

CHAPTER IV

AGRICULTURE, IRRIGATION AND FISHERIES

THE district of South Kanara is essentially an agricultural district, about 62.2 per cent of the population being dependent on cultivation for their livelihood. A majority of even the unoccupied population subsists on incomes derived from the same source. An interesting feature of agriculture in this district is that all classes and castes are represented in it, the land-owners being, however, mainly Bunts, Brahmins, Jains and Christians. The Bunts may be said to be the foremost land-owning and cultivating class. Among the Bunts, the lands have been owned, by and large, on joint-family system and a major area is leased out to tenants. The Brahmins belonging to the Havika sect have devoted themselves to the raising of arecanut plantations. Land-owners usually reside on their estates and whether they are present or not, the tenants having, their houses on the holdings or on the waste lands immediately adjoining them look after the fields.

A great part of the uncultivated waste consists of forest-clad hill land; there is also quite a large extent of grass land, particularly on the upland plateau between the coastal plain and inland forests. Cultivation is mainly carried on in the valleys which are naturally fertile and specially suited for growing of rice. Sugar-cane is cultivated in the coastal areas and on the banks of rivers.

Agricultural Population

There is a high proportion of agricultural workers and their dependents in the district. This shows that the people as a whole are fairly industrious and do not like "to simply sit and eat" (as the expression goes) while others work for them, unless they are incapacitated by age or other infirmity from joining the rest of the family and working with them.

The population of the district, according to the census of 1971, was 19,39,315, out of whom the rural and the urban population was 15,46,137 and 3,93,178 respectively, while the percentages for the district being 79.75 rural and 20.25 urban;

out of the total population of 19,39,315, only 7,48,744 were workers forming 38.61 per cent of the total population. Out of the 7,48,945 workers, 2,19,945 were cultivators, forming 29.37 per cent, 1,85,591 were agricultural labourers, forming 24.79 per cent and 3,90,508 were other workers, forming 45.84 per cent. So the agricultural population was 4,05,536 constituting about 54.16 per cent of the total number of workers. The following table gives the comparative figures of agricultural population as in 1961 and 1971 :—

<i>Particulars</i>	1961	1971
Total population	15,63,837	19,39,315
Total No. of workers	7,30,851	7,48,744
No. of cultivators	3,43,147	2,19,945
No. of agricultural labourers	1,30,607	1,85,591
Percentage of cultivators to total No. of workers ..	46.95	29.37
Percentage of agricultural labourers to total No. of workers.	17.87	24.79

The taluk-wise figures of cultivators and agricultural labourers according to the 1961 census were as follows :—

<i>Taluk</i>	<i>Total population</i>	<i>Total No. of workers</i>	<i>No. of cultivators</i>	<i>Percentage of total workers to</i>		
				<i>No. of agrl. labourers</i>	<i>Cultiva-tors</i>	<i>Agrl. labourers</i>
Belthangady ..	1,06,452	55,951	34,440	12,180	61.60	21.78
Buntwal ..	1,79,163	92,159	41,366	21,443	44.89	23.27
Coondapur ..	1,95,136	96,456	58,507	14,315	60.66	14.84
Karkal ..	1,82,471	87,029	53,371	17,820	61.33	21.62
Mangalore ..	3,92,936	1,66,420	36,919	22,261	22.20	13.37
Puttur ..	1,81,592	87,975	43,899	19,196	49.89	21.82
Udipi ..	3,26,087	1,43,901	74,645	23,392	51.87	16.26
District total ..	15,63,837	7,30,851	3,43,147	1,30,607	46.95	17.87

(For corresponding 1971 figures, see General Appendices)

The table given above shows that the proportion of agricultural workers or cultivators to the total working force was highest in Belthangady taluk followed by Karkal and Coondapur taluks.

But this proportion was of the lowest in Mangalore taluk. The largest percentage of agricultural labourers was found in Buntwal taluk followed by Puttur, Belthangady and Karkal taluks.

Size of holdings

By and large, the size of the land-holdings in the district is small, those with less than five acres constituting nearly half the total number of holdings. The percentages of holdings according to the extent of area as in the year 1955-56 were as follows :—

<i>Acreage size-groups</i>	<i>No. of holdings in '00s</i>	<i>Area in hectares</i>
Below 2 hectares	428	27,540
From 2-4 hectares	123	36,045
From 4-6 hectares	74	37,260
From 6-12 hectares	109	93,150
From 12-24 hectares	62	1,03,275
From 24-40 hectares	22	66,420
From 40-80 hectares	13	72,090
Above 80 hectares	6.5	1,18,260

(Source.—Census of Land-Holdings, 1955-56, Bureau of Economics and Statistics.)

In order to understand the extent of area under small holdings and their tenure, the State Agricultural Census Commissioner, Bangalore, has classified the total holdings in the district under different size groups and the area held under each group by tenure as in 1973. A table showing the number and area of such holdings by tenure is given in the general appendices.

**Consolidation
of holdings**

The *per capita* land-holding works out to about half an acre in the district. The size of the agricultural holdings is one of the important factors that determine the productivity of land. There were about 42,800 holdings of two hectares and below which constituted nearly 50 per cent of the total holdings. Such uneconomical small holdings and fragmentations of lands constitute a serious obstacle to increasing the productivity of the cultivated area. Keeping this in view, the Mysore Prevention of Fragmentation and Consolidation Act, 1966, was adopted and it is in force since May 1, 1969. It seeks to put a check on all transfers of lands which result in fragments. The holders of such lands cannot dispose them off to any one other than the contiguous holder. The Act also provides for consolidation of the existing fragments of lands so as to form economic holdings.

The sub-joined table gives particulars of land utilisation in the district as in 1961-62, 1967-68 and 1971-72 :—

Category	1961-62	1967-68	1971-72
Forests	5,50,618	5,79,512	5,97,930
Barren and uncultivated land	1,74,943	1,73,163	1,64,834
Land put to non-agricultural use	1,58,504	1,55,998	1,76,213
Permanent pastures and other grazing lands	86,245	76,466	81,034
Cultural waste	1,78,547	1,76,845	1,91,510
Lands under miscellaneous tree crops and grooves not included under net area sown.	2,97,621	2,68,178	2,35,602
Current fallows	83,976	92,992	84,782
Other fallow lands	33,719	27,354	47,246
Net area sown	4,82,891	4,98,192	4,50,294
Total cropped area	6,87,353	6,88,842	2,00,417
Area sown more than once	2,04,462	1,90,650	2,00,417

The figures in the above table reveal that a considerable extent of land, which can be put to agricultural use, has not been used for one reason or the other. An extent of 1,78,547 acres as in 1961-62, 1,76,845 acres as in 1967-68 and 1,91,510 acres as in 1971-72 was classified as cultivable waste which works out to about 10 per cent of the total cropped area. Under current fallows, there was an area of 83,976 acres in 1961-62, 92,992 acres in 1967-68 and 84,782 acres in 1971-72, while under other fallows there was an extent of 33,719 acres in 1961-62, 27,354 acres in 1967-68 and 47,246 acres in 1971-72. Thus there was a total waste land to the extent of 2,62,523 acres in 1961-62, 2,69,837 acres in 1967-68 and 2,76,292 acres in 1971-72 which could be cultivated. The percentage of total cropped area to the geographical area came to about 32.27 per cent in 1971-72. The table showing the taluk-wise land utilisation during the year 1971-72 has been appended at the end of the chapter.

The primary cause for the lands lying fallow is the poverty of the assignees who are unable to reclaim the lands and to bring them under the plough. Some fallow lands are with the landlords who keep them fallow in order to raise grass for their cattle to graze. Some are very uneven and it is thought to be uneconomical to get them levelled. Even if the elevated lands are levelled, it is said that they cannot be utilised for want of adequate supply of water. There is a trend to convert the fallow lands into gardens for raising pine-apple, mango, sapota, sweet potato, etc. There is also a considerable extent of waste land available for assignment. Some lands command perennial source of water and such lands are ideally suited for raising two or three paddy crops cocoa and areca plantations.

Cultivable waste

The extent of cultivable waste land in the district was 1,91,510 acres as in 1972 and was made up of small hillocks clothed with forests. Reclamation of such lands can be effected only with a considerable outlay of capital. Recent years have seen affluent farmers taking up the work of reclamation with the assistance of the Agricultural Department. A scheme for reclamation of alkaline and acidic soils and reclamation of waste lands by manual labour is in operation in the district. Under this scheme, farmers are encouraged to reclaim their waste lands by manual labour and as an incentive a subsidy of Rs. 50 per acre is being paid. A maximum limit of five acres is fixed for each individual cultivator for the payment of subsidy. As in 1972, 135 project reports were prepared for 135 hectares. Only an extent of 124.50 hectares was reclaimed involving 114 project reports and an amount of Rs. 6,902.28 was paid as subsidy and 164 hectares of waste land was reclaimed without subsidy. Under this scheme a five-acre lime demonstration costing Rs. 1,000 was laid out to reclaim the acidic soil in the district during 1971-72.

Classification of lands

The principal classification of lands is into rice and garden lands, according to the crop for the cultivation of which the soil is best suited. The rice lands are classified as such more with regard to the water supply than to the nature of the soil. Naturally, the lands with the best water supply, with the attendant silt on them, have a better soil than other lands in the same locality. There have been certain popular terms in the district used for indicating the quality of the fields and they are explained below. The first class is popularly called *bailu* and comprises the low-lying fields which are abundantly supplied with water. The annual rainfall is supplemented by water brought by channels from rivulets or raised from rivers by bailing. The best type of these lands yields three rice crops. The others give two crops of rice and one of dry grain. *Bailu* land producing three crops a year is called *kolake-gadde*. The land giving two rice crops is called *bailu-gadde*. Those *bailu* fields which lie so low as to be submerged during the first few months of the monsoon are called *patla-gadde* and yield only one rice crop during the second crop season which, however, is an abundant one. The second class of rice land is called *majalu* and consists of those fields in the higher parts of the valleys which, though not entirely dependent on the annual rainfall, have yet a considerably smaller supply of water than those situated in the lower parts. Two crops of rice are usually raised on *majalu* lands or one of rice and another of some dry grain or pulse. The third class of rice land is called *bettu* and comprises those fields which are entirely dependent on the rainfall, or those which have a supply of water only sufficient to last during a short break in the monsoon. The soil of *bettu* fields is poor in fertility. The rainfall being abundant, one good crop of rice is usually obtained from the *bettu* lands.

However, the settlement of 1934-35 discovered the fact that there had been considerable confusion over these terms and hence the following three classes of wet lands were authentically adopted ; namely, the first-class wet lands, yielding two or three wet crops, the second-class wet lands, yielding two wet crops, the second being irrigated mainly by bailing, and also lands yielding one wet and one dry crop, and the third-class wet lands which comprised lands that were less favourably situated. But the terms *bailu*, *majalu* and *bettu* are still prevalent in the district and are used roughly to cover the lands placed in the first, second and third classes respectively. Garden lands specially suited for the formation of coconut and arecanut plantations are called *bagayat*.

The average rainfall of the district amounts to about **Rainfall** 3,930 mm. per year. The south-west monsoon begins generally in the first week of June and extends upto September. The rainfall during this period is abundant and practically unfailling. The north-east monsoon rains commence in the early part of October, a major portion falling in that month itself. A few showers may be expected in November. The period from December to March is generally dry. A few pre-monsoon showers fall during April and May. Nearly 87 per cent of the annual rainfall is received during the South-West monsoon period. The rainfall increases as one proceeds from the coast to the Western Ghats.

The soil in the district is of a laterite type, characterised by **Soils** high iron and aluminium content. This variety usually occurs in heavy rainfall zones with an annual precipitation of over 100 inches or 3000 millimetres. This laterite type of soil is suitable for paddy, sugarcane, arecanut and plantation crops like cardamom and plantains.

The soil reaction tends to be on the acidic side in the heavy rainfall region of the district with a P.H. of 5.5 to 6 and is normal to crop growth with reference to soluble salt content. The soil correlators have, time and again, tested the soils in the district and have come to the conclusion that they have a high percentgae of nitrogen, a very low content of phosphorus and potash. Thus, the necessity has arisen to apply more of phosphatic and potassic fertilisers and less of nitrogenous fertilisers. It has been established that in the high rainfall areas of the district, wide application of lime is necessary to neutralise the acidic properties of the soils and to provide suitable conditions for good growth of crops. Experiments conducted at the Paddy Breeding Station, Mangalore, to determine how the laterite soils react to paddy growth, have established that with increasing doses of lime increased yield of paddy was obtained. Only a thousand pounds of lime per acre applied continuously for three years appeared to be the optimum for bringing the soil to neutral action. An example commonly cited

to prove the inadequacy of lime in the soils of the district is the poor build of the local cattle which apparently results from the lack of calcium in the feed. The numerous valleys and ravines to the east of the coastal region contain soil of a rich alluvial type

FORESTS

Preservation and development of forests are universally recognised as a fundamental and purposeful endeavour not only for mankind's progress but also for the very survival of human and animal life. Forests are sustained by land, water and air, and they reciprocally give back to Nature all that the elements have contributed to their sustenance. The creation of vast forest assets is today regarded as essential to any country's progress and prosperity. Their conservation and development constitute a separate programme in government planning.

In the South Kanara district, the slopes of the Western Ghats from north to south are beautifully clothed with dense forests of magnificent timber. The forest, stimulated by the heavy rainfall, start growing within a few miles from the coast. They are generally lofty, dense and evergreen, characterised by a large number of trees which occur together with fine canopies of tree crowns and shrub growth. Some of them are seen here in the original primeval condition. As we move towards the coast from the ghats, the forests are semi-evergreen with grassy banks along the coast interspersed with stunted growth of secondary species and scrub and also *Acacia catechu* valuable in its own way for 'Katta' manufacture.

Though it is difficult to say whether there were any rules in force for preservation of forests in the distant past, there is ample evidence to show that Tipu Sultan introduced certain rules particularly for the conservation of teak and sandalwood, which are found in abundance in the forests of the district. Till 1882, when the Forest Act was introduced, there used to be some kind of clearance of forest on claims of private ownership. But on the introduction of the Act, the rights and boundaries of private owners were defined and active steps for the preservation and conservation of forests began to be taken. In this connection, the chief obstacles were: (1) "Kumari" cultivators who used to cultivate temporarily large tracts of forest lands in the heart of forests by felling and burning valuable trees for growing a crop or two in the rich soil manured by the burnt wood. In 1898 the Forest Department limited the areas of "Kumari" cultivation and combined it with the operation of raising teak. They used to go on shifting from season to season. (2) The "Kumari" rights extended over an area of 100 yards from the cultivated areas from which the cultivators were expected to draw wood, green leaf, etc., for their personal use.

The district has a very large area under forests. According to State Survey, out of 8,28,175 hectares of the total geographical area, about 2,22,337 hectares are occupied by forests forming about 29 per cent of the geographical area. The extent of forests in the different taluks as in 1971 was as follows :—

<i>Taluk</i>	<i>Area</i> (in hectares)
Belthangady ..	56,411
Buntwal ..	6,106
Coondapur ..	54,902
Karkal ..	31,351
Mangalore ..	nil
Puttur ..	26,699
Sullia ..	46,059
Udipi ..	809
Total ..	2,22,337

The types of forests found in the district are as follows :—

Types of forests

- | | |
|-----------------------|--------------------|
| (i) Evergreen | (iv) Dry deciduous |
| (ii) Semi-evergreen | (v) Scrub |
| (iii) Moist deciduous | (vi) Others |

The forests are divided as follows according to convenience of administration :—

- (1) Reserve Forests maintained by the Forest Department.
- (2) Forest plantations maintained by the Forest Department. Out of those areas notified under Section 4 of the Mysore Forests Act, the barren lands and hillocks that are devoid of tree growth are being afforested by raising plantations like cashew, etc.
- (3) Reserve Forests (under Section 4 of the Mysore Forests Act.)
- (4) Revenue plantations maintained by the Revenue Department representing the afforestation works done in the unreserved lands for which a notification under Section 4 of the Act is issued.
- (5) Unreserved lands maintained by the Revenue Department. Protection and management of tree growth in unreserved lands are vested with the Forest Department. Suitable areas of

unreserved lands in compact blocks have been surveyed and demarcated and the notification under Section 4 of the Act has been issued for constituting them as Reserve Forests. The following areas have been notified for afforestation from 1968 onwards in the taluks of Belthangady, Buntwal, Coondapur, Karkal, Puttur and Udipi which will add over another 11,000 acres to the existing forest area in the district :—

		Area in acres	
<i>Area notified for afforestation</i>		1968	1969
Belthangady	..	2,326.75	210.00
Buntwal	..	68.00	494.00
Coondapur	..	1,607.70	754.89
Karkal	..	658.80	382.22
Puttur	..	1,107.70	2,641.60
Udipi	..	800.95	75.50
Total	..	6,569.90	4,558.21

(6) Several Panchayats in the district in recent years have commenced maintaining certain areas of waste lands to develop forests under the scheme "Farm Forestry" which envisages the creation of fuel reserves to help people to get their supply of fuel, small-sized timber to meet their agricultural demands and to provide green manure, fodder and grazing to village cattle.

(7) Panchayat forests are maintained by the Panchayats. There are nine panchayat forests with an extent of 1,78,293 acres maintained by a committee of panchayatdars under the supervision of the Revenue Department.

The principal timber trees found in the forests are teak (*Tectona grandis*), blackwood (*Dalbergia latifolia*), mango (*Mangifera indica*), kiralbhogi (*Hopea wightiana*), mathi (*Terminalia tomentosa*), thiruva (*Xylia dolabriformis*), wild jack (*Artocarpus hirsuta*), marwa (*Terminalia paniculata*), benteak (*Lagerstroemia lanceolata*) and several other species. The minor forest species are cardamom, pepper, canes, cinnamon, *nux vomica*, ginger, soapnut and *rampathri*.

There are many medicinal plants among the above which are made use of by the Village Oil Producers' Industrial Co-operative Society, Ltd., in Vishnunagar of Amaramudnur, for supplying the products to the Ayurvedic Pharmacists (see Chapter V-Industries).

**Major and
minor forest
products**

There are many items of forest produce, major and minor, in the district. Industrial wood, particularly softwood, suitable for veneering and plywood industry and match industry, sleepers, firewood, construction timber of durable species and bamboos

constitute the major produce of the forests. The minor forest products are pepper, tamarind, bursera, bamboo, *sheegekai* (soap-nut), lac, *rampathri*, etc. The revenue derived from the major and minor products for the years from 1961-62 to 1970-71 is given below :—

(Amount in rupees)

Year	Timber				Total
	(sleepers, hardwoods softwood, etc.)	Fire wood	Bamboos	Miscellaneous	
1961-62	60,53,597	4,00,363	10,023	97,039	65,61,023
1962-63	76,96,132	5,40,871	3,646	94,021	83,34,669
1963-64	55,34,337	4,32,409	25,240	85,228	60,77,214
1964-65	59,35,144	2,03,097	3,487	56,919	61,98,647
1965-66	72,34,802	2,34,461	19,771	68,801	75,57,835
1966-67	62,38,009	3,03,614	860	1,31,306	66,73,789
1967-68	33,37,327	3,18,325	2,17,055	1,47,938	40,20,646
1968-69	61,84,559	4,11,946	2,64,700	2,06,298	70,67,503
1969-70	50,32,921	5,67,700	2,62,216	2,92,422	61,55,259
1970-71	66,66,014	5,76,970	2,41,260	2,53,201	77,37,445

In the year 1961, the Mysore Forest Department raised its first rubber plantation of six hectares on an experimental basis. These plants established themselves and grew up well. Encouraged by this, from 1961 to 1968, the Department raised rubber plantations to the extent of 778.8 hectares in the district. These plantations are known as the Pre-Scheme Rubber Plantations. In November 1963, a survey was conducted jointly by the representatives of the Rubber Board and the Mysore Forest Department and it was reported that 13,200 hectares of forest land suitable for raising rubber plantations would be available in the district.

According to the Indo-Ceylon Agreement of 1964, India has to resettle 5,25,000 repatriates (about 1,50,000 families) in India, over a period of 15 years commencing from January 1968. With the object of rehabilitating 2,668 of these repatriates from Ceylon (now Sri Lanka) in South Kanara district, the Government of India sanctioned a scheme in 1968 for raising 8,000 acres of rubber plantations in this district at a total cost not exceeding Rs. 2,75,13,723, the whole amount being treated as loan to the State Government.

Similarly, the Government of India sanctioned a second Scheme in 1971 for raising another 5,000 acres of rubber plantations in the district in order to rehabilitate an additional 1,666 repatriates from Sri Lanka at a total cost of Rs. 3,64,76,000, the entire amount being again treated as loan to the State Government.

