

Udupi District: The coastal district of Udupi, Karnataka state falls along the west coast of peninsular India and is separated from the rest of peninsula by towering high Western Ghats. Udupi district belongs to Coastal Zone (Zone- 10) and the district comprises administrative subdivisions Kundapur, Udupi, Karkala, Brahmavar, Byndoor, Hebri and Kaup Taluks. The district is characterized by high rainfall (with normal rainfall of 3850 mm and which 80% of the rainfall will be received during June to September) temperature range (maximum 36.2°C and minimum 20.4°C) and relative humidity (84.5 to 96.5%).

Three major Agro -Ecological Situations viz. Coastal Plain land, Rolling Midland and Western Ghat could be identified. Marginal landholders dominate the scene (71.2%) of the total no. of holdings, but with a very small average holding size of 0.35 ha and a meager coverage of 24.9% of the total area of land holdings. Big farmers, who account for only 4.1 % of the number of landholders, cover an area of 28.0% of the total land. Out of the total geographical area of 3.56 lakh ha, an extent of 1.00 lakh ha. (28.1%) is cultivated.

With fast urbanization, land use for non-agricultural purposes is increasing and there is scope to further increase the net cultivated area in the district. However, there is a good scope to increase the gross cultivated area by increasing the area under irrigation during Rabi and summer seasons. Net area irrigated at present is 0.29 lakh ha. mainly through open wells and tube wells. Forest area in the district is 0.99 lakh ha. (27.8% of the total geographical area). Percentage forest cover of the total geographical area is high in Kundapura (40.1 %) and Karkala (29.65%) taluks as compared to Udupi (5.0%). There is considerably a large area (6800 ha) currently left fallow which can be brought back under cultivation. Paddy is the main crop grown in this area, occupying an area of 69,594 ha (52.5 per cent of the gross cropped area) followed by plantation crops such as cashew (18,011 ha), coconut (11,857 ha) areca nut (3,629 ha) and rubber (2,225 ha) etc.

The district receives heavy rainfall of around 3850 mm in four months period. Rainfall is the major source of standing water for paddy cultivation. However, heavy rainfall leading to continuous leaching of nutrients is a major constraint for crop production. Despite heavy rainfall during June to September, water shortage during

summer months continues to be another constraint for horticulture crops. Lift irrigation from streams and open wells in the low-lying areas are the major sources of irrigation in the district and covering an area of 33095 ha.

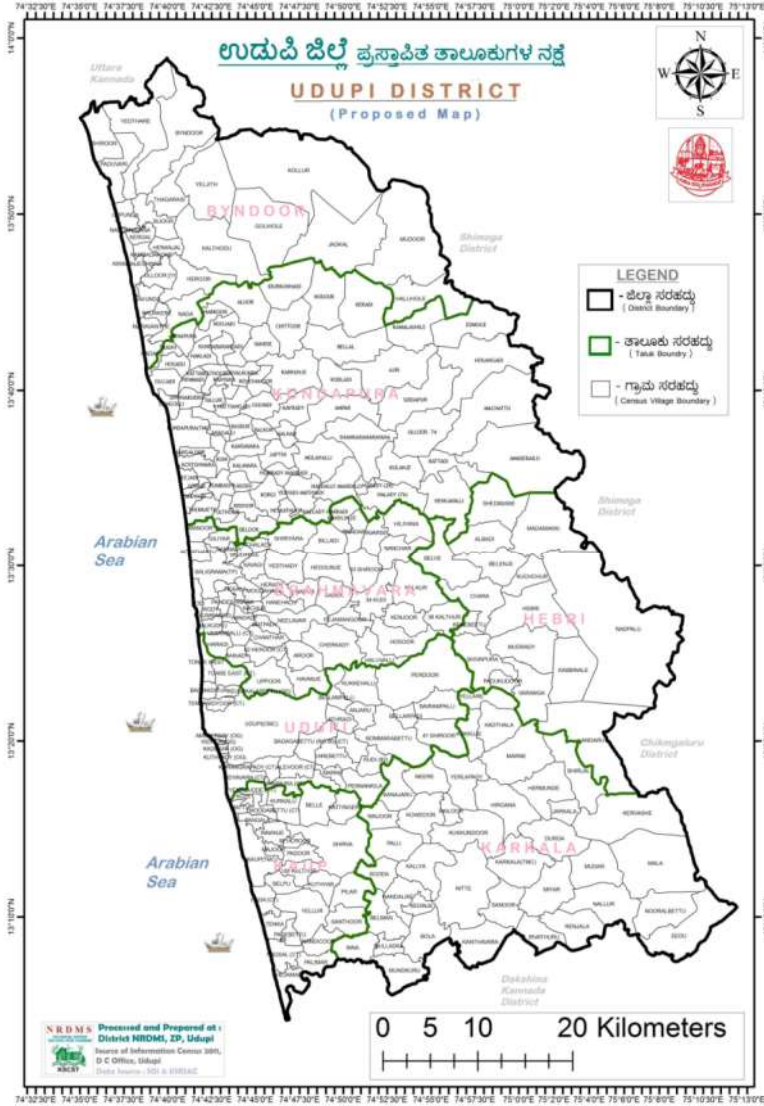
ICAR-Krishi Vigyan Kendra, Udupi district which covers Zone-X (coastal zone) of agro climatic-zones of Karnataka and it lies on the summits of slopes of the Western Ghats to Coastal region. The ICAR-Krishi Vigyan Kendra, Udupi which was started during 2002.

