

## **CHAPTER 3**

### **CURRENT (KNOWN) RANGE OF BIODIVERSITY**

There is limited understanding of the existing biodiversity of the district. Though most flowering plants, mammals and birds are documented, more diversity remains to be uncovered: especially lower plants, microorganisms, reptiles, moths, beetles, other insects and various other invertebrates. There is also very little documentation on diversity of traditional varieties of cultivated crops; much remains to be understood about the traditional agricultural systems and their intrinsic relationship with the environment, although agriculture is the lifeline of about 75% of the people. The earliest documented evidence of the agricultural practices is by British men Francis Buchanan and D. Brandis. The Centre for Ecological Sciences (CES) has conducted some ecological studies in natural resource management in various ecological zones. The existing agricultural systems have been also documented by Prakruti, a NGO based in Sirsi. Another NGO, Parisara Sanmrakshana Kendra has collected information on the paddy varieties of the district.

#### **3.1 State of natural ecosystems**

##### **3.1.1 Plants**

Daniels, *et al.* (1993) estimated that the district is known to shelter 1741 recorded species of flowering plants, a good number of them are endemic to the Western Ghats. The district is also a mosaic of different habitat types. A typical grid of forest area of 5 KM X 5 KM is likely to consist of six or more major types.

The district has tremendous diversity of lower plants and animals. Unfortunately much remains to be done in inventorying such great diversity. P.K. Rajagopal (personal communication) has listed 70 species of Pteridophytes (ferns) from Uttara Kannada. A study by Naik (1992) in the Sharavati river estuary reveal the presence of 87 species of diatoms, 21 species of Dinoflagellates, 11 species of Cyanophytes and about 80 species of Green Algae (Chlorophytes). Naik et al (2000) have reported 55 species of phytoplankton from Kali estuary, 37 of them being diatoms. Phytoplankton are the producers of the estuarine ecosystems and undoubtedly play vital role in making estuaries one of the highest productive ecosystems of the world. Nothing much is known about many of the lower plants such as Bryophytes and Lichens. A recent survey by Nayaka (2002) in the Western Ghats of the neighboring Shimoga district shows the presence of 143 lichens. Most of them are expected to be present in Uttara Kannada as well.

##### **3.1.2 Animals**

According to Daniels (1989) Uttara Kannada district has 419 taxa of birds. About 55% of these birds are residents in the district while 34% are winter visitors. Among the wintering birds 40% are water birds. The bird fauna of 419 taxa is considered remarkable for the size of the district (10,291 km<sup>2</sup>). The state of Kerala which is 3 times as large as the district has only 375 taxa and the state of Maharashtra which is 30 times larger, has

540 taxa. Of the 63 taxa of birds endemic to the Malabar province (Western Ghats-west coast region) Uttara Kannada has 34 of these. The list of the endemic birds of Uttara Kannada are given in Table 3.1

**Table 3.1 The endemic and rare bird species of Western Ghats-Sri Lanka found in Uttara Kannada**

Sno	Common name	Scientific name	Remarks
1	White-bellied blue flycatcher	<i>Musicapa pallipes</i>	Evergreen forests
2	Large Indian parakeet	<i>Psittacula eupatoria</i>	
3	Scalybellied green woodpecker	<i>Picus myrmecophoneus</i>	
4	Orange-breasted green pigeon	<i>Trecron bicinata</i>	
5	Nilgiri thrush	<i>Zoothera dauma</i>	
6	Yellow-backed sunbird	<i>Aethopyga siparaja</i>	Southern limit
7	Rufous-belleid hawk-eagle	<i>Hieraetus kinierii</i>	Evergreen forest
8	Blue-winged parakeet	<i>Psittacula columboides</i>	
9	Ceylon frogmouth	<i>Batrachostomus moniliger</i>	Rare, Malabar & Sri Lanka
10	White-bellied treepie	<i>Dendrocitta leucogastra</i>	
11	Greyheaded bulbul	<i>Pycnonotus priocephalus</i>	
12	Wyanad laughing thrush	<i>Garrulax delesserti</i>	Small population in Castle Rock
13	Black-headed babbler	<i>Ropocichla atriceps</i>	Rare. Nests in holes of large trees
14	Great Indian hornbill	<i>Buceros bicornis</i>	
15	Ruby-throat bulbul	<i>Pycnonotus melanicterus</i>	
16	White-headed myna	<i>Sturnus malabaricus</i>	
17	Malabar crested lark	<i>Galerida malabaricus</i>	Resident of humid forest & non-forest
18	Nilgiri wood pigeon	<i>Columba elphinstonii</i>	Endangered
19	Shaheen falcon	<i>Falco peregrinus peregrinator</i>	Rare; Lushington falls
20	Black eagle	<i>Ictinaetus malayensis</i>	