As in 1972, there were rubber plantations under three schemes which were in operation in the South Kanara district, namely, "Pre-Scheme Rubber Plantations", "8,000-Acre Scheme Rubber Plantations" and "5,000-Acre Scheme Rubber Plantations". Under the "Pre-Scheme", as already stated, rubber plantations on an area of 778.8 hectares were raised from 1961 to 1966. Under the second scheme, plantations to the extent of 3,270.1 hectares were raised by the end of 1970-71 and under the third scheme, 341 hectares were covered with plantations from 1971. As in 1972, there were altogether 4,390 hectares of rubber plantations in South Kanara district. The following table gives the year-wise figures of rubber plantations under each scheme :—

<i>Pre-Scheme</i>		<i>8,000-Acre Scheme</i>		<i>5000-Acre Scheme</i>	
<i>Year</i>	<i>Extent (Hectares)</i>	<i>Year</i>	<i>Extent (Hectares)</i>	<i>Year</i>	<i>Extent (Hectares)</i>
1961	6.0	1967	394.8	1971	163.0
1962	104.4	1968	694.0	1972	178.0
1963	100.8	1969	1075.5	..	..
1964	102.8	1970	1105.8	..	..
1965	181.6	..	..	..	..
1966	283.2	..	..	..	..
Total	778.8	..	3270.1	..	341.0

Under the "8,000-Acre scheme" a sum of Rs. 2,13,22,700 and under the "5,000-Acre Scheme", a sum of Rs. 8,05,700 was spent upto 1972.

Tapping

The rubber trees which were raised in 1961 were ready for tapping in 1968-69. These trees yielded a quantity of 1.32 tonnes of rubber during 1968-69. In 1971-72 even those planted in 1965 had come up for tapping. At present (1972), 81,298 rubber trees are subjected to tapping in an area of 495.6 hectares.

Rubber Processing Factory

There is a small Rubber Processing Factory at Kuthpaje in the Sullia Rubber Division. This factory consists of one rolling shed, one smoke-house and one godown. This unit is working to its full capacity. The quantity of rubber produced upto 1971-72, was 53.06 tonnes. This rubber factory is too small to consume all the latex derived from the rubber trees. Hence it has been found necessary to establish a new factory on modern lines. The required building has been already constructed. The factory is expected to be commissioned by 1973.

During 1969-70, a quantity of seven tonnes of processed rubber was sold realising about Rs. 31,564 while in 1972-73, the

corresponding figures were 30,630 tonnes of processed rubber and Rs. 1,50,044.80.

Two hundred and ten families comprising 1,024 repatriates from Sri Lanka were rehabilitated in the district upto 1972 under the 8,000-Acre Scheme. About two persons from each family were employed in the rubber plantations. The target is to rehabilitate 2,668 repatriates. **Rehabilitation of Repatriates**

There is a Government Tamil Primary School in Sullia for the benefit of children of the repatriates. A dispensary is also functioning there.

The Rubber Plantation Circle of the Mysore Forest Department took up raising of cocoa plantations in 1968 in the district. Cocoa (*Theobroma cocoa*) is a native of Central America. It thrives well in warm humid climate having rainfall from 1,250 mm. to 5,000 mm. This tree requires shade and comes up as an understorey amidst tall tropical trees. The fruit is a berry containing 20 to 40 beans. The main parts of the bean are the shell, the fibre and the butter. The Cocoa tree, when properly grown, begins yielding fruit from the seventh year. From the ninth year to about the thirtieth year, the Cocoa trees yield about 70 kgs. to 1,000 kgs. of Cocoa per hectare, the net return being about Rs. 3,000 per hectare. Cocoa is used in the manufacture of confectioneries and beverages. Cocoa butter, which forms 56 per cent of good cocoa beans, is an excellent vegetable fat. The area of cocoa plantations in the district as in 1972 was 610.8 hectares. **Cocoa plantation**

The original home of red-oil palm is Africa. It can be grown well where there is a well distributed abundant rainfall, adequate sunshine and temperature of about 26°C. It is a source of palm-oil and palm-kernel oil. These two oils are derived out of the fruit, palm-oil from the fleshy pericarp, and palm-kernel oil from kernels. The red-oil palm is grown in South Kanara by the Cocoa Plantation Division, Puttur, of the Mysore Forest Department. The beginning of this plantation was made in 1968 and as in 1972, the area under red-oil palm was nine hectares. **Red-oil palm**

The oil derived from the red-oil palm is rich in carotene and it is a source of vitamin-A. It is used in the manufacture of candles, soap and margarine, while the kernel oil is utilised in the manufacture of inferior grade soap and margarine. It is made use of in confectionery and to a less extent in pharmaceutical and toilet industries.

Nutmeg (*Myristica fragrans*), clove (*Syzigium aromaticum*) and cinnamon (*Cinnamomum zeylanicum*) plantations are being raised in the district from the year 1971. As in 1972, 28.4 hectares **Spices**

of nutmeg, clove and cinnamon plantations were raised in the Shiradi Reserve Forest. It is proposed to bring under these crops about 40 hectares per year from 1973 to 1975.

Pepper (*Piper nigrum*) is also being cultivated in the cocoa and spices plantations (for further details, *see* under Horticulture). An amount of Rs. 15,91,117 was spent in raising the cocoa and spices plantations in the district during the period from 1970-71 to the end of September 1972.

Famines and Floods

In the South Kanara district, which is well favoured by Nature with abundance of annual rainfall, there have been few failures of yearly rains. It is no wonder that this district never found itself in the grip of any serious famine. Conditions of scarcity in the other districts have a tendency to boost the prices of foodgrains in this district. The rains from June to September are so plentiful that the necessity for storing water in tanks for purposes of cultivation has not been felt. Rainfall is normally so evenly distributed that the people raise their first and best crop of paddy without much difficulty. Nature comes to their help and an abundant rainfall aids in the growth and maturing of the crop. There is a reference in an inscription dated in the year 1305 to an occurrence of famine in the district during the reign of Bankideva Alupendradeva II. It is stated that there was a dreadful famine in the area nearly 250 years ago. Severine Silva in his book "History of Christianity in Canara" (Vol. I, P. 74), referring to the kingdom of the Nayakas of Bednore says: "In this kingdom where there was no want and where everything was in plenty, a terrible famine appeared in the year 1727 caused by the failure of monsoon. It was the greatest famine that ever appeared in Canara. Parents were selling their children in Mangalore in order to get support for themselves". In 1872, opening of relief works became necessary, but even then it was not due to any actual famine, but to the distress caused by an abnormal export of grains which raised the local prices immensely. There have been subsequently famines several times in other districts, but none of them actually extended to this district. They merely tended to raise the prices of foodgrains in this district.

The district, however, faced calamities on account of floods in the several rivers. The worst and most disastrous flood experienced in recent history was in 1923. In July and August 1923, there was continuous and heavy rainfall throughout the district and as a result, almost all the rivers, which had to carry more water than they could hold, overflowed their banks. Almost all taluks of the district were affected. The worst affected places were Uppinangadi, Buntwal, Panemangalore and Venoor. The Gangolli Bar at Coondapur got widened because of the rush of flood waters towards the sea. Particularly in August 1923 the floods

were more destructive and seriously affected the above villages. A number of houses at Buntwal and Uppinangady were damaged. The big bridges at Puchamogar, Panemangalore and Venoor and several other bridges were destroyed. At Mangalore too, the railway line and several houses in Kudroli, Sultan's Battery, Bolar and Jeppu were damaged. Rice and grains worth more than Rs. 20,000 stored in the godowns were destroyed. In July 1924, there were floods again chiefly affecting the area close to the coast. Many roads all over the district were breached. Remissions of land revenue to the tune of about Rs. 25,000, grant of Rs. two lakhs by way of agricultural loans and free supply of building materials to the poorer classes of people were allowed by the Government. Local relief committees had to give shelter, feed and clothe hundreds of people for several days.

There were floods in all the rivers from 4th July 1959 to 8th July 1959 and again from 22nd July 1959 to 28th July 1959. The number of villages badly affected was 106, eight human lives and 24 head of cattle were lost. Crops in an area of about 650 acres were completely destroyed and those in about 1,000 acres were partially destroyed. The damage caused to about 1,625 houses was estimated to be of the order of about Rs. 1,11,790. The total extent of material damages caused by the floods was thought to be of about Rs. 2,10,600. Again in 1961, 95 villages were affected by floods with an area of 2,197 acres and 4,449 people. Crops on an area of 2,197 acres were damaged and nine head of cattle and one human life were lost; damages to 919 houses to the extent of about Rs. 1,12,565 and other damages to the tune of Rs. 3,38,450 were estimated to have occurred bringing the total damages to about Rs. 4,51,015.

In 1967, 21 villages were affected by floods with an area of about 481.53 acres and involving 737 persons. Crops in an area of 481.53 acres worth about Rs. 1,79,570 and 66 houses worth about Rs. 44,975 were damaged and the total damages in the district during those floods amounted to about Rs. 2,24,545.

In 1968, 239 villages with an area of 4,217.67 acres and involving 17,065 persons were affected by the floods in the district. Crops in an area of 2,672.60 acres worth about Rs. 6,80,936 were damaged and 99 head of cattle and 10 human lives were lost; 1,946 houses and some properties of public utilisation works were damaged. The total materials damaged in the district during those floods amounted to about Rs. 9,91,741.

In 1970, 58 villages and an area of 596 acres and 663 persons were affected by floods in the district. Crops in an area of 596 acres worth Rs. 7,100 were damaged and four head of cattle were lost; 171 houses and a few properties of public utilisation were

damaged. The total damages due to floods during the year was estimated at Rs. 1,37,619. In 1971, 55 villages, in an area of 11½ sq. miles and 1,073 persons were affected by the floods; the number of houses damaged was 353 and the total amount of damages came to about Rs. 2,09,841.

IRRIGATION

There are no extensive or major irrigation works in the district. The district enjoys an average rainfall of nearly 155 inches or 3,930 mm. The rains are received mostly during the south-west monsoon (from June to September). There are as many as 21 perennial rivers and streams in the district. These natural sources have not been properly exploited and there have been no major irrigation projects. A large part of this district is difficult for reclamation and cultivation on account of undulations with deep valleys interspersed with ridges and table lands. The first crop of paddy is usually grown from May to October. The second crop is grown during the period from October to January, while the third one is grown from January to May. The total area under irrigation is about 1,35,558 acres. The rains received during the north-east monsoon are not adequate for the growth of the second crop of paddy unless supplemented by irrigation sources. Failure or uneven distribution of rains during the second crop season results in diminution of flow in the streams and rivulets and consequently, there would be a possibility of failure of crops causing a lot of hardships to the farmers. The peculiar condition in the district is that the abundant water in the large number of rivers and rivulets received from the heavy rainfall drains off into the Arabian Sea without being utilised, as there have been no facilities for storing the monsoon flow. The existing irrigation is from the sources enumerated below in order of importance.

Traditional irrigation works

(1) *Mud Kattas*.—Mud *Kattas* are small earthen bunds constructed by the agriculturists themselves every year across water courses by co-operative efforts. Practically from all such storages, water is lifted by "picotahs" (local contrivances) or the impounded water is diverted through existing irrigation channels for irrigating the fields. A large number of such bunds are put up every year, with the assistance of labourers. Sometimes, when there are heavy showers during the north-east monsoon, these temporary earthen dams or bunds get washed off causing a lot of havoc to the standing crops and financial loss and anxieties to the farmers concerned.

(2) *Tanks*.—There are about 2,400 Government tanks in the district, which supply water in varying quantities to 22,031 acres. Very few tanks are having springs. Many of the tanks dry up early because of heavy percolation. Many of them are only small ponds without much capacity for irrigation. There are

30,870 privately owned irrigation tanks in the district. Water from some of these tanks is supplied to the fields by oil engine and electrical pumpsets.

(3) *Storage in river beds by means of vented dams, anicuts and salt water exclusion dams.*— In some places, where temporary mud *kattas* are put up annually, vented dams are put up by the Public Works Department or the Block Agency or by the Taluk Development Boards. There are some salt water exclusion dams put up across streams, rivulets and backwaters as near to the sea as is economically feasible to prevent the ingress of salt water and to store water in the water courses.

The difficult and rugged terrain of the district and the absence of sizeable stretches of irrigable lands have rendered the construction of major and medium irrigation projects very costly. The following are some of the projects which are taken up for execution :—

Major and
medium
works

(1) *The Bijur Reservoir Project.*—This project envisages construction of a reservoir across the *Bijur-hole* (Bijur river) near Kabse, a hamlet in Kalthode village of Coondapur taluk. The estimated cost of the project is Rs. 131 lakhs and is expected to irrigate 4,500 acres.

(2) *The Varahi Reservoir Project.*—The basin of this project is situated in Halady village of Coondapur taluk. The estimated cost of the project is about Rs. 91 lakhs and the approximate acreage to be irrigated is 5,000.

(3) *The Gowri-hole Project.*—Under this project there will be a dam across the Gowri-hole, a tributary of Kumaradhara river in Puttur taluk. The approximate cost of the project will be Rs. 81 lakhs and the ayacut of the project is estimated at 3,160 acres.

(4) *The Hanchikatte Project.*—This is a project to be executed across the Netravati river at Hanchikatte in Buntwal taluk, at an approximate cost of Rs. 83.50 lakhs and an ayacut of 3,680 acres will be brought under it.

(5) *The Netravati Project.*—This will be also across the Netravati river at Buntwal in Buntwal taluk and is estimated to cost Rs. 222 lakhs with an estimated ayacut of 1,680 acres.

(6) *The Katti-hole Reservoir Project.*—This project is estimated to cost about Rs. 28 lakhs and to command an ayacut of 1,370 acres.

Since major and medium irrigation works are very costly on account of the topography of the district and as the quantum and timeliness of rainfall vary from year to year resulting in

Minor irrigation

fluctuations in the area irrigated, minor irrigation works are stated to be better suited and more economical for this district. Since storages of water are limited, vast portions of *bettu* lands (terraced lands on the lower side of hillocks) are not irrigated during second and third crop periods.*

The following table gives the area irrigated in the district by different sources as in 1968-69 :—

<i>Source</i>		<i>Area in hectares</i>
1.	Government canals ..	701
2.	Private canals ..	1,957
Total ..		2,658
1.	Tanks ..	6,221
2.	Wells ..	26,153
3.	Other sources ..	47,751
Total ..		80,125
Grand total ..		82,783

(Source.—Bureau of Economics and Statistics, Bangalore.)

Tanks

There are no major irrigation tanks in this district. The scope of extension of irrigation under tanks is limited in this district due to percolation of stored-up water on account of the porous nature of the soil. The following are some of the tanks which irrigate 100 and more acres and for which improvements have been carried out :—

<i>Sl. No.</i>	<i>Name of tank</i>	<i>Name of village/ taluks</i>	<i>Ayacut in acres</i>
1.	Kavoor tank	.. Kavoor ..	172
2.	Thatrakere at Hiriadka	.. Bommarabettu ..	160
3.	Dalanthriya	.. Yellur ..	128
4.	Narnad Madaga	.. Uppur ..	100
5.	Kotekere	.. Hosangadi ..	102
6.	Chantar Madaga	.. Udipi taluk ..	270
7.	Marnad Madaga	.. Udipi taluk ..	100

*Fourth Five-Year Plan, Volume I, South Kanara, the Deputy Commissioner, South Kanara).

The extent of area covered by lift irrigation works executed between 1966 and 1972 is shown in the following table :—

Lift irrigation schemes

<i>Sl. No.</i>	<i>Lift irrigation scheme at</i>	<i>Estimated ayacut cost in Rs.</i>	<i>in Acres</i>
1.	Sankalkaria in Yelingi village (the Shambhavi river) ..	97,000	211.00
2.	Karialthalgundi in Ulapady village (the Shambhavi river)	1,23,000	248.00
3.	Mannur village (the Netravati river)	1,13,000	206.00
4.	Idyadi in Savanoor village (the Kumaradhara river) ..	63,000	123.94
5.	Survey (the Gowri river)	41,000	109.00
6.	Parappu in Kadaba village (the Kumaradhara river) ..	73,000	128.12
7.	Dodderi upstream side in Ajjavara village (the Payaswini river).	27,000	50.00
8.	Dodderi downstream side in Ajjavara village (the Payaswini river).	30,000	55.53
9.	Irmady	67,000	139.00
10.	Muggeri	84,000	160.00

There were, as in 1972, more than 200 vented dams and anicuts in the district irrigating about 15,000 acres. The following were the vented dams and anicuts irrigating more than hundred acres which were completed in South Kanara by the end of March 1972 :—

Vented Dams and Anicuts

<i>Sl.No.</i>	<i>Vented dams</i>	<i>Ayacut in acres</i>
1.	Pavanje river, Pavanje	220.00
2.	Tavadakatte, Yelinje	104.25
3.	Kattemar, Manjinady	122.78
4.	Kateel river, Delanthabettu	146.00
5.	Nandini river at Parakatte at Kateel, Kondamoole ..	260.60
6.	Puchadikatta, Korinjar	366.00
7.	Ferlakatta, Navoor	204.23
8.	Arabikatta, Mani	128.00
9.	C.A.R.S. Vittal, Vittal	123.00
10.	Kalladikalbetutodu in Shiriyar village	117.00
11.	Pangala-hole at Panjathur in Kuthyar village ..	170.52
12.	Pattathodu at Hirebettu village	136.75
13.	Hirebettuthodu at Hirebettu village	154.84
14.	Pangala-hole at Panjathur in Kaup Firka	149.67
15.	Noojadihole in Kundabarandadi village	146.99
16.	A stream at Anjadyagattuthodu in Badaginijar village ..	208.84
17.	Gurpur (Anicut)	1,098.00

Salt water exclusion dams

In the coastal region, where the rivers are subject to tidal action, the entry of salt water has been another problem affecting the fertility of the fields. In order to prevent the ingress of salt water into cultivable lands, low masonry permanent structures known as "Salt Water Exclusion Dams" are constructed. This saves a larger extent of the coastal area from being damaged and also incidentally provides better irrigation facilities. Upto the end of March 1972, 22 salt water exclusion dams, with an ayacut area of 2,787.40 acres, were completed. The following salt water exclusion dams completed upto that date irrigate more than hundred acres each :—

<i>Sl. No.</i>	<i>Place</i>	<i>Ayacut in acres</i>
1.	Manampady	257
2.	Pavanje river at Cheliyur	670
3.	Hoigegudda in between chitrapu and Padupanambur village	138
4.	Nadsal river in Padubidri at Nadsal	255
5.	Mampura Katta stream between Korangarapady and Manipur village	503
6.	Keppettodu at Tonse village	150
7.	Kubja river in Kavaradi and Gulvadi village	184

Filter point tube wells

Rainfed irrigation is the main practice in almost the whole of the district. Of late, filter point tube wells are becoming popular in sandy areas and they provide water both for cultivation and drinking. A length of tube, 3" to 4" in diameter with perforated points all over, is driven 24 feet into the ground to draw the sub-soil water. These tube wells are seen through the coastal areas where the soil is sandy, supplying water to second and third crops of paddy.

Water-table.—The water-level varies in different areas of the district, the average depth being 20 feet. In the dry months of the year, when there is no rainfall, the wells are as deep as 60 feet. After the outbreak of the south-west monsoon, the depth sometimes will be only three or four feet.

Irrigation wells

In addition to the various measures undertaken to provide irrigation to lands, such as construction of new tanks, restoration of tanks, vented dams and salt water exclusion dams and lift irrigation schemes, there are also a number of wells used for irrigation purposes with various devices. The total number of wells as in 1972 was 9,220 providing water for single crop, 15,938 for double crops and 1,718 wells for treble crops.

The Mysore State Land Development Bank is giving loans for sinking wells in the district. From 1965-66 to February 1970, the loans advanced by this Bank for the purpose amounted to Rs. 53,94,020; the number of wells completed was 825, while the number of wells sanctioned was 1,489.

As per the figures relating to 1968-69, there were at the time 27,194 wells irrigating an area of 26,153 hectares, whereas there were 19,628 wells prior to 1960. The following table gives the number of wells constructed according to sources of finance as in 1968-69 :—

Private source	..	..	24,640
Liberalised loan scheme	..	..	1,292
Land Development Bank	..	..	391
Taccavi loan	..	..	109
Local Development Works and Community Development Funds			204
Co-operative Societies	..	..	169
Others	..	..	369

There are various types of water-lifting devices in the district such as manual operation, *kapile*, persian wheel, oil engine pumpsets and electric pumpsets. The table given hereunder shows the number of wells fitted up with different water-lifting devices (excluding electric pumpsets) as in 1968-69 :—

Sl. No.	Name of taluk	Manual	Kapile	Persian wheel	Oil engine pumpsets
1.	Belthangady	492	57	1	141
2.	Buntwal	2,867	462	28	898
3.	Coondapur	1,197	149	161	91
4.	Karkal	2,364	183	2	249
5.	Mangalore	4,668	222	2	908
6.	Pattur	1,479	11	...	393
7.	Sullia	387	3	1	82
8.	Udipi	3,103	102	96	483
	District total	16,557	1,189	291	3,245

After the advent of hydel power in South Kanara in 1956, rural electrification and supply of power for irrigation pumpsets was taken up and a distribution network was laid in all the taluks of the district, in a phased manner. From the year 1961 onwards, there was a steady increase in supply of power for the purpose. Upto the end of 1972, the number of irrigation pumpsets energised in the district was 14,817, out of which Belthangady taluk had 509

sets, Buntwal taluk 1,559 sets, Coondapur taluk 2,093 sets, Karkal taluk 1,397 sets, Mangalore taluk 3,189 sets, Puttur taluk 802 sets, Sullia taluk 603 sets and Udipi taluk 4,665 sets.