The overall objective of the strategy document: To develop a plan of action for 'Doubling Farmers' Income by 2022' the specific objectives are as follows:

1. To identify technologies for enhancing productivity of the existing major crops and enterprises in the district
2. To find out means of reducing the cost of cultivation of major crops and enterprises
3. To explore opportunities for crop diversification in the existing major farming systems
4. To find out opportunities of value chain development and market linkage for enhancing and doubling farmers' income.

District profile

Geographic features: The district lies between 13°04' and 13°59' North latitude and 74°35' and 75°12' East longitude covering an area of 3575 sq km. It is about 88 km in length and about 38 km in widest part and is bounded by Uttara Kannada district in the North, by Shimoga and Chikamagalur district in the East and by Dakshina Kannada district in the South. Udupi District came into existence as a separate district on August 24th 1997. The district is the land of eternal beauty, sandwiched between the verdant mountains of Western Ghats and tranquil Arabian Sea.



Demographic features: According to the 2011 census Udupi district has a population of 11,77,908=00 roughly equal to the nation of Timor-Leste or the US state of Rhode Island. This gives it a ranking of 403rd in India (out of a total of 640). The district has a population density of 304 inhabitants per square kilometre (790/sq mi). Its population growth rate over the decade 2001-2011 was 5.9%. Udupi has a sex ratio of 1093 females for every 1000 males, and a literacy rate of 86.29%.

DISTRICT STATISTICS

Sl. No.	Particular	Area (Ha)
1	Geographical area	356446
2	Forest land	100102
3	Land not available for cultivation	
	a) Non agriculture	41650
	b) Barren	11596
	c) Total	53246
4	Cultivable waste land	36956
5	Permanent Pasture	10624
6	Trees and groves	44398
7	Fallow land	1197
8	Others	11444
9	Area sown (Net)	98478
10	Net irrigated area	-
	a) Tanks	
	b) Open wells	473
	c) Bore wells	24921
	d) Lift irrigation	2483
	e) Other sources	4685
	TOTAL	32562

Udupi district was created in August 1997. The three northern taluks, Udupi, Kundapura and Karkala, were separated from Dakshina Kannada District to form Udupi district. Udupi district is surrounded by Uttara Kannada district in the north, Dakshina Kannada district in the southern direction. Shivamogga district borders on north-east side and Chikkamagaluru district borders on the eastern side. Arabian Sea is on west of Udupi district. The district consisting of 356,446 ha geographical area, 158 Grama Zilla Panchayats, 26 towns, 9 Hoblies, 233 inhabited villages, 1177,361 total population, 71.6% rural population, human density of 379.5/sq. km and normal total rainfall of 4506.7 mm. The rainfalls received during 2016, 2012-16 and normal (50 years average) were more than the Dakshina Kannada district. The taluk wise details are as follows:

Agro-ecological situation of the District

In Coastal zone, the different farming situations exist due to varied agro-climatic conditions prevailing at micro-level, *i.e.*, Taluk level. The factors that have decided the farming situations in the zone are soil, rainfall and elevation. Further, soil type and rainfall distribution play a major role in delineating the farming situations. Elevation varies in the zone ranges from 17.92 to 107.59 m above mean sea level. Similarities in the farming situations, cropping pattern, productivity and production constraints are similar in the zone.

In the zone, Coastal alluvial soils, laterite, red loamy soils (forest brown soils) and mountain soils are predominant. The coastal alluvial soils are sandy and occur on fairly plain lands stretching as a narrow strip along the sea coast with varying width upto about four km. This includes the level khar lands lying adjacent to the sea, river estuaries, and banks of rivers of back water channels. The coastal alluvium is identified as one farming situations. As one moves eastwards, the soils of laterite origin with grey light red or red colour are observed continuously or occurring in patches here and there. These make demarcations upto mountain soils, 200 to 200 m from sea level having lowland, midland and uplands. These categorizations are largely based upon the micro-elevations in the field in a narrow range. The undulations are leveled/ terraced in course of time for the cultivation of the paddy and developed into these three types of lands. The water available in the lowlands is more for a longer period than in midlands and uplands. The lowland is generally concentrated adjoining the coastal alluvium and also scattered along with river banks, valley bottoms and plains occupying substantial area. Thus lowland is treated as separate farming situation. Adjoining the lowland belt at higher elevation, the midland farming situation exists and is separately identified. The water availability during post-monsoon season is less and available for a shorter period. Uplands are situated at higher elevation which includes the lower terraced portion and the upper sloppy reaches. In the former, paddy is generally grown during kharif season only and the land is left fallow due to lack of water. In some places, slopy lands are grown with perennial horticultural crops, though paddy is seen with patches. This upland forms a farming situation. The middle portion of the zone is also featured by the presence of hillocks of varying heights within 200 m from the base occurring sporadically with busy growth where perennial horticultural crops are cultivated. They are slopy with poor soil depth and

water retention. This is considered as a separate farming situation. The Western Ghats, another farming situation, is the area from the base to around the mid-height of the Western Ghats (western side) mostly bordering the eastern side of the zone, dominated by mountains and forest soils. This is mostly occupied by the reserve forest. Thus, altogether, six major farming situations are identified in the zone namely coastal alluvium, lowland, midland, upland, hillock and Western Ghats. 300

The zone covers 8 taluks, representing three taluks of Udupi (Karkala, Kundapura and Udupi) and all five taluks of Dakshina Kannada district (Bantwal, Belthangady, Mangalore, Puttur and Sulya). The taluk wise information is provided and discussed here.

Description of Agro-climatic Zone

Coastal Zone (Zone X): This zone comprises of an area of 1.167 Mha (6.13% of total) in three districts – Udupi, Dakshina Kannada and parts of Uttara Kannada (total 13 taluks). The annual rainfall ranges from 3010.9-4694.4 mm of which 80 % is received in monsoon season. The elevation is less than 300-800 mm and the soils are red lateritic and coastal alluvial. The crops grown are Rice, Pulses and Sugarcane.

Sl. No	Agro-climatic Zone	Characteristics							
		Av. Rainfall (mm)	Av. Temp. range (°C)	Soil type	Major crops	Farming situations	Major cropping systems	Special features	Taluks
1.	Coastal Zone (Zone-X)	3602.8 mm	35.58°C (14.17°C)	Laterite and coastal alluvial soil	Paddy, Cashew, Coconut, Arecanut, Blackgram, Groundnut, vegetables and black pepper	Rain fed and irrigated (bore well, Cannel)	Paddy based cropping system (Black gram/ groundnut/ vegetables) Horticulture based cropping system (Cashew, Coconut, Arecanut, Black pepper and rubber)	Lateritic soils light textured with medium availability of nitrogen and prosperous and low potash	Udupi, Kundapur, Bantwal, Karkala, Kaup, Hebri and Byndoor

