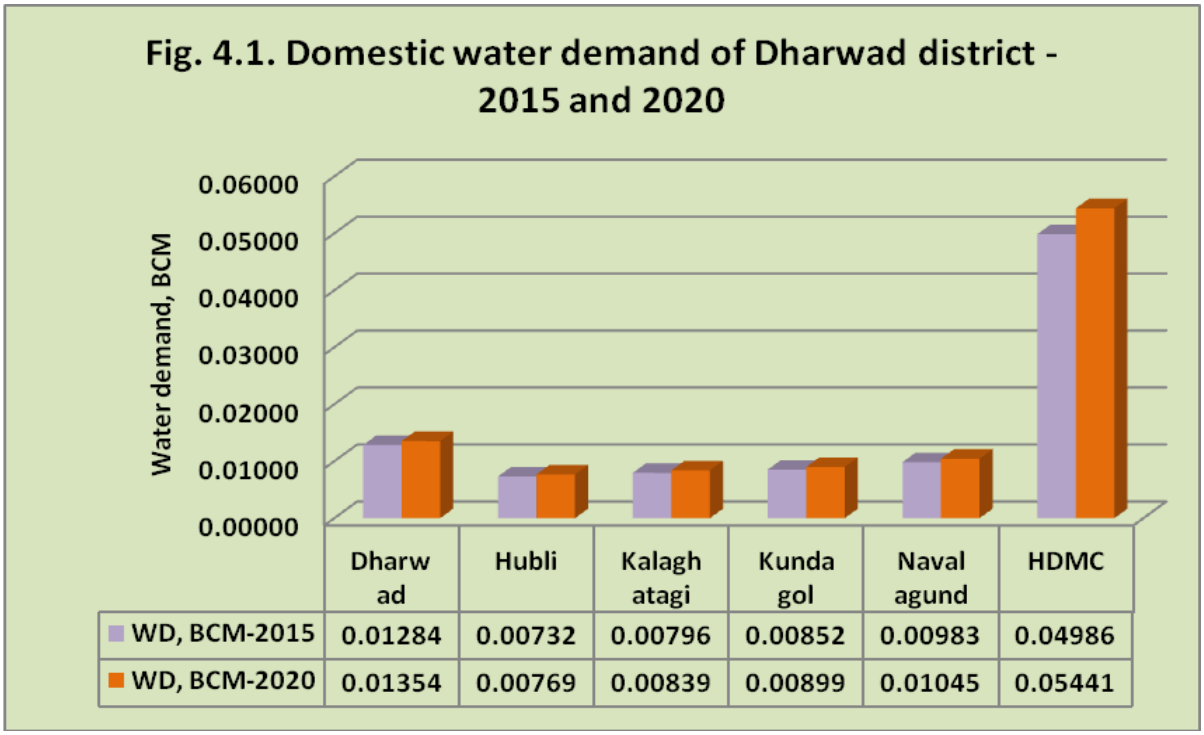
A number of factors like climate, culture, food habits, work and working conditions, level and type of development, and physiology determine the requirement of water. The per capita water requirement in urban areas is more than that in the rural areas. As per the Bureau of Indian Standards, IS:1172-1993, a minimum water supply of 200 liters per capita per day (lpcd) should be provided for domestic consumption in cities with full flushing systems. IS:1172-1993 also mentions that the amount of water supply may be reduced to 135 lpcd for the LIG and the economically weaker sections (EWS) of the society and in small towns [Modi, 1998]. However, in the Tenth Plan (2002-07), the cities with planned sewerage systems are classified into two groups based on population, i e, metropolitan or megacities (minimum water supply level is 150 lpcd) and non-metropolitan cities (135 lpcd) [Government of India 1997, 2002]. Over and above the aforesaid demand, 15% losses may be allowed for determining the quantity of raw water required.

During 2015, water requirements for domestic use in Hubli-Dharwad Municipal Corporation, Navalgund and Dharwad taluks are relatively higher (0.009833861 to 0.049862555 BCM), while it is lower in taluks of Hubli and Kalaghatgi (0.007320984 to 0.007955055 BCM). The water requirements in these taluks corresponded to the prevalent population. For district as whole, water demand is 0.096332478 BCM in 2015 (Table 4.1). With projected growth of population of 15% during 2011 to 2020, the domestic water requirements in the taluks of Dharwad district followed the same trend (Table 4.1, Fig. 4.1, 4.1a, 4.1b).Thus, domestic water requirement is projected at 0.10346955 BCM in 2020 from the present consumption level of 0.096332478BCM during 2015 (Table 4.1, Fig. 4.1).

Table 4.1. Domestic water demand (BCM) of Dharwad district - present and projected 2020

Blocks/ Taluks	Population in 2011	Water demand, BCM	Population in 2015	Water demand in 2015, BCM	Projected population, 2020	Projected water demand by 2020, BCM
Dharwad	249,993	0.012318405	260,636	0.012842839	274,804	0.01354097
Hubli	142,807	0.007036815	148,574	0.007320984	156,112	0.00769242
Kalaghatagi	154,659	0.007620822	161,442	0.007955055	170,364	0.00839469
Kundagod	165,568	0.008158363	172,850	0.008517184	182,430	0.00898924
Navalagund	190,208	0.009372499	199,571	0.009833861	211,985	0.01044556
Hubli-Dharwad Municipal Corporation	943,788	0.046505154	1,011,924	0.049862555	1,104,144	0.05440667
Total	**1,847,023**	**0.091012058**	**1,954,997**	**0.096332478**	**2,099,839**	**0.10346955**

Water requirement for human being - 135 liters/head/day, lphd;
Domestic Water requirement/Demand in Billion cubic meter, BCM
= (Population X Water requirement, 135 lphd X 365 days)/ (1000 liters X 1,000,000,000)
Assumption: Increase in population during 2011 - 2021 is 13.7% similar to as that of decadal growth rate of population of 15.3% observed between 2001-2011 and 16.8% between 1991 to 2001.
{Source: Dharwad district at a glance 2013-14, Zilla Panchayat, Dharwad}
http://www.census2011.co.in/census/district/254-dharwad.html



4.2. Water requirement for crops:

Field/horticultural/plantation crops grown in Dharwad district are paddy, maize, groundnut, ragi (both in Kharif & rabi), jowar, bajra, Tur, black gram, green gram, cowpea, avare, horse gram, sesamum (in Kharif only), Bengal gram (rabi only) (under agriculture), fruit crops, and vegetable crops. For calculation of water requirement of irrigated crops, following methodology and some assumptions have been used based on the recommendations of the NCA, 1976 and methodology suggested by Bhaskar et al. (2016).

Irrigation water requirement considered for calculation purpose for various crops are paddy (150 cm in rabi/summer, 100 cm in Kharif), maize - 60 cm, bajra/jowar - 45 cm, red gram - 70 cm, groundnut - 45 cm, other oilseeds - 40 cm, cowpea/green gram/other pulses - 40 cm, vegetable crops - 50 cm, and fruit crops - 60 cm. From this water requirement of various crops and the area of the crops grown under irrigation, irrigation water requirement for crops has been worked out.

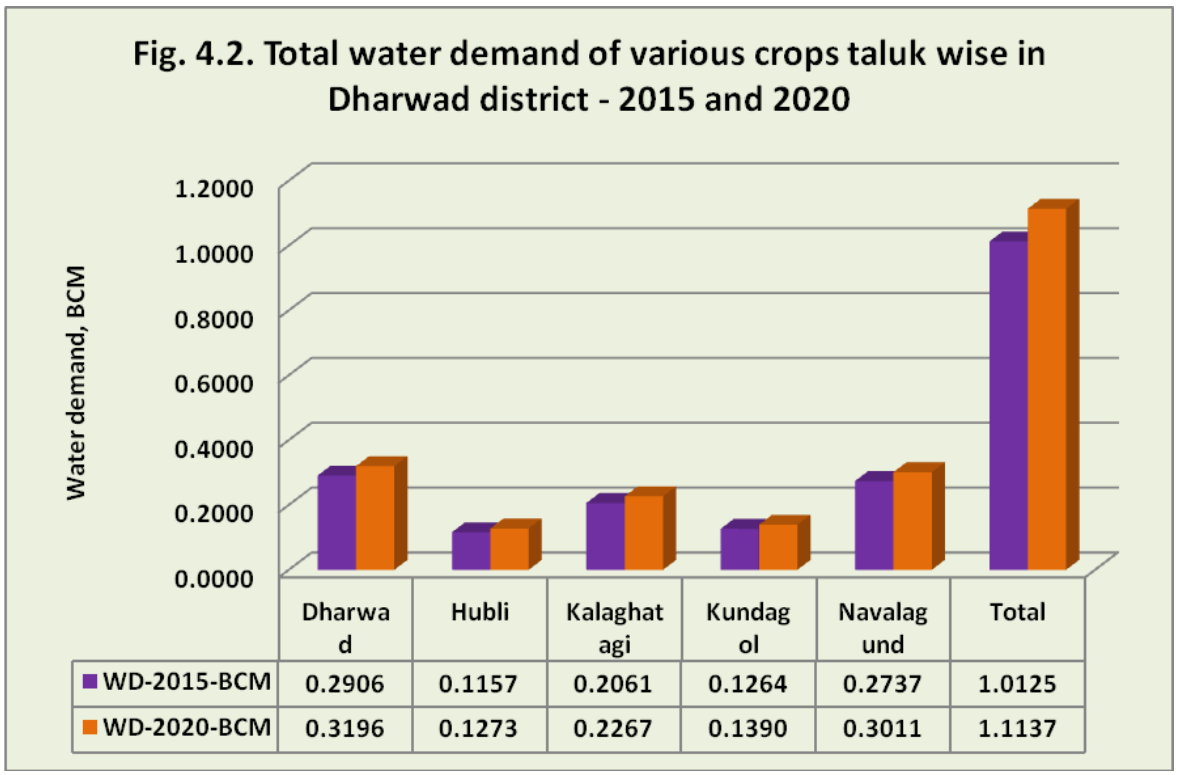
Assumption - Rain water accounted for crop use is 50% of total rainfall occurring during the cropping season in Dharwad district, considering the soil type (vertisols, clay loam soils) and the intensity of rain. Rain water used for crop growth is used for water demand of rainfed crops.

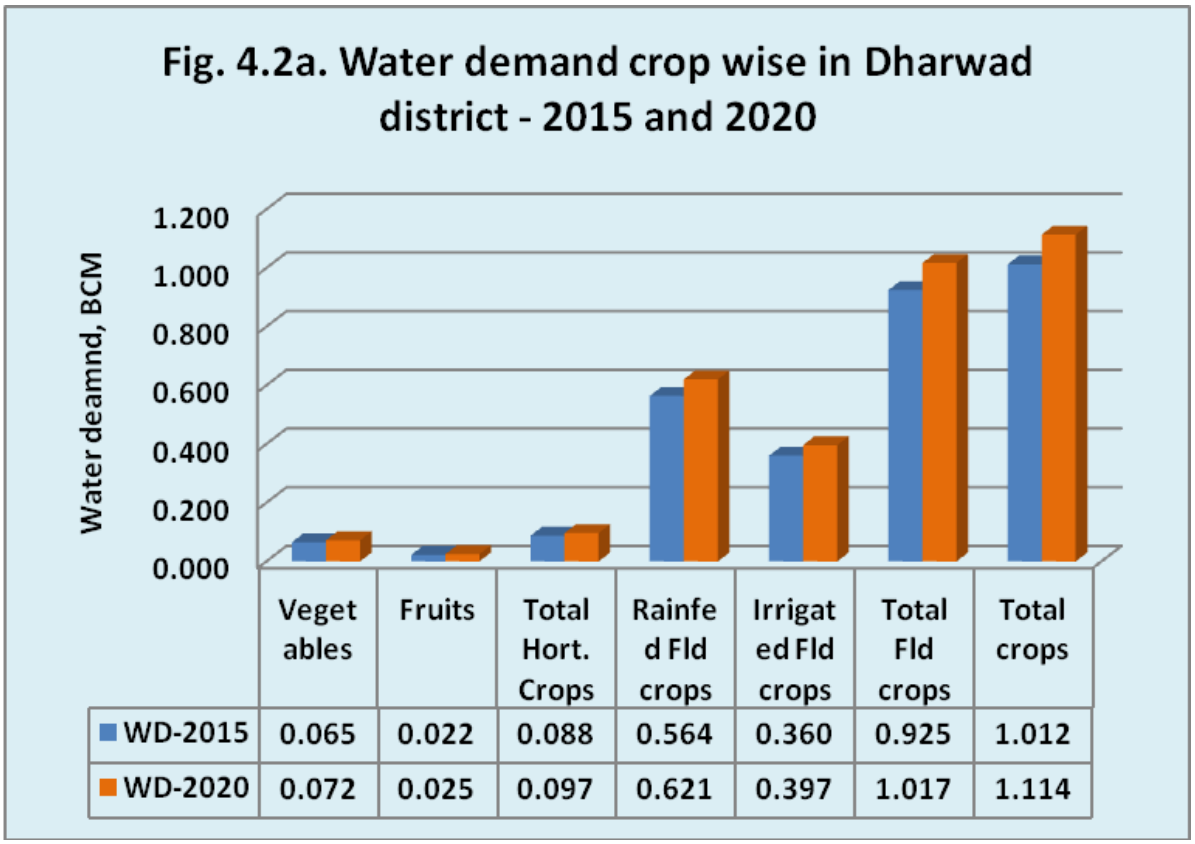
Total water requirement of crops is relatively higher in Navalagund and Dharwad taluks (0.27372 to 0.29058 BCM) in view of large area of irrigated crops (rice, groundnut, sugarcane, maize, tur, bengal gram, vegetables, fruit crops) as well as more area under rainfed crops. Total water requirement of irrigated crops of the district is 0.36049 BCM, whereas total water requirement of rainfed crops is 0.56413 BCM in view of large area under crops (Jowar, pulses - green gram, bengal gram, oilseeds - safflower) in taluks of Dharwad, Kundagol and Kalaghatagi. Water demand for total horticultural crops is 0.08786133 BCM for Dharwad district, of which major share goes to vegetables (0.065448445 BCM). Further, water demand of total horticulture crops is more in Kundagol, Kalaghatagi and Dharwad taluks as compared to other taluks. The projected water demand for total crops is also worked out for 2020, keeping 10% increase in irrigated area due to efficient rain water use, more under area and other means. For Dharwad district, the projected total water demand for crops is 1.11373 BCM by 2020 as compared to the present demand of 1.01248 BCM), which amounts to 10% increase (Table 4.2, Fig. 4.2, 4.2a).

Table 4.2. Water requirement of horticulture and agricultural crops (BCM) in Dharwad district - 2014-15

Taluks	Vegetables	Fruits	Total - Horticulture crops	Rainfed field crops	Irrigated field crops	Agriculture crops (Irrigated + Rainfed)	Total crops
	Net Water requirement, BCM						
Dharwad	0.0062637	0.0137751	0.0200389	0.1366719	0.133870	0.2705419	0.2905807
Hubli	0.0077018	0.0065527	0.0142545	0.0842320	0.0172455	0.1014775	0.115732
Kalaghatagi	4.905E-05	0.0014290	0.0014780	0.1263338	0.0782475	0.2045813	0.2060594
Kundagol	0.0035126	0.0003086	0.0038212	0.1221383	0.000434	0.1225723	0.1263935
Navalagund	0.0479213	0.0003475	0.0482688	0.0947546	0.1306935	0.2254481	0.2737169
Total	**0.0654484**	**0.0224129**	**0.0878613**	**0.5641305**	**0.3604905**	**0.9246211**	**1.0124825**
Projected for 2020 - 10% increase	**0.0719933**	**0.0246542**	**0.0966475**	**0.6205436**	**0.3965396**	**1.0170832**	**1.1137307**

Water requirement for crops: Fruit crops - 60 cm, Vegetable crops - 50 cm, Maize - 60 cm, Pulses - 40 cm, Oilseeds - 40 cm, Groundnut - 45 cm, Tur - 70 cm, Jowar - 55 cm, Ragi - 45 cm; Rice - 150 cm during rabi/summer, 100 cm in Kharif, Sugarcane - 200 cm, Banana - 120 cm, Flowers - 40 cm, Tomato/Onion - 60 cm
Here 50% of rainfall is accounted as water available for crop use for rainfed crops. Irrigation water requirement, ha - cm = Area of the crop, ha X Water requirement of the crop, cm; One ha-cm = 1,00,000 liters or 100 cubic meters; Irrigation water requirement in BCM = {(Irrigation water requirement, ha-cm X 100)/100,000}
Source: Dharwad district at a glance 2014-15;





4.3. Water requirement of Livestock:

Livestock sector plays a significant role in rural economy of India. It contributes to 5% of total domestic gross product (DGP) and one fourth of total agricultural GDP (AgGDP). Livestock sector is unique in terms of providing employment opportunity particularly to two third of women workforce in India towards animal rearing. Livestock is an integral part of mixed farming of Indian agriculture. Both indigenous cattle and buffalo population registered an annual decline of 4.5 per cent and 4.3 per cent respectively between 2007 and 2012 census periods, while that of crossbred cattle increased by 5.8 per cent (https:www/Uttara%20Kannada/Livestock%20census%20Karnataka.pdf).

Besides, contributing food and inputs (draught energy and manure) for crop production, livestock are important as savings or investments for the poor household and provide food security or insurance through various ways in different production systems. Rainfed regions support the highest number of livestock units. Except buffalo and pigs, more than half of all livestock species

(52.3 to 60.1%) are concentrated in the rainfed region. Even 43.1% of the total buffalo and 44.7% of pigs are reared in rainfed region. Irrigated region accounts for higher proportion of buffalo (43.1%) and except sheep it accounts for second highest population of all major livestock species. although the resource degradation in rainfed areas has been observed, various support programmes of the government are encouraging mixed farming to stabilize the income of the resource poor farmers of arid and semi-arid regions of the state. Considering these facts, increase in total population of the livestock has been maintained at 5% in 2020 as compared to earlier census of 2012 (Anjani Kumar and Singh, 2008).

Water requirement for livestock and other animals namely - indigenous cattle, cross bred cattle, draft animals/bulls/others, sheep, goats, pigs, duck, and poultry, have been calculated separately with the corresponding population for 2012. The projected water requirement for livestock population at 2020 has also been calculated separately for all live stocks. The total water requirement for live stocks for 2012 and projected for 2020 is provided taluk wise in Table 4.3.

Total population of livestock and other animals in Dharwad district is 1344,822 during 2012 and their water requirement is 0.0047392 BCM. Considering the increase in the population of livestock at 5% from 2012 to 2020, their water demand would be 0.0049761 BCM with corresponding population of 1412,063 (Table 4.3, Fig. 4.3). Water demand of livestock is more in Dharwad, followed by Hubli, Kalaghatagi and Navalagund taluks, as reflection of corresponding livestock population in these taluks.

Table 4.3. Water requirement of livestock and other animals in Dharwad district in 2015 and projected for 2020

Taluks	Water requirement of livestock, Billion cubic meters (BCM)			
	Population, 2015	Present Water requirement for 2015, BCM	Projected Population, 2020	Water requirement for 2020, BCM
Dharwad	560088	0.0015277	588092	0.0016040
Hubli	278967	0.0009726	292915	0.0010213
Kalaghatagi	345611	0.0009590	362892	0.0010069
Kundagod	62106	0.0005383	65211	0.0005652
Navalagund	98050	0.0007416	102953	0.0007787
Total	**1344822**	**0.0047392**	**1412063**	**0.0049761**

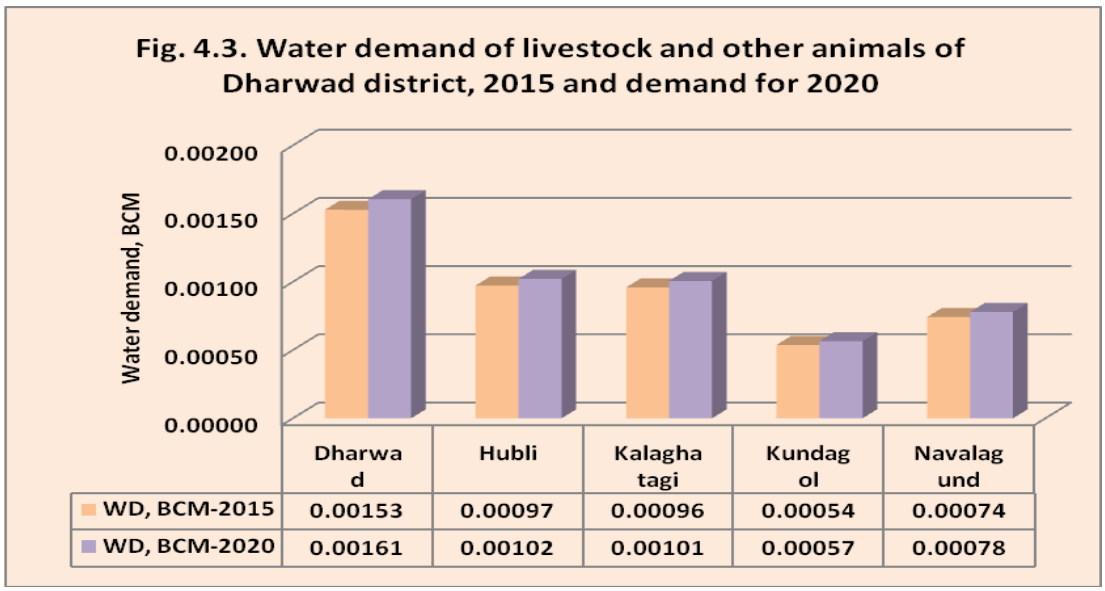
Water requirement for various livestock: liters/head/day, lphd: Indigenous cattle - 36 lit; Cross bred cattle/Buffalo - 55 lit; Sheep/Goat - 3.5 lit; Pigs - 6.3 lit; Poultry - 0.3 lit; Dog - 1.8 lit; Duck - 1.0 lit; Others (Bull/He Buffalo/Others) - 55 lit

Water requirement is calculated based on water requirement for various livestock(s), BCM = {(Population of livestock * Water requirement for various livestock, lphd X 365 days)/1000*1000,000,000)}

Livestock population is projected to be increased by 5% between 2012 to 2020 census, due to encouragement in the government policies and more support for integrated farming systems. Though cattle population has decreased particularly in favour of indigenous cattle, this reduction is compensated with increase in the density of cross bred animals and other animals due to economic considerations.

(Anjani Kumar and Singh, D.K. 2008. Livestock production systems in India: An appraisal across agro-ecological regions. Indian Journal of Agricultural Economics, 63(4): 577-597)

Source: Deputy Director, Department of Animal Husbandry and Veterinary Services, Dharwad, Dharwad District at a glance - 2014-15



4.4. Water demand for Industry

Surface water is the major source of water for the industries in India (41%) followed by groundwater (35%) and municipal water (24%). With greater demand for water, water availability to Industries is becoming scarce and has to invest more for getting water. In addition, industries have to adopt conservation measures and reuse of water after treatment. The water available from waste water treatment is being used for gardening.

While inadequate availability of water is the major risk facing the industries (37%), others agree that poor water quality is another major risk in the running of business (14%). Sectors like pharmaceuticals, power, food processing and agriculture feel the brunt of poor water quality. High costs for obtaining water are hindering the business interest of smaller industries and the ones which are located in the drier regions of the country. Around 14 per cent of the respondents also feel that environmental changes over the past few decades have had an impact on freshwater availability. A realization is gradually emerging that rectifying measures needs to be taken by industries to augment freshwater through rainwater harvesting and wastewater treatment and reuse.