Soil erosion

Soil erosion is noticed all over the district. Due to the peculiarity of the terrain, erosion starts from the banks of the natural drainage area where the flow has to negotiate steep slopes. Salinity of soil is caused by the presence of certain salts which get impregnated by saltwater inundating the soil. These salts are highly injurious to plant growth, rendering even fertile soil unfit for cultivation. Such lands in South Kanara are bunded first so as to prevent saltwater getting in; this is followed by irrigation with fresh water and drawing off at frequent intervals. This reduces the salinity of the soil to a very great extent. The application of green manure crops like diancha, kolinji, sesbania, sannhemp and the like makes the land fit for cultivation.

Land reclamation

Reclamation of waste lands forms an important function of the Agriculture Department. Bulldozers are being hired out by the Agro-Industries Corporation. It has been found that reclaiming and ploughing with bulldozers and tractors is economical and time-saving.

Implements

The raiyats cultivate their lands mainly by harnessing bullocks and buffaloes, mostly buffaloes. The agricultural implements ordinarily used throughout the district are not very different from those used elsewhere in the contiguous districts except that they have local names. The most important among these implements are the plough, the yoke, the levelling board, the rake, the wooden mallet, the axe, the spade, the seed drill, the fork, the sickle, the bill-hook, etc. Some of the instruments are crude, but even so they are not ill-suited for the puddle cultivation of rice for which they are mainly required. In recent years, efforts have been made to introduce improved implements and better results can be seen in all the taluks of the district where some farmers have taken to these improved ones. Among the agricultural implements introduced in recent years in the district is the iron plough with mould-board attachment which is specially meant for inverting the soil for preparatory cultivation and to obtain better tilth. This plough is used to remove weeds, stubble and other impediments in the fields.

Of late, the Japanese method of paddy cultivation is being employed. Wherever fields are prepared for this type of cultivation, the Japanese type of inter-cultivator is employed. This new implement is locally manufactured and is best suited for inter-cultivating the standing paddy crops planted in regular lines. The ridge plough is occasionally used for forming ridges and

furrows for sugarcane, sweet potato, chillies and the like. A labour-saving implement called the bund-former is recommended for forming ridges for sweet potato, ginger and other cash crops. With this implement, field bunds in dry lands can also be formed economically. The wet-land puddler is used after three ploughings and is worked in paddy fields under puddle conditions to render the soil into a fine tilth. The buck-scraper is largely recommended for levelling uneven lands with the help of bullocks. Farmers are now going in for partial mechanisation of their cultivation and accordingly, more and more power-tillers are being purchased by them. Following were the agricultural machines in use in the district as in 1972 :—

1. Tractors	..	11
2. Power-tillers	..	424
3. Improved paddy threshers :		
(a) Hand operated	..	25
(b) Power operated	..	2
4. Sugarcane crushers :		
(a) Power operated	..	127
(b) Buffalo drawn	..	600
5. Improved seed drills	..	50
6. Hand-operated dusters	..	104
7. Power sprayers	..	175
8. Hand-operated sprayers	..	3,500
9. Oil crushers	..	75
10. Bulldozers	..	4
11. Borewell rigs	.	3

The manures commonly used are farm-yard manure, ash and burnt earth (*sudumanni*). Farm-yard manure is prepared according to the loose box system using green and dry leaves for litter. Burnt earth is prepared by burning dry leaves and rubbish along with earth and is extensively used for paddy and other crops. Wood-ash is obtained locally from kitchen hearths and also from tile factories. In the inland tracts, where forests are still abundant, green leaves are applied directly to the paddy fields without either being burnt or mixed with animal products. Wood-ash is a favourite manure and is used in a thorough-going manner in the *Kumari* form of cultivation where standing forest is felled and burnt on the spot and seed sown in the ashes. Privileges have also been extended to the cultivators with regard to the use of leaves and lopping from the forest. All around cultivated lands, a belt of 100 yards of land is left for the exclusive use of the cultivator for the supply of manure, fuel, pasturage and other domestic needs. Such lands are known as *Kumaki*. In the garden lands, the ground round the foot of the trees is dug to a small depth and the pit covered with earth after being filled with fresh leaves, ash, etc. Salt is also much valued as a manure for coconut trees.

Comparatively speaking, the raiyats of this district pay greater attention to the selection and use of manures. Fish manure is being extensively used for sugarcane cultivation; another type of manure, which is popular, is river mud or silt which is taken from the marshy river-beds and is employed on the coast and in villages where beds of rivers and streams are suitable for the use of such mud. The last three decades have seen an extensive use of artificial manures and the demand for such manure is increasing as the farmers have come to realise their importance for increasing the yields of the crops. The green manuring practice is gaining popularity slowly and steadily among farmers. The farmers of this region generally apply green leaves of the nearby forests and *kumaki* soil to fields. As this is limited, the practice of growing green manure along the field bunds and incorporating the same in the soil is gaining prominence, thereby minimising dependence on the forest leaves. The green manure crop of kolinji has become popular all over the district; sannhemp and sesbania are also grown. In addition to these, glyricidia, a perennial green manure crop, is also grown on waste lands and on field bunds. Thus more and more areas are being brought under green manure crops.

Cultivating seasons

The people of South Kanara observe both the solar (*Sauramana*) and luni-solar (*Chandramana*) calendars. The former seems to have been in use from the earliest times, since there are Tulu names for the solar and none for the luni-solar months. All the operations of cultivation are regulated according to the months of the solar system.

There are three well-defined seasons of cultivation; the first called 'yenal' or 'karthi', from June-July to September-October, the second called 'suggi' lasting from October-November to January-February and the third called 'kolake' from January-February to April-May. Crops during the first season are raised under rainfed conditions, while during the subsequent two seasons, they are raised under irrigation. The important agricultural crops grown in this district and the area under each are given in the statement below :— (1 Hectare is equal to 2.47 acres)

Sl. No.	Name of crop		Area	
			(in acres)	(in hectares)
			1957-58	1971-72
1.	Paddy	1st crop	3,23,164	1,23,650
	"	2nd crop	1,25,090	49,307
	"	3rd crop	15,083	7,440
2.	Ragi	...	3,353	115
3.	Horsegram	...	19,132	...
4.	Blackgram	...	9,252	430
5.	Greengram	...	6,165	533

Paddy is the chief crop occupying over 75 per cent of the cultivated area. Nearly 70 per cent of the crop is raised during the first crop season. The other crops grown during the first season are ragi, chillies, sweet potato, ginger, gingelli and vegetables. During the second crop season, paddy, ragi, chillies, horsegram, blackgram and greengram and vegetables are raised under irrigated conditions except pulses which are raised under dry conditions in single crop wet lands. Cultivation during the third season is carried out on a limited scale and the chief crops raised are paddy, sweet potato, ragi and sugarcane while greengram and blackgram are raised under dry conditions with the available moisture in the soil after the harvest of the second-crop paddy. The manures that are generally applied are cattle manure, burnt earth, fish guano, groundnut cake and ammonium sulphate. In very recent years, sea island cotton has been introduced and is still in the trial stage.

The district has not seen any systematic and regular rotation of crops. The single-crop wet lands grow paddy during the first crop season and are left fallow till the next first-crop season; under favourable conditions, however, a crop of pulse is taken during the succeeding second-crop season and the land is left fallow during the third-crop season. The double-crop lands grow paddy during the first-and second-crop seasons and then left fallow for the third season. In favourable areas, a dry pulse crop is taken during the third season. In sugarcane fields, however, paddy or chilly is usually rotated with cane. In order to popularise crop rotation, 40 multi-crop demonstrations were laid out during 1971-72 in the district.

Crop rotation

Because of the low level of fertility of the soils of this tract and with a view to enhancing the fertility level, the following crop rotations have been recommended :—

- (1) Paddy-paddy-pulses or kolinji (green manure crop)
- (2) Paddy-pulses or maize or ragi-paddy.
- (3) Paddy-maize or ragi-kolinji.
- (4) Paddy-kolinji or ragi.

In addition to the above rotations, paddy-sugarcane-paddy, a two-year rotation, in sugarcane area is recommended. Growing of pulse crop after a main-crop is commonly practised in this tract. The Department of Agriculture is persuading the farmers to take up systematically, any of the rotations recommended above.

The staple produce of South Kanara is rice, which is cultivated in all the valleys of the district by terracing the slopes. As many as three crops are grown every year on a considerable portion of the low-lying lands where irrigation facilities are available. Though,

doubtless, paddy ranks first in importance amongst the agricultural products of the district, it is not the only crop grown on wet land. In recent decades sugarcane has become a very prominent and important money crop, especially in the coastal areas of the district on the banks of rivers. Several kinds of grams (horsegram, greengram and blackgram) are grown mainly as a second crop on the *majalu* rice fields under dry conditions in single and double-crop wet lands after the harvest of paddy. Ragi is grown in this district to a very small extent.

Paddy

Paddy being the chief crop of the district, the cultivator devotes his individual attention to his rice fields, since the produce constitutes the greatest portion of his annual income. Raising dry nurseries of paddy is the common practice. The fields intended for raising nurseries are ploughed immediately after the harvest of the previous crop of paddy. Before the last ploughing, the fields are manured with farm-yard manure and ash. The seeds are then sown broadcast, covering them by giving another ploughing and compressed by passing a levelling board. The sowings commence as early as in March and continue up to May depending upon soil conditions and duration of the variety. Wet nurseries are also raised immediately after the harvest of the third crop of paddy in May where irrigational facilities exist. Where soil conditions do not permit dry sowings or raising of wet nurseries, sowings are done with the help of pre-monsoon showers in May. After the introduction of High-Yielding Varieties and Intensive Agricultural Programme, transplanting of younger seedlings (25 to 30 days old) has become common and the old practice is being eliminated.

Preparatory cultivation commences with good pre-monsoon rains and transplanting of paddy in low-lying areas commence later in May or beginning of June depending upon the rainfall. *Baitu* fields are planted first followed by *majalu* and *bettu* fields. The transplanting operations continue upto the middle of July. The early varieties come to harvest during the latter half of September. The harvesting operations continue till the end of October.

Nurseries for the second crop are raised in a similar manner as for the first crop. Transplanting commences late in September and continues upto end of November. Broadcasting of seeds is also not uncommon during the second crop season, especially in the interior *malnad* parts. The second crop comes up for harvesting during January-February.

Where irrigational facilities exist, a third crop of paddy is taken. Broadcasting of seeds had been the general practice. But now farmers have been switching over to transplanting from

nurseries. Seedlings are transplanted during January-February and the crop comes up for harvesting in April-May. They only use short-duration varieties for the third crop. The lands that belong to the third class grow only one crop. The return from the third class wet lands is rather poor. Some fields of rice contain an excess of saline matter along coastal tracts where back-water enter into paddy lands. In such fields, the raiyat grows a rough and dark type of rice called *oguru dodda* or *oguru kalame*.

In certain localities of the district, the paddy is trodden out of the ears by cattle, but ordinarily threshing is done by beating a handful of stalks against a wooden or bamboo grating through which the grains fall, after which they are collected and tied up in straw bundles called *muras*; each bundle contains one *mura* or 42 seers of 80 tolas weight.

Curious customs prevail even today in respect of reaping the harvest. Before reaping a crop, the tenant usually presents the land-owners with what is known as *bele-kanike* which is a sort of offering of a present. The land-owner takes the opportunity of looking up his accounts with the tenants and if there are any arrears, an agreement has to be arrived at before the present is accepted, acceptance of the present being a sign that the reaping of the crop may be proceeded with. In certain villages in the interior, there is another custom of allowing a small piece of good wet land to lie fallow. This is supposed to be in propitiation of the family deities. But of late, these customs are being discontinued.

Curious
customs

Sugarcane is a ten to twelve months crop. The cultivation is confined to the coastal belts along the banks of rivers. Sugarcane is planted from December to March. An improved variety of sugarcane (CO. 419) has completely replaced older varieties. Certain villages in Mangalore and Udipi taluks are noted for the quality of sugarcane grown. *Rasthali Kabbu*, *Dara Kabbu*, *Kari Kabbu* and *Bidira Kabbu* are the local varieties grown for chewing purposes. Sugarcane is manured with farm-yard manure, ash, groundnut cake, fish manure and complex fertilizers. No sugar is manufactured in the district. The boiled juice is transferred to moulds and made into cakes and balls of jaggery. In Coondapur taluk, semi-solid juice is poured into tins and stored.

Sugarcane

The cultivation of dry grain crops on lands prepared by clearing scrub jungles or grass is termed *hakkalu* in order to distinguish it from the *kumari* type of cultivation. The crops and the method of cultivation are the same as in *kumari* except that more tillage is required. In the old days, this type of cultivation had been almost completely left to the hill tribes or labourers, but with the increase in population and the rise in prices and technical advances

Dry grain
crops

in the uses of manure, large sections of the agricultural population have taken to *hakkalu* cultivation. The crops mainly grown are ragi, horsegram, sweet potato and chillies.

**Progress of
scientific
agriculture**

In recent decades, increased food production has been the main aim of agricultural activities in the district. The Agricultural Extension staff carry on an intensive propaganda in this direction and the cultivating classes have been persuaded to opt for intensive and extensive cultivation. The technical staff make frequent visits to the growers and advise them on better methods of cultivation. Nurseries are raised wherever possible and improved seeds are distributed on a wide scale. In order to increase food production, both organic and inorganic manures are applied in increased quantities.

As paddy is the chief crop of the district, different strains of this grain have been recommended by the Agricultural Department. For rainfed paddy, PTB 9 and 10, MTU 3 and 20 and MGL are strongly recommended. For the second crop, CO 14 and 25 and PTB 20 are recommended. For the last crop, which depends on lift irrigation, PTB 10 and 9 and MTU 20 are recommended; PTB 9 and MTU 3 are very popular all over the district, especially during the first crop season. MGL strains are released from the Paddy Breeding Station in Mangalore and are of recent origin. These are evolved out of local varieties. PTB strains are released from Pattambi in Kerala. CO strains come from Coimbatore in Tamil Nadu. MTU strains, which are released from Andhra Pradesh, have been firmly established in the district.

**Supply of
fertilisers**

Application of modern fertilisers like ammonium sulphate, superphosphate, urea and the like has become popular. The South Kanara Co-operative Supply and Marketing Society is given the monopoly of distribution of fertilisers and retail supplies are executed by it through 282 Service Co-operative Societies located all over the district. Besides this, 150 private retail dealers are also dealing in fertilisers. The assistance of Young Farmers' Clubs is being utilised in connection with the distribution of these fertilisers. During 1958-59, 2,835 tons of ammonium sulphate and other fertilisers were distributed covering an area of 64,047 acres and 40,621 tons of rural compost were also distributed covering an area of 8,125 acres. During 1971-72, 24,744 tonnes of nitrogenous fertilisers, 10,643 tonnes of phosphatic fertilisers, 5,160 tonnes of potassic fertilisers and 588 tonnes of fertiliser mixtures were distributed covering a total area of 1,12,575 hectares; besides 4,25,000 tonnes of rural compost were also supplied.

**Green
manure crops**

'Kolinji' is the most popular among the green manure crops, mainly because it is drought-resistant and can be sown after the

harvest of paddy requiring no further attention. The total area covered under the green manure crops in the year 1958-59 was 5,083 acres and in 1971-72 it was 65,008 hectares. Glyricidia was popularised as a perennial shrub and grown in 7,013 acres in 1958-59 and during 1971-72, 10.25 lakhs of seedlings and cuttings were distributed.

Rural compost.—Intensive efforts are being made to increase the production of rural compost by utilisation of village wastes. Special training was given to the cultivators in the production of this compost. In 1958-59, 3,837 new compost pits were opened and 480 old pits were refilled and in 1971-72, 350 new pits were opened and 386 old pits were refilled. In all, 40,624 tonnes of compost were manufactured and out of this quantity, 33,639 tons were applied in 1958-59, and in 1971-72, 4,25,000 tonnes of compost were manufactured and utilised.

Urban compost.—Municipalities and panchayats are manufacturing urban compost from night soil and sweepings. A total of 1,288 tons of compost was produced and out of this a quantity of 691 tons was utilised in 1958-59 and in 1971-72 a quantity of 1,114 tonnes of compost was produced and another 1,105 tonnes was utilised.

There are four seed farms in the district, one each at Sanoor, Brahnavara, Belthangady and Koteshvara. The nucleus seed obtained from the Paddy Breeding Station at Mangalore is supplied to these seed farms for multiplication. The seed produced in these farms is supplied to registered seed-growers for multiplication and further distribution to the public. The subjoined statement gives some particulars of the seed farms :—

Seed Farms

<i>Sl. No.</i>	<i>Place of seed farm</i>	<i>Taluk</i>	<i>Year of starting</i>	<i>Total area of seed farm in acres</i>
1.	Belthangady	Belthangady	1958-59	24-15
2.	Sanoor	Karkal	1958-59	32-33
3.	Brahnavara	Udipi	1959-60	23-28
4.	Koteshvara	Coondapur	1962-63	27-00

During 1958-59, nine tons and 18 cwt. of seeds produced were distributed through the Paddy Breeding Station at Mangalore and 112 tons and 2 cwts. of seeds were given to registered seed-growers covering an area of 8,994 acres. The registered seed-growers distributed 315 tons and 5 cwts. of seeds to cultivators covering in all 25,222 acres. During 1971-72, 51.143 tonnes of

foundation seeds produced in four seed farms were distributed to 1,320 registered seed-growers covering an extent of 1,148 hectares.

**Intensive
Agricultural
Area
programme**

The Intensive Agricultural Area Programme was taken up in the district during 1966-67. Paddy, which is the main food crop in the district, was chosen for the purpose. In order to maximise the food production, stress was laid on persuading the farmers to adopt the recommended package of practices. In the year 1971-72, the average paddy yield of the improved varieties was estimated to be about 20.45 quintals per hectare. The total production during 1971-72 under improved varieties was 2,08,782.6 tonnes out of 1,02,094.23 hectares. The average per hectare yield obtained from out of local varieties was 15 quintals per hectare. The total additional production obtained due to implementation of the Intensive Agricultural Area programme during 1971-72 was 5,56,412 quintals.

**High-Yielding
Varieties
Programme**

The High-yielding Varieties Programme was introduced in the district during 1966-67. Under this scheme, IR-8 and Jaya varieties of paddy are being cultivated; IR-8 variety of paddy is the leading and popular high-yielding variety grown in this district; Jagannath, IR-20 and IR-22 varieties were also tried. Besides these, PTB-36, 37, 38, IET-1991 and IR-20 varieties were tried on a small scale during the summer season. The targets and achievements under this programme for the year 1971-72 were as follows :—

<i>Season</i>	<i>Target in hectares</i>	<i>Achievement in hectares</i>
Kharif ..	5,000	3,052—57
Rabi ..	8,000	5,046—62
Summer ..	2,500	2,381.77
Total	15,500	10,450—96

**Demonstration
plots**

In order to convince and educate the farmers about new methods and practices of agriculture and benefits accruing there from, 23 ABCD demonstration plots were laid out during the year 1971-72. Five national demonstration plots were laid out in the district, two each in Coondapur and Puttur sub-divisions and one in Mangalore taluk. In order to encourage the farmers to maximise production, the concept of taking multi-crops in a year was driven home to them. Twenty demonstration plots of one hectare each in Puttur and Karkal taluks were laid out during the year 1971-72 in cultivators' holdings where facilities existed for taking more than

two crops. In all these cases, pulse crops were raised during the summer.

Sugarcane is one of the important commercial crops grown in the district. In order to increase the per acre yield and the total sugarcane production and to educate the farmers on the package of practices, a Sugarcane Development Scheme was launched in the district in 1970-71 when 20 half-field demonstration plots were laid out in the district. As a measure of popularising the cultivation of pulses in the district, eight, 100-acre and five acre compact demonstration plots were laid out on the fields of farmers. Oilseeds are also grown in this district. Groundnut varieties like TMV-2, S-206 were tried and results were fairly satisfactory as they yielded upto 806.04 kgs. as against a yield of 575 kgs. with other varieties. Crop competitions of paddy and sugarcane at taluk, district and state levels are conducted to encourage the farmers to grow more crops.