The district is rich in wild mammal diversity. These include elephants, tigers, leopards and the endangered mammal Lion-tailed macaque. The details regarding the bats of Uttara Kannada are shown in Table 3.2 and the list of other wild mammals in Table 3.3. The 25 species of bats from the district account for 62.5% of the total number of bat species recorded from the Karnataka region by Paul Bates and David Harrison. Of these the Gersoppa-Jog Falls region alone has 10 species.

Naik et al (2000) have reported 45 zooplankton species from the Karwar coast. There are 14 species of bivalves (clams) associated with the Aghanasihini river estuary, which is unique to the entire west coast (P.K. Bhat personal communication). It is notable that the collection of bivalves for food is a major employment for hundreds of women in the estuarine villages. They also gather empty shells for lime making and industrial purposes.

The bivalves form an abundant and cheap source of good nutrition in coastal Uttara Kannada. A list of marine invertebrates from Uttara Kannada is given in Appendix I.

**Table 3.2 The bats reported from Uttara Kannada (Bates and Harrison)**

Sno	Name	Places reported
1	Fulvous fruit bat	Gersoppa, Muroor
2	Indian flying fox	Devikoppa
3	Lesser dog-faced fruit bat	Gokarna
4	Dawn bat	Muroor
5	Lesser mouse-tailed bat	Gokarna
6	Long winged tomb abt	Sirsi
7	Black-bearded tomb bat	Jog
8	Naked-rumped tomb bat	Sirsi
9	Pouch bearing bat	Malg. Sirsi, Gersoppa, Yellapur
10	Greater false vampire	Honavar, Sirsi, Jog, Devikoppa
11	Lesser false vampire	Sirsi, Hulekal, Gersoppa
12	Rufous horse-shoed bat	Barchi, Hulekal, Sirsi, Yellapur
13	Blyth's horse-shoe bat	Jog, Gersoppa
14	Lesser wooly horse-shoe	Sirsi
15	Fulvous leaf-nosed bat	Honavar
16	Kantor's leaf-nosed bat	Honavar
17	Schneider's leaf-nosed bat	Gersoppa, Honavar
18	Kelaart's leaf-nosed bat	Gersoppa, Muroor
19	Burmese whiskered bat	Gersoppa
20	Asiatic greater yellow house bat	Sirsi
21	Asiatic greater yellow house bat	Sirsi, Hulekal
22	Bamboo bat flat-headed bat	Sirsi, Hulekal
23	Least pipistrelle	Honavar
24	Kelart's pipistrelle	Sirsi, Honavar
25	Tickelle's bat	Yellapur, Potolli, Hulekal

**Table 3.3 Wild Mammals of Uttara Kannada**

1. Bonnet Macaque (*Macaca radiata*)
2. Lion-tailed Macaque (*Macaca silenus*)
3. Common Langur (*Presbytes entellus*)
4. Nilgiri Langur (*Trachypithecus johnii*)
5. Slender Loris (*Loris tardigradus*)
6. Tiger (*Panthera tigris*)
7. Leopard (*Panthera pardus*)
8. Leopard Cat (*Felis bengalensis*)
9. Fishing cat (*Felis viverrina*)
10. Jungle Cat (*Felis chaus*)
11. Malabar Civet (*Viverra civettina*)
12. Small Indian civet (*Viverricula indica*)