Indian industry is becoming responsive to the fact that it should be the role of every user to undertake measures for water conservation. It is desirable that the shared responsibility of companies across sectors is to join hands with communities and governments to work on programmes for water conservation, recharge and wastewater treatment (FICCI, 2011).

In Dharwad district, there are 526 small scale factories and 23,388 small scale industrial units across the district. Total water demand at present (2015) is put at 0.084BCM during 2015 as well as 2020. The projected water demand is also same as that of 2015, as there is no new proposal (Table 4.4).

It is necessary to augment the requirement of fresh water by undertaking wastewater treatment and using it for horticulture, gardening, ash handling, washing of ore, flushing toilets, cleaning, fire-fighting and dust suppression activities**.** The industries must see a merit and an economically value in reusing wastewater for purposes where water quality is not an important criterion. There is need to take up water auditing to understand the complete water use pattern in their operations and look for water saving measures.

Table 4.4 Water demand of Industries (category wise) in Dharwad district - Present and future demand by 2020

Sl. No.	Name of the Industry	Water demand, BCM	
		2015	2020
1	Dharwad (180 factories & 6575 small scale industrial units)	0.0146	0.0146
2	Hubli (312 factories & 11453 small scale industrial units)	0.0354	0.0354
3	Kalaghatagi (12 factories & 1824 small scale industrial units)	0.0125	0.0125
4	Kundagol (5 factories & 1667 small scale industrial units)	0.0095	0.0095
5	Navalgund (17 factories & 1869 small scale industrial units)	0.012	0.012
	Total	**0.084**	**0.084**

Assumption - 32 million liters/day is required for Navalgund with 17 factories and 1869 small scale industrial units. 0.084 BCM = 3 TMC of water
Here rain water harvesting measures are to be created in the premises of the industries to augment the water demand and also to recharge the bore well.

4.5. Water demand for power generation: There is no new proposal for power generation (Table 4.5) in the district.

Table 4.5 Water demand for power generation in Dharwad district

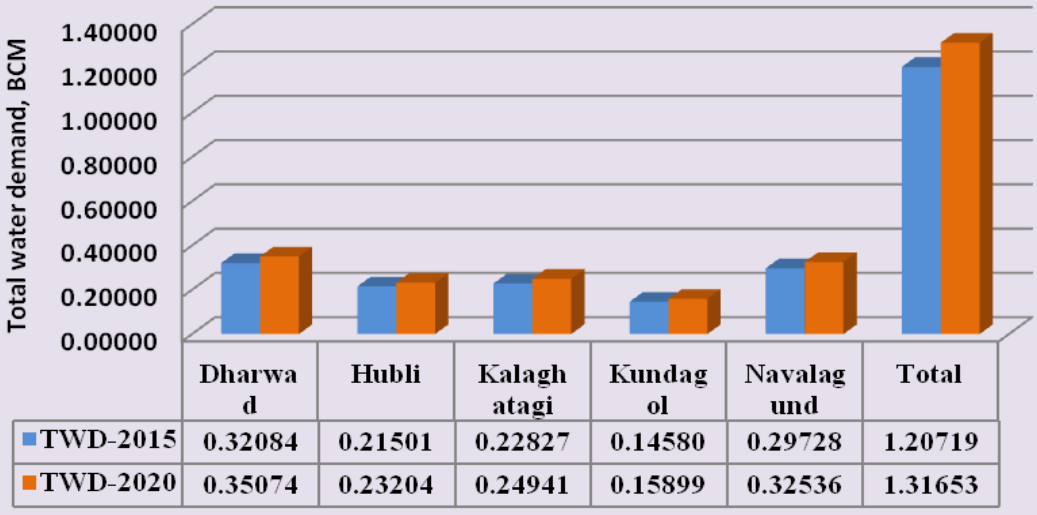
Block	Name of the power generating unit/ Power requirement	Present Water demand, BCM	Proposed for new power generating unit	Water demand at 2020, BCM
	None		No new proposal	

4.6. Water demand for other public purposes: Water is also required to be provided in public places like schools, colleges, offices, public toilets, bus station, railway stations, theaters, hostels, hotels, restaurants, hospitals, nurses' homes and medical quarters, community hall and all other public places. Here, it is very difficult to work out the water demand for all these places, which require many parameters - number of person involved in each activity, type facility available, etc. It is assumed that 10% of domestic requirement is considered as water demand for these public places. The water demand for these public places is 0.009633 BCM in 2015, where as this water demand would be 0.0103470 BCM by 2020 (Table 4.6, Fig. 4.5).

4.7. Total water demand of the district for various sectors:

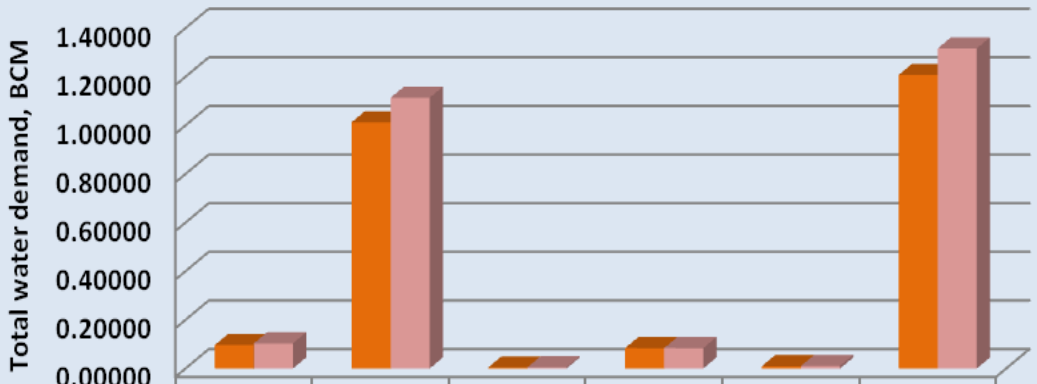
At present, water demand for all purposes in Dharwad district is 1.20719 BCM, of which major share goes to crops' demand of 1.01248 BCM (83.9%). The next share of water demand is for domestic purposes amounting to 0.0963325 BCM (8.0%) and industries amounting to 0.084 BCM (7.0%). The water demand of livestock and other purposes is around 1.1% of the total (Table 4.6, Fig. 4.4, 4.5). The projected water demand of various sectors for 2020 followed the same trend of 2015 and would be to the tune of 1.316526 BCM.

Fig. 4.4. Total water demand of varius sectors taluk wise in Dharwad district - 2015 and 2020



	Dharwad	Hubli	Kalaghatagi	Kundagol	Navalagund	Total
TWD-2015	0.32084	0.21501	0.22827	0.14580	0.29728	1.20719
TWD-2020	0.35074	0.23204	0.24941	0.15899	0.32536	1.31653

Fig. 4.5. Total water demand sector wise in Dharwad district - 2015 and 2020



	Domestic	Crops	Livestock	Industries	Others	Total
TWD-2015	0.09633	1.01248	0.00474	0.08400	0.00963	1.20719
TWD-2020	0.10347	1.11373	0.00498	0.08400	0.01035	1.31653

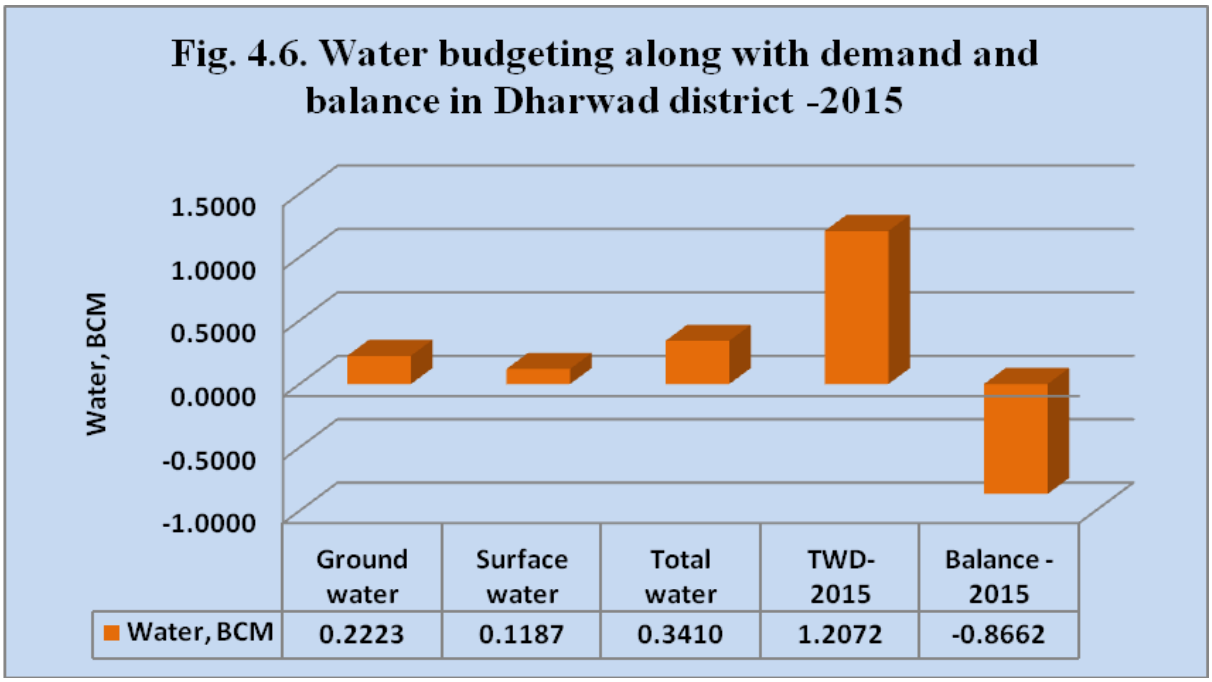
Table 4.6. Total water demand for various sectors in Dharwad district - present and projected demand for 2020

Taluks	Water demand at present (2015), BCM						
	Domestic	Crops (Irrigated + Rainfed)	Livestock	Industries	Power genera-tion	Other public places	Total water demand, BCM
Dharwad	0.01284284	0.2905807	0.001529	0.0146	0	0.0012843	0.3208368
Hubli	0.05718354	0.115732	0.000974	0.0354	0	0.0057184	0.2150079
Kalaghatagi	0.00795506	0.2060594	0.000959	0.0125	0	0.0007955	0.2282690
Kundagol	0.00851718	0.1263935	0.000539	0.0095	0	0.0008517	0.1458014
Navalagund	0.00983386	0.2737169	0.000742	0.012	0	0.0009834	0.2972762
Total	**0.09633248**	**1.0124825**	**0.004742**	**0.084**	**0**	**0.0096333**	**1.2071903**
Taluks	**Water demand for 2020, BCM**						
Dharwad	0.0135410	0.3196388	0.001605	0.0146	0	0.0013541	0.3507389
Hubli	0.0620991	0.1273052	0.001022	0.0354	0	0.0062099	0.2320362
Kalaghatagi	0.0083947	0.2266653	0.001007	0.0125	0	0.0008395	0.2494065
Kundagol	0.0089892	0.1390329	0.000565	0.0095	0	0.0008989	0.1589860
Navalagund	0.0104456	0.3010886	0.000779	0.012	0	0.0010446	0.3253578
Total	**0.1034696**	**1.1137308**	**0.004979**	**0.084**	**0**	**0.0103470**	**1.3165264**

Assumption - Increase in population is 14%, crops by 10% between 2011 to 2020, livestock by 5% between 2012 to 2020, Industrial use - same demand between 2015 to 2020, Power generation - Not proposed; Domestic water demand of Hubli - Dharwad Municipal Corporation has been added to Hubli taluk

4.8. Water budgeting: Total water available from surface water from canals (major and medium) is 0.11872 BCM (34.8%) and available underground water is 65.2% (Table 4.7). Thus, total water availability for the district from all sources at present is 0.34102 BCM, which is less than the present requirement (2015) of 1.2071903 BCM (Table 4.7, Fig. 4.6, 4.7). There is negative balance of water, amounting to -0.86617 BCM. Even for 2020, the water balance available is negative, i.e., -0.975506 BCM. This negative balance has been observed in all taluks. The effort should be made to encourage water

conservation structures to enhance the underground recharge and rejuvenating tanks/lakes by desilting and other means to hold more water in tanks/lakes, etc.



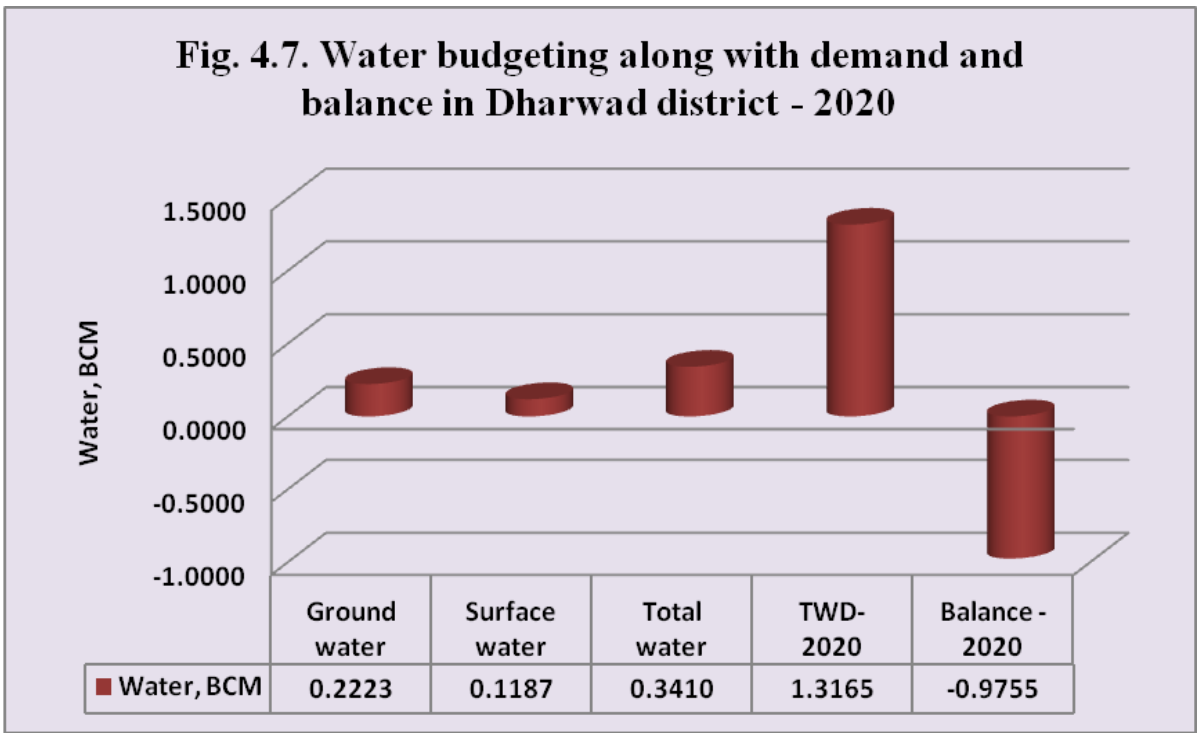


Table 4.7. Water budgeting for Dharwad district - available, demand and balance – 2015 and 2020

Taluks	Net underground water available, BCM (CGWB)#	Surface water from canal ##	Total water available, BCM (Col. 1+2)
	1	2	3
Dharwad	0.05101	0.11872	0.34102
Hubli	0.03152		
Kalaghatagi	0.04909		
Kundagol	0.02883		
Navalagund	0.06185		
Total	**0.2223**	**0.11872**	**0.34102**

	Total Water demand, BCM - 2015	Water balance after meeting all demands, BCM - 2015	Total Water demand, BCM - 2020	Water balance after meeting all demands, BCM - 2020
	4	5	6	7
Dharwad	0.3208368	**-0.86617**	0.3507389	**-0.975506**
Hubli	0.2150079		0.2320362	
Kalaghatagi	0.2282690		0.2494065	
Kundagol	0.1458014		0.1589860	
Navalagund	0.2972762		0.3253578	
Total	**1.2071903**	**-0.86617**	**1.3165264**	**-0.975506**

- CGWB - Central Ground Water Board, 2013 for Dharwad district - Net underground water available; ## - For details refer Table 3.1

CHAPTER V

STRATEGIC ACTION PLAN FOR IRRIGATION IN DHARWAD DISTRICT

Dharwad district is divided into 5 taluks namely, Dharwad, Hubli, Navalgund, Kundagol and Kalaghatagi with a geographical area of 4.27 lakh ha, accounting 4.5 % of the state's geographical area. The district has neither a major river nor an irrigation dam. As per 2011 population census, Hubli-Dharwad Municipal Corporation shares half of the district's total (1.847 million) population. Relatively smaller share (41%) of population lives in rural areas- indicating the impact of urbanization in the district.

Out of the total geographical area of 4,27,329 ha in the district, forest occupies 35,235 ha, area put to non-agricultural uses is 23,313 ha. Land classified as cultivable waste and permanent pasture together constitute 7556 ha area. The net sown area of Dharwad district is 2,85,716 ha accounting for roughly 66.9 percent of the geographical area of the district and the cropping intensity is 162.2 percent.

The rainfall varies widely across the taluks of Dharwad district. Kalaghatagi taluk receives annual mean precipitation of 980 mm in 73 rainy days, while transitional taluks of Dharwad and Hubli receive 744 to 792 mm in a typical bimodal pattern. Peak rainfall invariably occurs between June and September in 57-61 rainy days. Navalgund and Kundagol taluks receive mean annual rainfall of 616 and 676 mm in 42and 52 rainy days, respectively.

Dharwad district lacks in major rivers and as a result has very little area under irrigation. Only Navalgund taluk receives canal water from Malaprabha dam in Saundatti. Remaining taluks of the district are entirely dependent on rainfall or bore wells, wherever ground water sources are available. Navalgund

taluk has the maximum net irrigated area (33382 ha), accounting for 66.7 % of total irrigated area of the district. The irrigation by tanks is meagre and negligible. The district has 58449 ha under irrigation i.e., 12.8 per cent of the net cultivated area in the district.

Total natural ground water recharge in the entire district, enriching its availability, is around 37208 HAM (hectare-meter)- with highest recharge level in Navalgund (8255HAM), although much of it is poor in quality, followed by Kalaghatagi (7552 HAM) and lowest in Kundagol taluk (1085 HAM). Out of total recharge, 13090 HAM is drafted for irrigation and other purposes, resulting into groundwater development of 45 to 75 percent (safe). The ground water development varies across the taluks. However, all the taluks are in safe limit in respect of ground water use. Ground water use is more predominant in Dharwad and Navalgund taluks (73 to 75 percent), while in all other taluks, it ranges from 39 to 46 percent.

Most common crops in the district include Jowar, Wheat , Bajra,, Gram, Tur, green gram, soybean, groundnut, sunflower, sesame & other Oilseeds, Cotton, Sugarcane and chillies and forage crops. Banana,mango,sapota, gauva and coconut are important plantation/ horticultural crops of the district.

The total water availability for the district from all sources at present is 0.34102 BCM, which is less than the present requirement (2015) of 1.20719 BCM (Chapter IV). There is negative balance of water, amounting to -0.86617 BCM. This negative balance has been observed in all taluks except Navalagund. The projected water demand of various sectors for 2020 followed the same trend of 2015 and would be to the tune of 1.316526 BCM. The effort should be made to encourage water conservation structures to enhance the underground recharge and rejuvenating tanks/lakes by desilting and other means to hold more water in tanks/lakes, etc.

Dharwad district has sizable area under rainfed agriculture except Navalgund taluk where canal irrigation is available from Malaprabha canal. The ambitious aim of PMKSY envisages the provision for minimum protective irrigation, which can only improve the agricultural growth in these rainfed areas. This objective can be achieved by utilizing the rain water more efficiently by harvesting structures like farm ponds, check-dams, barrages and other surface structures.

The ground water scenario in the district has not reached alarming situation and is safe, however, indiscriminate drilling of bore wells without consideration of natural recharge capacity and long term sustainability may lead to over exploitation of ground water in the near future. Moreover, the estimates for water demand and availability indicate a deficit during 2015 and is expected to continue the same trend in 2020. These situations call for immediate infrastructural facilities for large scale artificial recharge of ground water, especially in over exploited taluks. The Comprehensive Action Plan will have to include the extensive measures to strengthen the maximum rain water harvesting for percolation and recharge.

In this background, drawing up of district irrigation plan on holistic basis derives great importance for considering all water resources of the district. Since many decades, more importance was given to construct reservoirs and provide canal irrigation to improve the performance of agriculture in the country. But, importance was not given to rationalise and regulate the use of 0ground water, even though ground water is more than 50% of national water resource. Similarly, desirable focus was not given in harvesting the surface flown rain water for it’s efficient use. Adoption of micro irrigation is known to save substantial water, which can help increasing the irrigated area. Adoption of

micro irrigation is not very popular in the district and needs encouragement in all respects.

The district level action plan is prepared as a part of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) for Dharwad district duly considering the available surface as well as ground water resources in the district for sustainable water management. PMKSY-DIP irrigation plan envisages a total of 1 ,34,746 ha of additional area to be brought under irrigation through surface and ground water sources by creating new water harvesting structures and using water saving irrigation system like micro irrigation. The total estimated cost for DIP under PMKSY is Rs. 24,964.40 crores.

The forth coming Strategic Action Plan, prepared for each taluk separately, will have to include the irrigation infrastructure for major irrigation, minor irrigation, ground water recharge, harvesting of rain water, improvement of irrigation efficiency and strengthening the adoption of micro-irrigation in the district. The district and taluk-wise summary of Strategic Action Plans are presented below.

Taluka Plans

Taluk-wise strategic action plans suggested for district irrigation plans under PMKSY are presented in Tables 5.1 through 5.14.

Table 5.1: STRATEGIC ACTION PLAN FOR DHARWAD TALUK

Concerned Ministry/ Department	Component	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
					I Yr	II Yr	III Yr	IV Yr	V Yr	Total
MoWR	AIBP	Barrage cum Bridge-Maj Irri	24	1200	720	720	720	720	720	3600
MoWR-PRED	AIBP	ZP tanks ERM-Extn, Renovation, modernization PRED	199	1990	2658	2657	2657	2657	2657	13286
MoWR	AIBP	Filling of MI tanks & Community micro irri for selected areas	5	300	8780	8780	8780	8780	8780	43900
MoWR	AIBP	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13	5000	6590	6590	6590	6590	6590	32950

MoWR	AIBP	Construction of new tanks & Community Micro Irrigation -MI	32	1280	15140	15140	15140	15140	15140	75700
MoWR	AIBP	Extn, renovation, modernization of tanks-Minor Irri	45	900	8540	8540	8540	8540	8540	42700
MoWR-PRED	AIBP	Drinking Water Supply, creating water storage tanks	2	0	200	200	200	200	200	1000
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Farm Ponds	100	100	20	20	20	20	20	100
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Bunding- drought proofing	10000	0	300	300	300	300	300	1500
DoLR-MoRD-Agri dept	Convergence with MGNREGA	On farm development/ distribution of pipes/ Broad bed and furrows, etc	7500	0	300	300	300	300	300	1500
DoLR-MoRD-Agri dept	Har Khet Ko Pani	Far Ponds-Drought Proofing through check dams/WHS	6000	6000	1800	1800	1800	1800	1800	9000
DoLR-MoRD	Har Khet ko Pani	Sewage Water Treatment	20 MLD	300	631	631	631	631	631	3155
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Drip	8000	8000	1440	1440	1440	1440	1440	7200
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Sprinkler	25000	9915	882	882	882	882	882	4410

MoA & FW/DAC & FW	Per Drop More Crop	Trench cum Bund	1200	0	48	48	48	48	48	240
DoLR-MoRD-Agri dept	PMKSY-Watershed	Farm Ponds	1500	1500	450	450	450	450	450	2250
DoLR-MoRD-Agri dept	PMKSY-Watershed	Check Dams	200	300	200	200	200	200	200	1000
DoLR-MoRD-Agri dept	PMKSY-Watershed	Percolation tanks	50	0	15	15	15	15	15	75
DoLR-MoRD-Agri dept	PMKSY-Watershed	Gokatte	35	0	35	35	35	35	35	175
DoLR-MoRD-Agri dept	PMKSY-Watershed	Bore well recharge Pits	4300	0	645	645	645	645	645	3225
DoLR-MoRD-Agri dept	PMKSY-Watershed	Dryland Horticulture	1500	0	75	75	75	75	75	375
DoLR-MoRD-Agri dept	PMKSY-Watershed	Agro Forestry	1500	0	75	75	75	75	75	375
TOTAL				**36785**	**49544**	**49543**	**49543**	**49543**	**49543**	**247716**

Note 1: Number of water harvesting structures (farm ponds, check dams and Nallah bunds) and their costs proposed in the plan are according to the information provided by the JDA, Dharwad district.