Soil and their fertility status of the Udupi District

The sandy soils are confined to the narrow strip of the coast having width ranging from less than 100 mtr to as much as the kilometer. These find to medium texture

sands are characterized by their extremely high rate infiltration and act as a good recharge media for ground water. Yellow loamy soils are transported from origin and are found mostly in along river banks and lower reaches of valleys. The prominent soil type is deep laterite gravelly soil which is found in almost entire district (Fig. given below). The texture of these soils varies from fine to course and suitable for growing horticulture crops.

Soils of the district are medium in nitrogen and phosphorus and low in potash content.

- Soils are deficient in zinc, magnesium and boron micronutrients.
- Soils are highly acidic in nature (pH 4.5 – 5.5).

Climate and Rainfall Pattern

The coastal zone is characterized by hot humid climate with heavy rain during Kharif (June to September) and dry spell from November to May. Considerable variation in rainfall within the zone is expected in respect of onset, withdrawal of monsoon or length of rainless period. However, all the regions of the zone are nearly uniform in respect of rainfall distribution and temperature variations. Most regions in the zone receive nearly >87% rainfall during south west monsoon only and enjoy brief mild winters (December to February), mild hot climate during May to November and brief hot climate from March to April. The zone typically enjoys a dry climate with moderate to high humidity during rainless months, while during pre-monsoon and south-west monsoon months, it is lower.

In the last 20-25 years, there is a radical shift in many climatic parameters. The zone has experienced shift in onset of monsoon or its withdrawal. Number of rainy days has been reduced in some taluks and occasionally very heavy rains are also observed. In general, the summers have been hotter; winters have become colder than earlier situations.

Rainfall

The coastal zone has a hot humid climate with heavy rains during *kharif* (June to September) and dry spell from November onwards up to May. The normal annual rainfall is 4506.7 mm in Udupi district. The highest rains are received during south west monsoon (June to September) (3689.3 mm) in the zone and constitute about 87%. The south-west monsoon received is relatively more in Udupi district (3996.3

mm). This is preceded by pre-monsoon showers during March to May months (216.8 mm- constitutes 5.1%). The north-east rains occurring from October to December constitute about 7.8% of the total.

Monthly rainfall data of the District

Month	Normal rainfall (mm)	Rainfall 2014 (mm)	Rainfall 2015 (mm)	Rainfall 2016 (mm)	Rainfall 2017(mm)	Rainfall 2018 (mm)
January	1.0	0.0	0.0	0.2	0.0	0.0
February	1.2	0.0	0.0	0.0	0.0	0.8
March	8.2	0.0	0.0	0.0	0.0	50.9
April	22.6	11.0	21.2	0.0	0.0	33.5
May	152.9	99.7	147.5	83.7	158.4	414.50
June	1049.5	508.0	678.7	1624.0	1347.0	1014.00
July	1117.5	978.6	1181.0	993.2	880.8	1024.6
August	824.1	1190.0	541.7	556.9	950.0	952.1
September	352.0	334.4	340.7	293.8	403.8	30.11 (12.09.18)
October	204.2	196.7	169.0	46.5	235.4	80.6
November	73.0	106.6	43.4	0.4	11.2	0.5
December	10.3	3.2	0.0	4.0	6.6	-
Total	3816.6	3428.4 (-388.2)	3123.2 (-693.4)	3602.7 (-213.9)	3992.7 (+176.1)	3684.7 (113 rainy days)

District cropping pattern (based on the analysis made by the KVK)