13. Common Palm Civet (*Paradoxurus hermaphroditus*)
14. Brown palm civet (*P. jerdoni*)
15. Common Indian Mongoose (*Herpestes mungo.*)
16. Stripe-necked Mongoose (*H. vitticolis*)
17. Striped hyena (*Hyaena hyaena*)
18. Jackal (*Canis aureus*)
19. Indian Fox (*Vulpes bengalensis*)
20. Indian Wild Dog (*Cuon alpinus*)
21. Sloth bear (*Melursus ursinus*)
22. Common Otter (*Lutra vulgaris.*)
23. Giant Squirrel (*Ratufa indica*)
24. Three Striped Squirrel (*Funambulus palmarum*)
25. Grizzled Giant Squirrel
26. Large Brown Flying Squirrel (*Pteromys oral* )
27. Grey Musk Shrew (*Cercidura caerulea*)
28. Common Indian Rat (*Mus rattus*)
29. Bandicoot rat (*Nesocia bandocoota*)
30. Porcupine (*Hystrix indica*)
31. Black-naped Hare (*Lepus nigricollis*)
32. Elephant (*Elephas maximas*)
33. Gaur (*Bos gaurus*)
34. Sambar (*Cervus unicolor*)
35. Spotted Deer (*Axis axis*)
36. Barking Deer (*Muntjacus muntjacus*)
37. Mouse Deer (*Tragulus memimna*)
38. Wild Boar (*Sus scrofa*)

### **Table 3.4 Reptiles of Uttara Kannada**

1. Crocodilus palustris
2. Heidactylus glea devii (house gecko)
3. Varanus bengalensis (Monitor lizard)
4. Lygosma guentheri
5. Chamaeleon calcaratus
6. Tylopus braminus
7. Python
8. Silybura elloti
9. Lycodon striatus
10. Hydrophobus nympha
11. Abalabes calmaria
12. Oligodon subgriseus
13. Zamensis mucosus (Rat snake)
14. Coluber helena
15. Tropidonotus monticola
16. T. plumbicolor
17. Dipsas ceylonensis
18. Dryophis perroteti

19. *D. mycterizans*
20. *Callophis nigrescens*
21. *Naja naja* (Cobra)
22. *N. bungarus*
23. *Ancistrocladon hypnale*
24. *Trimeresurus strigatus*

**Table 3.5 Amphibians of Uttara Kannada**

1. *Rana hexadactyla*
2. *R. cyanophyletis*
3. *R. tigrina*
4. *R. limnocharis*
5. *R. brevipes*
6. *R. malabaricus*
7. *R. curtipes*
8. *Micrixalus fuscus*
9. *Ixalus leucorhinus*
10. *Bufo melanostictus*
11. *Ichthyophis monochoerus* (limbless Amphibian)

**Table 3.5 Endemic fresh water fishes of Uttara Kannada rivers (Prakash Pandit, personal communication)**

Sno	Species	Endemism	
		Western Ghats	South India
1	<i>Puntius carnaticus</i>	**	
2	<i>P. bovanicus</i>		**
3	<i>P. dorsalis</i>		**
4	<i>P. fasciatus</i>		**
5	<i>P. curmuca</i>	**	
6	<i>P. jerdonii</i>	**	
7	<i>P. narayani</i>	**	
8	<i>P. lithopidas</i>	**	
9	<i>P. melanompyx</i>	**	
10	<i>P. sayadrensis</i>	**	
11	<i>P. pulchellus</i>	**	
12	<i>P. thomasii</i>	**	
13	<i>Gonoproktopterus wynadensis</i>	**	
14	<i>G. dubius</i>		**
15	<i>Tor khudree</i>		**
16	<i>Labeo procellus</i>	**	
17	<i>L. kawrus</i>	**	
18	<i>Garra Mulya</i>		**
19	<i>G. gotyla-stenorhynchus</i>	**	
20	<i>Cirrhinus fulungee</i>	**	
21	<i>Osteobrahma bakeri</i>	**	
22	<i>Esomus thermoicus</i>		**
23	<i>E. barbataus</i>	**	
24	<i>Salmostoma boopis</i>	**	
25	<i>Barilius gatensis</i>	**	
26	<i>B. canarensis</i>	**	