Fig 5.1: Irrigation Potential Created under different Components Dharwad Taluk

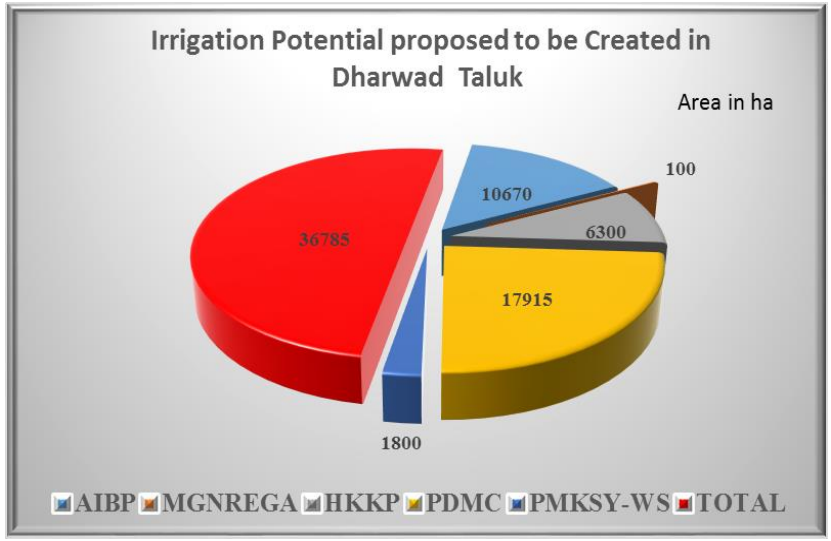


Fig. 5.2: Estimated cost of interventions under different Components Dharwad Taluk

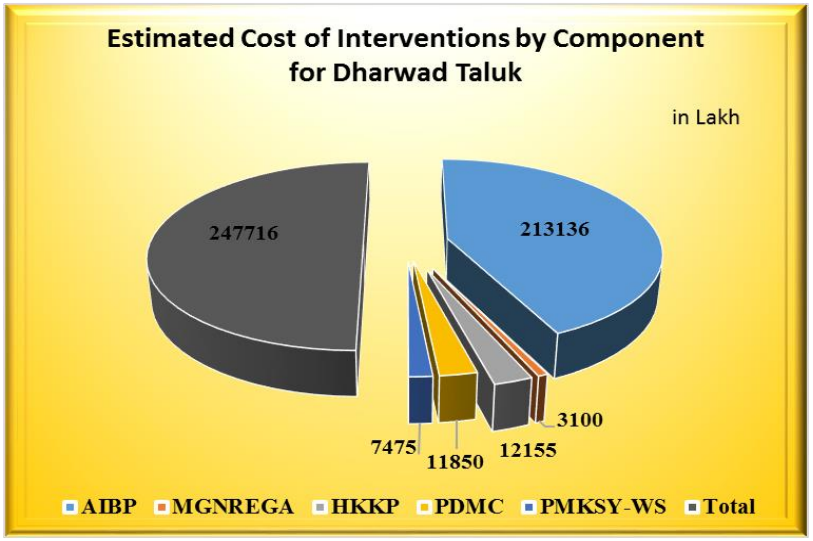


Table 5.2: STRATEGIC ACTION PLAN FOR HUBLI TALUK

Concerned Ministry/ Department	Component	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
					I Yr	II Yr	III Yr	IV Yr	V Yr	Total
MoWR	AIBP	Barrage cum Bridge-Maj Irri	26	1300	780	780	780	780	780	3900
MoWR-PRED	AIBP	ZP tanks ERM-Extn, Renovation, modernization	135	1350	1803	1803	1803	1802	1802	9013
MoWR	AIBP	Filling of MI tanks & Community micro irri for selected areas	5	300	7680	7680	7680	7680	7680	38400
MoWR	AIBP	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13	2500	5485	5485	5485	5485	5485	27425
MoWR	AIBP	Construction of new tanks & Community Micro Irrigation -MI	10	400	1000	1000	1000	1000	1000	5000
MoWR	AIBP	Extn, renovation, modernization of tanks-Minor Irri	12	240	2640	2640	2640	2640	2640	13200

MoWR-PRED	AIBP	Drinking Water Supply, creating water storage tanks	2	0	200	200	200	200	200	1000
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Farm Ponds	100	100	20	20	20	20	20	100
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Bunding- drought proofing	5000	0	150	150	150	150	150	750
DoLR-MoRD-Agri dept	Convergence with MGNREGA	On farm development/ distribution of pipes/ Broad bed and furrows, etc.,	12000	0	480	480	480	480	480	2400
DoLR-MoRD-Agri dept	Har Khet Ko Pani	Far Ponds-Drought Proofing through check dams/WHS	3000	3000	900	900	900	900	900	4500
DoLR-MoRD	Har Khet ko Pani	Sewage Water Treatment	47 MLD	200	1410	1410	1410	1410	1410	7050
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Drip	3000 Ha	3000	540	540	540	540	540	2700
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Sprinkler	12000	7808	424	424	423	423	423	2117
MoA & FW/DAC & FW	Per Drop More Crop	Trench cum Bund	800	0	32	32	32	32	32	160
DoLR-MoRD-Agri dept	PMKSY-Watershed	Farm Ponds	1000	1000	300	300	300	300	300	1500

DoLR-MoRD-Agri dept	PMKSY-Watershed	Check Dams	150	225	150	150	150	150	150	750
DoLR-MoRD-Agri dept	PMKSY-Watershed	Percolation tanks	30	0	9	9	9	9	9	45
DoLR-MoRD-Agri dept	PMKSY-Watershed	Gokatte	15	0	15	15	15	15	15	75
DoLR-MoRD-Agri dept	PMKSY-Watershed	Bore well recharge Pits	1500	0	225	225	225	225	225	1125
DoLR-MoRD-Agri dept	PMKSY-Watershed	Dryland Horticulture	500	0	25	25	25	25	25	125
DoLR-MoRD-Agri dept	PMKSY-Watershed	Agro Forestry	750	0	38	38	38	37	37	188
TOTAL				**21423**	**24306**	**24306**	**24305**	**24303**	**24303**	**121523**

Note 1: Numbers of water harvesting structures (farm ponds, check dams and Nallah bunds) and their costs proposed in the plan are according to the information provided by the JDA, Dharwad district.

Fig 5.3: Irrigation Potential Created under different Components Hubli Taluk

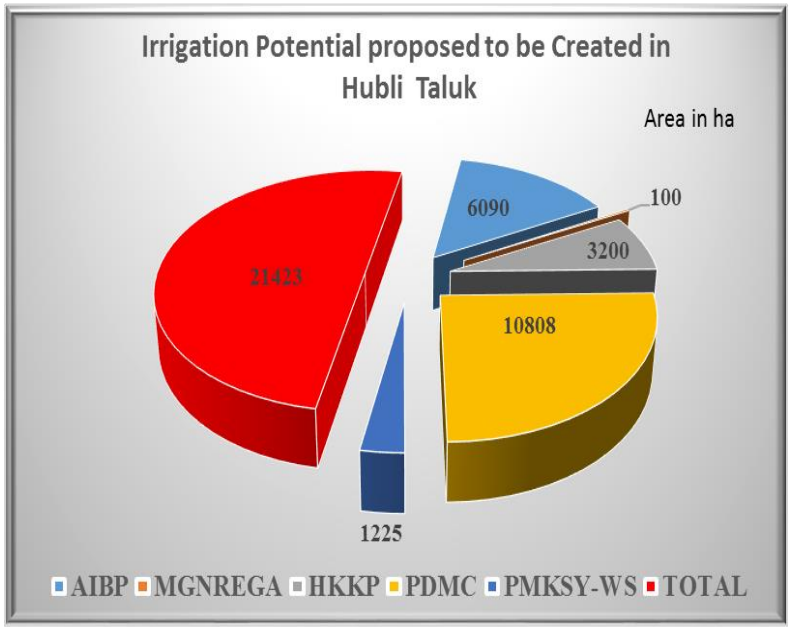


Fig. 5.4: Estimated cost of interventions under different Components Hubli Taluk

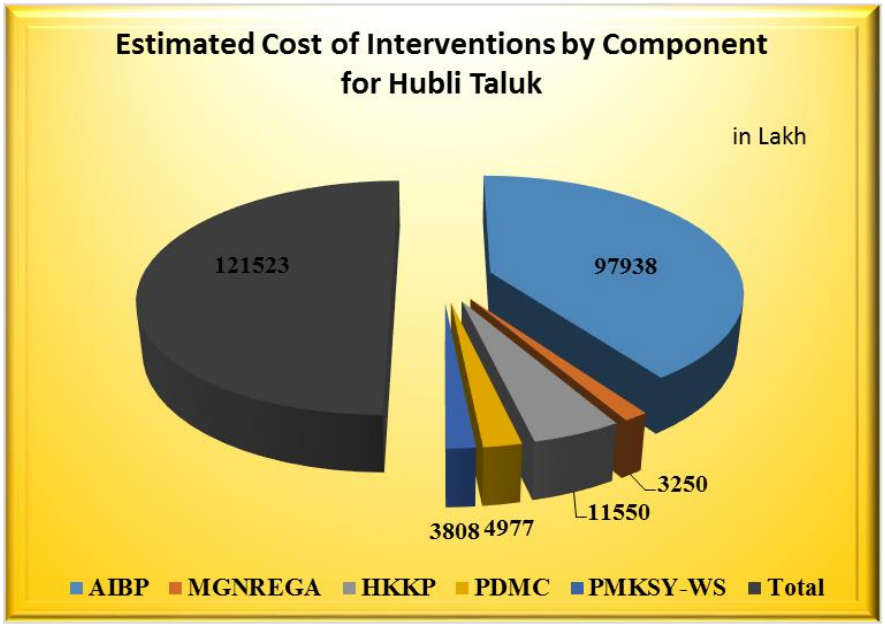


Table 5.3: STRATEGIC ACTION PLAN FOR KALAGHATAGI TALUK

Concerned Ministry/ Department	Component	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
					I Yr	II Yr	III Yr	IV Yr	V Yr	Total
MoWR	AIBP	Barrage cum Bridge-Maj Irri	19	950	570	570	570	570	570	2850
MoWR-PRED	AIBP	ZP tanks ERM-Extn, Renovation, modernization	840	8400	11217	11217	11217	11216	11216	56083
MoWR	AIBP	Filling of MI tanks & Community micro irri for selected areas	5	300	8880	8880	8880	8880	8880	44400
MoWR	AIBP	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13	0	6730	6730	6730	6730	6730	33650
MoWR	AIBP	Construction of new tanks & Community Micro Irrigation -MI	0	0	0	0	0	0	0	0.00
MoWR	AIBP	Extn, renovation, modernization of tanks-Minor Irri	4	80	3680	3680	3680	3680	3680	18400
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Farm Ponds	100	100	20	20	20	20	20	100

DoLR-MoRD-Agri dept	Convergence with MGNREGA	Bunding- drought proofing	5000	0	150	150	150	150	150	750
DoLR-MoRD-Agri dept	Convergence with MGNREGA	On farm development/ distribution of pipes/ Broad bed and furrows, etc	450	0	18	18	18	18	18	90
DoLR-MoRD-Agri dept	Har Khet Ko Pani	Far Ponds-Drought Proofing through check dams/WHS	1500	1500	450	450	450	450	450	2250
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Drip	5500 Ha	5500	990	990	990	990	990	4950
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Sprinkler	18000	6281	635	635	635	635	635	3175
MoA & FW/DAC & FW	Per Drop More Crop	Trench cum Bund	400	0	16	16	16	16	16	80
DoLR-MoRD-Agri dept	PMKSY-Watershed	Farm Ponds	400	400	120	120	120	120	120	600
DoLR-MoRD-Agri dept	PMKSY-Watershed	Check Dams	250	375	250	250	250	250	250	1250
DoLR-MoRD-Agri dept	PMKSY-Watershed	Percolation tanks	20	0	6	6	6	6	6	30
DoLR-MoRD-Agri dept	PMKSY-Watershed	Gokatte	40	0	40	40	40	40	40	200

DoLR-MoRD-Agri dept	PMKSY-Watershed	Bore well recharge Pits	2800	0	420	420	420	420	420	2100
DoLR-MoRD-Agri dept	PMKSY-Watershed	Dryland Horticulture	450	0	23	23	23	22	22	113
DoLR-MoRD-Agri dept	PMKSY-Watershed	Agro Forestry	1500	0	75	75	75	75	75	375
TOTAL				**23886**	**34290**	**34290**	**34290**	**34288**	**34288**	**171446**

Note 1: Numbers of water harvesting structures (farm ponds, check dams and Nallah bunds) and their costs proposed in the plan are according to the information provided by the JDA, Dharwad district.

Fig 5.5: Irrigation Potential Created under different Components Kalaghatagi Taluk

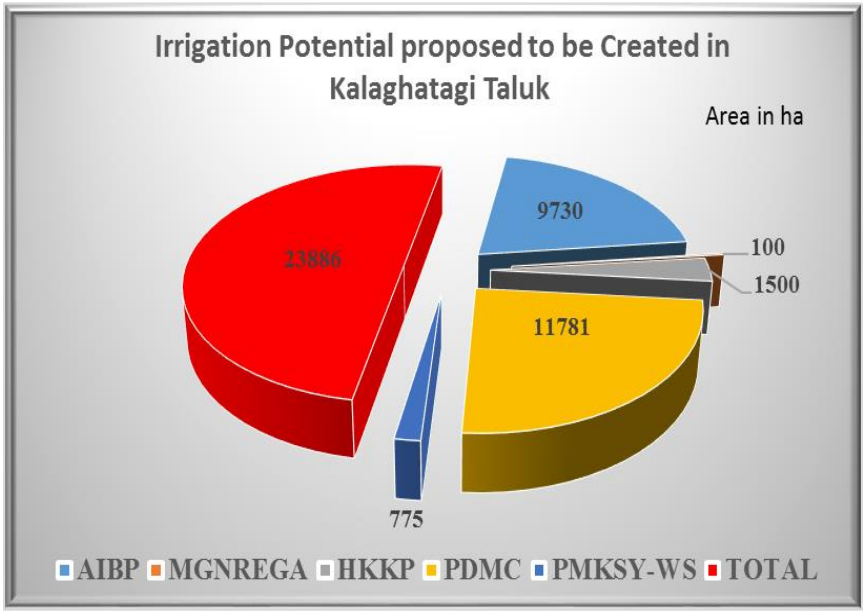


Fig. 5.6: Estimated cost of interventions under different Components Kalaghatagi Taluk

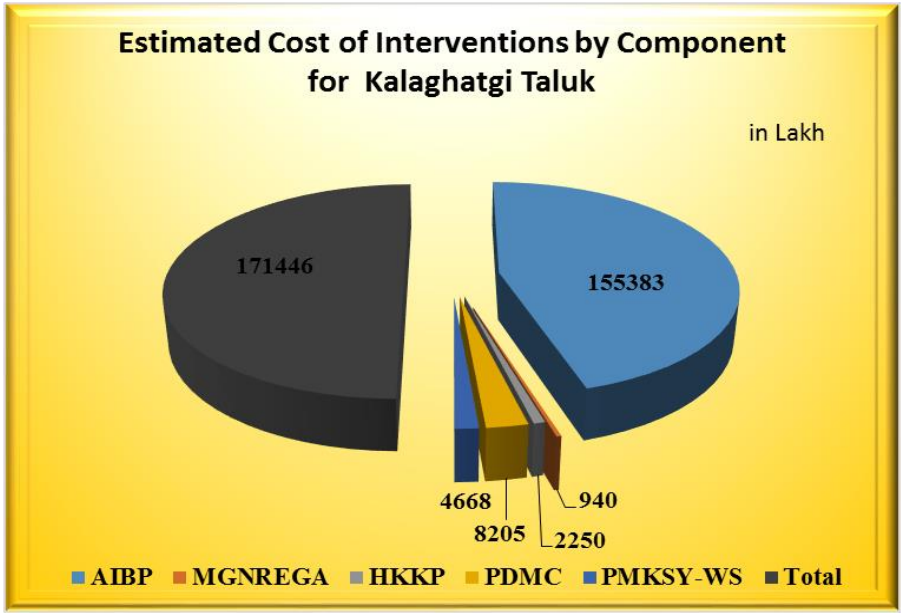


Table 5.4: STRATEGIC ACTION PLAN FOR KUNDAGOL TALUK

Concerned Ministry/ Department	Component	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
					I Yr	II Yr	III Yr	IV Yr	V Yr	Total
MoWR	AIBP	Barrage cum Bridge-Maj Irri	13	650	390	390	390	390	390	1950
MoWR-PRED	AIBP	ZP tanks ERM-Extn, Renovation, modernization	111	1110	1483	1482	1482	1482	1482	7411
MoWR	AIBP	Filling of MI tanks & Community micro irri for selected areas	5	300	8880	8880	8880	8880	8880	44400
MoWR	AIBP	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13	2500	6125	6125	6125	6125	6125	30625
MoWR	AIBP	Construction of new tanks & Community Micro Irrigation -MI	20	800	2000	2000	2000	2000	2000	10000
MoWR	AIBP	Extn, renovation, modernization of tanks-Minor Irri	61	1220	8930	8930	8930	8930	8930	44650

DoLR-MoRD-Agri dept	Convergence with MGNREGA	Farm Ponds	100	100	20	20	20	20	20	100
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Bunding- drought proofing	20000	0	600	600	600	600	600	3000
DoLR-MoRD-Agri dept	Convergence with MGNREGA	On farm development/ distribution of pipes/ Broad bed and furrows, etc	15000	0	600	600	600	600	600	3000
DoLR-MoRD-Agri dept	Har Khet Ko Pani	Far Ponds-Drought Proofing through check dams/WHS	7500	7500	2250	2250	2250	2250	2250	11250
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Drip	500 Ha	500	90	90	90	90	90	450
MoA & FW/DAC & FW	Per Drop More Crop	DPAP - Sprinkler	10000	719	353	353	353	353	352	1764
MoA & FW/DAC & FW	Per Drop More Crop	Trench cum Bund	900	0	36	36	36	36	36	180
DoLR-MoRD-Agri dept	PMKSY-Watershed	Farm Ponds	1600	1600	480	480	480	480	480	2400
DoLR-MoRD-Agri dept	PMKSY-Watershed	Check Dams	150	225	150	150	150	150	150	750

DoLR-MoRD-Agri dept	PMKSY-Watershed	Percolation tanks	45	0	14	14	14	13	13	68
DoLR-MoRD-Agri dept	PMKSY-Watershed	Gokatte	25	0	25	25	25	25	25	125
DoLR-MoRD-Agri dept	PMKSY-Watershed	Bore well recharge Pits	500	0	75	75	75	75	75	375
DoLR-MoRD-Agri dept	PMKSY-Watershed	Dryland Horticulture	400	0	20	20	20	20	20	100
DoLR-MoRD-Agri dept	PMKSY-Watershed	Agro Forestry	750	0	38	38	38	37	37	188
TOTAL				**17224**	**32559**	**32558**	**32558**	**32556**	**32555**	**162786**

Note 1: Numbers of water harvesting structures (farm ponds, check dams and Nallah bunds) and their costs proposed in the plan are according to the information provided by the JDA, Dharwad district.