During the Fourth Five-Year Plan, special schemes for helping the weaker sections of the community like small farmers, marginal farmers and agricultural labourers, were taken up in the State. Under the State sector, a Marginal Farmers and Agricultural Labourers Development Agency was set up in Udipi and Coondapur taluks of South Kanara district, during the year 1971-72. The district has a large number of marginal farmers owning less than 2.5 acres of lands. There is a sufficient population of agricultural labourers having homesteads, earning 50 per cent or more of their income from agricultural labour alone. The Government of Mysore sanctioned this scheme with a view to improving the economic conditions of these two categories of population by creating gainful employment for them. It may be mentioned here that according to the 1961 census, there were 59,855 marginal farmers and 1,30,667 agricultural labourers in the district. It was proposed to select about 20,000 marginal farmers and another 20,000 agricultural labourers including fishermen in Udipi and Coondapur taluks for the purpose of this scheme. The progress achieved during 1971-72 under the scheme was as follows :

**Marginal
Farmers and
Agricultural
Labourers
Schemes**

1. Total marginal farmers	..	21,005
2. Total agricultural labourers	..	8,567
3. Total number of marginal farmers enrolled as members of co-operatives	..	2,391

The Soil-Testing Laboratory, Mangalore, was commissioned during 1968. Soils from farmers' fields are collected and analysed in the Laboratory. During the year 1971-72, 18,013 samples from South Kanara district, 4,354 samples from Coorg district, and 113 samples from other sources were collected and analysed and the

**Soil-Testing
Laboratory**

data communicated to the individual farmers. The cultivators were advised to apply lime and fertilisers to their crops in particular proportions based on these soil test data. Three village fertility maps and four fertility maps of seed farms were prepared during the same year.

Pests and diseases

The most common pests which affect paddy in the district are the steam borer, army worm, case worm, hispa, green jassids, rice bug, grass hopper, rice thrips, leaf-roller, leaf-miner and gallfly. To eradicate these pests, 50 per cent D.D.T. wettable powder, Folidol E-605, Paramar BHC 10 per cent dust, BHC wettable 10 per cent powder, Thimmet phorate-10G and other chemicals are sprayed or dusted.

Animal pests.—Rats and field mice attack paddy, coconut, sugarcane, sweet potato and fruits. Zinc phosphide or agromore rataffin is largely employed to check these pests.

Leaf spot, stem rot and blast were the most prevalent crop diseases affecting paddy in the district. These diseases are being checked by draining the fields and applying of lime at 1 cwt. per acre after the fungicide treatment. Blast is controlled by sparying bordeaux mixture or any other fungicide.

In order to encourage effective plant protection work, various types of chemicals are stocked departmentally and are distributed at subsidised rates and also at full costs. During the year 1971-72, 732.100 litres of liquid formulations and 34.936 tonnes of dust formulations at 75 per cent of the cost and 9.379 tonnes of dust and 883.800 litres of liquid formulations at 50 per cent of the cost were distributed to farmers. Plant protection equipments were also being issued at subsidised rates.

Agricultural Research Station

The Agricultural Research Station, (Kankanady), Mangalore, located in the village of Jappinamogaru, about two-and-a-half miles from Mangalore City, was started in 1944 by the Government of the erstwhile composite Madras State. It was transferred to the control of the University of Agricultural Sciences, Bangalore, on 1st October 1965. The area of the farm is 16.8 hectares. This Research Station, right from its inception, concentrated its attention on breeding high-yielding strains by pure-line selection among the predominant local types of paddy. As a result of these local types, a total of seven strains have so far been evolved to cover an area of five lakh acres; out of them, five strains, namely, MGL-1, MGL-2, MGL-3, MGL-4 and MGL-5 are for the first crop season (June to September) and MGL-6 and MGL-7 for the second crop season (October to January).

In addition to the release of the above mentioned varieties, the research station has also been responsible for introduction of several strains into the district from other parts of the country, namely, MTU-3 and MTU-20 from Maruthuru (Andhra Pradesh), PTB-9, PTB-10, PTB-28 and PTB-20 from Pattambi (Kerala State), and GEB-24, CO-14 and CO-25 from Coimbatore (Tamil Nadu). After experiments and demonstrations, it has been found that Jaya and IR-8 are most suitable for the district. These two varieties may be grown in all the three cropping season. Other agronomic and entomological researches are also conducted in this Station. Besides these programmes, research work under the All-India Rice Improvement Project is also being carried out at this centre.

The Co-ordinated Agronomic Experiments Scheme aims at evolving suitable cultural, rotational, irrigational and fertiliser practices for important crops for different agro-climatic and soil regions of the country. With this objective, complex agronomic experiments were first initiated in 1953 (on the recommendation of Dr. A. B. Stewart of the Macaulay Institute of Soil Research, Aberdeen, Scotland at 18 centres under a "fertiliser use project". While these experiments were in progress, a committee set up by the Indian Council of Agricultural Research recommended a larger coverage representing different agro-climatic and soil regions of the country. Then new series of experiments were started under the name "Model Agronomic Experiments" in 1957 and are being continued under the All-India Co-ordinated Agronomic Experiments Scheme. This experimental programme is in progress at 44 research centres (popularly known as Model Agronomic Centres) and Mangalore is one of those centres which was started during the 1969 kharif season with a total annual budget of Rs. 38,000.

**Co-ordinated
Agronomic
Experiments
Scheme**

The results of researches and experiments carried out on various aspects of different crops by agricultural scientists, are communicated to the farmers by the extension staff of the Agricultural Department. Exhibitions, field days, etc., are conducted to impart know-how to the farmers. Crop competitions are also held. There are also some private agencies working in the district to popularise among the farmers modern methods of cultivation and they are mentioned below.

The Syndicate Agriculture Foundation, Manipal, was registered in 1966 under the Mysore Societies Registration Act, 1960 (Mysore Act 17 of 1960). The Syndicate Bank of South Kanara took a decision to go forward with a scheme for helping agricultural and horticultural development through this agency.

**Syndicate
Agriculture
Foundation**

As in 1970, there were over 3,000 farmers as members of this Foundation. The membership is open to farmers and others

interested in farming and institutions engaged in activities connected with agricultural and horticultural development. Membership has been classified under four heads as patrons, life members, ordinary members and agricultural members. The Foundation is rendering assistance to the farmers by way of guidance and soil testing, supply of improved seeds, holding of demonstrations, seminars, field days, competitions, etc. Many progressive minded farmers of the district have been evincing interest in the activities of this Foundation. Issues concerning latest agricultural problems were discussed by various seminars conducted by the Foundation.

The Foundation has taken up a project for seed-production and conducting of experiments in farming methods by taking over a 17-acre farm from the Canara Land Investments. A dairy and poultry unit at Manipal was also taken over by the Foundation from the Academy of General Education. Training classes in poultry-farming, dairying and farm-management are conducted for the benefit of farmers. The Foundation has arranged for free testing of soil samples of each member every year. It is also publishing a monthly magazine "Krishi Loka" in Kannada. It conducted crop competitions in 1968 and awarded prizes. The Foundation is receiving an annual grant of Rs. 10,000 from the Syndicate Bank, besides the membership contributions and other donations from well-wishers.

**Farm
Information
Exchange Clubs**

One of the objectives of the Syndicate Agriculture Foundation is to promote better understanding among the farming community and to create an awareness among them to adopt modern techniques in increasing their farm production. In order to achieve this objective, the Foundation is organising "Farm Information Exchange Clubs" with the co-operation of various financial institutions, voluntary associations and the State Department of Agriculture. Such Farm Information Exchange Clubs were functioning, as in 1972, at (1) Pangala, (2) Varamballi, (3) Hiriyaadka, (4) Hebri, (5) Buntwal, (6) Kotekar and (7) Kota, all in this district, and there were also two other clubs in other districts of the State.

**Farmers'
Forum**

The Farmers' Forum, South Kanara district, was started during the year 1958 under the Mysore State Farmers' Forum. The main objective of the Forum is augmentation of the farm produce. The Forum holds conferences, exhibitions and seminars at taluk and district levels to help the farmers in their work and to promote mutual understanding and friendship among them. As in 1972, there were 203 active members and nine life members in the Forum.

**Young Farmer's
Association**

The Young Farmers' Association of the district was started in the year 1957. It has organised village clubs and as in 1972,

there were 80 such clubs in the district with an average membership of 40. These clubs are self-supporting and are the basis of the Young Farmers' Association. Through these clubs, the rural youth are trained to become good farmers and citizens. Efforts have been made to organise taluk committees of the Association to regularise the programmes of the clubs. The members of the clubs participate in taluk, district and State *melas*. The Association works in close co-ordination with the Agricultural Department and the Extension Wing of the Development Blocks.

The South Kanara District Co-operative Agricultural Development Society, Ltd., Mangalore, sponsored by Shri T. A. Pai, was started in 1962 under the Mysore Co-operative Societies Act of 1959 (for details See Chapter VI).

HORTICULTURE

Formerly, horticulture was dealt with as a part of agriculture and so the work of horticulture was looked after by the Department of Agriculture. When the food situation became acute in the country, more attention began to be paid to growing of fruits and vegetables and steps were taken to encourage horticultural pursuits and to make the people realise the importance of horticulture. The programme of horticultural activities was extended to all the districts of the new Mysore State. In South Kanara, the work of horticultural development began in 1960. When a separate Department of Horticulture came into existence in the State in 1963, its district office was opened in South Kanara, with the object of developing horticultural crops with special and concentrated attention to individual crops like pepper, cashew, coconut, arecanut, fruits, vegetables, etc.

Horticultural crops grown in this district are a helpful economic balancing factor for a number of agriculturists. Unlike in other districts, in this district, crops like coconut, arecanut, pine-apple, mango, vegetables, etc., are the common features of cultivation of many individual agriculturists. Their lands are considerably used for growing horticultural crops. The area under horticultural crops has been gradually increasing. The acreages of different horticultural crops grown in the district for the years 1970-71 and 1971-72 (taluk-wise) are given at the end of the Chapter.

Amongst the garden trees in this district, the most important **Coconut** are those of coconut, arecanut, pepper and also jack. The wild mango, tamarind and palmyra are not very common. The coconuts grow best on sandy soils and large plantations extend along the coast-line of this district. Scattered trees are also grown on the

banks of the field and in other favourable spots. Coconut trees are usually propagated from nuts which have not been plucked, but have been allowed to ripen and fall from the tree. These nuts are put down in moist, ploughed ground with their tops above the surface. They sprout within about three months and after a year or two, are transplanted in three feet cube pits. The manure for these trees consists mainly of earth from the bottom of backwaters, which is highly impregnated with salt, and the leaves of the *nux vomica* trees and ash.

Far away from the coast, however, coconut trees need watering except during the monsoons. The trees began to bear after five to twelve years according to the nature of the soil and continue to yield till they are about sixty years old. There has been a tendency in recent years to overcrowd the coconut plantations. It is estimated that the correct number per acre should be about 75 trees. A pest that is peculiar to the coconut known as *nephantis serinopa* made its appearance in 1922 in this district, but the Agricultural Department has been able to check the spread of this pest by systematically operating on the affected trees and by rearing and spreading parasitic insects. The spraying of bordeaux mixture on the trees has its effect on bud-leaf rot.

Arecanut

The cultivation of arecanut is carried on mainly near the ghats in the deep narrow valleys in which are to be found perennial streams and abundance of shade and moisture. Seed-nuts are usually selected from the second crop of mature trees and are put down in a well-moistened shady spot. They are left there for about one to three years and then finally retransplanted in pits which are about three feet square and three feet deep. An arecanut tree begins to bear fruit about ten years after its first planting, or seven years after its second planting. From about its fiftieth year until its decay, which happens between the seventieth and hundredth year, the quantity of fruit greatly diminishes, but the quality improves. The crop is usually plucked when fully ripe between November and March. The nuts are dried in shade for 40 days, dehusked and then put in the market. In most of the arecaunt plantations, plantain trees and pepper and betel creepers are also grown. The cultivation of cardamom in these plantations is also being attempted.

There are two distinct parts in this district which are famous for arecanut ; the first is Vittal *magane* in the north-west of Puttur taluk and the other is Honnar *magane* in Coondapur taluk. The nuts from the former region are usually sent to Mangalore, while those from the other region are taken to Shimoga. The arecaunt is susceptible to a fungoid disease known as *mahali* or *kole-roga*

and the Department of Horticulture has been successful in combating this disease to a very large extent by spraying Bordeaux mixture.

The cashew-nut tree (*Anacardium occidentale linn*), a native of South America, was introduced in India and West Africa by the Portuguese about 400 years ago, mainly for the purpose of checking soil erosion on coastal lands and hill slopes. Cashew grows under varying soil and climatic conditions from the sandy coast to the lateritic hill slopes of the west coast, upto an elevation of 700 metres above the sea level, and in regions receiving an annual rainfall of 75 cms. as well as in those with over 300 cms. Cashew-nut gained commercial importance during the last 25 years on account of the increased demand for its edible kernel and shell oil in the international markets.

Cashew is a highly cross-pollinated crop. This crop is usually raised by seed. Seeds for sowing should be collected from vigorous and healthy trees bearing regular and heavy crops of medium-sized nuts. Seeds produced from the current year's crop register high percentage of germination. Cashew can also be propagated vegetatively by layers and grafts. Planting vegetatively propagated plants, such as layers and grafts, is better than raising the crop by sowing seeds. It is necessary to manure the seedlings adequately every year to help maximum vegetative growth before they begin to flower. Interculture may be confined to shallow digging. The cashew tree begins to bear fruit in the third year and it attains full bearing stage by the tenth year. The trees bear good crops for nearly 20 to 25 years after which they begin to decline. The cashew tree bears two kinds of flowers, male and bisexual. The percentage of male flowers is normally about 95, while that of bisexual flowers (fruit bearing) is not more than four or five. Only fully matured nuts which have a hard greyish black outer shell should be harvested. The average yield from a bearing tree is estimated at five kgs. or even less. A well maintained plantation with optimum population of trees should yield over a tonne of nuts per acre.

The cashew apple is sweet when it is fully ripe. Its juice is rich in vitamin-C and sugar. It is used for preparing pickles and *chutneys*. But the juice of the cashew apple is going waste. Many tasty preparations like candies, jam, juice, clarified juice, cashola syrup, *chutney* and the like can be made from the fully ripe cashew apples. It is possible to make wine from the juice. The juice mixes well with the juices of lime, pine-apple, orange, grape and apple and makes tasty blends. All these products keep well in storage over one-and-a-half years.

The cashew tree is subject to several pests and diseases, of which the following are more notable: Pests—root and stem borer, thrips, leaf-miner and tea-mosquito; Diseases—Die-back and powdery-mildew. Control measures have been evolved to combat the pests and diseases. Prophylactic treatments ensure maximum protection to the crop. Combination spraying of an insecticide and a fungicide is very effective and economical.

Spices

Spices have been important in human diet. India has, from ancient times, been regarded as the home of spices and is reputed for the most important spices like black pepper, cardamom, ginger, chillies and turmeric. Though these crops are cultivated on much smaller scales when compared to the food crops, still they constitute a sizeable share in the international trade earning foreign exchange. It is only in India that one can find all spices, in all about 35 items, including curry powder, a delicate blend of several spices of varying formulae for which India is specially renowned. The spices grown in the district are pepper, ginger, cardamom, clove, nutmeg and cinnamon.

Pepper

Pepper is an important spice crop in the district. It can be grown as a mixed crop using arecanut palms as standards. Rooted cuttings at the rate of two per palm are planted at the base of each palm, about 30 to 35 cms. away from the base. While planting, southern side of the palm may be avoided. As the pepper-vine grows it has to be trained to the palm. Cattle manure or compost at the rate of 8 kgs. per vine is to be applied before the south-west monsoon. Ammonium sulphate, superphosphate and muriate of potash at the rate of 500 gms., one kg. and 100 gms. respectively per vine may be applied in the month of August or September. The manures are applied around the vine to a depth of about 15 cms., about 30 cms. away from the base and mixed with soil by light forking. Pepper-vine commences yielding from the third year. There are various development schemes for the development of this crop in the district.

Clove

Clove (*Eugenia caryophyllate*) is strictly a tropical plant requiring a warm humid climate and it grows well in places from the sea level upto an altitude of 3,500 feet under heavy rainfall conditions ranging from 60" to 120" and humidity ranging from 60 to 67 per cent. Deep and rich loams with high humus content are best suited. If clove is grown in too moist a climate, it will not flower. Planting is done in a two feet cube pit with a spacing of 25 feet either way in the month of June-July. Before planting, pits are filled with a mixture of burnt earth, compost and top-soil. The optimum age of seedlings for planting is 1½ to 2 years. Clove can also be grown mixed with orange, coffee, cocount, banana, nutmeg and such other commercial crops. It takes nearly

eight to ten years for getting the first crop. The clove of commerce is the unopened flower bud. The unopened flower buds are carefully picked up by hand when they turn pink. They are evenly spread out in the sun for drying. An average acre-yield of 175 kgs. of clove is obtained and the gross income from this is estimated at Rs. 6,000 per acre.

Cinnamon (*Cinnamomum Zeylaricum*) is a plant of the humid tropical region. It comes up well in places from sea level upto 3,500 feet with a rainfall of 60" to 100", a temperature range of 65° to 100°F and humidity of 60 to 85 per cent. Well drained deep sandy soils, rich in humus, is the best suited soil. Two-year old seedlings are planted with a spacing of six feet on either way. Under proper conditions of growth, the seedling will be ready for the first cutting in about three years after transplanting. A healthy bush will then give two to three shoots fit for peeling. The shoots selected for cutting should be about 1½ to two metres in length and about two to two-and-a-half cms. in diameter. The first cutting season of the year is May and the second season starts from November. The shoots are cut to convenient pieces before peeling. The bark is then peeled off with a special peeling knife. The scraping and peeling have to be done on the same day of cutting. The quills are then dried in the sun. The leaves and other choppings are immediately removed to the distillery for extraction of oil. An average acre-yield of 100 kgs. of cured bark is obtained and is valued at about Rs. 7,000.

Cinnamon

Nutmeg (*Myristico fragrans*) thrives well in a hot moist climate and grows in places from sea level upto about 3,500 ft. with a rainfall ranging from 80 to 150 inches and a humidity range of 50 to 70 per cent and a temperature range of 65° to 100°F. Deep rich loamy soil and laterite soil are best suited for the crop. The seedlings are planted when they are about six months old in two feet cube pits with a spacing of 30 feet during June-July. Fast growing shade trees like *Enterolobium saman*, *Erythrina*, *Albizzia* are planted for providing necessary shade. Bearing commences from seven to eight years; when the husks of the nuts split open, the fruits are fully ripe for picking. The seed and the mace are used as a spice. An average of 75,000 nuts are harvested from an acre and this fetches a gross income of about Rs. 10,000 per acre.

Nutmeg

The Cashew Research Station at Ullal, Mangalore, was started in June 1953 under the joint auspices of the State Government and the Indian Council of Agricultural Research. The station was transferred to the University of Agricultural Sciences on 1st October, 1963. It is mainly a research station and the results of research are passed on to the cultivators as and when definite results are available. The station collected 111 indigenous and

Cashew
Research
Station

nine exotic types. Based on the yields of these types, 14 high-yielding plants have been selected and further work on these selections is under way. Air-layering of cashew trees had been tried and found successful. High-yielding plants are propagated by air-layering and the layers have been distributed to the cultivators. It has been found that layers yield a heavier crop than seedlings by about three times. Though cashew is a waste land crop, where no manuring is done, experiments have shown that the cashew plants respond very well to manuring which helps to get high yields. The research staff visit cashew plantations and give guidance regarding plant protection. Recently trials with pine-apple have been taken up to find out the most suitable cultural practices for getting an economical crop.

**Plantation
Crops Research
Institute**

The Regional Station of the Central Plantation Crops Research Institute, Vittal, was established in 1956, as the Central Arecanut Research Station by the erstwhile Indian Central Arecanut Committee. It was taken over by the Indian Council of Agricultural Research in April 1966. Later, in 1970, the Station was recognised as a Regional Station of the Central Plantation Crops Research Institute Complex.

The Station has sections pertaining to genetics, agronomy, soil chemistry, plant physiology, pathology, entomology and breeding of cashew and pepper. A detailed research on each and every aspect of the plantation crops is undertaken. The research findings are published by participating in the farmers' seminars and agricultural exhibitions organised by different State Governments and by conducting a Farmers' Week annually at the station. Short duration training programmes for the benefit of farmers, extension workers and executive staff are being organised. The results of researches are also being published through pamphlets and articles in popular journals. Requests for spot inspections on different problems in growers' gardens are also attended to.