Indicating Cropping Pattern of the District

Cropping pattern
<p>a) Agriculture – Monocropping: <i>khari</i> Paddy (sole crop) – 42491 ha Relay cropping: Paddy (Kharif) – Blackgram(Rabi) – 3524 ha Paddy based cropping pattern: 1. Paddy – Groundnut – 2050 ha 2. Paddy - Sesamum – 268 ha, 3. Paddy - Cowpea and Vegetables in late <i>rabi</i> -860 ha</p> <p>b) Horticulture –1. Cashew- 19496 ha 2. Coconut – 17774 ha 3. Coconut-Black pepper multi storied cropping system– 41 ha 4. Arecanut – 7467 ha 5. Arecanut and Black pepper multi storied cropping system – 380 ha 6. Vegetables (sole crop)- 350 ha</p> <p>c) Livestock enterprises : Dairy farming, Poultry, Fishery,Piggery & Goat Farming</p>

Land holdings of Udupi District

Classification	Holding	Area		
	Nos.	% to Total	Ha.	% to Total
<=1 Ha	158750	79.20	51551	34.45
>1 to <=2 Ha	25316	12.62	34886	23.32
>2 Ha	16419	8.18	63180	42.23
Total	200485	100.00	149617	100.00

Source: Executive Summary of NABARD 2016-17

Land use: In Udupi district land use system mainly under Agriculture, Horticulture and forestry.

Animal Husbandry and Fisheries Activities in Udupi District

Animal population of Udupi district (As per 2012 census)

Sl. No.	Category of Animal	Total (000)	Male (000)	Female(000)
1	Cattle- Cross Breed	96758	8990	87768
2	Cattle-indigenous	155309	21178	134131
3	Buffaloes	8846	6833	2013
4	Sheep- Cross Breed	09	05	04
5	Sheep indigenous	61	43	18
6	Goat	6600	1740	4860
7	Pig- Cross Breed	2035	785	1250
8	Pig- indigenous	1063	499	564
9	Rabbits	1396	545	851
10	Poultry-Cross Breed	944656	8264	936392
11	Poultry – Indigenous	249116	118272	130844

District Features

Agro-climatic zone(s) names	Zone- 10 - Coastal Zone
No. of Taluks	7
No. of Villages	3497
No. of Holdings	1,112,243
Gross cropped area (Ha)	118991
Area under irrigation (%) of GCA	33.36%
Sources of irrigation	Cannels, Wells, Tanks, Tube Wells, Open wells and streams
Major Soil Types	Lateritic
Major crops in Kharif	Paddy, Vegetables, Banana
Major crops in Rabi	Groundnut, Blackgram, Vegetables, Banana
Major perennial crops	Coconut, Areacanut, Pepper, Udupi Jasmine, Cashew, Rubber
Major Livestock details	Cow, Goat, Buffalo, Rabbit, Poultry. Dairy Cows-Cross breed 79111, Indigenous-239389

Major Production System of the District

- **Agriculture Crop:** Rice-Rice, Rice-Blackgram, Rice-Groundnut
- **Horticulture crop:** Coconut, Cashew, Arecanut, Blackpepper, Rubber, Brinjal, Watermelon, Cucumber, Gourds, Beans, Jasmine and Chrysanthemum
- **Animal Husbandry :** Dairy, Poultry & Piggery, Fishery Sciences

Major agricultural problems in the district

1. Salvenia (Antargange) weed management in low lying paddy areas
2. Spiraling white fly menace in coconut
3. Acidic soils
4. Bud necrosis virus in watermelon
5. Root grub in Arecanut
6. Labour scarcity
7. Imbalanced nutrient management and leaching loss of nutrients
8. Pest and disease problems
9. Alternate Paddy variety for MO-4 (Kharif Season)
10. Alternate Red Rice variety for Rabi season
11. Paddy white backed hopper menace in rabi paddy
12. Red palm weevil menace in coconut and Arecanut (not able to control by the use of pheromone traps)
13. IPDM in fruits and vegetables
14. Effective management practices for managing quick wilt in black pepper
15. Yellow green algae in paddy
16. Wild animal menace

Major thrust areas identified based on the overall district agricultural profile and the problems:

- Introduction and popularization of high yielding varieties in agriculture and horticulture crops
- Paddy mechanization
- Hydroponic for green fodder production
- DSR paddy
- Management of weeds through herbicides
- IPDM in Arecanut, coconut, brinjal, cucumber and bhendi
- ICM in paddy, vegetables, watermelon, Jasmine and Chrysanthemum