Fig 5.7: Irrigation Potential Created under different Components Kundagol Taluk

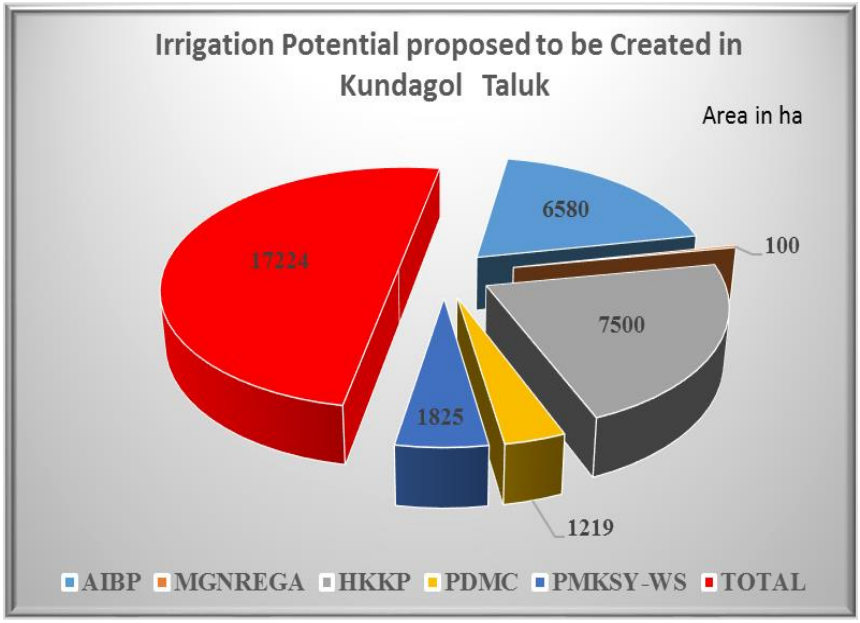


Fig. 5.8: Estimated cost of interventions under different Components Kundagol Taluk

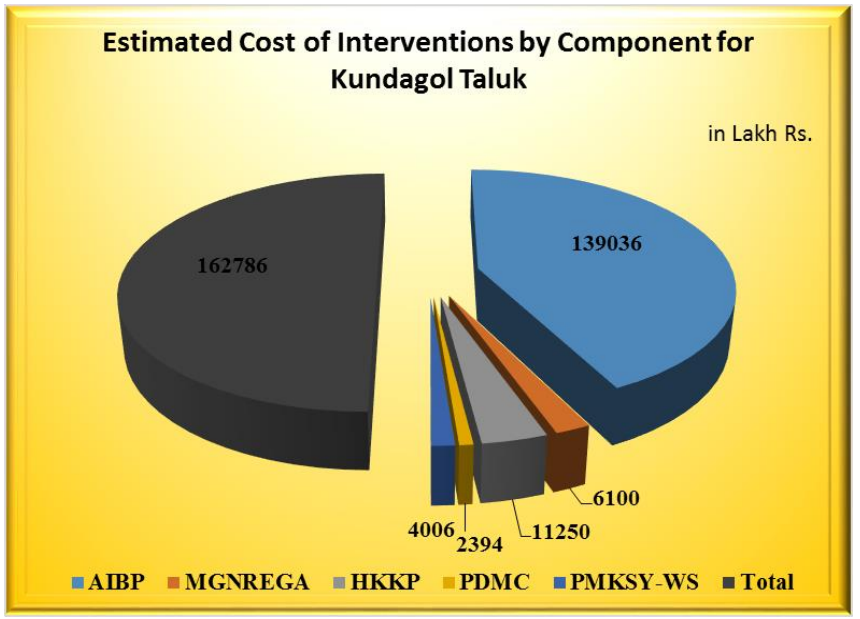


Table 5.5: STRATEGIC ACTION PLAN FOR NAVALGUND TALUK

Concerned Ministry/ Department	Component	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
					I Yr	II Yr	III Yr	IV Yr	V Yr	Total
MoWR	AIBP	Extn, renovation, modernization of existing canals-Maj Irri	103	8353	158840	158840	158840	158840	158840	794200
MoWR	AIBP	Barrage cum Bridge-Maj Irri	64	3200	174900	174900	174900	174900	174900	874500
MoWR-PRED	AIBP	ZP tanks ERM-Extn, Renovation, modernization	63	630	842	841	841	841	841	4206
MoWR	AIBP	Filling of MI tanks & Community micro irri for selected areas	5	300	7280	7280	7280	7280	7280	36400
MoWR	AIBP	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	10	2500	5938	5938	5938	5938	5938	29690

MoWR	AIBP	Construction of new tanks & Community Micro Irrigation -MI	40	1600	4200	4200	4200	4200	4200	21000
MoWR	AIBP	Extn, renovation, modernization of tanks-Minor Irri	1	20	480	480	480	480	480	2400
MoWR-PRED	AIBP	Drinking Water Supply, creating water storage tanks	2	0	200	200	200	200	200	1000
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Farm Ponds	100	100	20	20	20	20	20	100
DoLR-MoRD-Agri dept	Convergence with MGNREGA	Bunding- drought proofing	20000	0	600	600	600	600	600	3000
DoLR-MoRD-Agri dept	Convergence with MGNREGA	On farm development/ distribution of pipes/ Broad bed and furrows, etc	20000	0	800	800	800	800	800	4000
DoLR-MoRD-Agri dept	Har Khet Ko Pani	Far Ponds-Drought Proofing through check dams/WHS	10000	10000	3000	3000	3000	3000	3000	15000
MoA & FW/DAC & FW	Per Drop More Crop	Non-DPAP - Drip	500	500	90	90	90	90	90	450
MoA & FW/DAC & FW	Per Drop More Crop	Non-DPAP - Sprinkler	8000	5500	283	282	282	282	282	1411
MoA & FW /DAC & FW	Per Drop More Crop	Trench cum Bund	1500	0	60	60	60	60	60	300

DoLR-MoRD-Agri dept	PMKSY-Watershed	Farm Ponds	2500	2500	750	750	750	750	750	3750
DoLR-MoRD-Agri dept	PMKSY-Watershed	Check Dams	150	225	150	150	150	150	150	750
DoLR-MoRD-Agri dept	PMKSY-Watershed	Percolation tanks	65	0	20	20	20	19	19	98
DoLR-MoRD-Agri dept	PMKSY-Watershed	Gokatte	35	0	35	35	35	35	35	175
DoLR-MoRD-Agri dept	PMKSY-Watershed	Bore well recharge Pits	285	0	43	43	43	43	42	214
DoLR-MoRD-Agri dept	PMKSY-Watershed	Dry land Horticulture	300	0	15	15	15	15	15	75
DoLR-MoRD-Agri dept	PMKSY-Watershed	Agro Forestry	1000	0	50	50	50	50	50	250
TOTAL				**35428**	**358596**	**358594**	**358594**	**358593**	**358592**	**1792969**

Note 1: Numbers of water harvesting structures (farm ponds, check dams and Nallah bunds) and their costs proposed in the plan are according to the information provided by the JDA, Dharwad district.

Fig 5.9: Irrigation Potential Created under different Components Navalagund Taluk

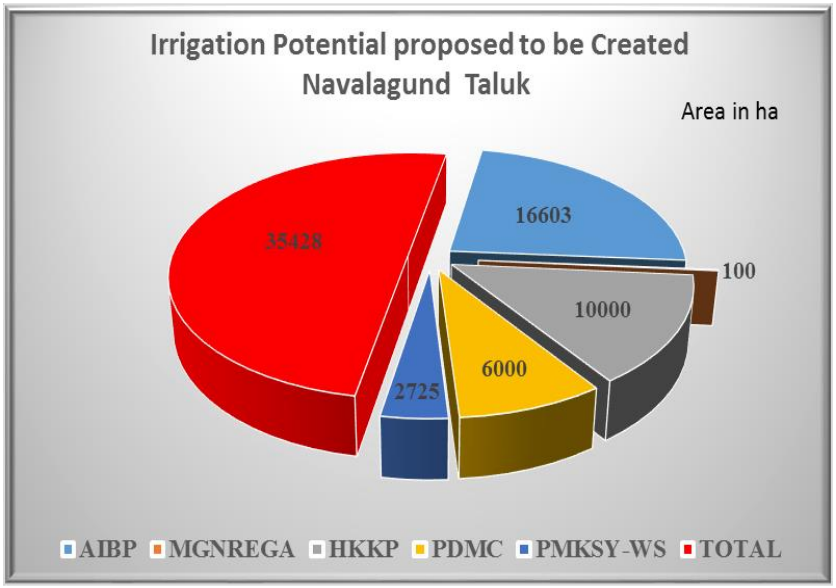
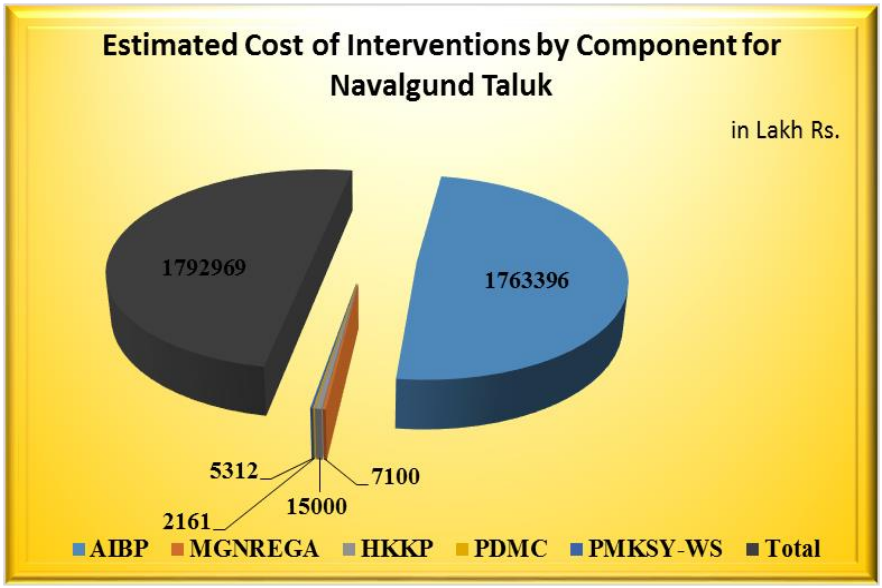


Fig. 5.10: Estimated cost of interventions under different Components Navalagund Taluk



PMKSY-DIP for District

Table 5.6: PMKSY-DIP Strategic Action Plan for Dharwad District- AIBP

Sl. No	Name of the Blocks /sub Dist	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
						I Yr	II Yr	III Yr	IV Yr	V Yr	Total
1.	Dharwad	MoWR	Barrage cum Bridge-Maj Irri	24	1200	720	720	720	720	720	3600
2.	Dharwad	MoWR-PRED	ZP tanks ERM-Extn, Renovation, modernization	199	1990	2658	2657	2657	2657	2657	13286
3.	Dharwad	MoWR	Filling of MI tanks & Community micro irri for selected areas	5	300	8780	8780	8780	8780	8780	43900
4.	Dharwad	MoWR	Construction of Bridge cum Barrage, desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13	5000	6590	6590	6590	6590	6590	32950
5.	Dharwad	MoWR	Construction of new tanks & Community Micro Irrigation -MI	32	1280	15140	15140	15140	15140	15140	75700

6.	Dharwad	MoWR	Extn, renovation, modernization of tanks-Minor Irri	45	900	8540	8540	8540	8540	8540	42700
7.	Dharwad	MoWR-PRED	Drinking Water Supply, creating water storage tanks	2		200	200	200	200	200	1000
8.	Hubli	MoWR	Barrage cum Bridge-Maj Irri	26	1300	780	780	780	780	780	3900
9.	Hubli	MoWR-PRED	ZP tanks ERM-Extn, Renovation, modernization	135	1350	1803	1803	1803	1802	1802	9013
10	Hubli	MoWR	Filling of MI tanks & Community micro irri for selected areas	5	300	7680	7680	7680	7680	7680	38400
11	Hubli	MoWR	Construction of Bridge cum Barrage, desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13	2500	5485	5485	5485	5485	5485	27425
12	Hubli	MoWR	Construction of new tanks & Community Micro Irrigation -MI	10	400	1000	1000	1000	1000	1000	5000

13	Hubli	MoWR	Extn, renovation, modernization of tanks-Minor Irri	12	240	2640	2640	2640	2640	2640	13200
14	Hubli	MoWR-PRED	Drinking Water Supply, creating water storage tanks	2		200	200	200	200	200	1000
15	Kalaghatagi	MoWR	Barrage cum Bridge-Maj Irri	19	950	570	570	570	570	570	2850
16	Kalaghatagi	MoWR-PRED	ZP tanks ERM-Extn, Renovation, modernization	840	8400	11217	11217	11217	11216	11216	56083
17	Kalaghatagi	MoWR	Filling of MI tanks & Community micro irri for selected areas	5	300	8880	8880	8880	8880	8880	44400
18	Kalaghatagi	MoWR	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13		6730	6730	6730	6730	6730	33650
19	Kalaghatagi	MoWR	Extn, renovation, modernization of tanks-Minor Irri	4	80	3680	3680	3680	3680	3680	18400
20	Kundagol	MoWR	Barrage cum Bridge-Maj Irri	13	650	390	390	390	390	390	1950

21	Kundagol	MoWR-PRED	ZP tanks ERM-Extn, Renovation, modernization	111	1110	1483	1482	1482	1482	1482	7411
22	Kundagol	MoWR	Filling of MI tanks & Community micro irri for selected areas	5	300	8880	8880	8880	8880	8880	44400
23	Kundagol	MoWR	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	13	2500	6125	6125	6125	6125	6125	30625
24	Kundagol	MoWR	Construction of new tanks & Community Micro Irrigation -MI	20	800	2000	2000	2000	2000	2000	10000
25	Kundagol	MoWR	Extn, renovation, modernization of tanks-Minor Irri	61	1220	8930	8930	8930	8930	8930	44650
26	Navalgund	MoWR	Extn, renovation, modernization of existing canals-Maj Irri	103	8353	158840	158840	158840	158840	158840	794200
27	Navalgund	MoWR	Barrage cum Bridge-Maj Irri	64	3200	174900	174900	174900	174900	174900	874500
28	Navalgund	MoWR-PRED	ZP tanks ERM-Extn, Renovation, modernization	63	630	842	841	841	841	841	4206

29	Navalgund	MoWR	Filling of MI tanks & Community micro irri for selected areas	5	300	7280	7280	7280	7280	7280	36400
30	Navalgund	MoWR	Construction of Bridge cum Barrage , desilting, Nalla decongestion, construction of side walls, ghats to control floods and barrages at Bennehalla & Tupparihalla Nala	10	2500	5938	5938	5938	5938	5938	29690
31	Navalgund	MoWR	Construction of new tanks & Community Micro Irrigation -MI	40	1600	4200	4200	4200	4200	4200	21000
32	Navalgund	MoWR	Extn, renovation, modernization of tanks-Minor Irri	1	20	480	480	480	480	480	2400
33	Navalgund	MoWR-PRED	Drinking Water Supply, creating water storage tanks	2		200	200	200	200	200	1000
TOTAL					**49673**	**473781**	**473778**	**473778**	**473776**	**473776**	**2368889**

Table 5.7 Component: Convergence with MGNREGA

Sl. No	Name of the Blocks/sub Dist	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
						I Yr	II Yr	III Yr	IV Yr	V Yr	Total
1.	Dharwad	DoLR-MoRD-Agri dept	Farm Ponds	100	100	20	20	20	20	20	100
2.	Dharwad	DoLR-MoRD-Agri dept	Bunding-drought proofing	10000		300	300	300	300	300	1500
3.	Dharwad	DoLR-MoRD-Agri dept	On farm development/ distribution of pipes/ Broad bed and furrows, etc	7500		300	300	300	300	300	1500
4.	Hubli	DoLR-MoRD-Agri dept	Farm Ponds	100	100	20	20	20	20	20	100
5.	Hubli	DoLR-MoRD-Agri dept	Bunding-drought proofing	5000		150	150	150	150	150	750
6.	Hubli	DoLR-MoRD-Agri dept	On farm development/ distribution of pipes/ Broad bed and furrows, etc	12000		480	480	480	480	480	2400

7.	Kalaghatagi	DoLR-MoRD-Agri dept	Farm Ponds	100	100	20	20	20	20	20	100
8.	Kalaghatagi	DoLR-MoRD-Agri dept	Bunding-drought proofing	5000		150	150	150	150	150	750
9.	Kalaghatagi	DoLR-MoRD-Agri dept	On farm development/ distribution of pipes/ Broad bed and furrows, etc	450		18	18	18	18	18	90
10	Kundagol	DoLR-MoRD-Agri dept	Farm Ponds	100	100	20	20	20	20	20	100
11	Kundagol	DoLR-MoRD-Agri dept	Bunding-drought proofing	20000		600	600	600	600	600	3000
12	Kundagol	DoLR-MoRD-Agri dept	On farm development/ distribution of pipes/ Broad bed and furrows, etc	15000		600	600	600	600	600	3000
13	Navalgund	DoLR-MoRD-Agri dept	Farm Ponds	100	100	20	20	20	20	20	100
14	Navalgund	DoLR-MoRD-Agri dept	Bunding-drought proofing	20000		600	600	600	600	600	3000

15	Navalgund	DoLR-MoRD-Agri dept	On farm development/ distribution of pipes/ Broad bed and furrows, etc	20000		800	800	800	800	800	4000
Total					**500**	**4098**	**4098**	**4098**	**4098**	**4098**	**20490**

Table 5.8. Component: Har Khet Ko Pani

Sl No	Name of the Blocks/sub Dist	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
						I Yr	II Yr	III Yr	IV Yr	V Yr	Total
1.	Dharwad	DoLR-MoRD-Agri dept	Far Ponds-Drought Proofing through check dams/WHS	6000	6000	1800	1800	1800	1800	1800	9000
2.	Dharwad	DoLR-MoRD	Sewage Water Treatment	20 MLD	300	631	631	631	631	631	3155
3.	Hubli	DoLR-MoRD-Agri dept	Far Ponds-Drought Proofing through check dams/WHS	3000	3000	900	900	900	900	900	4500
4.	Hubli	DoLR-MoRD	Sewage Water Treatment	47 MLD	200	1410	1410	1410	1410	1410	7050
5.	Kalaghatagi	DoLR-MoRD-Agri dept	Far Ponds-Drought Proofing through check dams/WHS	1500	1500	450	450	450	450	450	2250
6.	Kundagol	DoLR-MoRD-Agri dept	Far Ponds-Drought Proofing through check dams/WHS	7500	7500	2250	2250	2250	2250	2250	11250

7.	Navalgund	DoLR-MoRD-Agri dept	Far Ponds-Drought Proofing through check dams/WHS	10000	10000	3000	3000	3000	3000	3000	15000
Total						**10441**	**10441**	**10441**	**10441**	**10441**	**52205**

Table 5.9.Component: Per Drop More Crop

Sl No	Name of the Blocks/sub Dist	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
						I Yr	II Yr	III Yr	IV Yr	V Yr	Total
1.	Dharwad	MoA & FW/DAC & FW	DPAP - Drip	8000	8000	1440	1440	1440	1440	1440	7200
2.	Dharwad	MoA & FW/DAC & FW	DPAP - Sprinkler	25000	9915	882	882	882	882	882	4410
3.	Dharwad	MoA & FW/DAC & FW	Trench cum Bund	1200		48	48	48	48	48	240
4.	Hubli	MoA & FW/DAC & FW	DPAP - Drip	3000 Ha	3000	540	540	540	540	540	2700
5.	Hubli	MoA & FW/DAC & FW	DPAP - Sprinkler	12000	7808	424	424	423	423	423	2117
6.	Hubli	MoA & FW/DAC & FW	Trench cum Bund	800		32	32	32	32	32	160
7.	Kalaghatagi	MoA & FW/DAC & FW	DPAP - Drip	5500 Ha	5500	990	990	990	90	990	4950
8.	Kalaghatagi	MoA & FW/DAC & FW	DPAP - Sprinkler	18000	6281	635	635	635	635	635	3175

9.	Kalaghatagi	MoA & FW/DAC & FW	Trench cum Bund	400		16	16	16	16	16	80
10	Kundagol	MoA & FW/DAC & FW	DPAP - Drip	500 Ha	500	90	90	90	90	90	450
11	Kundagol	MoA & FW/DAC & FW	DPAP - Sprinkler	10000	719	353	353	353	353	352	1764
12	Kundagol	MoA & FW/DAC & FW	Trench cum Bund	900		36	36	36	36	36	180
13	Navalgund	MoA & FW/DAC & FW	Non-DPAP - Drip	500	500	90	90	90	90	90	450
14	Navalgund	MoA & FW/DAC & FW	Non-DPAP - Sprinkler	8000	5500	283	282	282	282	282	1411
15	Navalgund	MoA & FW/DAC & FW	Trench cum Bund	1500		60	60	60	60	60	300
Total					**47723**	**5919**	**5918**	**5917**	**5017**	**5916**	**29587**

Table 5.10 Component: PMKSY-Watershed

Sl No	Name of the Blocks/sub Dist	Concerned Ministry/ Department	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Estimated cost/Year wise funds requirement (in lakh Rs.)					
						I Yr	II Yr	III Yr	IV Yr	V Yr	Total
1.	Dharwad	DoLR-MoRD-Agri dept	Farm Ponds	1500	1500	450	450	450	450	450	2250
2.	Dharwad	DoLR-MoRD-Agri dept	Check Dams	200	300	200	200	200	200	200	1000
3.	Dharwad	DoLR-MoRD-Agri dept	Percolation tanks	50		15	15	15	15	15	75
4.	Dharwad	DoLR-MoRD-Agri dept	Gokatte	35		35	35	35	35	35	175
5.	Dharwad	DoLR-MoRD-Agri dept	Bore well recharge Pits	4300		645	645	645	645	645	3225
6.	Dharwad	DoLR-MoRD-Agri dept	Dryland Horticulture	1500		75	75	75	75	75	375
7.	Dharwad	DoLR-MoRD-Agri dept	Agro Forestry	1500		75	75	75	75	75	375
8.	Hubli	DoLR-MoRD-Agri dept	Farm Ponds	1000	1000	300	300	300	300	300	1500
9.	Hubli	DoLR-MoRD-Agri dept	Check Dams	150	225	150	150	150	150	150	750
10.	Hubli	DoLR-MoRD-Agri dept	Percolation tanks	30		9	9	9	9	9	45
11.	Hubli	DoLR-MoRD-Agri dept	Gokatte	15		15	15	15	15	15	75
12.	Hubli	DoLR-MoRD-Agri dept	Bore well recharge Pits	1500		225	225	225	225	225	1125

13.	Hubli	DoLR-MoRD-Agri dept	Dryland Horticulture	500		25	25	25	25	25	125
14.	Hubli	DoLR-MoRD-Agri dept	Agro Forestry	750		38	38	38	37	37	188
15.	Kalaghatagi	DoLR-MoRD-Agri dept	Farm Ponds	400	400	120	120	120	120	120	600
16.	Kalaghatagi	DoLR-MoRD-Agri dept	Check Dams	250	375	250	250	250	250	250	1250
17.	Kalaghatagi	DoLR-MoRD-Agri dept	Percolation tanks	20		6	6	6	6	6	30
18.	Kalaghatagi	DoLR-MoRD-Agri dept	Gokatte	40		40	40	40	40	40	200
19.	Kalaghatagi	DoLR-MoRD-Agri dept	Bore well recharge Pits	2800		420	420	420	420	420	2100
20.	Kalaghatagi	DoLR-MoRD-Agri dept	Dryland Horticulture	450		23	23	23	22	22	113
21.	Kalaghatagi	DoLR-MoRD-Agri dept	Agro Forestry	1500		75	75	75	75	75	375
22.	Kundagol	DoLR-MoRD-Agri dept	Farm Ponds	1600	1600	480	480	480	480	480	2400
23.	Kundagol	DoLR-MoRD-Agri dept	Check Dams	150	225	150	150	150	150	150	750
24.	Kundagol	DoLR-MoRD-Agri dept	Percolation tanks	45		14	14	14	13	13	68
25.	Kundagol	DoLR-MoRD-Agri dept	Gokatte	25		25	25	25	25	25	125
26.	Kundagol	DoLR-MoRD-Agri dept	Bore well recharge Pits	500		75	75	75	75	75	375
27.	Kundagol	DoLR-MoRD-Agri dept	Dryland Horticulture	400		20	20	20	20	20	100

28.	Kundagol	DoLR-MoRD-Agri dept	Agro Forestry	750		38	38	38	37	37	188
29.	Navalgund	DoLR-MoRD-Agri dept	Farm Ponds	2500	2500	750	750	750	750	750	3750
30.	Navalgund	DoLR-MoRD-Agri dept	Check Dams	150	225	150	150	150	150	150	750
31.	Navalgund	DoLR-MoRD-Agri dept	Percolation tanks	65		20	20	20	19	19	98
32.	Navalgund	DoLR-MoRD-Agri dept	Gokatte	35		35	35	35	35	35	175
33.	Navalgund	DoLR-MoRD-Agri dept	Bore well recharge Pits	285		43	43	43	43	42	214
34.	Navalgund	DoLR-MoRD-Agri dept	Dryland Horticult.	300		15	15	15	15	15	75
35.	Navalgund	DoLR-MoRD-Agri dept	Agro Forestry	1000		50	50	50	50	50	250
Total					**8350**	**5056**	**5056**	**5056**	**5051**	**5050**	**25269**

Table 5.11: Irrigation Potential Created by Component

Area in ha

Sl.No.	Component	Dharwad	Hubli	Kalaghatagi	Kundagol	Navalgund	Total
1	AIBP	10670	6090	9730	6580	16603	**49673**
2	MGNREGA	100	100	100	100	100	**500**
3	HKKP	6300	3200	1500	7500	10000	**28500**
4	PDMC	17915	10808	11781	1219	6000	**47723**
5	PMKSY-WS	1800	1225	775	1825	2725	**8350**
Total		**36785**	**21423**	**23886**	**17224**	**35428**	**134746**