**Nurseries and
Farms**

The Department of Horticulture has started 14 nurseries and farms at various places in the district to provide the required quality seed material for the various horticultural crops. The Horticultural Nursery at Mangalore supplied, as in 1972, 15,600 vegetable seedlings; 18,600 flower plants and 250 kgs. of vegetable seeds, while the Model Orchard-cum-Nursery, Padil, distributed 3,000 fruit plants (grafts, layers and seedlings), 15,884 ornamental and other plants and 2,927 kgs. of vegetable and other seeds and the Cashew Progeny Orchard, Maddadka, with an extent of 42.46 acres, supplied 1,750 cashew seedling materials and 520 cashew air-layers. The Pine-apple Progeny Orchard, Belthangady, having an area of 65 acres, has raised pine-apple and other fruit plants like mango, sapota and guava. It is also a

multiplication centre. The Kukkundur Horticulture Farm, Karkal, with an area of 15.49 acres, is multiplying pine-apple interplanted with mango and sapota. The Horticultural Farm, Ramasamudra, Karkal, having an area of 50.90 acres is cultivating cashew, mango, sapota, coconut and pine-apple. Experiments are conducted on various aspects of horticultural crops in this farm.

The Shivalli Farm, near Udipi, the area of which is 27.45 acres, grows pine-apple, mango, coconut and sapota for providing planting materials. The Horticultural Farm, Kumbhashi, with an area of 8.49 acres, is growing pine-apple, mango, sapota bordered with coconut trees, for serving as a production and distribution centre. The Horticultural Farm, Sullia, having an area of 18.86 acres, is propagating hybrid pepper—Panniyur-I. The Cocoa Progeny Garden, Charmady, is multiplying Forestero variety of cocoa. The Vegetable Seed Farm, Thumbe, Mangalore, is producing quality vegetable seeds in an area of 14 acres. The Multipurpose Horticultural Farm, Vittal, with an area of 16 acres, has been started for raising nurseries for various development schemes. The Mango Progeny Orchard, Kedur, which has an area of 12.49 acres, is to raise a mango orchard for seed purposes. The District Horticultural Office, Mangalore, and the Taluk Horticultural Offices at Coondapur, Udipi, Karkal, Belthangady, Buntwal, Sullia and Puttur have nurseries attached to them and these nurseries supply seedlings to the growers.

The following horticultural development schemes were undertaken in the district, as in 1972 :—

Development schemes

- (1) Cashew Development
- (2) Pepper Development
- (3) Cashew Package (Plant Protection)
- (4) Cashew Package (Demonstration)
- (5) Cashew Package (Cashew Air-Layers)
- (6) Botanical Garden
- (7) Plant Protection of Horticultural Crops
- (8) Banana Development
- (9) Quick-growing Fruits and Vegetables
- (10) Scheme for Fruit Production in Specially Selected Areas—Pine-apple.
- (11) Cocoa Development
- (12) Coconut Development
- (13) Fruit Development
- (14) Development of Vegetables in River and Tank Beds

- (15) Areca Development
- (16) Scheme for cultivation of Hybrid Pepper—Panniyur-I
- (17) Scheme for Special Arecanut Development
- (18) Scheme for Development of Export Quality Banana
- (19) Agricultural Refinance Corporation Schemes on Coconut, Arecanut and Pine-apple
- (20) Applied Nutrition Programme
- (21) Areca Package Programme
- (22) Subsidiary Food Crops
- (23) Vegetable Development Scheme
- (24) Model Orchard-cum-Nursery, Padil Farm
- (25) Vegetable Cultivation

Cashew Development Scheme.—Though India is exporting a large quantity of cashew kernels, it is not having enough raw materials for its cashew industry. About 20,000 tonnes of raw nuts were being imported to feed the existing industry. The Government of India and the State Government initiated a scheme for the development of cashew in the year 1958. The Government of Mysore implemented this scheme mainly by attending to raising of cashew seedlings, assignment of lands for cashew cultivation and providing loan assistance. It was estimated that about an extent of 14,000 acres was under this crop in the year 1958, and about two lakh acres were available for the cultivation of this crop. Then it was programmed to take up extensive cultivation of this crop by raising and distributing seedlings from the nurseries of the Department of Horticulture. Between 1959 and 1963, there were four nurseries in the district raising about two lakh seedlings annually to cover about 2,000 acres. From 1963, the number of nurseries was increased to eight thereby raising two lakh seedlings more. Cashew air-layer work and distribution of air-layers were also taken up from 1960.

Pepper Development Scheme.—The Government of Mysore sanctioned a scheme for the development of pepper cultivation in 1958. This scheme was mainly confined to multiplication of high-yielding pepper rooted-cuttings and their distribution; this was also supported by grant of land for its cultivation, grant of loan assistance and rejuvenation of existing gardens. In this district, the scheme was started with two nursery centres for producing 50,000 rooted-cuttings to cover an area of 200 acres. As there was difficulty in the supply of seedlings by these two nurseries, the number of nurseries was raised to seven covering all the taluks.

Coconut Development Scheme.—A scheme for the development of this crop was started in 1960, mainly for raising seedlings

by collection of nuts from known parentage, and three nursery centres were started in the district for raising 15,000 seedlings. In 1964, the number of seedlings to be raised was increased to 30,000 and later to 90,000 with nurseries in all the taluks.

Areca nut Development Scheme.—A developmental scheme for areca was initiated in 1962. It was arranged for raising quality seedlings and distribution of 25,000 seedlings from two nurseries. Later, the nurseries were increased to eight for raising 1.50 lakh seedlings annually.

Pine-apple Development Scheme.—Propagation of pine-apple is mainly by suckers. Production of these suckers has become a problem. The Department of Horticulture has planted 40 acres with pine-apple under the scheme, mainly for the multiplication of suckers.

Banana Development Scheme.—The State Government sanctioned a scheme for development of banana in 1968. A multiplication centre was started at Belthangady in 1968 and one lakh suckers were distributed. A centre for growing Cavendish banana was started at the Ramasamudra Farm in Karkal taluk.

Cocoa Development Scheme.—A scheme for development of cocoa was sanctioned in 1964. As a first step, a progeny material centre was started at Charmady. Forestero variety of cocoa was introduced for planting in irrigated arecanut and coconut gardens for raising it as a mixed crop.

Cashew.—Propagation of cashew was mainly done by seedlings. A centrally-sponsored scheme for the production of air-layers was started in this district in 1967 for providing 10,000 air-layers annually. It was proved that manuring of cashew trees would increase the per-tree production by about 30 per cent. Hence a centrally-sponsored scheme for manurial demonstrations in cultivators' gardens was taken up from 1967. Forty demonstrations are laid in the district annually. Considerable damage is caused by pests and diseases resulting in a low yield in cashew. It was proved experimentally that pests and diseases like tea-mosquitoes, stem-borer, die-back could be controlled by the use of chemicals. A centrally-sponsored scheme for demonstration of the use of chemicals in cultivators' fields was started in 1967 for covering an area of 600 acres.

Package
Programme

Pepper.—The hybrid pepper—Panniyur-1—was recently introduced under a centrally-sponsored scheme. Planting of this variety was started in 1969. Twenty demonstrations of 50 cuttings in each plot during 1970-71, 25 demonstrations of 100 cuttings

each during 1971-72 and ten demonstrations of 100 cuttings each during 1972-73 were laid out.

**Agricultural
Refinance
Corporation**

A special Three-year Coconut Development Scheme was started in the district in 1970-71. The aim of this scheme was to bring about 2,000 acres under coconut cultivation in the various taluks, aided by the Agricultural Refinance Corporation. Long-term loans were provided at the rate of Rs. 1,760 per acre and Rs. 1,400 per unit of 60 plants (acreage basis and unit basis along with bunds of paddy fields) at 8½ per cent interest, issued in instalments through the Primary Land Development Banks. Quality seedlings and technical guidance were made available to the cultivators by the Department. As in 1972, 535 cultivators, who were having an area of 868.5 acres and 437.75 units, were benefited by this scheme.

A special Three-year Pine-apple Development Scheme was started in the district in 1971. The aim of the scheme was to bring about 2,000 acres under pine-apple cultivation in Belthangady, Buntwal, Coondapur, Karkal, Mangalore and Puttur taluks, aided by the Agricultural Refinance Corporation. The scheme provided a loan of Rs. 2,500 per acre for planting 5,000 to 6,000 suckers. The amount was disbursed in two annual instalments of Rs. 2,100 in the first year and Rs. 400 in the second year. The rate of interest charged to the cultivator was 8½ per cent. Upto the end of November 1972, 38 cultivators, with an area of 107.10 acres, were benefited by this scheme.

An Arecanut Refinance Scheme, spread over a period of nine years, for the development of arecanut plantations in the Belthangady, Buntwal, Karkal, Puttur and Sullia taluks was started in July 1966. An amount of Rs. 5,000 per acre is sanctioned by the Mysore State Co-operative Land Development Bank Ltd., Mangalore and is disbursed in seven annual instalments, the amount of first instalment being Rs. 1,700 and subsequent instalments being Rs. 550 per year. Initially, a target of 600 acres was fixed for this district and as the response from the cultivators was good, the area was increased. As in 1972, 522 cultivators, with an area of 862.85 acres, received help under this scheme.

**Applied
Nutrition**

The Buntwal, Coondapur and Sullia taluks have been covered by the Applied Nutrition Programme, by taking up community orchard and kitchen gardening. The kitchen gardens are raised on the holdings of the Mahila Mandal members and on the school gardens. Quick growing fruits like pine-apple, banana and papaya have been supplied. Grafts of mango, sapota and guava were planted in the community orchards and school gardens.

A centrally-sponsored scheme for "Development of Fruit Production (Banana) for Export" is under implementation in the district since February 1972. The objective of this scheme is to increase the production of selected varieties of banana (Cavendish) for export purposes in the potential areas of the district. Demonstration plots are organised in the cultivators' fields and facilities of loans are available in the commercial banks for this purpose. As at the end of 1972, 51 demonstration plots were laid out and an extent of 10 acres was taken up for cultivation of the cavendish variety. A 50 per cent subsidy for power sprayers and plant protection chemicals is being given. It is proposed to develop 1,500 hectares in the district by the end of the Fourth Plan and also to cover 30 demonstration plots and 500 hectares each year by providing loan facilities. The Department of Horticulture is providing suckers, fertilisers, chemicals, etc., worth about Rs. 1,000 for each of the demonstration plot. The commercial banks assist in providing loans upto Rs. 1,500 per acre.

ANIMAL HUSBANDRY

The primary objectives of the animal husbandry sector have now been well defined. This sector is to produce improved bullocks for agriculture, to increase *per capita* availability of milk, to make available good poultry, to increase *per capita* availability of eggs, to provide better veterinary aid and to increase the nutritional level of livestock by stepping up production of fodder.

There is, in reality, no distinctive breed of cattle in South Kanara due to heavy rainfall and deficiency of calcium and lack of suitable breeding bulls in sufficient number. The cows and bulls in the district are diminutive in size with stunted growth and have no definite breed characteristics. They are known as "Non-Descript Malnad Giddas". The majority of the cattle are dark-haired. Though small in size, they are sprightly animals with an extraordinary power of endurance and resistance to diseases. Due to the low quality of the cattle, their lactative period is 6 to 7 months and the dry period is 7 to 8 months. Many of the large land-owners among the Bunts keep very fine racing buffaloes. In the rural parts, the farmers spend practically nothing towards their feed. They make use of them for cultivation, milk and manure. These animals have for centuries been playing an important role in the rural economy of the district.

For three months from June to August, cattle can hardly move in the open for grazing and are confined to sheds where they are fed with paddy straw, spear grass and small quantities of green grass. From September to December, grazing is available in plenty and therefore, this period is the happiest for these animals.

After December, the luxuriant growth of grass disappears and till the onset of the monsoon, the feed for cattle is generally poor which leads to the deterioration of the cattle. Hardly any fodder crops are grown. The hill grass, *muli*, is not properly utilised by ensilaging it for fodder. The heavy monsoon causes considerable erosion of the soil and hence it is necessary for the farmer to depend on his cattle for purposes of manure. This explains as to why cattle sheds in this district can as well be called manure pits. A thick layer of green leaves is spread on the floor of these ill-ventilated sheds over which the cattle are let loose; the excreta and the leaf get thoroughly mixed up and fermented during the long monsoon months and the animals live and feed under such conditions all through this period. That they survive this ordeal is itself a testimony to their hardihood.

Malnutrition and indiscriminate breeding have also been responsible for the degeneration. Recent years, however, have witnessed an increasing awareness of the necessity of improving conditions of life for the cattle. Although numerically the cattle population is large in the district, the milk yield and milk efficiency of the cattle are among the lowest. A smaller number of well-cared for, well-bred and healthy cattle will be more economical to keep and will contribute in a much greater measure to the diet of the people and to agricultural efficiency. The measures to be taken towards this end are controlled breeding, balanced feeding and prevention of diseases.

Upgrading of cattle

Breeding through inferior bulls causes deterioration in the stock. Hence breeding has to be restricted to only superior stud bulls of approved types recommended for the district. Under the free-bull distribution scheme, Sindhi and Murrah buffalo breeding bulls were distributed either to the village panchayats or agriculturists to upgrade the local cattle. A majority of the taluk headquarters' veterinary hospitals were maintaining Sindhi and Murrah buffalo breeding bulls for crossing the local cows and buffaloes. An Artificial Insemination Centre was started at Mangalore in April 1955. Foreign breeds, such as Jersey and Holstein breeding bulls, were introduced in the Artificial Insemination Centre in the years 1964 and 1969 respectively and it is supplying semen to 27 sub-centres throughout the district. There is one District Livestock Farm, a Milk Dairy, 27 Dairy Farms and 27 Milk Producer's Co-operative Societies in the district.

The district is depending on other regions for its replenishment of cattle. Some of the ploughing cattle are imported from above the ghats. The price of an ordinary pair of bullocks which was about Rs. 20 to Rs. 30 at the close of the century is now easily twelve to twenty times that figure. An ordinary pair of male buffaloes would now cost between Rs. 800 to Rs. 900. The large land--

holders in these parts keep some very fine racing buffaloes. The milch cattle of the district are poor except in the urban areas where good she-buffaloes and Sindhi cows are found. Efforts are being made to improve the cattle of the district by proper veterinary care and the provision of good breeding bulls.

Owing to heavy rains and excessive dampness, many of those cattle, which are in a weak condition on account of deficiency in sustenance during the lean months, die with the advent of the monsoon. It is estimated that about 40 to 50 thousand head of cattle are imported from the old Mysore area, Dharwar district and other parts into the district through annual cattle fairs at Kulkunda in Sullia taluk and Seethanadi in Karkal taluk and weekly cattle markets at Kota in Coondapur taluk and Kunjal in Udipi taluk, and other places.

Of goats and sheep, the district has no large population. Attempts made by the people to breed more of these species have not been successful, mainly owing to the very heavy rainfall. The district, therefore, depends on the adjoining districts for supply of sheep and goat for its mutton. In the coastal towns, a number of good goats, probably introduced from Kathiawar or Arabia, are found and they are maintained for milch purposes.

A considerable section of the population of the district uses pork, and pigs in sizeable numbers are bred in the urban areas. The Jesuit Priests settled in this area have helped in the rearing of pigs by importing boars of foreign breed. The rural areas also have taken to upgrading of the stock and the past decade witnessed considerable improvement both in numbers and in the quality of the breed.

The shortage of mutton in this district is made good to a great extent by poultry. It is estimated that about two lakh eggs are produced daily which shows that the breeding of poultry has been prolific. The Rhode Island Red and the White Leghorn have almost completely replaced the local breeds in the urban areas. In the rural areas also, steps have been taken to replace the local breeds by the foreign breeds. However, these foreign breeds do not produce a stock of fighting quality, fit for the cock fights, which are the pastime of some people in the villages.

Donkeys are almost non-existent and horses are found in a small number. (Statements giving the numbers of different types of livestock in the district, taluk-wise, as per the quinquennial censuses of 1961 and 1966 are included in the General Appendices).

Out of a total cattle population of 7,75,976 in the district in 1966, the number of animals that were kept for work

**Goats and
sheep**

Piggery

Poultry

**Cattle
Population**

was only 2,78,006 which formed about 36 per cent of the total bovine population. The other animals, though not used on the farms, are useful to the farmers in various other ways. The following table gives the classification of bovine population in the district according to the 1966 Livestock Census :—

Particulars	Cows	Buffaloes
(a) Males over three years :		
(i) Breeding ...	1,181	519
(ii) working ...	1,50,785	1,25,542
(iii) Others ...	6,244	2,753
Total ...	1,58,210	1,28,814
(b) Females over three years :		
(i) Breeding ; ...		
(a) In milk ...	94,178	24,880
(b) Dry ...	86,072	18,171
(c) Not calved ...	25,284	4,570
(ii) Working ...	1,225	454
(iii) Others ...	4,726	859
Total ...	2,11,485	48,934
(c) Young stock ...	2,01,189	27,344
Total ...	5,70,884	2,05,092

The density of livestock population in South Kanara district as per the 1966 livestock census was as follows :—

Area in sq. k.m.	..	..	8,415
Human population (1961 census)	..	..	15,63,837
Cultivated area during 1963-64 (in hectares)	..	..	280,499
Cattle.—		Goats.—	
(a) ..	68	(a) ..	3
(b) ..	37	(b) ..	1
(c) ..	404	(c) ..	8
Buffaloes.—		Total Livestock.—	
(a) ..	24	(a) ..	97
(b) ..	13	(b) ..	52
(c) ..	73	(c) ..	291
Sheep:—		Poultry.—	
(a) ..	0.03	(a) ..	232
(b) ..	0.01	(b) ..	61
(c) ..	0.08	(c) ..	341

a — per sq. km.

b — per 100 persons

c — per 100 sectors
cultivated

There were, as in 1972, two Veterinary Hospitals, 14 Veterinary Dispensaries, 25 Rural Veterinary Dispensaries, one Artificial Insemination Centre, two Artificial Insemination Sub-Centres and three First-Aid Veterinary Centres functioning on the Madras pattern, nine Camp Dispensaries, one Regional Research Laboratory, one Regional Poultry Farm and one District Livestock Farm. In addition, there were, during the same year, 40 private poultry farms and 27 private dairies in the district.

**Veterinary
Institutions**

There were, during the same year, one Key Village Scheme with eight units, one Hill Cattle Development Scheme with two subsidiary centres, a World Food Programme, one Extension Centre, three Piggery Development Blocks, a Poultry Development Scheme subsidised for the weaker sections of the population and a Milk Supply Scheme in operation in the district.

**Veterinary
schemes**

There were, during the same year, 28 Veterinary Assistant Surgeons, 71 Veterinary and Livestock Inspectors, 87 Veterinary Compounders and 75 peons working in the district under the control of the District Livestock and Animal Husbandry Officer.

The following table gives the yearly average number of cases treated in the veterinary institutions of the district.

<i>Particulars</i>	<i>Average number of cases treated per year from 1962-63 to 1971-72</i>
Number of cases treated at the dispensaries ...	14,36,81.7
Number of cases treated on tour ...	9,76,41.8
Number of castrations done ...	7,538.8
Number of inoculations for various diseases ...	74,7,61.6

The common animal diseases in the district are gastro-intestinal ailments like diarrhoea and dysentery, deficiency diseases like milk fever and hypocalcemia, udder infections like mastitis and uterine infections like pyometra and endometritis. Among the contagious diseases, haemorrhagic septicaemia and foot-and-mouth diseases are the two main diseases generally found in the district. The outbreak of contagious diseases is found to be seasonal. Haemorrhagic septicaemia outbreaks are found in the beginning and end of monsoons. The foot-and-mouth disease appears in the winter months. There are poultry deficiency diseases such as raup, rickets, encephalomalacia and curly-toe diseases, protozoan diseases like coccidiosis, worm infestation, contagious diseases like ranikhet, fowl-pox, coryza and non-specific diseases like avian leucosis complex and ectoparasites ticks, fleas and mites.

**Animal
diseases**

The average annual number of inoculations done during the period from 1962-63 to 1971-72 was as follows :—

Haemorrhagic septicaemia	..	2,76,288
Black-quarter	..	1,516
Rinderpest	..	25,618
Anthrax	..	55,102
Others	..	4,47,429

**Artificial
Insemination**

With a view to upgrading the local non-descript cattle and buffaloes rapidly by scientific methods, an Artificial Insemination Centre was established at Mangalore in 1955, which was provided with three Jersey, two Holstein and two Murrah bulls. The centre collects semen from each bull every alternate day. There are eight sub-units at Buntwal, Venoor, Coondapur, Karkal, Puttur, Uppinangady, Sullia and Kalanja. At present (1972), artificial insemination work is carried on at 27 places in the district. The collected semen is supplied to all the 27 centres of the district. The number of artificial inseminations done for the past ten years from 1962-63 to 1971-72 was 1,42,374 and the number of calves born was 23,822 males and 25,230 females. Artificial insemination was being done in the district prior to 1956 also, when the district was a part of the Madras State.