Fig 5.11

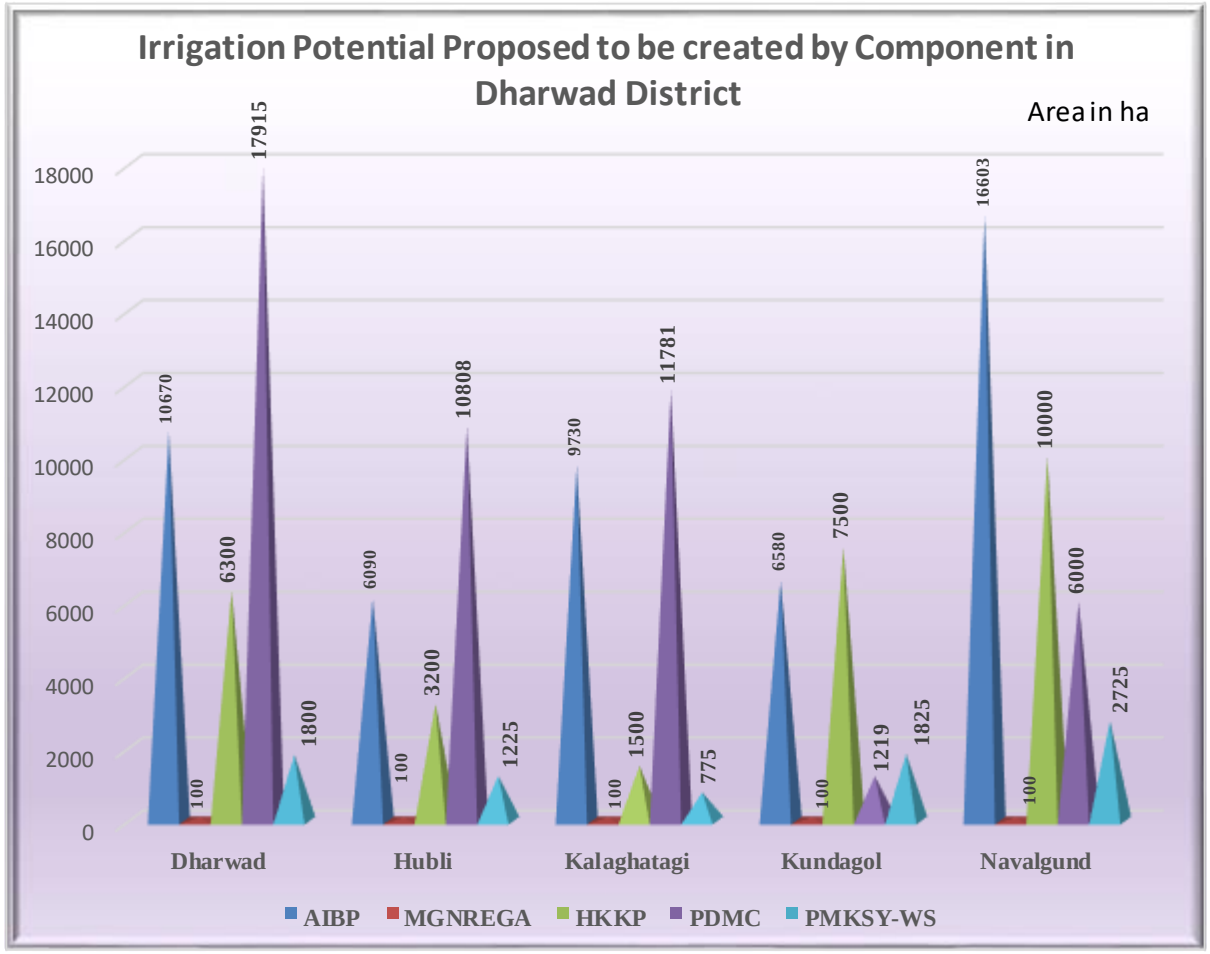

Irrigation Potential Proposed to be created by Component in Dharwad District
Area in ha
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
10670
100
6300
17915
1800
6090
100
3200
10808
1225
9730
100
1500
11781
775
6580
100
7500
1219
1825
16603
100
10000
6000
2725
Dharwad
Hubli
Kalaghatagi
Kundagol
Navalgund
AIBP
MGNREGA
HKKP
PDMC
PMKSY-WS

Table 5.12: Estimated Cost of Interventions by Component

in Lakh Rupees

Sl. No.	Component	Dharwad	Hubli	Kalaghatagi	Kundagol	Navalgund	Total
1	AIBP	213136	97938	155383	139036	1763396	**2368889**
2	MGNREGA	3100	3250	940	6100	7100	**20490**
3	HKKP	12155	11550	2250	11250	15000	**52205**
4	PDMC	11850	4977	8205	2394	2161	**29587**
5	PMKSY-WS	7475	3808	4668	4006	5312	**25269**
Total		**247716**	**121523**	**171446**	**162786**	**1792969**	**2496440**

Fig 5.12

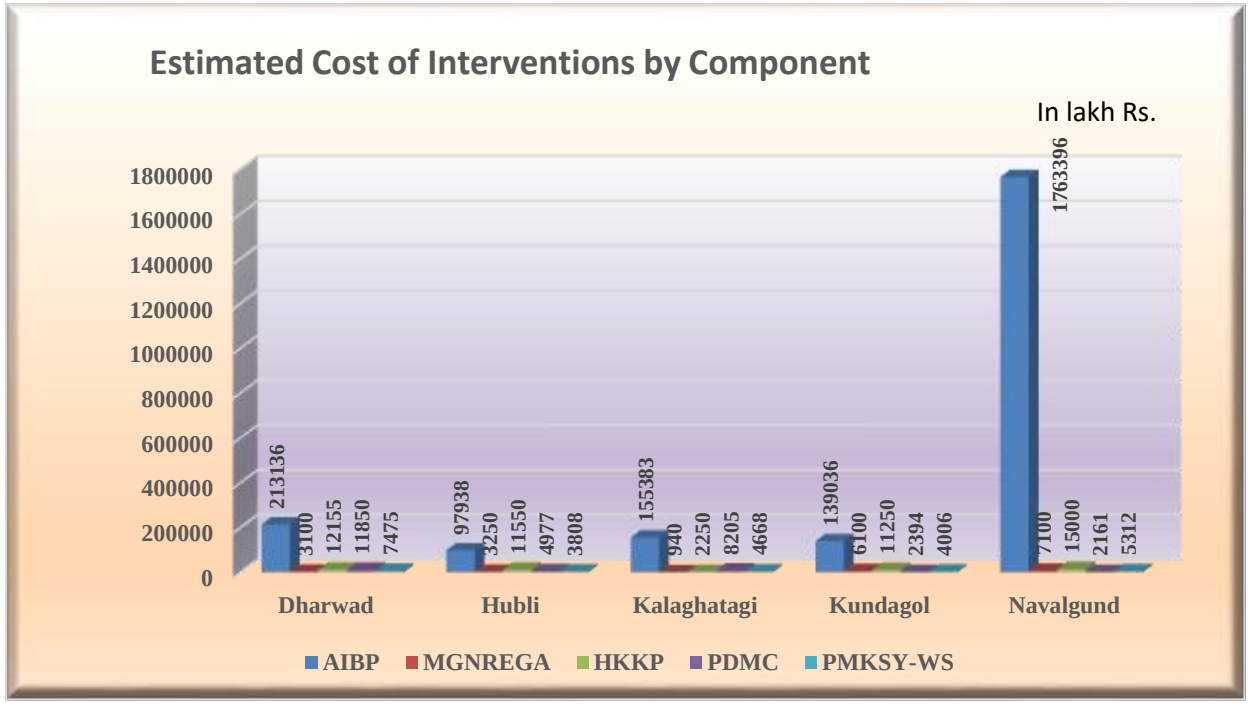

Estimated Cost of Interventions by Component
In lakh Rs.
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
213136
3100
12155
11850
7475
97938
3250
11550
4977
3808
155383
940
2250
8205
4668
139036
6100
11250
2394
4006
1763396
7100
15000
2161
5312
Dharwad
Hubli
Kalaghatagi
Kundagol
Navalgund
AIBP
MGNREGA
HKKP
PDMC
PMKSY-WS

Table 5.13 DISTRICT ABSTRACT-BUDGET-TALUK & YEAR WISE

in Lakh Rupees

Sl. No.	Year	Dharwad	Hubli	Kalaghatagi	Kundagol	Navalagund	Total
1	I	49544	24306	34290	32559	358596	**499295**
2	II	49543	24306	34290	32558	358594	**499291**
3	III	49543	24305	34290	32558	358594	**499290**
4	IV	49543	24303	34288	32556	358593	**499283**
5	V	49543	24303	34288	32555	358592	**499281**
Total		**247716**	**121523**	**171446**	**162786**	**1792969**	**2496440**

Fig 5.13

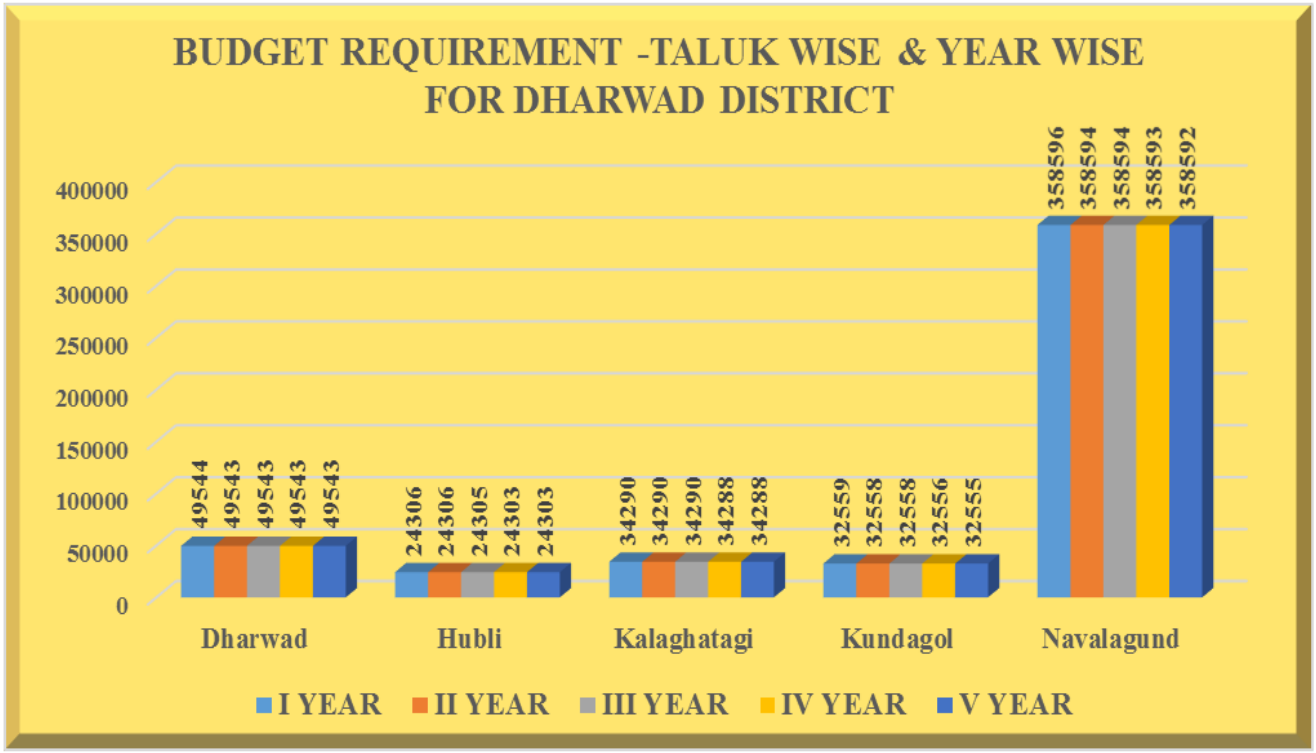
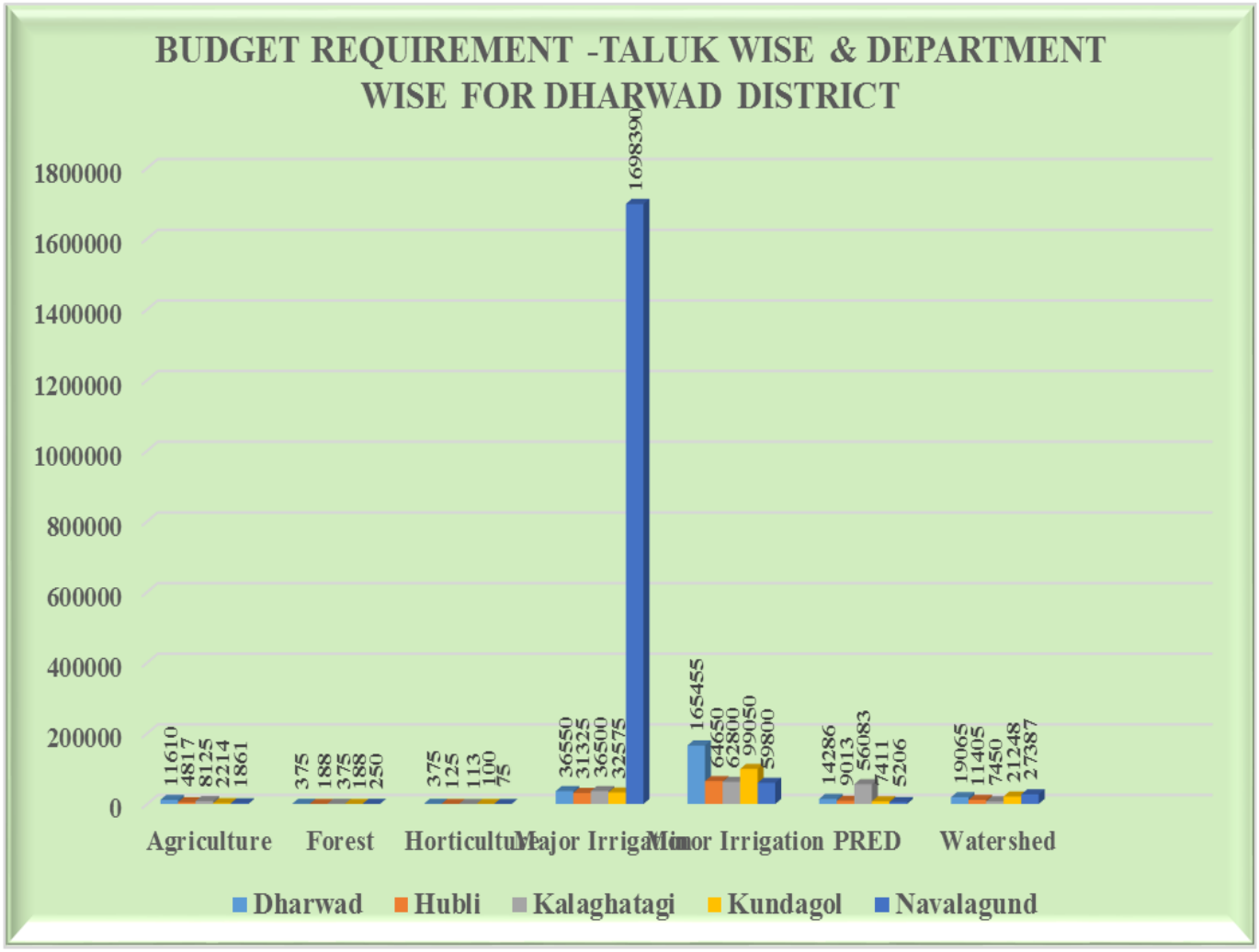

BUDGET REQUIREMENT -TALUK WISE & YEAR WISE FOR DHARWAD DISTRICT
400000
350000
300000
250000
200000
150000
100000
50000
0
49544
49543
49543
49543
49543
24306
24306
24305
24303
24303
34290
34290
34290
34288
34288
32559
32558
32558
32556
32555
358596
358594
358594
358593
358592
Dharwad
Hubli
Kalaghatagi
Kundagol
Navalagund
I YEAR
II YEAR
III YEAR
IV YEAR
V YEAR

Table 5.14 DISTRICT ABSTRACT-BUDGET-TALUK & DEPARTMENT WISE

in Lakh Rupees

Sl. No.	Department	Dharwad	Hubli	Kalaghatagi	Kundagol	Navalagund	Total
1	Agriculture	11610	4817	8125	2214	1861	**28627**
2	Forest	375	188	375	188	250	**1376**
3	Horticulture	375	125	113	100	75	**788**
4	Major Irrigation	36550	31325	36500	32575	1698390	**1835340**
5	Minor Irrigation	165455	64650	62800	99050	59800	**451755**
6	PRED	14286	9013	56083	7411	5206	**91999**
7	Watershed	19065	11405	7450	21248	27387	**86555**
Total		**247716**	**121523**	**171446**	**162786**	**1792969**	**2496440**

Fig 5.14


BUDGET REQUIREMENT -TALUK WISE & DEPARTMENT WISE FOR DHARWAD DISTRICT
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
11610
4817
8125
2214
1861
375
188
375
188
250
375
125
113
100
75
36550
31325
36500
32575
1698390
165455
64650
62800
99050
59800
14286
9013
56083
7411
5206
19065
11405
7450
21248
27387
Agriculture
Forest
Horticulture
Major Irrigation
Minor Irrigation
PRED
Watershed
Dharwad
Hubli
Kalaghatagi
Kundagol
Navalagund

CONCLUSIONS

- Dharwad district is a part of Northern transitional zone, having a typical dryland eco-system except parts of Navalgund taluks which have irrigation facilities from Malaprabha Canal. Erratic monsoon and frequent dry spells elevates the risk in farming. The soil and water conservation measures through watershed approach, drought proofing is absolutely necessary to ensure reasonable level of crop yields.
- Strengthening water harvesting structures like farm ponds, check dams, tanks, barrages, percolation tanks etc., are very essential to harness rain water in this region.
- The PMKSY has five major components wherein activities are to be taken up by various departments such as Major Irrigation, Minor Irrigation, PRED, Agriculture, Horticulture, Animal Husbandry, Urban Water Supply, Industries etc., so as to enhance the area under irrigation and also provide additional funding.
- Under AIBP (Accelerated Irrigation Benefit Programme), various activities are proposed by major irrigation, minor irrigation departments wherein incomplete works are proposed to be taken up in different taluks at an estimated cost of Rs. 23688.89 crores and this would create irrigation potential of 49673 ha in the district.
- MGNREGA is another important source of funding for employing man-power to take up farm ponds, check dams, lining, bunding etc. Various activities are proposed in different taluks at an estimated cost of Rs. 204.90 crores, through which an additional area of 500 ha are going to be created for new irrigation.
- Another important component is Har Khet Ko Pani (HKKP) wherein new water harvesting structures and irrigation infrastructure is proposed. This

would create new irrigation potential of 28500 ha by incurring an expenditure of Rs. 522.05 crores.

- Per Drop More Crop is another activity wherein 47723 ha of area will be covered with Rs. 295.87 crores budget.
- Under PMKSY watershed component, many small works are suggested through which 8350 ha additional area will be created with an expenditure of Rs. 252.69 crores.
- Overall, Dharwad district will have an additional area under irrigation by 2020 to an extent of 134,746 ha with a budgetary support of Rs. 24964.40 crores.

APPENDICES

General Information of the District: Dharwad

1.1 District Profile Source: Gazetteer, Census Report, any other source of Government				
Sl. No	**Name of the District**	**District code**	**Latitude**	**Longitude**
1	Dharwad	562	15'02'00" to 15'48'00"N	74'43'30" to 75'33'25"E

1.4 Agro Ecology, Climate, Hydrology and Topography **Source: IMD, regional ICAR centre(s), SAUs, KVKs etc.**

Name of the State: Karnataka

Name of the District: Dharwad

Name of the Block*: Dharwad

Sl No.	Agro Ecological Zone Type	Tyoe of Terrain	Block area (ha)	Average Monthly Rainfall (mm)		No Of Rainy days	Maximum Rainfall Intensity			Average Weekly Temperature (*C)									Potential Evapo Transpiration (PET)				Elevation		
							Upto 15 Min.	Beyond 15 but upto 30 Min	Beyond 30 but upto 60 Min	Period									Period			Cumulative Total			
										Summer (April/May)			Winter (Oct-Mar.)			Rainy (June-Sept)			Summer	Winter	Rainy Season		Min	Max	Mean
										Min	Max	Mean	Min	Max	Mean	Min	Max	Mean							
	North-Eastern Transitional Zone	Plain and Partly Hilly	121622	Jan	1	0	118	No Data	No Data	23	38	30.5	14	37	25.5	23	30	26.5	284	746	476	1506	459	701	580
				Feb	1	0																			
				Ma	7	1																			
				April	47	3																			
				May	75	5																			
				June	123	9																			
				July	157	14																			
				Aug	116	12																			
				Sep	122	8																			
				Oct	101	6																			
				Nov	35	2																			
				Dec	6	1																			

1.4 Agro Ecology, Climate, Hydrology and Topography **Source: IMD, regional ICAR centre(s), SAUs, KVKs**

Name of the State: Karnataka

Name of the District:Dharawd

Name of the Block*: Hubli

Sl No.	Agro Ecological Zone Type	Tyoe of Terrain	Block area (ha)	Average Monthly Rainfall (mm)		No Of Rainy days	Maximum Rainfall Intensity			Average Weekly Temperature (*C)									Potential Evapo Transpiration (PET)				Elevation		
							Upto 15 Min.	Beyond 15 but upto 30 Min	Beyond 30 but upto 60 Min	Period									Period						
										Summer (April/May)			Winter (Oct-Mar.)			Rainy (June-Sept)			Summer	Winter	Rainy Season	Cumulative Total	Min	Max	Mean
										Min	Max	Mean	Min	Max	Mean	Min	Max	Mean							
	North-Eastern Transitional Zone	Plain and Partly Hilly	121622	Jan	1	0	120	No Data	No Data	38	23	30.5	14	37	25.5	22	31	26.5	303.2	734.9	466.2	1504.3	462	675	569
				Feb	1	0																			
				Mar	6	1																			
				Ap	46	3																			
				May	86	5																			
				June	115	9																			
				July	126	12																			
				Aug	98	10																			
				Sep	113	8																			
				Oct	107	7																			
				Nov	37	2																			
				Dec	8	0																			

1.4 Agro Ecology, Climate, Hydrology and Topography						Source: IMD, regional ICAR centre(s), SAUs, KVKs																				
Name of the State: Karnataka																										
Name of the District: Dharwad																										
Name of the Block*: Kalghatagi																										
Sl No.	Agro Ecological Zone Type	Tyoe of Terrain	Block area (ha)	Average Monthly Rainfall (mm)		No Of Rainy days	Maximum Rainfall Intensity			Average Weekly Temperature (*C)									Potential Evapo Transpiration (PET)				Elevation		
							Upto 15 Min.	Beyond 15 but upto 30 Min	Beyond 30 but upto 60 Min	Period									Period			Cumulative Total			
										Summer (April/May)			Winter (Oct-Mar.)			Rainy (June-Sept)			Summer	Winter	Rainy Season		Min	Max	Mean
										Min	Max	Mean	Min	Max	Mean	Min	Max	Mean							
	North-Eastern Transitional Zone	Plain and Partly Hilly	121622	Jan	2	0	124	No Data	No Data	24	38	31	19	37	28	23	31	27	289.6	714.4	409.2	1413	378	673	526
				Feb	2	0																			
				Mar	9	1																			
				Apr	48	3																			
				May	76	5																			
				June	161	12																			
				July	233	18																			
				Aug	171	16																			
				Sep	119	9																			
				Oct	115	7																			
				Nov	38	2																			
				Dec	8	0																			

1.4 Agro Ecology, Climate, Hydrology and Topography **Source: IMD, regional ICAR centre(s), SAUs, KVKs**

Name of the State: Karnataka

Name of the District: Dharwad

Name of the Block*: Kundgoal

Sl No.	Agro Ecological Zone Type	Tyoe of Terrain	Block area (ha)	Average Monthly Rainfall (mm)		No Of Rainy days	Maximum Rainfall Intensity			Average Weekly Temperature (*C)									Potential Evapo Transpiration (PET)				Elevation		
										Period									Period						
										Summer (April/May)			Winter (Oct-Mar.)			Rainy (June-Sept)									
							Upto 15 Min.	Beyond 15 but upto 30 Min	Beyond 30 but upto 60 Min	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Summer	Winter	Rainy Season	Cumulative Total	Min	Max	Mean
	North-Eastern Transitional Zone	Plain and Partly Hilly	121622	Jan	0	0	112	No Data	No Data	24	38	31	19	37	28	23	31	27	304.5	735.5	469.0	1509	508	652	580
				Feb	6	0																			
				Mar	8	1																			
				Apr	45	3																			
				May	73	5																			
				June	95	8																			
				July	105	11																			
				Agu	88	9																			
				Sep	109	8																			
				Oct	100	6																			
				Nov	43	2																			
				Dec	5	0																			

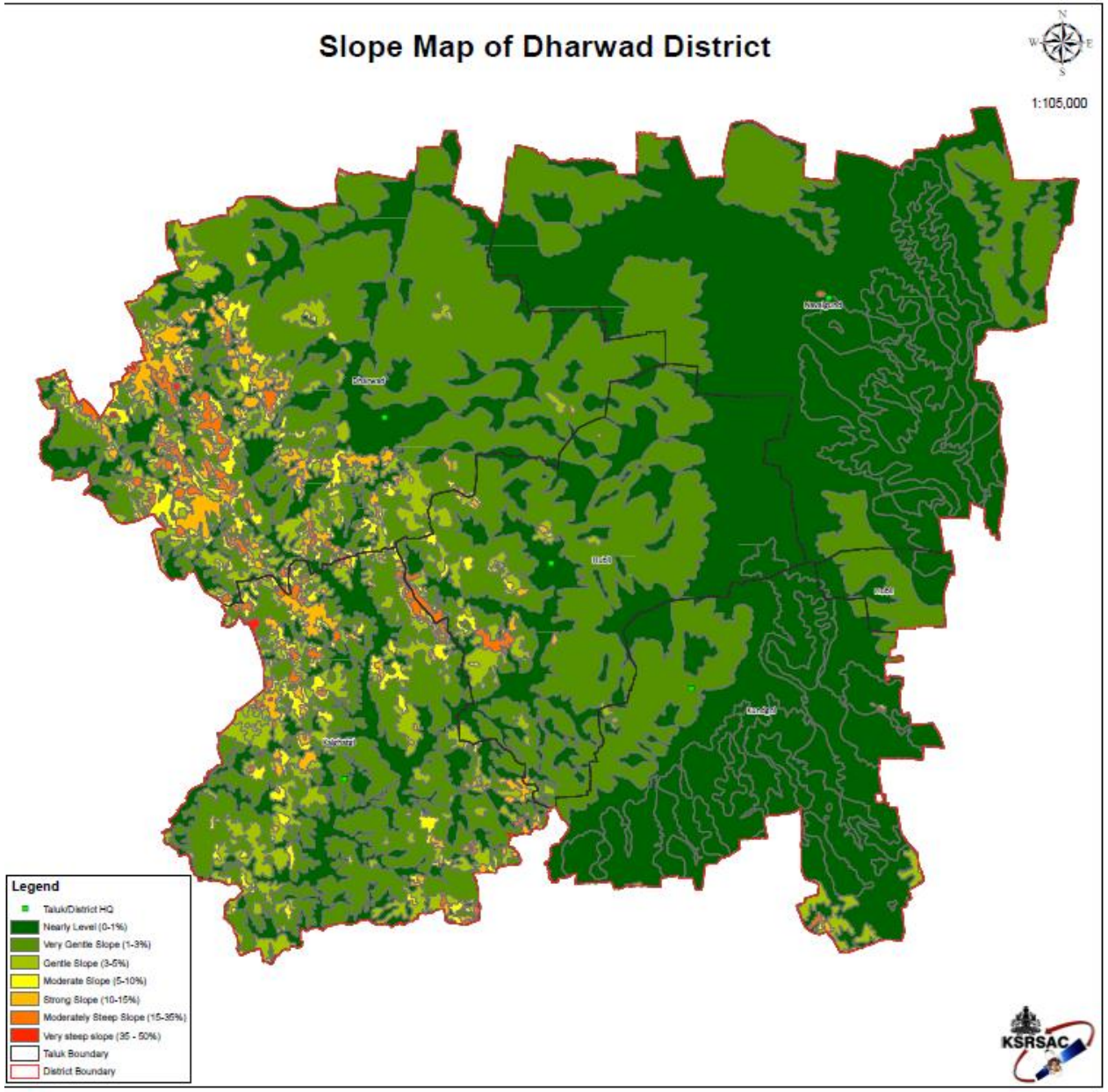
1.4 Agro Ecology, Climate, Hydrology and Topography **Source: IMD, regional ICAR centre(s), SAUs, KVKs**

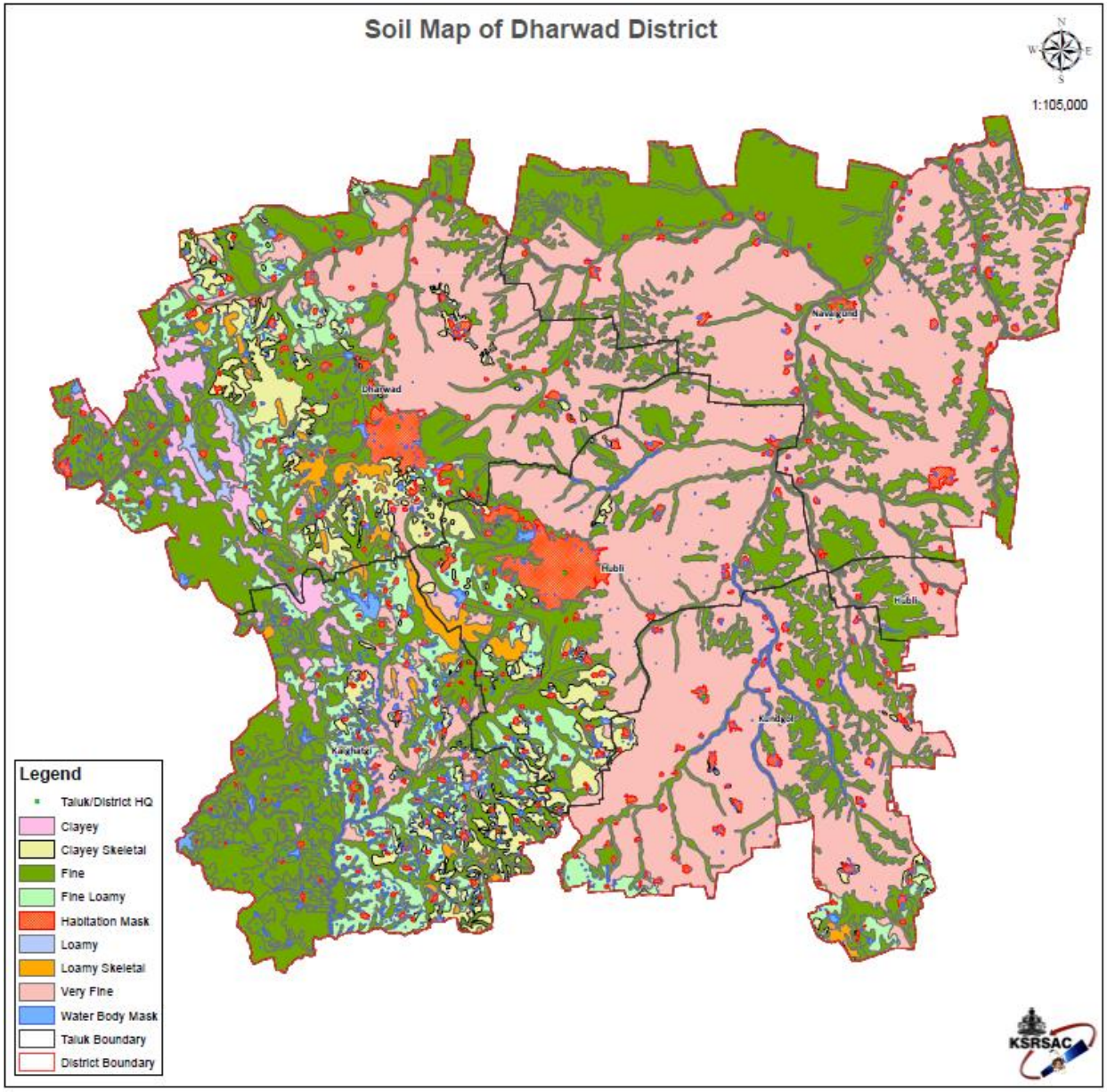
Name of the State: Karnataka

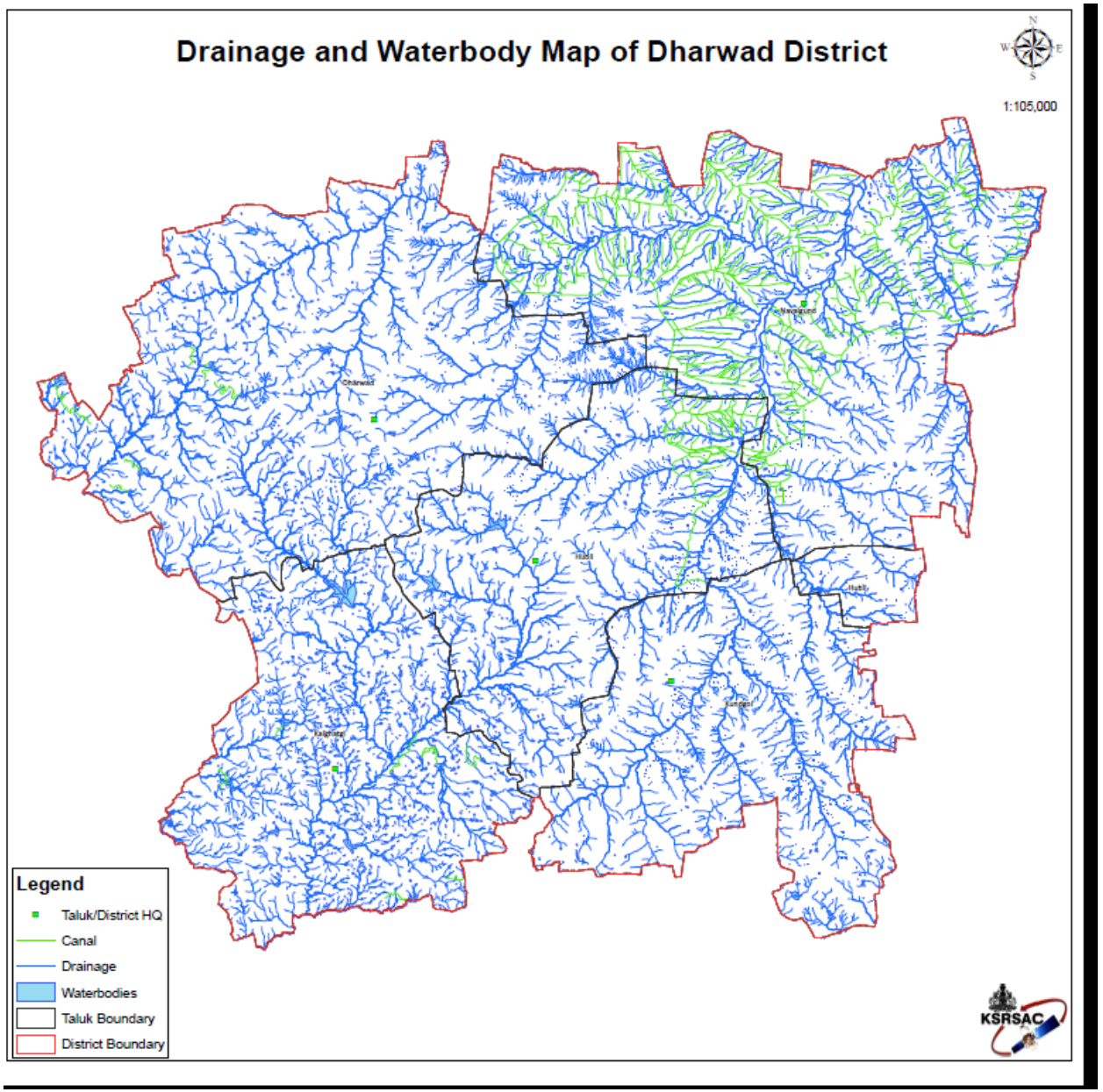
Name of the District: Dharwad

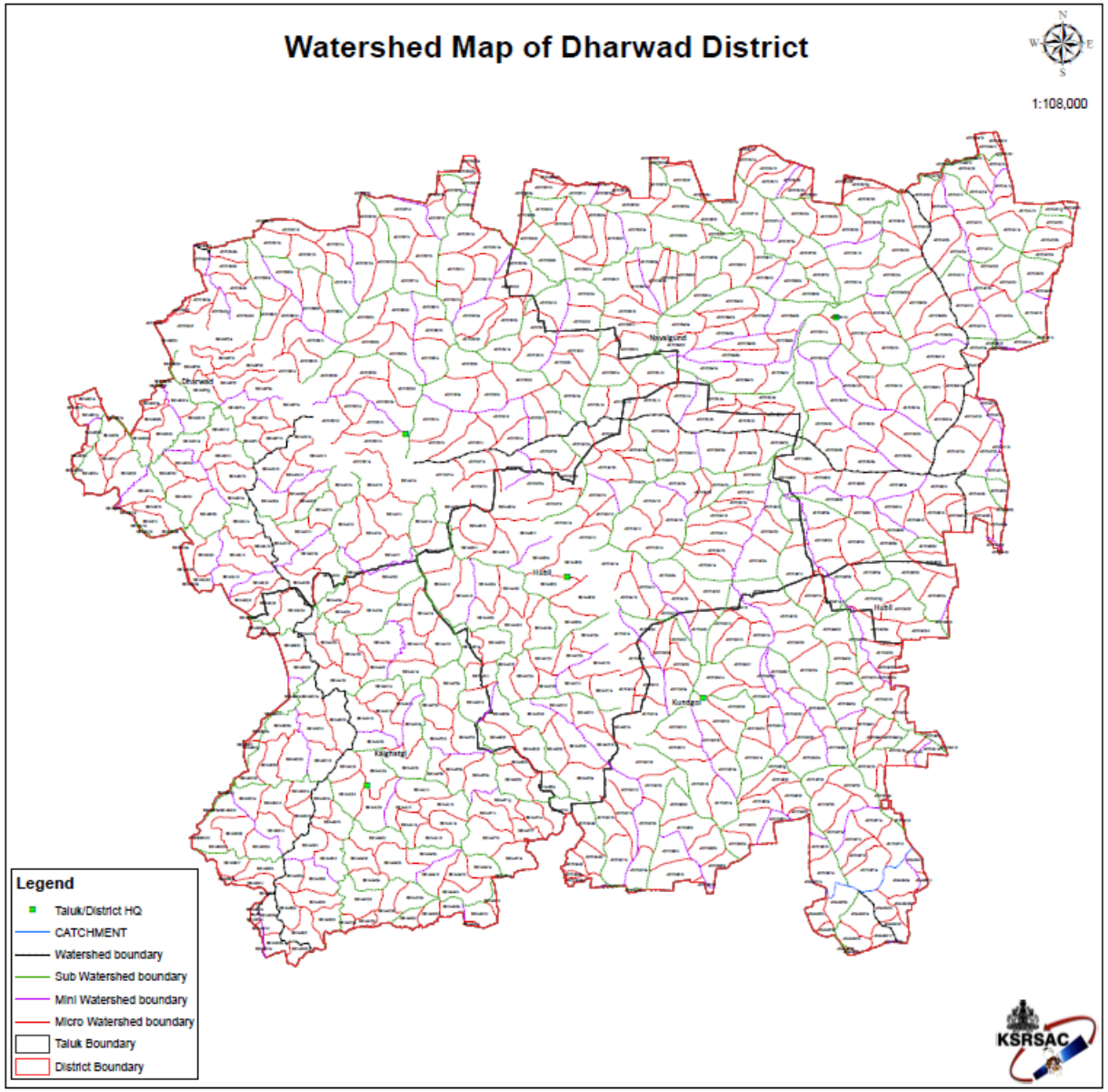
Name of the Block*: Navalgund

Sl No.	Agro Ecological Zone Type	Tyoe of Terrain	Block area (ha)	Average Monthly Rainfall (mm)		No Of Rainy days	Maximum Rainfall Intensity			Average Weekly Temperature (*C)									Potential Evapo Transpiration (PET)				Elevation		
										Period									Period						
										Summer (April/May)			Winter (Oct-Mar.)			Rainy (June-Sept)									
							Up to 15 Min.	Beyond 15 but upto 30 Min	Beyond 30 but upto 60 Min	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Summer	Winter	Rainy Season	Cumulative Total	Min	Max	Mean
	North-Eastern Transitional Zone	Plain and Partly Hilly	121622	Janua	1	0	120	No Data	No Data	23	38	30.5	14	37	25.5	22	32	27	320.4	756.9	507.8	1585	469	577	523
				Febru	2	0																			
				Marc	10	1																			
				April	31	2																			
				May	75	5																			
				June	84	6																			
				July	71	7																			
				Aug	71	7																			
				Sept	143	7																			
				Octob	95	6																			
				Nov	28	2																			
				De	5	0																			


Slope Map of Dharwad District
N
W
E
S
1:105,000
Legend
Taluk/District HQ
Nearly Level (0-1%)
Very Gentle Slope (1-3%)
Gentle Slope (3-5%)
Moderate Slope (5-10%)
Strong Slope (10-15%)
Moderately Steep Slope (15-35%)
Very steep slope (35 - 50%)
Taluk Boundary
District Boundary
KSRSAC


Soil Map of Dharwad District
N
W
E
S
1:105,000
Dharwad
Navalgund
Hubli
Kundgol
Kalghatgi
Legend
Taluk/District HQ
Clayey
Clayey Skeletal
Fine
Fine Loamy
Habitation Mask
Loamy
Loamy Skeletal
Very Fine
Water Body Mask
Taluk Boundary
District Boundary
KSRSAC


Drainage and Waterbody Map of Dharwad District
1:105,000
Legend
Taluk/District HQ
Canal
Drainage
Waterbodies
Taluk Boundary
District Boundary
KSRSAC


Watershed Map of Dharwad District
N
W
E
S
1:108,000
Dharwad
Navalgund
Hubli
Kundgol
Kalghatgi
Legend
Taluk/District HQ
CATCHMENT
Watershed boundary
Sub Watershed boundary
Mini Watershed boundary
Micro Watershed boundary
Taluk Boundary
District Boundary
KSRSAC

Chapter II: District Water Profile:

2.1 Area-wise, Crop-wise Irrigation Status Source: Department of Agriculture, Agriculture Statistic of State, Agristat

Name of the State: Karnataka

Name of the District : DHARWAD

Name of the Block: DHARWAD

Crop Type	Kharif (Area in ha)			Rabi Area in ha			Summer Crop (Area in ha)			Total Area in ha			Horticulture & Plantation Crops (Area in ha		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
A) Cereals(paddy,wheat)	350	5552	**5902**	0	2846	**2846**	3	0	**3**	353	8398	**8751**			
B) Coarse Cereals(jowar, maize)	112	7761	**7873**	551	9020	**9571**	59	0	**59**	722	16781	**17503**			
C) Pulses	0	7888	**7888**	0	25172	**25172**	43	0	**43**	43	33060	**33103**			
D) Oil Seeds	0	12616	**12616**	0	707	**707**	157	0	**157**	157	13323	**13480**			
E) Fibre	212	6476	**6688**	0	0	**0**	0	0	**0**	212	6476	**6688**			
F) Any other crops…(s.cane)	0	0	**0**	0	0	**0**	373	0	**373**	373	0	**373**			

2.1 Area-wise, Crop-wise Irrigation Status Source: Department of Agriculture, Agriculture Statistic of State, Agristat															
Name of the State: Karnataka															
Name of the District :DHARWAD															
Name of the Block: HUBLI															
Crop Type	Kharif (Area in ha)			Rabi Area in ha			Summer Crop (Area in ha)			Total Area in ha			Horticulture & Plantation Crops (Area in ha		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
A) Cereals	14	41	**55**	209	2975	**3184**	0	0	**0**	223	3016	**3239**			
B) Coarse Cereals	210	2160	**2370**	1338	5681	**7019**	390	0	**390**	1938	7841	**9779**			
C) Pulses	0	3208	**3208**	115	11799	**11914**	48	0	**48**	163	15007	**15170**			
D) Oil Seeds	160	10565	**10725**	0	900	**900**	433	0	**433**	593	11465	**12058**			
E) Fibre	442	9991	**10433**	0	972	**972**	0	0	**0**	442	10963	**11405**			
F) Any other crops...	0	0	**0**	0	0	**0**	23	0	**23**	23	0	**23**			

2.1 Area-wise, Crop-wise Irrigation Status Source: Department of Agriculture, Agriculture Statistic of State, Agristat															
Name of the State: Karnataka															
Name of the District :DHARWAD															
Name of the Block: KALGHATGI															
Crop Type	Kharif (Area in ha)			Rabi Area in ha			Summer Crop (Area in ha)			Total Area in ha			Horticulture & Plantation Crops (Area in ha		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
A) Cereals	732	9375	**10107**	25	12	**37**	91	0	**91**	848	9387	**10235**			
B) Coarse Cereals	225	10582	**10807**	2110	8550	**10660**	334	0	**334**	2669	19132	**21801**			
C) Pulses	0	205	**205**	0	758	**758**	22	0	**22**	22	963	**985**			
D) Oil Seeds	0	14515	**14515**	0	20	**20**	583	0	**583**	583	14535	**15118**			
E) Fibre	0	750	**750**	0	0	**0**	0	0	**0**	0	750	**750**			
F) Any other crops...	0	0	**0**	0	0	**0**	349	0	**349**	349	0	**349**			

2.1 Area-wise, Crop-wise Irrigation Status Source: Department of Agriculture, Agriculture Statistic of State, Agristat															
Name of the State: Karnataka															
Name of the District :DHARWAD															
Name of the Block:KUNDGOL															
Crop Type	Kharif (Area in ha)			Rabi Area in ha			Summer Crop (Area in ha)			Total Area in ha			Horticulture & Plantation Crops (Area in ha		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
A) Cereals	0	90	**90**	8	6449	**6457**	0	0	**0**	0	90	90			
B) Coarse Cereals	55	1412	**1467**	0	7757	**7757**	0	0	**0**	55	1412	1467			
C) Pulses	0	1857	**1857**	0	9710	**9710**	5	0	**5**	5	1857	1862			
D) Oil Seeds	0	16071	**16071**	0	3028	**3028**	130	0	**130**	130	16071	16201			
E) Fibre	0	19072	**19072**	0	8235	**8235**	0	0	**0**	0	19072	19072			
F) Any other crops...	0	0	**0**	0	0	**0**	0	0	**0**	0	0	0			