**Key Village
Scheme**

The term "Key Village" is expressively worded as it is designed to hold the "Key" to the success of cattle improvement. The Key Village Scheme envisaged a systematically planned method for the best utilization of superior germ-plasm obtained from superior stock by its proper distribution throughout. The technique of artificial insemination is adopted to utilize the available, though limited, number of approved bulls to the maximum extent. The work is being carried out with concentrated efforts in selected villages. Simultaneous attention is paid to increase production of feeds and fodders. Prophylactic measures are taken against contagious diseases. The main centre of the Key Village Scheme was established in 1957 at Kinnigoli. It has eight sub-units at Yekkar, Haleyangady, Karnad, Mundkur, Surathkal, Balkunje, Niddodi and Ganjimutt.

**Hill Cattle
Development
Scheme**

For the main purpose of improving the breed of cattle in the district, the Department of Animal Husbandry and Veterinary Services implemented a scheme called the Hill Cattle Development Scheme during the Third Five-Year Plan period. This scheme was introduced in South Kanara district in 1963, with its headquarters at Udipi. It has two subsidiary centres at Kallianpur and Hiriyadka. The semen required for artificial insemination is supplied from Artificial Insemination Centre, Mangalore. Cross-breeding, castration of scrub animals and disease-control measures

are also taken up under this scheme. The total cost of the scheme was Rs. 28,552.

In order to upgrade the cattle in those interior parts where artificial insemination work cannot be taken up, bulls are distributed every year. During the year 1971-72, three Murrah buffalo bulls were distributed as was done in previous years. This scheme is implemented through the Taluk Development Boards.

Breeding Bull Scheme

It has been noted that the various development schemes operated in the South Kanara district have not reached all the sections of the population. As already stated earlier, this district has a large number of marginal farmers owning less than 2.5 acres of lands and agricultural labourers. The Government of Mysore sanctioned in 1971-72 a Marginal Farmers and Agricultural Labourers Scheme with a view to improving the economic conditions of these two categories of population by helping to create some gainful employment for them.

Marginal Farmers and Agricultural Labourers Scheme

The Udipi and Coondapur taluks were selected for the implementation of this scheme. A sum of Rs. 9.72 lakhs was sanctioned during 1971-72 to benefit 200 families under dairying, 200 families under poultry farming and 100 families under piggery. For 1972-73, a sum of Rs. 16.07 lakhs has been allocated to benefit 400, 300 and 100 families under each of the above-mentioned three aspects respectively, and for the final year of the Fourth Five-Year Plan, i.e., 1973-74, a sum of Rs. 16.07 lakhs is allotted for the same purpose, the total allotment being Rs. 41.86 lakhs. Inclusive of the risk fund, the allotment comes to Rs. 44.52 lakhs.

The Piggery Development Scheme is also meant for the weaker sections of the area. The main purpose of this scheme is to distribute pure-bred boars and sows to the economically weaker sections of the community and to upgrade the local breeds. During the year 1970-71, 45 boars were distributed at Rs. 10 each. In 1971-72, 10 more boars at the same subsidy and six trios, subsidised at Rs. 110 each, were distributed. (Two sows and one boar make one trio.)

Piggery Development Scheme

With the object of production of balanced food like eggs, poultry, etc., and to educate the people about the importance and efficacy of the nutritive foods in the daily diet, three Applied Nutrition Programme blocks were opened in the district. The first was started in 1967-68 at Sullia, the second in 1968-69 at Buntwal and the third in 1969-70 at Coondapur. The Applied Nutrition Programme Block at Sullia ceased to function since 1972-73.

Applied Nutrition Programme

**District
Livestock
Farm, Koila**

The District Livestock Farm, Koila, was established in the year 1950. It is situated about 38 miles away from Mangalore, on the Mangalore-Subramanya Road in Puttur taluk. The object of starting this farm is production and distribution of pedigree bulls to various institutions and individuals, free supply of seed materials for propagation of improved varieties of fodder grasses, demonstration of scientific animal husbandry practices, namely, production of clean milk, cultivation and conservation of fodder and management of cattle and poultry in different stages. Further, efforts are being made to find out a suitable breed of animal and type of fodder grass for agro-climatic conditions prevailing in the area. The farm has an area of 764 acres. A Fodder Development Scheme, a Malnad Pasture Regeneration Scheme and a Lift Irrigation Scheme have been undertaken by this farm.

Murrah and Dharwar buffaloes, Sindhi, Gir, Hallikar cattle and local grades are reared on this farm. The farm is supplying about 300 to 400 litres of milk everyday. In order to improve the milk production, artificial insemination with Jersey semen has been undertaken from 1971. There is also a poultry unit in the farm. It is raising the brooded chicks and pullets required for various schemes in the district. Further, in order to popularise small-scale back-yard poultry in the rural areas, the needs of farmers for a few birds are also met. There are about 700 birds in the poultry unit.

**Clinical
Laboratory,
Mangalore**

The Clinical Laboratory, Mangalore, started functioning from April 1965, under the Third Plan Programme. It is manned by a Regional Research Officer, one Laboratory Technician and a Laboratory Attendant. The purpose of this institution is to help the field veterinary staff of the Department of Animal Husbandry and Veterinary Services in the diagnosis and control of animal diseases, as an adjunct to the animal health and coverage in the districts of South Kanara and Coorg. Different types of specimens received from the veterinary institutions and private parties pertaining to different species of animals suffering from contagious and non-contagious diseases of viral, bacterial, protozoan and parasitic origin are examined in the Laboratory and the results are communicated to help the field veterinary staff for taking further curative and control measures. Besides, the Regional Research Officer visits various places wherever and whenever needed for disease investigation. The biologicals required to undertake preventive inoculations are stored in the institution to meet the emergent needs of the veterinary institutions in the district. During 1971-72, 674 faecal samples, 14 blood smears and 260 scrapings of nasal discharge, milk samples and other miscellaneous samples were examined.

The Government Dairy, Kulashekara, Mangalore, was established on 17th September 1963. It is situated on a Government land of 12.4 acres on Mangalore-Karkal Road at 4.5 mile-stone with an independent approach road. The milk-shed area of this scheme, taking into consideration a radius of 40 miles, comprises Mangalore taluk, Buntwal taluk and portions of Udipi, Karkal, Puttur and Belthangady taluks with a cattle population of 2,79,042 cows and 1,55,328 buffaloes.

Government
Dairy

The Dairy has been procuring the surplus marketable milk in the milk-shed mentioned above, through Milk Producers' Co-operative Societies, in addition to the procurement of milk from the District Livestock Farm, Koila, and providing incentives and other facilities for the development of cattle and small-scale dairy farming. The milk is procured in three routes covering about 27 Milk Producers' Co-operative Societies and the total quantity of milk procured is about 5,000 litres per day. A special feature of this scheme is that milk is procured only from the Milk Producers' Co-operative Societies and no individual supplier is entertained and thereby individual middlemen are completely eliminated. The Milk Producers' Co-operative Societies supplying milk were helped with loans at low rates of interest from the Government funds in the first year under the Dairy Extension Programme and a Gerber's fat-testing machine was given to each of the societies. Those co-operatives which have a wide area of operation were also supplied with bicycles and furniture. They have also been provided with the required number of cans for collection of milk. The average daily milk supply by the various milk producers' co-operative societies to the dairy is about 4,380 litres. The District Livestock Farm, Koila, is also supplying about 200 litres to the Dairy.

A statement showing the quantity of milk handled and receipt and expenditure for the years 1963-64, 1967-68 and 1971-72 is given below :—

Year	Quantity of milk handled, in litres, in a year	Receipt Rs.	Expenditure Rs.
1963-64	354.0	389.40	3,553.42
1967-68	8,34,405.5	10,74,921.05	9,43,689.90
1971-72	11,85,291.5	17,77,937.00	16,35,415.00

There is a Dairy Extension Wing attached to this scheme, which mainly looks after milk production by organising Milk Producers' Co-operative Societies. During the year 1965, a total

sum of Rs. 80,000 was sanctioned as loans to the various Milk Producers' Co-operative Societies from the Government funds and this amount was fully recovered in a period of three years. Subsequently, loans were obtained from the South Canara District Central Co-operative Bank and commercial banks. Fodder grass slips are being supplied by the Dairy Extension Wing regularly every year free of cost for raising the fodder for milch animals.

Private Dairy Farms

There are 27 private dairy farms in the district with a milk production of about 5,000 litres per day. These dairies are maintaining Dharwar buffaloes, graded Jersey, graded Gir, Murrah buffaloes, graded Holstein, graded Sindhi, Surthi buffaloes, Hijar and local breeds. These private dairies are supplying milk to households, hotels and Milk Producers' Co-operative Societies.

Cattle Fairs

Two cattle fairs are held in the district, one at Subramanya-Kulkunda (Sullia taluk) and another at Seethanadi (Karkal taluk). The cattle fair at Subramanya-Kulkunda is held annually generally about the month of November. The duration of the fair is fifteen days. The cattle usually brought to the fair are :—

<i>Cows</i>	<i>Buffaloes</i>
(1) Hallikars and other cross Breeds	(1) Local non-descript
(2) Local non-descript of Mysore	(2) Dharwar
(3) Local non-descript of South Kanara	(3) Murrah

The cattle are brought mainly from Hassan, Tumkur, Chikmagalur and Bangalore districts, Puttur and Belthangady taluks of South Kanara district and Krishnagiri of Salem district. The number of cattle that were brought for sale at this fair in 1970 and 1971 was 10,814 and 6,084 respectively. The types of cattle with their numbers brought to this fair in 1971 were as follows :—

He-buffaloes	850	Buffalo calves	354
She-buffaloes	1,250	Bullocks	650
Male adult buffaloes	2,900	Cows	50
		Calves	30
		Total	6,084

(out of 6,084 cattle 5,700 cattle were sold)

The ruling prices of the animals were as follows :—

	<i>Good</i>	<i>Medium</i>	<i>Small</i>
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
He-buffalo	800	450	80
She-buffalo	1,800	900	250
Bullocks	1,200	700	250

The cattle fair at Seethanadi (Karkal taluk) is held annually about November or December. The duration of the fair is sixteen days. The cattle usually brought to this fair are Hallikar, graded Jersey, graded Sindhi and Killar.

The cattle are brought here from Hassan, Tumkur, Hubli-Dharwar, Shimoga, Tirthahalli, Barguri (Salem district), etc., and from entire South Kanara. The numbers of cattle that had been brought here in 1970 and 1971 were 3,106 and 3,903 respectively. Out of the 3,903 cattle brought here in 1971, 2,750 were sold. The ruling prices of the animals at this fair were as follows :—

Type of Cattle	Good	Medium	Small
	Rs.	Rs.	Rs.
He-buffalo	800	400	150
She-buffalo	2,800	1,600	850
Bullocks	1,600	1,400	600

A Poultry Extension Centre was established at Mangalore in 1958 at a cost of Rs. 45,000. The District Poultry Farm, Koila, and the Poultry Extension Centre, Mangalore, were merged in 1965 to form the Regional Poultry Farm with headquarters at Koila at a cost of Rs. 65,000. The headquarters was shifted to Mangalore from Koila in 1967. Later, in 1971, the Koila portion of the poultry farm was handed over to the District Livestock Farm, Koila, to form a separate poultry unit.

Regional
Poultry Farm

The Regional Poultry Farm, Mangalore, has been serving as a seed multiplication centre for the propagation of White Leghorn (Mychix). Apart from the supply of birds and hatching eggs, the Farm has been extending other facilities like custom hatching, technical guidance and training to the poultry farmers. Under a crash programme, the Farm was expanded from 500 to 1,000 layers. The Farm also caters to the needs of the Applied Nutrition Blocks. The following table shows the production and distribution of eggs and birds at this Farm periodically from 1958-59 to 1971-72 :—

Sl. No.	Particulars	1958-59	1967-68	1971-72
1	2	3	4	5
1.	Eggs produced	3,983	89,906	76,017
2.	Utilised for hatching	...	4,631	23,886
3.	Sold for hatching	810	4,168	4,095
4.	Sold for table purpose	...	80,098	54,649
5.	Supplied to Artificial Insemination Centres.	...	1,093	1,194

1	2	3	4	5
6.	Chicks produced	...	1,752	12,150
7.	Day-old chicks sold	...	1,164	6,074
8.	Adults sold	...	2,323	4,276
9.	Number of persons availed of custom hatching.	50	86	19
10.	Number of eggs set for custom hatching.	...	3,419	1,554

**Poultry
Extension
Centre**

The Poultry Extension Centre, Coondapur, was established in 1958. It is a 100-layer farm. Its primary function is to cater to the needs of the Applied Nutrition Programme Blocks. Custom hatching is done and sexed day-old chicks are also sold. The Centre has training facilities for poultry farmers.

**Poultry
Development
Scheme**

In order that the weaker sections may take up poultry farming to improve their economic condition and nutritional standards, a Poultry Development Scheme was started in the district in the year 1970-71. It provides incentives by supplying birds, feeds, etc., at subsidised rates. Each of the selected families is assisted to set up a poultry unit of 50 layers. An allotment of Rs. 3,000 was made in 1970-71 for helping three families and during the next year a sum of Rs. 5,000 was allotted for assisting five families. In 1972, there were 40 private poultry farms in the district, with about 19,000 birds. Their total egg production came to about 5,35,000 per year.

**Poultry
Farmers'
Society**

The South Kanara District Poultry Farmers' Co-operative Society Ltd., Mangalore, was started in the year 1964 with the objective of developing poultry farming in the district. In 1972, the Society had 565 members with a paid up share capital of Rs. 10,830. The Department of Animal Husbandry and Veterinary Services channelised Rs. 60,000 under the crash programme through this Society as loans for the benefit of poultry farmers. Each poultry farmer was given a loan of Rs. 1,000 in two instalments, one of which was given in the form of poultry feed, poultry equipment and chicks of high bred variety and another portion was given in cash. The Society prepares poultry feed under the supervision of the Assistant Director, Regional Poultry Farm, Mangalore. It is selling poultry medicines, poultry equipment, water troughs and feeds to the members. The eggs received from the members are also sold by the Society. The total sale of poultry feed, eggs, medicines and equipment during the year 1971-72 was to the extent of Rs. 1,17,396.

There has been very little practice of specially growing any fodder crop in the district. The cattle are let out to graze in the forests or *gomal* lands very near to the village or town. Only

during nights, when they are tied in the sheds, the cattle are fed with paddy straw, which is available in plenty in the district. The fodder available in the forests and *gomals* is the spear grass found all over the district in hills and plains. The spear grass when young is grazed by the cattle and at the flowering stage it is cut and converted into good hay. Ragi straw is also used as fodder as ragi is also grown in the district. Of late, some efforts are being made to grow some fodder crops, as the forest lands and *gomal* lands are being made use of otherwise. Since recent years, some perennial and annual grass crops are being grown in the district in small areas. The perennial grass crops are Pusa Hybrid, Napier, Guinea grass, Thin Napier and Para grass and the annual grass crops are jowar, maize, teosinte, etc.

FISHERIES

The term "Fisheries" is usually applied to the business of catching any forms of life living in the rivers and the seas. It includes the catching of edible fish, lobsters and crabs, collection of oysters, hunting of whales and seals, gathering of sponges and corals. The life in water is a valuable source protein as well as Vitamins A and B. Fish is one of the important protective foods because of its high nutritive value. Fish can form a specially valuable addition to the diet of primarily rice-eating people as carbo-hydrates are practically nil.

Surplus fish, trash fish and fish wastes are also indirectly used as food by converting them into fish-meal for livestock, piggery and poultry. Fish is also used as raw material for manufacture of fish-oil, fish liver-oil, fish-glue, etc. Other uses of fish are as larvicides (for control of mosquitoes and guineaworm), as pets and for angling sport.

The fisheries in the State assumed added importance only after the formation of the new Mysore State which included the two coastal districts of North Kanara and South Kanara. This coastal region is reputed as the mackerel coast. As in the case of other parts of the coasts in India, only about fifth of the fishable area of about 10,000 sq. miles on this coast is at present exploited. Mackerel used to be the fish which was most abundant in this coast but in recent years, the landings of this fish have been rather poor and sardines have dominated the catch. Mackerel is, however, still the most important fish in this State and the economy of the fishing industry is still, to a certain extent, dependent on this fish.

The bulk of the Fisheries of the Mysore coast is made up of the sardines (chiefly oil sardines) the mackerel and other

miscellaneous pelagic fishes which come into the inshore waters during the fishing season, presumably for feeding in the shallower waters teeming with life after the heavy south-west monsoon. Although these shoaling fishes appear on the coast with almost clock-like regularity, there are fluctuations in their abundance which makes fishing somewhat uncertain. One redeeming feature of the fishery of the Mysore coast is that generally when the mackerel fishery is a failure, there is a good fishery of the oil sardine and when the oil sardine is scarce, the mackerel fishing is generally good. However, while an abundance of mackerel augurs well for the fishing industry, an abundance of oil sardine brings with it problems of preservation. Often in good seasons of oil sardine, the fish are so abundant and are caught in such large numbers that neither the preservation nor the transport facilities are adequate for handling and properly disposing of these catches, with the result that they are sometimes dried on the beach or buried in the land to be used later on as manure. In the coast of Mysore, extraction of sardine oil has been a cottage industry, the fish being cooked in water and the cooked fish pressed in a screw press, the oil being laddled out from the surface of the pressed liquid. The pressed cake is dried and marketed as "Fish guano", a product of the coast well known for decades which is used as a fertilizer. Actually, this pressed cake, if properly processed, could be converted into fish-meal for which there is a large and growing demand in the country for use as poultry feed.

The South Kanara district has a coast-line of about 141 kms. in length. This comparatively small length of coast-line has an immense wealth of fishery resources. The sea off this district yields, on an average, 80,000 metric tonnes of fish, although the catch in favourable seasons is much more, which accounts for nearly 60 per cent of the total fish catch of the State and is valued at about Rs. 162 lakhs. In 1957-58 the sea fish landings were estimated to have been over 72,000 tons annually, the landings in 1971-72 being about 51,000 tonnes. The district is endowed with a heavy rainfall, much of which is carried by the numerous short and swift rivers to the sea, carrying plenty of nutrient materials, washed from the land. A feature of these rivers is the sandbars at their mouths, which thus make the inner area comparatively safe for the navigation of frail craft which is an important means of communication in the district. Some of these rivers are subject to tidal influence as far as 15 to 20 miles inland. The estuaries of these rivers are noted for the richness of their fauna, both fresh-water and marine forms being available in comparative abundance. The estuarine rivers are, in fact, natural hatcheries, which serve during the monsoon as breeding grounds for many marine forms, which seek shelter there from the inhospitable seas during this inclement season.

The sea off the South Kanara coast shares the defects usually associated with the seas washing the peninsular tract of the sub-continent. The depth of the surrounding sea testifies to the steepness of the continental slope, which suggests the comparative closeness of the hundred fathom line about 50 nautical miles off-shore. The continental ledge is narrow and almost skirts the coast-line. Such an environment, as is well known, is unfavourable to teeming fish life and often causes an apparent monotony of biological conditions. These unpropitious features are offset, however, by the large quantity of land-washed water brought in by the rivers and by the strong monsoon winds which, by their impact on the land, set up powerful surface drifts, which serve to churn up the waters of the sea from the deeper and richer layers. The upsurging waters bring up plankton to the surface, which acts like a magnet attracting shoals of fish and for which it provides valuable sustenance.

The coast-line is dotted with a number of fishing hamlets, these being 85 fishing villages in this district, with a fisher-folk population of about 60,000. Out of this, nearly 15,365 were active adults engaged in fishing as in 1971. The various types of active adults were as follows :

Number of full-time fishermen	..	12,910
Number of part-time fishermen	..	2,225
Seasonal fishermen	..	230
		15,365
Total	...	15,365

There were 10,012 women and 1,536 men engaged in the fish trade.

The fishing population consists of Mogaveeras, Bovies, Kharvis, Harikanthas, Daljees and Moplals. The Moplals speak Malayalam and most of the Mogaveeras speak Tulu. The Kharvis and Daljees speak Konkani and the Harikanthas and other fisher folk in the northern part of Udipi taluk and in Coondapur taluk speak Kannada. The fishing season begins by the middle of September and ends by the end of April next year.