2.1 Area-wise, Crop-wise Irrigation Status Source: Department of Agriculture, Agriculture Statistic of State, Agristat															
Name of the State: Karnataka															
Name of the District : DHARWAD															
Name of the Block: NAVALGUND															
Crop Type	Kharif (Area in ha)			Rabi Area in ha			Summer Crop (Area in ha)			Total Area in ha			Horticulture & Plantation Crops (Area in ha		
	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
A) Cereals	0	0	**0**	3899	9098	**12997**	0	0	**0**	3899	9098	**12997**			
B) Coarse Cereals	3172	0	**3172**	2144	8595	**10739**	0	0	**0**	5316	8595	**13911**			
C) Pulses	158	16796	**16954**	3367	24286	**27653**	0	0	**0**	3525	41082	**44607**			
D) Oil Seeds	110	4189	**4299**	28	5831	**5859**	0	0	**0**	138	10020	**10158**			
E) Fibre	9340	8033	**17373**	124	4170	**4294**	0	0	**0**	9464	12203	**21667**			
F) Any other crops...	0	0	**0**	0	0	**0**	8	0	**8**	8	0	**8**			

2.1. Area of major crops under agriculture and horticulture of Dharwad district, 2014-15 (ha)

	Cereals, ha					
Taluks	**Paddy**	**Jowar**	**Maize**	**Wheat**	**Other cereals & minor millets**	**Total cereals & minor millets**
Dharwad	10,607	10,501	7,592	4,036	27	32,763
Hubli	197	6,081	5,643	3,579	35	15,539
Kalaghatagi	9,814	7,142	12,741	11	98	29,810
Kundagol	54	7,237	1,470	7,472	153	16,394
Navalagund	5	10,183	6,133	13,887	0	30,208
Total	20,677	41,144	33,579	28,985	313	124,714
	Pulses, ha					
	Tur	Horse gram	Green gram	Bengal gram	Total pulses	Total food grains
Dharwad	670	122	8,189	16,893	26,747	59,510
Hubli	555	299	3293	6,778	11,176	26,715
Kalaghatagi	78	788	1830	710	3655	33,465
Kundagol	221	598	1127	7280	9366	25,760
Navalagund	85	0	16,378	18,961	35,469	65,677
Total	1609	1807	30,817	50,622	86,413	211,127

	Oilseeds				Commercial crops		Horticulture crops	
	Groundnut	safflower	Soybean	Total oilseeds	Cotton	Sugarcane	Fruits	Vegetables
Dharwad	3569	860	7353	11,797	9539	6251	6736	5994
Hubli	4939	938	7600	13,851	19,760	132	2874	6017
Kalaghatagi	856	16	14,489	15,401	1332	2839	1311	545
Kundagol	14,931	2238	2523	20,076	29,277	3	118	2175
Navalagund	2848	1337	19	7,325	37,276	101	119	24,959
Total	27,143	5389	31,984	68,450	97,184	9326	11,158	39,690

Source- Dharwad district at a glance, 2014-15

2.2. Total production and productivity of major crops of Dharwad district, 2014-15

District total	Total production, metric tones										
	Rice	Jowar	Maize	Wheat	Total cereals and minor millets	Tur	Horse gram	Green gram	Avare	Bengal gram	Total pulses
Dharwad	26,453	25,598	97,743	31,164	181,413	1841	563	7257	259	23824	33744
	Total production, metric tones										
	Groundnut	Safflower	Soybean	Total oilseeds	Cotton, bales	Sugarcane, t/ha					
Dharwad	30161	7092	17757	58140	106844	207,380					

District total	Productivity, kg/ha										
	Rice	Jowar	Maize	Wheat	Total cereals and minor millets	Tur	Horse gram	Green gram	Avare	Bengal gram	Total pulses
Dharwad	1028	611	2273	763	5219	669	482	338	1014	414	3796
	Total production, metric tones										
	Groundnut	Safflower	Soybean	Total oilseeds	Cotton, bales	Sugarcane, t/ha					
Dharwad	891	1075	805	3287	277	63					

2.2 Production and Productivity of major Crops Source: DAP, Agriculture Statistic

Name of the State: Karnataka

Name of the District: Dharwad

Name of the Block: Dharwad

Season	Crop Sown						Rainfed				Irrigated				Total			
	Cereals	Coarse Cereals	Pulses	Oil Seeds	Fibre Crops	Any Other Crops	Area (ha)	Production (qtn/yr)	Productiv ity or Yield (Q/ha)	Cost of Cultivation (Rs./ha)	Area (ha)	Production (qtn/yr)	Productivity (Q/ha)	Cost of Cultivation (Rs./ha)	Area (ha)	Production (qtniYr)	Productivity (Q/ha)	Cost of Cultivation (Rs./ha)
A. Kharif	paddy						5552	35477	6.39	74130	350	5194	14.84	86485	5902	40671	21.23	160615
		jowar					221	1509	6.83	34594	12			39536	233	1509	6.83	74130
		maize					7540	222053	29.45	59304	100	3871	38.71	79072	7640	225924	68.16	138376
			greengram				6916	1763.8	2.55	29652	0	0	0	0	6916	1763.8	2.55	29652
			redgram				972	2060.64	2.12	37065	0	0	0	0	972	2060.64	2.12	37065
				groundnut			2476	19560.4	7.9	49420	0	0	0	61775	2476	19560.4	7.9	111195
				soybean			10140	89739	8.85	37065	0	0	0	54362	10140	89739	8.85	91427
					cotton		6476	72531.2	11.2	111195	212			111195	6688	72531.2	11.2	222390

B. Rabi		jowar					9020	24534.4	2.72	34594	0			39536	9020	24534.4	2.72	74130
	wheat						2846	8964.9	3.15	34594	0			44478	2846	8964.9	3.15	79072
		maize								59304	551	15510.65	34.1	79072	551	15510.65	34.1	138376
			bengalgram				25172	101191.4	4.02	44478	0			56833	25172	101191.44	4.02	101311
					cotton		0		4.8	111195	0			111195	0	0	4.8	222390
				safflower			707	3648.12	5.16	29652	0			37065	707	3648.12	5.16	66717

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2.2 Production and Productivity of major Crops Source: DAP, Agriculture Statistic

Name of the State: Karnataka

Name of the District: Dharwad

Name of the Block: hubli

Season	Crop Sown						Rainfed				Irrigated				Total			
	Cereals	Coarse Cereals	Pulses	Oil Seeds	Fibre Crops	Any Other Crops	Area (ha)	Production (qtn/yr)	Productiv ity or Yield (Q/ha)	Cost of Cultivati on (Rs./ha)	Area (ha)	Production (qtn/yr)	Productivity (Q/ha)	Cost of Cultivati on (Rs./ha)	Area (ha)	Produc tion (qtniYr)	Productivity (Q/ha)	Cost of Cultivation (Rs./ha)
	paddy						41	389.9	9.51	74130	14	305.9	21.85	86485	55	695.81	31.36	160615
		jowar					51	370.3	7.26	34594				39536	51	370.26	7.26	74130
		maize					2109	51881	24.6	59304	210	5202	24.77	79072	2319	57083.1	49.37	138376
			grrengram				3009	7222	2.4	29652	0			0	3009	7221.6	2.4	29652
			redgram				199	809.9	4.07	37065	0			0	199	809.93	4.07	37065
				groundnut			4171	14807	3.55	49420	160			61775	4331	14807.1	3.55	111195
				soybean			6394	47316	7.4	37065	0			54362	6394	47315.6	7.4	91427
					cotton		9991	88920	8.9	1E+05	442			111195	10433	88919.9	8.9	222390

B. Rabi		jowar					5681	18747	3.3	34594	50	401	8.02	39536	5731	19148.3	11.32	74130
	wheat						2975	10710	3.6	34594	209	1536	7.35	44478	3184	12246.2	10.95	79072
		maize					0	0	21.2	59304	1288	41551	32.26	79072	1288	41550.9	53.46	138376
			bengalgram				11799	28672	2.43	44478	115	652.1	5.67	56833	11914	29323.6	8.1	101311
					cotton		972	5006	5.15	1E+05	0			111195	972	5005.8	5.15	222390
				safflower			900	3636	4.04	29652	0			37065	900	3636	4.04	66717

2.2 Production and Productivity of major Crops Source: DAP, Agriculture Statistic

Name of the State: Karnataka

Name of the District: Dharwad

Name of the Block: kalghatgi

Season	Crop Sown						Rainfed				Irrigated				Total			
	Cereals	Coarse Cereals	Pulses	Oil Seeds	Fibre Crops	Any Other Crops	Area (ha)	Production (qtn/yr)	Productiv ity or Yield (Q/ha)	Cost of Cultivati on (Rs./ha)	Area (ha)	Production (qtn/yr)	Productivity (Q/ha)	Cost of Cultivati on (Rs./ha)	Area (ha)	Produc ti on (qtniYr)	Productivity (Q/ha)	Cost of Cultivation (Rs./ha)
KHARIFF	paddy						9375	69656.25	7.43	74130	732	23497.2	32.1	86485	10107	93153.45	39.53	160615
		jowar					45	305.55	6.79	34594	0			39536	45	305.55	6.79	74130
		maize					10537	241297.3	22.9	59304	225	0	0	79072	10762	241297.3	22.9	138376
			greengram				50	0	0	29652	0			0	50	0	0	29652
			redgram				155	864.9	5.58	37065	0			0	155	864.9	5.58	37065
				groundnut			15	55.05	3.67	49420	0			61775	15	55.05	3.67	111195
				soybean			14500	120350	8.3	37065	0			54362	14500	120350	8.3	91427
B. Rabi		jowar					8550	4460	5.2	34594	0			39536	8550	4460	5.2	74130
	wheat						12	0	0	34594	25			44478	37	0	0	79072
		maize					0	0	24.2	59304	2110	74145.4	35.14	79072	2110	74145.4	59.34	138376

			bengalgram				758	5071.02	6.69	44478	0			56833	758	5071.02	6.69	101311
					cotton		0			111195	0			111195	0	0	0	222390
				safflower			20	0	0	29652	0			37065	20	0	0	66717

2.2 Production and Productivity of major Crops Source: DAP, Agriculture Statistic

Name of the State: Karnataka

Name of the District: Dharwad

Name of the Block:kundgol

Season	Crop Sown						Rainfed				Irrigated				Total			
	Cereals	Coarse Cereals	Pulses	Oil Seeds	Fibre Crops	Any Other Crops	Area (ha)	Production (qtn/yr)	Productivity or Yield (Q/ha)	Cost of Cultivation (Rs./ha)	Area (ha)	Production (qtn/yr)	Productivity (Q/ha)	Cost of Cultivation (Rs./ha)	Area (ha)	Production (qtniYr)	Productivity (Q/ha)	Cost of Cultivation (Rs./ha)
kharif	paddy						90	0	0	74130	0			86485	90	0	0	160615
		jowar					195	832.65	4.27	34594	0			39536	195	832.65	4.27	74130
		maize					1217	0	0	59304	55	0	0	79072	1272	0	0	138376
			green gram				1680	1915.2	1.14	29652	0			0	1680	1915.2	1.14	29652
			redgram				177	442.5	2.5	37065	0			0	177	442.5	2.5	37065
				groundnut			13092	72006	5.5	49420	0			61775	13092	72006	5.5	111195
				soybean			2979	7804.98	2.62	37065	0			54362	2979	7804.98	2.62	91427
					cotton		19072	156390.4	8.2	111195	0			111195	19072	156390.4	8.2	222390
B. Rabi		jowar					7577	19094.04	2.52	34594	0			39536	7577	19094.04	2.52	74130
	wheat						6449	23538.85	3.65	34594	8	0	0	44478	6457	23538.85	3.65	79072
		maize					180	3258	18.1	59304	0			79072	180	3258	18.1	138376

			bengalgram				9710	17963.5	1.85	44478	0			56833	9710	17963.5	1.85	101311
					cotton		8235	31293	3.8	111195	0			111195	8235	31293	3.8	222390
				safflower			3028	6843.28	2.26	29652	0			37065	3028	6843.28	2.26	66717

2.2 Production and Productivity of major Crops Source: DAP, Agriculture Statistic

Name of the State: Karnataka

Name of the District: Dharwad

Name of the Block: Navalgund

Season	Crop Sown						Rainfed				Irrigated				Total			
	Cereals	Coarse Cereals	Pulses	Oil Seeds	Fibre Crops	Any Other Crops	Area (ha)	Production (qtn/yr)	Productiv ity or Yield (Q/ha)	Cost of Cultivati on (Rs./ha)	Area (ha)	Production (qtn/yr)	Productivity (Q/ha)	Cost of Cultivati on (Rs./ha)	Area (ha)	Production (qtniYr)	Productivity (Q/ha)	Cost of Cultivation (Rs./ha)
kharif f		maize					0			59304	3172	73907.6	23.3	79072	3172	73907.6	23.3	138376
			greengram				16722	15049.8	0.9	29652	139	0	0	0	16861	15049.8	0.9	29652
			redgram				74	0	0	37065	19	0	0	0	93	0	0	37065
				groundnut			4189	13027.79	3.11	49420	110	0	0	61775	4299	13027.79	3.11	111195
					cotton		8033	55427.7	6.9	111195	9340	0		111195	17373	55427.7	6.9	222390
B. Rabi		jowar					8595	40826.25	4.75	34594	1894	13920.9	7.35	39536	10489	54747.15	12.1	74130
	wheat						9098	22926.96	2.52	34594	3899	22614.2	5.8	44478	12997	45541.16	8.32	79072
		maize					0			59304	250	9055	36.22	79072	250	9055	36.22	138376
			bengal gram				24286	96901.14	3.99	44478	3367	14713.79	4.37	56833	27653	111614.93	8.36	101311
					cotton		4170	15012	3.6	111195	124	719.2	5.8	111195	4294	15731.2	9.4	222390
				safflower			5831	14577.5	2.5	29652	28	0		37065	5859	14577.5	2.5	66717

5.1: Strategic Action plan for irrigation in District under PMKSY

Sl No	Name of the Blocks/sub Dist	Concerned Ministry/ Department	Component	Activity	Total Number/ Capacity (cum)	Command Area/ Irrigation Potential (Ha)	Period of Implementation (5/7 yrs)	Estimated cost (in Crore Rs.)
1	Dharwad	MoWR	AIBP	Major Irrigation- Extension, Renovation & Modernization Of Existing Canals				
	Hubli							
	Kalaghatagi							
	Kundagol							
	Navalgund				103	41688		7942.00
	DIST.				**103**	**41688**		**7942.00**
2	Dharwad	MoWR	AIBP	Major Irrigation- Barrage cum Bridge	24			36.00
	Hubli				26			39.00
	Kalaghatagi				19			28.50
	Kundagol				13			19.50
	Navalgund				64			8745.00
	DIST.				**146**			**8868.00**
3	Dharwad	MoWR	AIBP	Zilla Panchayat Engineering Department (ZP tanks) ERM Extension, Renovation, Modernization	199			900.00
	Hubli				135			
	Kalaghatagi				840			
	Kundagol				111			
	Navalgund				63			
	DIST.				**1348**			**900.00**
4	Dharwad	MoWR	AIBP	Filling of MI tanks and community	5			439.00
	Hubli				5			384.00

	Kalaghatagi			micro irrigation systems for selected areas of Kalaghatagai & Hubli by lift irrigation from Bedthi tributary	5			444.00
	Kundagol				5			444.00
	Navalgund				5			364.00
	DIST.				**25**			**2075.00**
5	Dharwad	MoWR	AIBP	Construction of Bridge-cum-Barrages, Desilting, Nala decongestion, side-walls, construction of Ghats, to control the floods and to create irrigate using barriage water of Bennehalla & Tupparihalla Nala	13	5000		329.50
	Hubli				13	2500		274.25
	Kalaghatagi				13			336.50
	Kundagol				13	2500		306.25
	Navalgund				10	2500		296.90
	DIST.				**62**	**12500**		**1543.40**
6	Dharwad	MoWR	AIBP	Minor Irrigation-Construction Of New Tanks & Community Micro Irrigation	32			757.00
	Hubli				10			50.00
	Kalaghatagi							
	Kundagol				20			100.00
	Navalgund				40			210.00
	DIST.				**102**			**1117.00**
7	Dharwad	MoWR	AIBP	Minor Irrigation-Extension ,Renovation & Modernization Of Existing Tanks	45			427.00
	Hubli				12			132.00
	Kalaghatagi				4			184.00
	Kundagol				61			446.50
	Navalgund				1			24.00
	DIST.				**123**			**1213.50**

	Dharwad	MoWR	AIBP	ZP Engineering (Drinking water supply) Creation of three water storage tanks in the abandoned Murrum Quarry spots	2			10.00
	Hubli				2			10.00
	Kalaghatagi							
	Kundagol							
	Navalgund				2			10.00
	DIST.				**6**			**30.00**
8	Dharwad	MOA & FW DAC& FW	PER DROP MORE CROP (Micro Irrigation) - Supplementary water management activities	DPAP Drip	8000 Ha	9915	5 yrs	72.00
	Hubli			DPAP Drip	3000 Ha	7808	5 yrs	27.00
	Kalaghatagi			DPAP Drip	5500 Ha	6281	5 yrs	49.50
	Kundagol			DPAP Drip	500 Ha	719	5 yrs	4.50
	DPAP Talukas Total			**DPAP Drip**	**17000 Ha**	**24723 Ha**	**5 yrs**	**153.00**
9	Dharwad	MOA & FW DAC& FW	PER DROP MORE CROP(Micro Irrigation)- Supplementary water management activities	DPAP sprinkler	25000	9915	5 yrs	44.10
	Hubli			DPAP sprinkler	12000	7808	5 yrs	21.17
	Kalaghatagi			DPAP sprinkler	18000	6281	5 yrs	31.75
	Kundagol			DPAP sprinkler	10000	719	5 yrs	17.64
	DPAP Talukas Total			DPAP sprinkler	**65000**	**24723 Ha**	**5 yrs**	**114.66**
10	Navalgund	MOA & FW DAC& FW	PER DROP MORE CROP(Micro Irrigation)- Supplementary water management activities	Non DPAP Drip	**500 Ha**	60039 ha	5yrs	**4.50**
11	Navalgund	MOA & FW DAC& FW		Non DPAP sprinkler	**8000 Ha**	60039 ha	5 yrs	**14.11**
12	Dharwad	MOA & FW DAC& FW	PER DROP MORE CROP (Micro Irrigation) - Supplementary water management activities	Trench cum Bund (Ha) Topping up of MGNREGA	1200	1200	5 yrs	2.40
	Hubli				800	800	5 yrs	1.60
	Kalaghatagi				400	400	5 yrs	0.80
	Kundagol				900	900	5 yrs	1.80
	Navalgund				1500	1500	5 yrs	3.00

	DIST.				4800	4800	5 yrs	**9.60**
13	Dharwad	MOA & FW DAC& FW	PER DROP MORE CROP(Micro Irrigation)- Supplementary water management activities	Farm ponds Topping up of MGNREGA	100	100	5 yrs	1.00
	Hubli				100	100	5 yrs	1.00
	Kalaghatagi				100	100	5 yrs	1.00
	Kundagol				100	100	5 yrs	1.00
	Navalgund				100	100	5 yrs	1.00
	DIST.				**500**	**500**	5 yrs	**5.00**
14	Dharwad	DoLR-MoRD	PER DROP MORE CROP (Micro Irrigation) - Supplementary water management activities	**Bunding** Drought proofing through check dams/ Water Harvesting Structures	10000	10000	5yrs	15.00
	Hubli				5000	5000	5yrs	7.50
	Kalaghatagi				5000	5000	5yrs	7.50
	Kundagol				20000	20000	5yrs	30.00
	Navalgund				20000	20000	5yrs	30.00
	DIST.				**60000**	**60000**	5yrs	**90.00**
15	Dharwad	DoLR-MoRD	PER DROP MORE CROP(Micro Irrigation)- Supplementary water management activities	**Farm Ponds** Drought proofing through check dams/ Water Harvesting Structures	6000	6000	5yrs	90.00
	Hubli				3000	3000	5yrs	45.00
	Kalaghatagi				1500	1500	5yrs	22.50
	Kundagol				7500	7500	5yrs	112.50
	Navalgund				10000	10000	5yrs	150.00
	DIST.				**28000**	**28000**	5yrs	**420.00**
16	Dharwad	MOA & FW DAC& FW	PER DROP MORE CROP(Micro Irrigation)- Supplementary water management activities	On Farm Development (Distribution Pipe/ Rised Bed and Furrow System)	7500	7500	5yrs	15.00
	Hubli				12000	12000	5yrs	24.00
	Kalaghatagi				450	450	5yrs	0.90
	Kundagol				15000	15000	5yrs	30.00
	Navalgund				20000	20000	5yrs	40.00
	DIST.				**54950**	**54950**	5yrs	**109.90**
17	Dharwad	DoLR-MoRD	PMKSY (Watershed)	Farm Ponds	1500	1500	5yrs	22.50
	Hubli				1000	1000	5yrs	15.00
	Kalaghatagi				400	400	5yrs	6.00
	Kundagol				1600	1600	5yrs	24.00
	Navalgund				2500	2500	5yrs	37.50

	DIST.				**7000**	**7000**	5yrs	**105.00**
18	Dharwad	DoLR-MoRD	PMKSY (Watershed)	Check Dams	200	300	5yrs	10.00
	Hubli				150	225	5yrs	7.50
	Kalaghatagi				250	375	5yrs	12.50
	Kundagol				150	225	5yrs	7.50
	Navalgund				150	225	5yrs	7.50
	DIST.				**900**	1350	5yrs	**45.00**
19	Dharwad	DoLR-MoRD	PMKSY (Watershed)	Percolation Tanks	50	125	5yrs	0.75
	Hubli				30	75	5yrs	0.45
	Kalaghatagi				20	50	5yrs	0.30
	Kundagol				45	112.5	5yrs	0.68
	Navalgund				65	162.5	5yrs	0.98
	DIST.				210	525	5yrs	**3.15**
20	Dharwad	DoLR-MoRD	PMKSY (Watershed)	Gokatte	35	122.5	5yrs	1.75
	Hubli				15	52.5	5yrs	0.75
	Kalaghatagi				40	140	5yrs	2.00
	Kundagol				25	87.5	5yrs	1.25
	Navalgund				35	122.5	5yrs	1.75
	DIST.				**150**	525	5yrs	**7.50**
21	Dharwad	DoLR-MoRD	PMKSY (Watershed)	Bore well Recharge pits	4300	4300	5yrs	32.25
	Hubli				1500	1500	5yrs	11.25
	Kalaghatagi				2800	2800	5yrs	21.00
	Kundagol				500	500	5yrs	3.75
	Navalgund				285	285	5yrs	2.14
	DIST.				**9385**	**9385**	5yrs	**70.39**
22	Dharwad	DoLR-MoRD	PMKSY (Watershed)	Dryland Horticulture	1500	1500	5yrs	3.75
	Hubli				500	500	5yrs	1.25
	Kalaghatagi				450	450	5yrs	1.13
	Kundagol				400	400	5yrs	1.00
	Navalgund				300	300	5yrs	0.75

	DIST.				3150	3150	5yrs	**7.88**
23	Dharwad	DoLR-MoRD	PMKSY (Watershed)	Agro Forestry	1500	1500	5yrs	3.75
	Hubli				750	750	5yrs	1.88
	Kalaghatagi				1500	1500	5yrs	3.75
	Kundagol				750	750	5yrs	1.88
	Navalgund				1000	1000	5yrs	2.50
	DIST.				**5500**	**5500**	5yrs	**13.75**
24	Dharwad	DoLR-MoRD	MoWR	Sewage Water Treatment	20 MLD	300		31.55
	Hubli				47 MLD	200		70.50
	Kalaghatagi							
	Kundagol							
	Navalgund							
	DIST.					500		**102.05**
	Grand Total					**134746**		**24964.38**

5.2: AIBP – Minor Irrigation

Sl. No	Name of the District	Name of the Blocks/ Taluka	Concerned Ministry / Department	Component	Activity	Total Number/ Capacity (cum)	Command Area/ lrrigation Potential (Ha)	Period of Implementation (5/7 yrs)	Estimated cost (Rs in Crores)
			MoWR	AIBP	Surface Minor Irrigation				
1	Dharwad	Dharwad			Construction of Barrage cum Bridge across nalla in Dharwad Tq Dharwad Dist (23 Nos)		1265		34.50
2	Dharwad	Dharwad			Construction of Bandhara across nalla in Dharwad Tq Dharwad Dist (40 Nos)		1680		30.00
3	Dharwad	Dharwad			Construction of Barrage across nalla in Dharwad Tq Dharwad Dist (25 Nos)		1375		25.00
4	Dharwad	Dharwad			Construction of new M.I Tank in Dharwad Tq Dharwad Dist (2 Nos)		160		7.00
5	Dharwad	Dharwad			Renovation, Repairs and Improvements to M.I Tank in Dharwad Tq Dharwad Dist (42 Nos)		2940		37.00
6	Dharwad	Dharwad			Providing and Constructing LIS on Doggi Nalla, and others to fill up near by tanks in Dharwad Tq Dharwad Dist (2 Nos)		640		15.00

7	Dharwad	Dharwad			Providing and Constructing LIS on Tupari Nalla, in Dharwad Tq Dharwad Dist (5 Nos)		1650		60.00
8	Dharwad	Dharwad			Construction of New Water storage Tank in Dharwad Tq Dharwad Dist (1 Nos of 2000 Acres)		-		600.00
9	Dharwad	Dharwad			Trimming and Protection works to nallas in Dharwad Tq Dharwad Dist (40.00 Kms)		-		150.00
10	Dharwad	Dharwad			Renovation, Repairs and Improvements to HDMC Tank in Dharwad Tq Dharwad Dist (15 Nos)		-		30.00
					Dharwad Taluk total		**9710**		**988.50**
11	Dharwad	Kalghatagi			Providing and Constructing LIS on Doddahalla,Tattihalla in Kalghatagi Tq Dharwad Dist (10 Nos)		3300		80.00
12	Dharwad	Kalghatagi			Construction of Barrage cum Bridge across nalla in Kalghatagi Tq Dharwad Dist.(15 Nos)		810		22.50
13	Dharwad	Kalghatagi			Construction of Bandhara across nalla in Kalghatagi Tq Dharwad Dist (60 Nos)		2760		48.00
14	Dharwad	Kalghatagi			Construction of Barrage across nalla in Kalghatagi Tq Dharwad Dist (20 Nos)		1020		20.00

15	Dharwad	Kalghatagi			Renovation, Repairs and Improvements to M.I Tank in Kalghatagi Tq Dharwad Dist (59 Nos)		5605		59.00
16	Dharwad	Kalghatagi			Trimming and Protection works to nallas in Kalghatagi Tq Dharwad Dist (40.00 Kms)		-		120.00
					Kalghatagi Taluk total		**13495**		**349.50**
17	Dharwad	Hubli			Providing and Constructing LIS on Karki halla in Hubli Tq Dharwad Dist (2 Nos)		690		20.00
18	Dharwad	Hubli			Construction of Barrage cum Bridge across nalla in Hubli Tq Dharwad Dist.(12 Nos)		840		18.00
19	Dharwad	Hubli			Construction of Bandhara across nalla in Hubli Tq Dharwad Dist (15 Nos)		735		11.25
20	Dharwad	Hubli			Construction of Barrage across nalla in Hubli Tq Dharwad Dist (5 Nos)		260		5.00
21	Dharwad	Hubli			Renovation, Repairs and Improvements to M.I Tank in Hubli Tq Dharwad Dist (9 Nos)		864		9.00
22	Dharwad	Hubli			Trimming and Protection works to nallas in Hubli Tq Dharwad Dist (15.00 Kms)		-		60.00
23	Dharwad	Hubli			Renovation, Repairs and Improvements to HDMC Tank in Hubli Tq Dharwad		-		18.00

					Dist (10 Nos)				
					Hubli Taluk total		**3389**		**141.25**
24	Dharwad	Kundgol			Construction of Barrage cum Bridge across nalla in Kundgol Tq Dharwad Dist.(20 Nos)		1240		30.00
25	Dharwad	Kundgol			Construction of Bandhara across nalla in Kundgol Tq Dharwad Dist (35 Nos)		1785		26.25
26	Dharwad	Kundgol			Construction of Barrage across nalla in Kundgol Tq Dharwad Dist (10 Nos)		690		10.00
27	Dharwad	Kundgol			Renovation, Repairs and Improvements to M.I Tank in Kundgol Tq Dharwad Dist (1 Nos)		80		1.50
28	Dharwad	Kundgol			Providing and Constructing LIS on Benni halla in Hubli Tq Dharwad Dist (8 Nos)		2480		80.00
29	Dharwad	Kundgol			Trimming and Protection works to nallas in Kundgol Tq Dharwad Dist (50.00 Kms)		-		150.00
					Kundgol Taluk total		**6275**		**297.75**
30	Dharwad	Navalgund			Construction of Barrage cum Bridge across nalla in Navalgund Tq Dharwad Dist.(15 Nos)		990		22.50

31	Dharwad	Navalgund			Construction of Bandhara across nalla in Navalgund Tq Dharwad Dist (28 Nos)		1360		22.40
32	Dharwad	Navalgund			Construction of Barrage across nalla in Navalgund Tq Dharwad Dist (12 Nos)		756		12.00
33	Dharwad	Navalgund			Construction of new M.I Tank in Navalgund Tq Dharwad Dist (2 Nos)		-		10.00
34	Dharwad	Navalgund			Trimming and Protection works to nallas in Navalgund Tq Dharwad Dist (6.00 Kms)		-		24.00
					Navalgund Taluk total		**3106**		**90.90**
					Dharwad District Total		**35975**		**1867.90**

5.3: Activities under AIBP

S. No	Name of the District	Name of the Blocks/ Taluka	Concerned Ministry/ Department	Component	Activity	Total Number / Capacity (cum)	Command Area/ irrigation Potential(Ha)	Period of Implementation(5/ 7 yrs)	Estimated cost (Rs in Crores)	Information to be obtained from dept
			MoWR	AIBP	Surface Minor Irrigation					
1	2	3	4	5	6	7	8	9	10	11
1	Dharwad	Dharwad			Construction of Barrage cum Bridge across nala near Benchi Balageri village in Dharwad Tq Dharwad Dist		57		1.55	
2	Dharwad	Dharwad			Construction of Barrage cum Bridge across nala near Kambarganavi-Honnapur village in Dharwad Tq Dharwad Dist		60		1.85	
3	Dharwad	Dharwad			Construction of Barrage across nala near Kadabagatti village in Dharwad Tq Dharwad Dist		44		1.11	

4	Dharwad	Dharwad			Construction of Barrage across local nala near Honnapur (Site No.3) village in Dharwad Tq Dharwad Dist		56		0.70	
5	Dharwad	Dharwad			Construction of Barrage across local nala near Benachi-Muttalmari Road in in Dharwad Tq Dharwad Dist		54		1.60	
6	Dharwad	Dharwad			Construction of Barrage across Tupparinala near Bogur village in Dharwad Tq Dharwad Dist		46		1.35	
7	Dharwad	Dharwad			Construction of Barrage across Tupparinala near Kotabagi village (Site No.2) in Dharwad Tq Dharwad Dist		58		1.19	
8	Dharwad	Dharwad			Construction of Barrage across Tupparinala near Agasanhalli Tadakod road village in Dharwad Tq Dharwad Dist		46		1.16	

9	Dharwad	Dharwad			Construction of Barrage across local nala near Ramapur village in Dharwad Tq Dharwad Dist		42		1.01	
10	Dharwad	Dharwad			Construction of Barrage across Tuppari nala near Tegur village (Site No.2) in Dharwad Tq Dharwad Dist		44		1.40	
11	Dharwad	Dharwad			Construction of Barrage across Tuppari nala near Hangaraki village in Dharwad Tq Dharwad Dist		53		1.40	
12	Dharwad	Dharwad			Construction of Barrage across Tuppari nala near Kalle village in Dharwad Tq Dharwad Dist		57		1.40	
13	Dharwad	Dharwad			Construction of Barrage across Dodda halla Aravatagi village (Site No.3) in Dharwad Tq Dharwad Dist		44		1.20	
14	Dharwad	Dharwad			Construction of Barrage cum Bridge across Local nala near		56		1.85	

					Hosalli village in Dharwad Tq Dharwad Dist					
15	Dharwad	Dharwad			Construction of Barrage across Local nala near Dori-Kogilgeri village in Dharwad Tq Dharwad Dist		55		1.83	
16	Dharwad	Dharwad			Construction of Barrage across Local nala near Kambarganavi village (Site No.1) in Dharwad Tq Dharwad Dist		46		1.00	
17	Dharwad	Dharwad			Construction of Barrage across Local nala near Kambarganavi village (Site No.2) in Dharwad Tq Dharwad Dist		48		1.00	
18	Dharwad	Dharwad			Construction of Barrage across nala near Belligatti village (site No.4) in Dharwad Tq Dharwad Dist		44		1.00	
19	Dharwad	Dharwad			Construction of Barrage cum Bridge across local nala near		45		1.25	

					Belligatti - Amblikoppa road in Dharwad Tq Dharwad Dist					
20	Dharwad	Dharwad			Construction of Bandhara across Katti halla near Shivalli village in Dharwad Tq Dharwad Dist		44		0.50	
21	Dharwad	Dharwad			Construction of BCB across Local nala near Hebballi-Unkal road in Hubli Tq Dharwad Dist		55		1.25	
22	Dharwad	Dharwad			Construction of Barrage cum Bridge across Radi halla Nalawadi Umachagi road in Dharwad Tq Dharwad Dist		58		1.97	
23	Dharwad	Dharwad			Construction of Bandhara across Mokashi halla near Amminbhavi village in Dharwad Tq Dharwad Dist		56		0.50	
24	Dharwad	Dharwad			Construction of new M.I Tank across Sanna halla near Narayan devarkoppa (Devarhubballi) village in Dharwad		60		3.00	

					Tq Dharwad Dist					
25	Dharwad	Kalghatagi			Construction of Barrage cum Bridge across nala near Muttagi village in Kalghatagi Tq Dharwad Dist		58		1.76	
26	Dharwad	Kalghatagi			Construction of Bandara across nala near Muttagi village in Kalghatagi Tq Dharwad Dist		42		0.65	
27	Dharwad	Kalghatagi			Construction of Barrage cum Bridge across nala near Emmett*i* village in Kalghatagi Tq Dharwad Dist		60		1.78	
28	Dharwad	Kalghatagi			Construction of Barrage across Mangyan halla near Sangameshwar village in Kalghatagi Tq Dharwad Dist		53		0.98	
29	Dharwad	Kalghatagi			Construction of Barrage across Tatti halla near Sangameshwar village (Site No.2) in Kalghatagi Tq		58		1.65	

					Dharwad Dist					
30	Dharwad	Kalghatagi			Construction of Barrage across Local nala near Bammigatti village in Kalghatagi Tq Dharwad Dist		43		1.34	
31	Dharwad	Kalghatagi			Construction of Barrage across Mangyan halla near Kudalagi village in Kalghatagi Tq Dharwad Dist		41		1.16	
32	Dharwad	Kalghatagi			Construction of Bandhara across local nala near Gamangatti village in Hubli Tq Dharwad Dist		45		0.50	
33	Dharwad	Kalghatagi			Construction of Bandhara across Vadakan halla near Gamangatti village (Site No.2) in Hubli Tq Dharwad Dist		44		0.50	
34	Dharwad	Kalghatagi			Construction of Bandhara across Local nala near Mishrikoti village (Site No.2) in Kalghatagi Tq Dharwad Dist		45		0.50	
35	Dharwad	Kalghatagi			Construction of Bandhara across Bedthi nala near		58		1.65	

					Hanumapur village in Kalghatagi Tq					
36	Dharwad	Kalghatagi			Construction of Bandhara across Bedthi halla near Bhogenagarkoppa Ramanal village in Kalghatagi Tq Dharwad Dist		54		1.50	
37	Dharwad	Kalghatagi			Construction of Bandhara across Savi halla near Somankoppa village (Site No.2) in Kalghatagi Tq Dharwad Dist		43		0.50	
38	Dharwad	Kalghatagi			Construction of Bandhara across Savi halla near Somankoppa village (Site No.3) in Kalghatagi Tq Dharwad Dist		45		0.50	
39	Dharwad	Kalghatagi			Construction of Bandhara across Savi halla near Belavanthar village (Site No.2) in Kalghatagi Tq		46		0.50	
40	Dharwad	Kalghatagi			Construction of Bandhara across Savi halla near Belavanthar		45		0.50	

					village (Site No.3) in Kalghatagi Tq					
41	Dharwad	Kalghatagi			Construction of Bandhara across Badagi halla near Tabakadhonnali village in Kalghatagi Tq Dharwad Dist		45		0.70	
42	Dharwad	Kalghatagi			Construction of Bandhara across halla near Bagadgeri village (Site No.2) in Kalghatagi Tq Dharwad Dist		41		0.70	
43	Dharwad	Kalghatagi			Construction of Bandhara across halla near Chalamatti village in Kalghatagi Tq Dharwad Dist		40		0.50	
44	Dharwad	Hubli			Construction of Bandhara across Landan halla near Sulla village in Hubli Tq Dharwad Dist		43		0.60	
45	Dharwad	Hubli			Construction of Barrage cum bridge across bedthi near Virapur village in Hubli Tq Dharwad Dist		58		1.60	

46	Dharwad	Hubli			Construction of Bandhara across Chikka halla near Sulla village in Hubli Tq Dharwad Dist		45		0.60	
47	Dharwad	Hubli			Construction of Bandhara across Local nala near Kusugal village in Hubli Tq Dharwad Dist		44		0.50	
48	Dharwad	Hubli			Construction of Bandhara across Local nala near Umachagi village in Hubli Tq Dharwad Dist		45		0.50	
49	Dharwad	Hubli			Construction of Bandhara across Nadavina halla near Bidnal village (Site No.1) in Hubli Tq Dharwad Dist		41		0.75	
50	Dharwad	Hubli			Construction of Bandhara across Nadavina halla near Bidnal village (Site No.2) in Hubli Tq Dharwad Dist		42		0.75	
51	Dharwad	Hubli			Construction of Bandhara across halla near Katnur village in		43		0.75	

					Hubli Tq Dharwad Dist					
52	Dharwad	Hubli			Construction of Barrage across halla near Adargunchi village in Hubli Tq Dharwad Dist		45		1.20	
53	Dharwad	Hubli			Construction of Bandhara across halla near Hubli Adargunchi village in Hubli Tq Dharwad Dist		44		0.75	
54	Dharwad	Hubli			Construction of Barrage cum Bridge across halla near Varur-Chabbi village in Hubli Tq Dharwad Dist		53		1.00	
55	Dharwad	Hubli			Construction of Barrage cum Bridge across local nala near Mantur-Kundgol road in Hubli Tq Dharwad Dist		57		1.00	
56	Dharwad	Hubli			Construction of Barrage across Narachanahalla near Nagarhalli village in Hubli Tq		44		1.00	

57	Dharwad	Hubli			Construction of Barrage cum Bridge across local nala near Byahatti-Kiresur road in Hubli Tq Dharwad Dist		58		1.50	
58	Dharwad	Hubli			Construction of Barrage cum Bridge across local nala near Bandiwad village in Hubli Tq Dharwad Dist		48		1.00	
59	Dharwad	Hubli			Construction of Barrage cum Bridge across local nala near Ingalhalli-Nalavadi road in Hubli Tq Dharwad Dist		46		1.25	
60	Dharwad	Hubli			Construction of Bandhara across local nala near Umachagi village in Hubli Tq Dharwad Dist		40		0.75	
61	Dharwad	Hubli			Construction of Barrage cum Bridge across local nala near Kusugal railway station road in Hubli Tq Dharwad Dist		42		1.00	
62	Dharwad	Hubli			Construction of Barrage cum Bridge across Radi halla near		44		1.50	

					Umchagi-shiraguppi road in Hubli Tq Dharwad Dist					
63	Dharwad	Hubli			Construction of Barrage cum Bridge across Yaran halla near Ingalhalli Shishuvinal halli road in Hubli Tq Dharwad Dist		57		1.50	
64	Dharwad	Hubli			Construction of Barrage cum Bridge across local nala near Morab-Savadatti road in Dharwad Dist		54		1.25	
65	Dharwad	Hubli			Construction of Barrage cum Bridge across local nala near Annigeri-Koliwad road in Hubli Dist		46		0.80	
66	Dharwad	Hubli			Construction of Barrage cum Bridge across Bilebal nala near Umachagi-Annigeri road in Hubli Dist		58		1.25	
67	Dharwad	Hubli			Construction of Barrage cum Bridge across Badagi halla near Koliwad-Cart track road in Hubli		46		0.70	

68	Dharwad	Hubli			Construction of Bandhara across Laddi halla near Kusugal viilage in Hubli Dist		44		0.40	
69	Dharwad	Hubli			Construction of Bandhara across Hirekere halla near Byahatti viilage in Hubli Dist		56		0.75	
70	Dharwad	Kundgol			Construction of Barrage across Benni halla Yeliwal village (Site No.2) in Kundgol Tq Dharwad Dist		42		1.10	
71	Dharwad	Kundgol			Construction of Barrage cum Bridge across Kabbenhalla near Gurunahalli village (Site No.2) in Kundgol Tq Dharwad Dist		58		1.60	
72	Dharwad	Kundgol			Construction of Barrage across halla near Kodliwad village in Kundgol Tq Dharwad Dist		56		1.50	
73	Dharwad	Kundgol			Construction of Bandhara across halla near Kodliwad village in Kundgol Tq Dharwad Dist		54		0.75	

74	Dharwad	Kundgol			Construction of Bandhara across halla near Kodliwad village (Site No.2) in Kundgol Tq Dharwad Dist		46		0.75	
75	Dharwad	Kundgol			Construction of BCB across halla nearYeribudihal village in Kundgol Tq Dharwad Dist		44		1.00	
					Total		**3677**		**81.29**	

5.4: Adnur-Kittur L.I.S. in Navalgund taluka of Dharwad Dist.

Sl.No	Name of the Block / Sub District	Concerned Ministry/Department	Componet	Activity	Total Number /Capacity (Cum)	Command Area / Irrigation Potentail (Ha)	Period of Implementation (5/7 yrs)	Estimated cost (in Rs. lakhs)
1	Navalgund	MoWR	AIBP	Major Irrigation MRBCC Dn.no.4 Navalgund				
	(MRBCC Dn.no.4 Naalgund)			Adnur-Kittur L.I.S. in Navalgund taluka of Dharwad Dist.	1	**121.40**	2/3years	**700.00**

5.5: Bennihalla protection works in Navalgund taluka of Dharwad Dist.

Sl.No	Name of the Block / Sub District	Concerned Ministry/Department	Compo net	Activity	Total Number /Capacity (Cum)	Command Area / Irrigation Potential (Ha)	Period of Implementation (5/7 yrs)	Estimated cost (in Rs. lakhs)
1	Navalgund	MoWR	AIBP	Major Irrigation MRBCC Dn.no.4 Navalgund				
	(MRBCC Dn.no.4 Naalgund)			**Bennihalla protection** works in Navalgund taluka of Dharwad Dist**.**		Irrigation potential may be treated as "NIL", since Bennihalla protection works are proposed.		
1				Bennihalla Flood Protection work from Navalgund to Gudisagar village km No. 3	1		2/3years	250.00
2				Bennihalla Flood Protection work from Navalgund to Gudisagar village km No. 4	1		2/3years	250.00
3				Bennihalla Flood Protection work from Navalgund to Gudisagar village km No. 5	1		2/3years	250.00
4				Bennihalla Flood Protection work from Navalgund to Gudisagar village km No. 6	1		2/3years	250.00
5				Bennihalla Flood Protection work from Gudisagar to	1	-	2/3years	250.00

				Arahati village km No. 1				
6				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 2	1	-	2/3years	250.00
7				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 3	1	-	2/3years	250.00
8				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 4	1	-	2/3years	250.00
9				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 5	1	-	2/3years	250.00
10				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 6	1	-	2/3years	250.00
11				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 7	1	-	2/3years	250.00
12				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 8	1	-	2/3years	250.00
13				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 9	1	-	2/3years	250.00

14				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 10	1	-	2/3years	250.00
15				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 12	1	Irrigation potential may be treated as "NIL", since Bennihalla protection works are proposed.	2/3years	250.00
16				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 13	1		2/3years	250.00
17				Bennihalla Flood Protection work from Gudisagar to Arahati village km No. 14	1		2/3years	250.00
18				Bennihalla Flood Protection work from Thadhal to Yavagal village km No. 1	1		2/3years	250.00
19				Bennihalla Flood Protection work from Thadhal to Yavagal village km No. 2	1		2/3years	250.00
20				Bennihalla Flood Protection work from Thadhal to Yavagal village km No. 3	1	-	2/3years	250.00
21				Construction of Bandhara across Bennihalla near Gudisagar Village	1	110.00	2/3years	300.00
22				Construction of Bandhara across Bennihalla	1	100.00	2/3years	300.00

23				Construction of Bandhara across Bennihalla near Kadadahalli Village	1	90.00	2/3years	300.00
24				Construction of Bandhara across Bennihalla near Arahati Village	1	120.00	2/3years	300.00
25				Construction of Bandhara across Bennihalla near Yamanur Village - Site -1	1	60.00	2/3years	250.00
26				Construction of Bandhara across Bennihalla near Yamanur Village - Site -2	1	60.00	2/3years	250.00
27				Construction of Bandhara across Bennihalla near Navalgund Village - Site -1	1	100.00	2/3years	250.00
28				Construction of Bandhara across Bennihalla near Navalgund Village - Site -2	1	100.00	2/3years	250.00
29				Construction of Bandhara across Bennihalla near Gudisagar Village - Site -1	1	100.00	2/3years	250.00
30				Construction of Bandhara across Bennihalla near Nagnur Village	1	100.00	2/3years	250.00
31				Construction of Bandhara across Bennihalla near Sotakanal Village - Site -1	1	100.00	2/3years	250.00
32				Construction of Bandhara across Bennihalla near Kadadalli Village - Site -1	1	100.00	2/3years	250.00

33				Construction of Bandhara across Bennihalla near Arhatti Village - Site -1	1	100.00	2/3years	250.00
34				Construction of Bandhara across Bennihalla near Village - Site -2	1	100.00	2/3years	250.00
				Total	**34**	**1340.00**		**8700.00**