The following are the important varieties of marine fish of this district :

1. Mackerel (*Basterlliger kanagurta*) :

None of the fish is of more economic importance than the mackerel and it forms the basis of a flourishing industry. The success or failure of a fishing season is often determined by the abundance or paucity of the mackerel. This fish forms 60 to 80 per cent of the total catch. The appearance and disappearance

of this fish are indeed intriguing. Dense shoals of the fish strike the coast, soon after the abatement of the south-west monsoon, the shoals generally appearing earlier in the south and seeming to move gradually northwards. The shoals are easily spotted as the fish in their migration swim on the surface and their course can be followed by sight.

The mackerel is locally known as Bangade, and is distinguished by its rich metallic colouration and by a number of detached finlets between the back fin and the tail. Its flesh is of a firm consistency and has also some oil in it. Salt-cured mackerel is in great demand in upghat markets, as well as in Sri Lanka.

2. Sardines (*Sardinella longiceps* and *Sardinella fimbriata*):

These two species stand second in importance to mackerel among the fishes of this district. Their occurrence, particularly of the oil sardine, is very irregular and uncertain. In some years, the catch of the oil sardine is so huge that some of it cannot even be disposed of and has to be buried on the beach only to be used as manure. In lean years, the catches are very poor. The oil sardine has a large oil content, especially the adult. The oil, known as sardine oil, is extracted by cooking the fish in open vats and then pressing the cooked matter in a screw press. The pressed cake, known as fish guano, is used as manure. The oil is of great utility in the leather industry. When the oil sardine is abundant, preparation of sardine oil and fish guano is a flourishing cottage industry in the coastal area.

3. Cat Fish (*Tachysurus dussumieri*):

In the order of abundance in the catches, the cat fish takes the next place. It makes sporadic appearances in large shoals between December and April. The fish is not very highly esteemed for consumption in the fresh condition, and is, therefore, extensively salted and dried. There is a good demand for salted cat fish in the inland districts and also in Sri Lanka.

4. Prawns (*Penaeus indicus* and *Metapenaeus dobsoni*)

The prawns are abundant during the monsoon months and are of great economic importance as they are highly esteemed as food. In recent years, after the installation of a freezing plant at Mangalore, the freezing of prawns for export to the United States of America is becoming an established industry.

5. Silver bellies (*Leiognathus species*):

Next to prawns, silver bellies are caught in a fair quantity. They are mostly sun-dried and are generally popular among fish eaters.

The other fishes of commercial importance are sharks (*Scoliodon* and *Carcharhinus*) and skates (*Trygon*), Soles, *Cyneglossus*, Jew-fish (*Sciaena*), Seer (*Seouberomous*) and pomfret (*Parastromoteus*). Of these, the last two, *i.e.*, seer and pomfret, although caught in comparatively smaller quantities, are highly esteemed and fetch a good price. Apart from these, shoals of miscellaneous fishes like jew-fishes, various clupoids, anchovies, carangids, etc., are caught in large numbers and constitute a fishery of "miscellaneous fish", which, though not important on account of the species or size of the fish, are nevertheless of considerable significance on account of the size of the total catch, which may be some times as much as 25 per cent of the total landings. When the mackerel or the sardines do not make their appearance, this miscellaneous fishery is what sustains the industry. These miscellaneous fish are consumed mostly by the poorer classes and they generally fetch a low price.

The fishing season is comparatively of short duration, commencing in September and generally declining by February, although actual fishing may continue up to end of April. The period of the south-west monsoon from June to August is the off-season for sea fishing. During this period, however, prawns are in abundance and are caught in sheltered waters close to the shore. Mullet whiting (*Sillago*), thread fins (*Polyemids*), bekti (*Latos*), etc., are caught in the estuaries. The table given at the end of the Chapter shows the total of quantity of fish landed and its value from 1967-68 to 1971-72.

The most common methods of catching fish from the sea on the South Kanara coast may be briefly classified as follows :—

**Fishing
methods**

1. Gill-net fishing :
 - (i) Drift gill-nets
 - (ii) Set gill-nets
 - (iii) Encircling gill-nets.
2. Seining :
 - (a) Shore seines—big and small
 - (b) Boat seines
3. Cast-net fishing
4. Hook and line fishing
5. Fishing by traps and other devices

Gill-net fishing :

In gill-nets, the fish get caught in the mesh of the net when trying to swim through. The fish is able to get its head through a

mesh, but not its body, and when it attempts to free itself, the twine slips under the gill cover and the fish becomes gilled. These nets are rectangular in shape and a series of nets are tied end to end and made to hang in the water like a wall. They may be made out of hemp or cotton twine and the size of the mesh varies according to the kinds of fish to be caught. Drift nets are not anchored in the water, but the boat as well as nets drift along with the current.

A drift gill-net may be fished at the surface or in mid-water, but the net is always suspended vertically with a cork line on the top edge and a lead line at the bottom. In fishing below the surface, the size and number of floats and weights are adjusted so that the net will sink, the desired fishing depth being maintained by lines fastened at intervals from the cork line to large surface buoys. There are various kinds of drift-nets used in the district depending upon the material, the size of mesh and the fish to be caught. Kandadi-bale, aibur-la-bale, kai-bale, etc., are examples of drift gill-nets.

Set gill-nets are anchored and are not allowed to drift. Like drift nets, they may be operated at the surface or at the bottom. Chala-vala and Kantha-bale are examples of set gill-nets. The encircling gill-net known as patta-bale is commonly used for catching mackerel. The net is made of thin cotton twine with 2" mesh (stretched); 16 to 18 pieces of net are laced together and used. Two canoes are generally required for its operation, but a larger number may combine. The operation consists in setting the net round a shoal of fish, usually in water sufficiently shallow for the net to reach the bottom. When the shoal or at least a part of it is enclosed in the ring of netting, the fishermen let loose a pandemonium of noise, yelling and splashing the water. The terrified fish rush in all directions only to get themselves gilled in the surrounding wall of netting.

Seining : (a) Shore Seine.—A shore seine is a long length of netting, shot from a boat as it is rowed from the beach and back again in a semi-circle, enclosing any fish that may be within the semi-circle. The Rampani net is the large shore seine, very commonly used on the coast of South Kanara. The fine shore seine is said to have been introduced from Goa, some 75 years ago. It is also said the introduction of this net into South Kanara was due to the initiative of a Catholic priest called Father Rampan or Rampani. It is the largest of all the nets used on this coast and is made of hemp and cotton. It may be as much as a mile or more in length, and is made by joining together 500 to 700 pieces of webbing. The depth of the net increases gradually from the outer end of each wing (where it is about 6 feet) to 25 or 30 feet in the centre. The

mesh conversely decreases from about $2\frac{1}{2}$ " (stretched) at the outer end to 1" (stretched) in the central region. The head rope is provided with wooden floats and the ground rope is weighted with stones or lead pieces. At the free ends of the net, the head and foot ropes are often fastened to the ends of a short, stout pole. A hauling rope of coir, about 200 to 300 fathoms long and 2" to 3" thick, is attached by a short bridle to the pole at each end of the net. The Rampani net is shot only when a shoal of fish is noticed coming close enough to the shore to justify an attempt to surround it with net. For this purpose, look-outs are stationed at suitable points of vantage.

The net is loaded on the 'padavu' which is a plank-built outrigger boat used only for the operation of this net. When a shoal is sighted, the boat is launched leaving one end of the hauling rope on the beach. The boat is rowed fast and away from the shore, paying out the net as it goes and the shoal is surrounded in a large semi-circle. The remaining part of the net is then laid towards the shore and the other hauling rope is taken, and the hauling begins. A few small auxiliary canoes tend the headrope to prevent it from sinking and letting the fish escape. The operation may last a few hours. As the net is hauled, the arc of the circle becomes smaller and smaller and the fish are gathered in the central section of the net. The water between the net and the shore then becomes seething mass of fish which are bailed out into baskets or into canoes according to the size of the catch. Sometimes, the catch is so large that a part of it is left in the sea in the enclosure of the net, to be bailed out the next day. The net requires 60 to 80 people to operate. It has immense catching power and as much as 10 tons of fish may be landed in a haul.

The cost of a Rampani net is said to be about Rs. 30,000. This expenditure is met by collective efforts. 'Rampanis' are often unregistered co-operative fishing units, some 40 to 50 owner-members contributing a few pieces of net each. Each unit has a 'Thandel' who is responsible for the fishing and an accountant ('Shanubhogue') who maintains the accounts. The proceeds of the fishing operations are pooled together and after deducting the expenses, they share equitably. The accounts are generally settled only at the end of a season and until then, the members are given advances to meet their personal expenditure. A small shore seine known as the 'Kairampani' is operated when small shoals are near the shore, but not enough to operate the Rampani or when the Rampani cannot be operated on account of adverse weather or other circumstances.

(b) *Boat seine*.—This is a huge circular bag-net generally made of hemp, with a long wing of coir-rope netting attached on either side. The bag is about 60 feet long, broadening towards

the mouth. The mesh varies from $\frac{1}{2}$ inch to $1\frac{1}{2}$ inches. The upper edge of the net (head rope) is provided with floats and the lower edge (foot rope) with weights. A stout rope is attached to each wing. This net, which is locally known as 'Mari-bale', is used for catching shoaling fishes like cat fish, mackerel and sardines. Two large canoes are necessary for the operation. The two canoes, with half the net loaded into the stern of each, paddle side by side to the fishing ground. When a shoal of fish is seen, they manoeuvre into a position ahead of them. The canoes then separate, shooting the net between them and across the course of the shoal. The boats encircle the shoal and come together again and start hauling in the net quickly, the fish being caught in the bag.

Cast-net fishing :

The cast net (*beesu bale* or *beedu bale*) is the most commonly used net, in the sea, as well as in the rivers and tanks. It is rare to find a family of fishermen which does not own a cast net. It has many varieties, differing from one another in the size of the meshes, the diameter of its circle and the weights at the periphery. But all varieties agree in general construction. They have a served ring opening at the centre (or apex) through which the hauling line passes. This hauling line subdivides into numerous secondary strings. Each of these in turn subdivides into three short branches, the ends of which are attached to the peripheral cord which is weighted at intervals. The cast net is a very useful net, for it is operated by one man and can be used from the shore or from a boat. The net when cast spreads out into a circle. The weights at the periphery quickly take it to the bottom. Then the line is hauled in. The leaded margin is drawn inwards and upwards, getting finally bunched together in the centre. The fish get imprisoned in the ring-shaped pouch that is formed. The net is then hauled up. Some of the cast nets are quite large and may be as big as 40 feet in diameter. They require great dexterity and strength to be cast properly.

Hook and line fishing :

Suspending a baited hook at the end of a line and enticing and catching fish, which when trying to swallow the bait, get hooked, is an ancient method of fishing practised everywhere, by professionals as well as amateurs. Long-line fishing is carried on, on a commercial scale, while angling is generally resorted to as a means to improve the family's food supply.

Long-line fishing :

This method of fishing, locally known as *bepu* fishing, is generally common among the Moplah fishermen. A long line, to which are attached 200 to 1,000 hooks baited with flesh or eal,

sardine, mackerel and other selective fish is set in the sea at known fishing grounds. The line is buoyed at each end by a large and conspicuous buoy of wood or empty kerosene tins, with smaller floats at intervals. Large stone sinkers attached to either end of the line anchor the line when it is laid. The line is hauled up after an interval, and the fish caught are chiefly cat fish, sharks, rays, snates, seer, carangids and small jew-fish.

Angling :

Fishing with a leaded line armed with one or more hooks just above the lead is practised to a limited extent during the leisure hours of the fishermen, mainly as a means of getting their daily needs of fish for consumption at home. Angling with a rod and a line is common in the backwaters, rivers and ponds.

Traps and other devices :

Various kinds of basket traps are used for catching fish in creeks, streams and ponds, in very shallow water. The water is strained through the bamboo-woven basket or traps which are made with openings through which fish can enter but cannot get out. Drag nets are also used in shallow water in rivers and ponds.

Trawling :

Trawling consists of dragging a bag net along the bottom of sea. The water is strained through the meshes of the moving net and the fish are caught in the bag. The mouth of the net is kept open with a device, which consists of two boards, one on each side, which when dragged through the water tend to move apart. These boards are called the otter boards and the method of fishing is called otter-trawling. This kind of fishing, which requires a mechanised boat, has only recently been started in this district and is mainly used for catching prawns.

Sailing boats :

It is estimated that there are nearly 3,232 fishing boats for use on the sea and estuaries of this district. These fishing craft consist almost entirely of small, open boats propelled by sail or oars. Excepting the 'Padavu', which is used for the operation of the Rampani net, the other boats are all dug-out canoes carved out of a single tree trunk. The canoes range from the small ones (20 to 25 feet in length) used for fishing mostly in estuaries, to the large Kairampani boat nearly 40 feet long and used for the operation of the small shore seine. Intermediate sizes are used for the operation of other nets like Patta-bale, Kantha-bale, Beppu, Beesu-bale, etc. The cost of these canoes ranges from Rs. 300

to Rs. 3,000. The Rampani 'Padavu' is a plank-built boat with an outrigger consisting of two booms and one float, this boat being 50 to 55 feet long.

**Development
of Fisheries**

The development of fisheries was taken up in the Second Five-Year Plan. In recent years, the development of marine fisheries has generally progressed along the following lines :—

(1) Increasing the catch by improving and extending the catching of fish in the sea, and for this purpose action has been taken to :

(a) introduce the use of mechanical power for fishing ;

(b) introduce improved fishing gear and fishing craft ;

(2) Improving the utilisation of fish by providing adequate facilities for preservation, processing, distribution and marketing.

Ancillary to these programmes of development have been :

(3) Setting up of boat-building yards for construction of improved types of fishing boats,

(4) Training of fishermen in the use of new types of fishing boats and fishing methods,

(5) Provision of harbour facilities and facilities for fish handling, boat repairs, etc.,

(6) Survey and location of fishing grounds in new areas and evolution of better fishing gear and craft through design and experiment,

(7) Building up of a stronger and better man-power required by the industry through socio-economic betterment of the fishermen by means of education, rehabilitation, co-operation and financial assistance.

Till recently, fishing in the district was confined only to indigenous methods and only the coastal belt was the area of operation. Though the district has vast continental shelf with huge fishery resources, the fishing operations could not, for obvious reasons, be extended to the deeper waters. With a view to exploiting the untapped resources, mechanisation of fishing was introduced in the year 1958 by establishing a boat-building yard at Mangalore. In the beginning, the fishermen thought that the sound produced by the engine in the water could be a hindrance and the fish would run away from the boats because of the sound instead of coming closer. But soon they realised that mechanisation was considerably helpful. After the introduction of mechanisation of fishing, rich shrimp trawling grounds were discovered and the commissioning of the freezing plant in Mangalore gave a fillip

to the freezing and export of shrimp, making mechanised fishing more popular and profitable. The demand for mechanised fishing boats progressively increased. From 1962 onwards, the Government of Mysore started giving engines also to fishermen for construction of boats at their own cost and in due course, a number of private builders took up the construction of mechanised boats and the South Kanara District Co-operative Fish Marketing Federation also took up this work. With the success achieved in this aspect, the Federation started construction of boats on a large scale and was able to implement a project of construction and supply of mechanised boats at a cost of Rs. 1,25,00,000. The number of boat-building yards as in 1972 in the district was 24, one being in public sector, two in co-operative sector and 21 in private sector.

The number of mechanised boats in the district from 1958-59 to 1971-72 was as follows :

Year	Boats	Boats	Engines	Boats added	Total
	Supplied by Fisheries Department	Supplied under Agri- cultural Refi- nance Scheme	Supplied by Fisheries Department	under Bank Finance Scheme	
1	2	3	4	5	6
1958-59	9	..	..	..	9
1959-60	12	..	..	..	12
1960-61	17	..	..	..	17
1961-62	10	..	..	..	10
1962-63	9	..	1	..	10
1963-64	16	..	8	..	24
1964-65	6	..	41	..	47
1965-66	7	..	34	..	41
1966-67	8	20	20	..	48
1967-68	1	54	28	..	83
1968-69	1	57	10	..	68
1969-70	..	83	8	163	254
1970-71	..	26	..	109	135
1971-72	..	..	..	19	19
Total	96	240	150	291	777

The mechanised fishing in the district is mostly confined to smaller boats of 30' and 32' in length and powered by 10 to 30 H.P. diesel engines, all of which are engaged in trawling shrimps. Shrimp trawling is carried out near the shore in 10.14 fathoms of water. The shrimps landed are processed by the freezers and exported to foreign countries. The quantity of shrimp and other fish

products exported to foreign countries during 1970-71 and 1971-72 and the foreign exchange realised were as follows :—

Year	Quantity exported (tonnes)	Foreign exchange realised in Rs.
1970-71	942	82,00,000
1971-72	1935	2,11,74,047

Mechanisation of fishing has so far been confined to catching of bottom fish, while the catching of shoaling fishes like sardines and mackerels is still carried out by traditional methods. The number of old types of fishing units which were in operation in the district in 1972 was as follows :—

1. No. of country crafts	..	3,232
2. No. of 'Rampani' units (each unit consisting of a group of 60-80 fishermen)	..	89
3. No. of 'Kairampani' units (each unit consisting of 30-40 fishermen)	..	114
4. No. of encircling gill-net pieces		5,520
5. No. of cast-nets	..	4,365
6. No. of other drift or gill units	..	15,130

Utilisation of fish

A large quantity of fish is landed on the coast of this district but for want of adequate facilities for storage and transport, only a small part of it reaches the interior markets in the fresh condition. It is estimated that about 47 per cent of the total catch is consumed fresh, while about 50 per cent of the catch is cured with salt and about 3 to 4 per cent is preserved by sun-drying. Two to three per cent may be converted into manure and about one per cent is treated for oil. The Government's aims in the plan for development of fisheries are directed as much towards providing facilities for preserving and storing fish and for quick distribution of them in the interior, for marketing and for increasing the catch. Besides supplying salt at subsidised rates at the Government Fish-curing yards, ice plants and cold storages are being set up at suitable places. Diesel trucks as well as smaller transport vehicles are being supplied to fishermen's co-operative societies to facilitate quicker distribution of fish.

Sun-drying.—Some fish which have small and thin bodies lend themselves to preservation simply by drying in the sun. Small prawns, ribbon fish, mullets, soles, silver bellies and white bait are preserved in this manner.

Curing of fish with salt constitutes one of the most important **Fish-curing** methods of preserving fish on this coast and a large proportion of the catch is preserved by this means. The easy availability and storability of salt and the availability of plenty of sunlight combined with the difficulty and expense of providing other means of preservation at the fish-landing centres make salt-curing of fish economical as well as inevitable. There were 15 Government fish-curing yards in this district which are situated in the vicinity of the major fish landing centres. Salt is stored and issued at these yards all the year round and facilities are provided for cleaning and drying the fish. Apart from these yards, there are numerous private fish-curing places where the curers have their own cement vats and salt stores.

Dry-curing.—Large fishes such as seer, pomfret, cat fish, jew-fish, perches, etc., are slit through the dorsal line from the root of the tail to the tip of the snout and the guts and gills are removed. The vertebral column adheres, however, to one of the two surfaces of the slit fish. The vertebral column is severed from the depth of the fish, but is not detached. This operation imparts to the fish a wide flat shape. Cuts are then made lengthwise on the thick fleshy parts. Cuts such as those just described are not, however, made in thin fish such as mackerel, ribbon fish, sardines and small pomfrets, which have only the original slit along the dorsal line.

The mackerel fish are also slit along the abdomen, as some fish-curers favour this method. The sardines are cured either by severing the head and slitting open the abdomen with a diagonal stroke or by a mere thrust of the knife into the abdomen and by the extraction then with the fingers, of the entrails and gills. Sharks and other large sized fishes are cut to sizeable fillets for marketing purposes.

Wet-curing.—Locally, this method is called "Ratnagiri Curing" or "Karvani Curing". Small-sized fishes are not opened, while large sized fishes such as seer, and thread fins are split and cleaned before they are treated with salt. Ordinarily, one maund of salt is required for every three maunds of fish and on occasions one maund of salt is used for two maunds of fish. On the first day, half the quantity of salt is rubbed on the cut surface of the large-sized fish and the fish are then stacked in quadrangular heaps on the floor of the curing shed upto a height of three to four feet. The small-sized fish are merely treated with salt and heaped up. On the second day, one half of the remaining salt is rubbed in and the fish so restacked that the top fish become the bottom

up. On the third day the remaining salt is applied and the fish are restacked again. If a satisfactory cure is not obtained, the process is repeated on the fourth day, with a fresh quantity of salt. The fish become fit for export in about a week. The fish cured by the wet process are not exposed to the sun. Wet-salted fish normally contains 60 per cent of water, 16 per cent of salt and 24 per cent of solid matter, against 80 per cent of water and 20 per cent of solid matter in raw fish.

Colombo-curing.—The fish like mackerel and seer are also pickled, a method which goes by the name of “Colombo curing” or “Jadi” or “Pickling”. Along with the salt, an acid fruit called ‘Korkapuli’ is used and this gives the fish a distinctive flavour which is popular in Ceylon (Sri Lanka). The use of the fruit is said to give another advantage by softening the bones of the fish.

A good proportion of the cured fish is exported to Sri Lanka, Burma and other countries. Home markets to which cured fish is supplied are Ratnagiri in Maharashtra, Changanachery in Kerala and Tiruchirapalli in Tamil Nadu. Cured fish finds also a good market in the coffee and tea estates in the Malnad areas.

Iceing

The use of the ice for preserving fish opened up bigger markets for the fish. The ice serves to preserve fish for a few days which fetches a higher price. The landings of fish are also increasing year by year, thereby providing opportunities for new methods of preserving. During the Second and Third Five Year Plans more and more processing factories have been established in the public, private and co-operative sectors along with preservation factories. The number of ice plants and cold storages in the district as in 1972 was as follows :

(Capacity in tonnes)

Sectors	Ice Plant		Cold Storage	
	Number	Capacity	Number	Capacity
Public Sector	9	54	8	223
Private Sector	25	275	6	200
Co-operative Sector	2	15	2	90

Freezing

During certain seasons, the fish-landings are so heavy that there is a possibility of the fish being wasted either by poor preservation or no preservation at all. At such time, it is necessary to process the fish for long terms storage and this can be

done by freezing, canning, salting, smoking and dehydration. Freezing got a fillip after the export of fish gained importance. The first freezing plant was set up in Mangalore by the Government of the erstwhile Madras State. Prawn, frog legs and tails of lobsters are also frozen, mainly for export to the United States of America. In 1958-59, over 200 tons of these frozen foods were exported. As in 1972, the following was the number of freezing plants and frozen fish storages in the district :—

(Capacity in tonnes)

Sector	Freezing Plants		Frozen Fish Storages	
	Number	Capacity	Number	Capacity
Public Sector	4	27	4	640
Private Sector	10	26.5	7	615
Co-operative Sector ..	1	12	1	100

Although large quantities of oil sardines are caught on this coast, its landings are so erratic that no effort has been made to can them. It was only recently that a small cannery was established at Malpe for canning small shrimp for export. In 1972, there were six canning plants with a capacity of 40,000 cans per day in the private sector and one canning plant with a capacity of 4,000 cans per day in the co-operative sector functioning in the district. The problem faced in the field of canning of fish is the short period of availability of the raw material which restricts the season of operation of the canning plant. This difficulty could be overcome by using frozen fish, increasing the catch by using bigger vessels and also organising fishing for tuna.

Canning

Dehydration of fish is by a process called accelerated freeze drying (A.F.D.) One advantage of this process is that refrigerated conditions of storage or transport are not required and dehydrated fish can be transported and stored at normal temperatures provided they are properly packed. On account of their being very light in weight, the cost of transport is also less. Recently, accelerated freeze drying of fish has been started on a pilot scale by a private party in Mangalore.

Dehydration

Shark-liver oil, sardine oil, fish guano, fish manure and fish meal are the bye-products obtained from marine fisheries of the district. Small quantities of crude oil were being extracted in a crude way from time immemorial from oil sardines. Recently, improved methods of boiling the fish in open pans over fire and

**Bye-products
of fish**

pressing the boiled stuff in screw presses were introduced among the fishermen and better quality of oil is now being produced whenever there are large catches of oil sardine. The pressed cake is dried in the sun and formed into 'guano', a fertilizer. During 1966-67, there were 101 small oil and guano factories on the coast producing about 300 tons of oil and about 1,200 tons of guano valued at over Rs. 4 lakhs.

Shark-liver oil.—The district also produces over 31,000 lbs. of livers of sharks yielding over 11,000 lbs. of crude shark-liver oil, which is at present supplied to the Kerala State Government Oil Factory at Kozhikode. The fins of sharks and maws or sounds of cat fish and ghol are exported to the far-eastern countries.

There are two fish meal plants with a capacity of four tonnes per day and two fish oil plants, in the private sector. The following table shows the quantities of bye-products of fish in the district :—

<i>Bye-products</i>	1958-59	1960-61	1962-63	1964-65	1966-67
Shark liver collection (in kgs.)	12,153.8	13,696.7	15,223.5	7,168	8,159
Shark liver oil extracted (in kgs.)	1,894.2	2,714.3	4,601	2,024	2,209
Guano (in tonnes)	..	981.57	..	2,533	3,952
Beach dried manure (in tonnes)	11.17	1,249.2	2,460	3,384	3,844
Sardine Oil (in tonnes)	..	446.5	..	1,435	1,046

Inland Fisheries

With the preponderance of marine fisheries in the district, the inland fisheries occupy a secondary place. The rivers namely Netravati, Gурpur, Pavanje, Mulki, Udyavara, Swarnanadi, Seethanadi (Mabukal), Haladi, Kubjanadi, Chakranadi and Kollur, however, yield valuable estuarine fish and shell fish which find a good market particularly in the monsoon months. Elsewhere, the fishery of the rivers consists mostly of carps of which mention may be made of the mahseer found in the upper reaches, particularly of the Netravati and its tributaries. The other fishes that are found in the rivers are *Labeo calbasu*, *Labeo fimbriatus*, *Barbus conirostris*, *Barbus carnaticus*, *Barbus Kolus*, *Barbus machecola*, *Barbus labecula*, *barilius sp.*, *Ophiscephelus marulius*, *ophiscephelus striatus*, *Mystus sp.*, *Callichrous sp.* and *Mastacombeilus armatus*. In the estuaries, mullets, Indian whiting, *etroplus* and chanos may be found. Besides the rivers, there are several ponds and tanks in the district, most of which overflow during the monsoon and are very low at

the height of summer. Mention may be made of the Ramasamudra tank at Karkal, which is a perennial sheet of water and the largest inland waterspread in the district, and the Sultan's Farm at Kodi near Coondapur where chanos and mullets are reared. In recent years, fry and fingerlings of major carps like catla, rohu and mrigal have been obtained from outside and stocked in some of the ponds. Special mention may be made of the exotic fish, *Tilapia mossambica*, which has been stocked in many ponds and tanks and is thriving and breeding profusely. The *gourami* (also an exotic fish) has established itself in the Ramasamudra tank. The inland fisheries of the district serve to supply fish to the interior places where marine fish does not reach regularly.

The work of inland fisheries by the State Fisheries Department in the district is mainly ; (1) Seeds collection, stocking and supply, (2) Maintenance of fish farms and cultural operations, (3) Exploitation of tanks and direct fish production, (4) Disposal of fishes by auction and (5) Technical guidance to the fish farms.

The district has several fish seed farms for inland fisheries, **Fish Seed Farm** *i.e.*, (1) Mangalore ponds, (2) Karkal fish farm, (3) Kodi fish farm or Sultan's farm, (4) Puttur tanks and (5) Other tanks.

The *gourami*, *mulletts*, *etroplus*, *chamos*, *megalopos*, *tilapia*, *barbus* and other varieties of fish seeds are collected for stocking and rearing in the seed farms. Besides rearing carp fry in the farms and distributing them for stocking in the tanks and ponds, fish are directly produced and supplied to private parties. Two marine fish farms (brakish water fish farms) were constructed under the Community Project Scheme at Moolki and Pavanje in Mangalore taluk. Estuarine and salt water species like *mulletts*, *chamos* and *etroplus* are reared in these farms.

As in 1972, there were 34 Fishermen Co-operative Societies **Fishermen Co-operative Societies** in the district. Nearly 80 per cent of the fishermen population has been brought into co-operative fold. The government of Mysore has been granting long-term loans, short-term loans, share capital contribution and managerial cost to these societies. The Department of Fisheries has advanced loans towards construction of mechanised boats. The amount of loans granted in respect of 129 boats was Rs. 20.70 lakhs (for more details, see Chapter VI).

The South Kanara District Co-operative Fish Marketing **Fish Marketing Federation** Federation was started in the year 1954. The 34 Fishermen Co-operative Societies in the district are affiliated to this institution. The Federation had, as in 1972, one boat-building yard, one workshop, one ice-cold storage-cum-freezing plant and one canning plant (for further particulars see Chapter VI).

**Amenities
to fishermen**

All the fishing villages are situated near the sea shore and the fishermen found it difficult to send their children to schools situated at a long distance. Hence the Department of Fisheries has established schools in important fishing villages. In order to train the fishermen in the use of mechanical boats, fishermen training centres have been established in the district (*See* chapter XV).

**Fisheries
Development
Corporation**

The Mysore State Fisheries Development Corporation Ltd., established under the Indian Companies Act, 1956, with the idea of helping overall development of fishing industry in the State, started functioning on 30th October 1970. As in 1972, it was maintaining five freezing plants at Ullal, Mangalore, Kulai and Gangolli of South Kanara district and Karwar of North Kanara district, six ice and cold storage at Moolki, Kaup and Mangalore of South Kanara district, Bhatkal and Kumta of North Kanara district and Mercara of Coorg district, two cold storages at Maravanthe and Hassan and one ice plant at Coondapur, two boat-building yards at Mangalore and Karwar, two fishing trawlers, namely, Chamundi and Vedavati, four refrigerated trucks and four insulated trucks. It manufactures and sells ice and provides freezing facilities to the private parties. The results of operation of the Corporation in respect of icing and freezing of fish during 1971-72 were as follows :—

<i>Particulars</i>	<i>Quantity in tonnes</i>	<i>Amount realised (Rs. in lakhs)</i>
1. Ice produced	7,146.904	3.63
2. Fresh fish stored in storage	3,411.750	0.37
3. Fish and Prawn frozen	884.972	..
(a) Preparation charges .. ..	..	0.32
(b) Freezing storage rent .. ..	..	1.32
(c) Freezing charges .. ..	..	2.22
4. Indirect revenue .. ..	..	1.70
Total .. ..	..	9.56

During 1971-72, the Corporation constructed the following number of boats :—

(1) 30' mechanised boat	1
(2) 32' mechanised boat	8
(3) 43' mechanised boat	1
(4) 15' V-Bottom boats	3

The Corporation is transporting fresh fish and frozen master cartons. About 40 tonnes of frozen mackerels were marketed in 1971-72 for export purposes. It started the preparation of filleted fish of various varieties like promfret, seer, mackerel, cat fish, perch, etc.

The Fisheries College, Mangalore, is a professional college of unique type in India, established in 1969 with the objective of providing technical and scientific personnel for handling the fisheries developmental schemes of the State and Central Governments as also fishing industry in the west coast region. The Marine Products Processing Training Centre at Mangalore, which was started with Indo-Japanese collaboration in 1963, formed nucleus for the establishment of this College. The main activities of this institution are : (i) Training technically qualified personnel both at degree-level and at post-graduate diploma-level ; (ii) conducting of development-oriented research activities ; and (iii) dissemination of end results of research to the fish farmers by extension work. In addition, technical service in the form of advice and supervision is also provided to processing industries.

**Fisheries
College,
Mangalore**

The Fish Technology Experiment Station, Mangalore, was started by the Central Food Technological Research Institute, Mysore, with the object of experimenting on the proper utilisation of fish. It is experimenting on the efficacy of the ordinary method of curing. It is also experimenting on the production of fish powder, preservation of pure fish oil, conversion of fish oil into a usable product in soap and paint industries, preparation of *vanaspathi* ghee by adding hydrogen and converting fish into animal feed. A chemically mixed salt has been prepared by this institute to be used in salt-drying of fish, to keep the fish fresh for six to seven months without losing colour and without mould formation. It is also doing research on other aspects of fish such as chemical composition of fish and the chemical action taking place when fish oil gets spoiled.

**Fish
Technology
Station**

TABLE 1

Taluk-wise particulars of Land Utilisation in South Kanara as in 1971-72

(Area in hectares).

Name of Taluk	Total area in hectares	Forests	Net area available for cultivation			Other uncultivable land excluding current fallow		Fallow land		Net area sown	Total cropped area	Area sown more than once
			Barren and uncultivable land	Land put to non-agricultural use	Cultural waste	Permanent pastures and other grazing lands	Land under misc. tree crops and grooves not included in area sown	Current fallows	Other fallow land			
1	2	3	4	5	6	7	8	9	10	11	12	13
Mangalore ..	55,380	..	9,835	10,287	3,705	1,076	2,125	3,268	1,146	23,838	27,632	9,109
Puttur ..	99,693	30,317	24,419	5,769	3,284	5,130	10,230	4,218	1,643	14,683	32,607	9,079
Karkal ..	1,36,934	30,582	1,548	3,093	22,598	2,772	26,333	20,782	125	29,101	36,299	7,675
Udipi ..	92,593	6,598	2,728	12,103	9,284	5,834	12,861	2,213	6,813	34,159	39,434	10,333
Coondapur ..	1,55,954	65,329	5,255	14,166	9,859	5,270	20,457	2,208	4,786	28,624	35,530	11,692
Belthangady ..	1,38,920	56,419	6,313	19,580	12,730	4,707	17,685	1,130	1,833	18,523	21,533	6,850
Bantwal ..	71,758	6,103	13,788	7,134	13,315	1,915	2,937	639	2,399	23,528	16,468	2,625
Sullia ..	82,995	46,626	4,206	772	4,458	6,822	4,847	619	802	13,843	59,714	25,555
Total ..	8,34,227	2,41,974	68,192	72,904	79,233	33,526	97,475	35,077	19,547	1,86,299	2,69,217	82,918

One hectare—2.5 acres.

TABLE 2

Statement showing the acreage of land utilized for growing horticultural crops in various taluks of South Kanara district.

Sl. No.	Name of crop	Belthangady		Buntwal		Coondapur		Karkal		Mangalore		Puttur		Sullia		Udipi	
		1970-71	71-72	70-71	71-72	70-71	71-72	70-71	71-72	1970-71	71-72	70-71	71-72	70-71	71-72	70-71	71-72
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	Arecanut ..	2,729	2,740	4,239	4,250	1,667	1,669	2,272	2,290	1,881	1,920	5,800	5,800	4,900	4,900	891	900
2.	Coconut ..	1,682	1,806	3,856	2,916	6,600	6,721	3,911	4,069	5,374	5,465	1,841	1,891	1,622	1,698	10,840	10,986
3.	Cashew-nut ..	2,675	2,895	9,173	9,267	6,802	6,929	5,904	6,057	3,480	3,643	3,411	3,490	3,862	3,941	3,424	3,529
4.	Cocoa ..	110	150	39	53	4	12	28	37	30	50	23	49	35	55	4	14
5.	Betel-vine ..	100	100	200	200	75	75	100	100	75	90	200	200	100	100	50	50
6.	Pepper ..	1,025	1,037	861	878	110	117	189	199	1,634	1,654	156	166	78	86	47	62
7.	Chillies ..	200	245	500	510	1,000	1,030	400	460	680	600	350	400	200	200	2,000	1,900
8.	Vegetables ..	900	975	620	960	900	850	1,110	1,300	1,240	1,350	650	715	450	510	850	910
9.	Ginger ..	100	125	185	265	50	75	245	314	170	240	40	100	25	50	80	65
10.	Cardamom ..	600	600	..	..	..	..	..	..	..	..	..	..	50	50	..	..
11.	Turmeric ..	75	75	50	50	50	50	75	85	50	56	25	25	15	15	10	25
12.	Clove, Nutmeg and Cinnamon.	9	8	..	..	..	..	..	..	..	..	4	5	1	2	..	..
13.	Sweet flag (Baje)	4	10	1	2	3	4	3	6	$\frac{1}{2}$	2	1	5	2	6	$\frac{1}{2}$	2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
14.	Tapioca ..	700	700	50	50	10	15	200	200	70	80	500	500	800	800	20	20
15.	Sweet Potato ..	300	300	700	700	900	900	500	500	1,200	1,250	350	350	250	250	1,500	1,600
16.	Mango ..	500	500	800	800	1,000	1,020	1,000	1,010	1,000	1,070	600	600	485	425	600	600
17.	Banana ..	800	800	800	800	400	400	800	800	2,000	2,000	8,450	3,450	2,000	2,040	300	300
18.	Citrus Varieties	5	6	2	3	1	2	2	2	2	2	5	6	2	3	1	1
19.	Sapota ..	10	10	20	20	125	125	75	75	35	50	5	5	5	5	75	100
20.	Pine-apple ..	200	200	100	100	300	305	500	630	50	50	50	50	50	50	150	150
21.	Jack fruit ..	1,000	1,000	1,100	1,100	600	605	1,200	1,200	1,000	1,000	900	900	600	600	600	605
22.	Papaya ..	25	25	100	105	60	60	75	80	110	110	100	100	25	25	35	40

* (excluding forest plantations).

TABLE 3

Total quantity of Fish landed and its value (year-wise) for the years 1967-68 to 1971-72 in the South Kanara District

Sl. No.	Species	1967-68		1968-69		1969-70		1970-71		1971-72	
		Quantity landed in tonnes	Value in Rs.	Quantity landed in tonnes	Value in Rs.	Quantity landed in tonnes	Value in Rs.	Quantity landed in tonnes	Value in Rs.	Quantity landed in tonnes	Value in Rs.
1	2	3	4	5	6	7	8	9	10	11	12
Elasmobranchs											
1.	Shark Rays and Skates	308	4,37,407	283	3,26,721	348	3,02,786	973	6,12,128	838	7,70,056
Clupeoids											
2.	Oil Sardine	18,081	2,81,171	17,856	22,74,661	18,030	26,65,509	22,285	36,84,251	17,032	26,53,697
3.	White Sardine	6	9,775	12	23,980	3	8,165	..	..	..	..
4.	Other Sardines	33	13,840	282	97,261	407	2,64,455	77	30,150	161	51,106
5.	Anchovies	4	2,660	8	6,040	..	..	..	..	..	..
6.	Other Clupeoids	273	7,680	672	3,10,473	362	1,27,305	825	3,35,065	442	1,52,900
Scombrifods											
7.	Mackerel	1,623	11,63,450	1,900	19,56,675	13,014	76,85,219	22,054	85,74,403	15,091	61,31,110
8.	Seer Fish	346	6,55,990	238	3,43,590	862	7,90,075	898	8,81,125	375	3,87,737
9.	Tuna	20	13,000	5	3,770	64	60,000	..	..	5	5,700

1	2	3	4	5	6	7	8	9	10	11	12		
Perches													
10.	Lactarius	..	..	30	16,620	2	1,100	..	..	268	1,32,863		
11.	Silver Bellies	..	..	263	10,06,835	256	87,480	1,178	3,33,901	248	94,260	802	1,74,867
12.	Lathrinus	..	..	22	1,07,600	..	..	3	2,000	144	87,764	..	..
13.	Sciaenids	..	..	..	..	266	1,04,140	113	59,960	81	17,165	902	3,62,163
14.	Ribbon fish	..	..	..	..	..	..	..	..	..	..	426	1,06,175
15.	Cat fish	..	..	4,197	19,48,192	4,770	29,97,901	5,538	450,43,332	2,138	11,15,920	1,294	9,15,123
16.	Pomfrets	..	..	31	67,495	74	71,047	122	91,550	131	66,349	353	2,10,72
17.	Mulletts	..	..	..	..	..	..	..	..	..	..	14	3,194
18.	Soles	..	..	644	2,80,700	1,007	5,04,186	640	2,66,375	373	1,32,210	1,276	3,58,651
19.	Sabre fish	..	..	1	405	..	..	2	1,595	..	..	..	..
20.	Lady fish	..	..	..	..	..	..	..	..	..	..	73	7,168
21.	Miscellaneous	..	..	7,120	35,15,031	9,837	4,43,241	9,046	69,57,434	11,437	29,68,404	7,168	16,76,099
22.	Prawns	..	..	2,065	21,07,114	5,931	69,61,406	4,008	48,87,234	4,948	69,28,520	4,141	69,48,631
23.	Crabs	..	..	..	..	..	..	..	..	1	675	222	34,445

TABLE 4

Taluk-wise figures of cultivators and agricultural labourers in South Kanara District according to 1971 census

<i>Taluk</i>	<i>Total population</i>	<i>Total No. of workers</i>	<i>No. of cultivators</i>	<i>No. of agricultural labourers</i>
Belthangady	1,37,535	57,413	22,828	21,981
Buntwal	2,26,787	1,00,999	25,467	25,128
Coondapur	2,42,810	88,600	38,506	25,112
Karkal	2,12,496	86,695	38,531	26,520
Mangalore	4,90,566	1,90,679	21,612	23,331
Puttur	1,56,266	59,798	18,695	17,820
Sullia	87,946	32,970	9,212	11,661
Udipi	1,84,909	1,31,530	45,094	34,038
District Total	1,99,315	7,48,744	2,19,945	1,85,591

Percentage of cultivators to total no. of workers of the district—29.37

Percentage of agricultural labourers to total no. of workers of the district—24.79

Source—Census of India, General Population Tables, 1971, Part-II-A-Mysore