27	<i>Osteochilus thomassi</i>	**	
28	<i>Nemacheilus semiarmatus</i>	**	
29	<i>N. sinuatus</i>	**	
30	<i>N. anguilla</i>	**	
31	<i>N. altipedunculatus</i>	**	
32	<i>Mystus malabaricus</i>	**	
33	<i>M. oculatus</i>	**	
34	<i>M. vittatus</i>	**	
35	<i>M. montanus</i>		**
36	<i>Horabagus brachysoma</i>	**	
37	<i>Batasio travancoria</i>	**	
38	<i>Ompok malabaricus</i>	**	
39	<i>Glyptothorax madraspatana</i>	**	
40	<i>G. anamalaiensis</i>	**	
41	<i>Clarias dussumieri</i>	**	
42	<i>Aplocheilus lineatus</i>		*
43	<i>Etroplus surettensis</i>		*
44	<i>E. maculatus</i>		*

Uttara Kannada, traditionally is very rich in biodiversity of marine and estuarine fishes. The details regarding the commercial fishes of the district are given in Table 3.4

**Table 3.6 Details regarding the marine and estuarine fishes of commercial importance from Uttara Kannada**

No	Common name	Scientific name	Kannada	Konkini
1	Mackerel	<i>Rastrelliger kanagurta</i>	Bangade	Bangade
2	Oil sardine	<i>Sardinella longiceps</i>	Trale, Tori	Tarle, Bhutai
3	Tuna	<i>Euthynus affinis</i>		
4	Sole	<i>Cyanoglossus</i> spp.	Leppe, Nangu	Lenga
5	Lady fish	<i>Sillago</i> spp.	Nogali, Kane	Nogali
7	Ghol	<i>Protonibea diacanthus</i>	Goli, Balvi	Ghol
8	Jew fish	<i>Sciaea aneus</i>	Balvi	
9	Croaker	<i>Johnius solidado</i>		Dodi, Dantya dodi
10	Dhoma	<i>J. dussumieri</i>	Kodvi	Dodi
11	Brown lined reef cod	<i>Epinephelus undulosus</i>	Kallmurya, Gobro	Gobro
12	Giant reef cod	<i>E. argenti-maculatus</i>	Patte kallmurya	
13		<i>Lutjanus rivulatus</i>	Arthala	Arhtala
14		<i>Diagramma griseum</i>	Aadaga	Aadaga
15	Gar fish	<i>Strongylura strongylura</i>	Kande tole, Havu meenu	Tole
16	Wolf herrings	<i>Chirocentrus dorab</i>	Karli	Karli
17		<i>Chanos chanos</i>	Hoomeenu	
18		<i>Megalops cyprinoides</i> **	Selakku	
19	Bombay duck	<i>Harpodon nehereus</i>	Bombil	
20	Sardine	<i>Sardinella fimbriata</i>	Pedi	Pedi
21	Sardine	<i>S. albella</i>		
22	Sardine	<i>S. longiceps</i>	Baige	
23	Sardine	<i>S. gibbosa</i>	Pedi	Pedi
24	Sardine	<i>Dussumieria acuta</i>		
25	Sardine	<i>D. basseltir</i>		
26	White sardine	<i>Kewala coval</i>	Swadi	
27		<i>Escualosa thoracata</i>	Belenji	Beleni
28		<i>Hilsa ilisha</i> ***	Paliya	
29		<i>H. toli</i>		

30		<i>Selipinna taty</i> **		
31	Anchovies	<i>Anchoviella commersonii</i>		
32	Anchovies	<i>A. indica</i>		
33	Anchovies	<i>A. tri</i> **		
34	Anchovies	<i>Stolephorus devisi</i>	Dinasi	Dinasi, Motyala
35	Anchovies	<i>S. bataviensis</i>	-do-	-do-
36	Anchovies	<i>Thryssa mystax</i> **	Oenchli	Enaga, Onaga
37	Anchovies	<i>T. malabaricus</i>		
38	Anchovies	<i>T. purava</i> **		
39	Pony fish	<i>Leignathus bindus</i>	Gurkku,	Kampa
40	Lactarices		Savandale	Savandale
41	Silver bellies	<i>L. splendens</i>	Guruku	Kampa
42	Threadfin bream	<i>Nemipterus japonicus</i>	Rani meenu	Rani
43	Threadfins		Ravese	Ravns
44	Tuna	<i>Auxis thazard</i>	Bugudi	Tokke
45	Tuna	<i>A. rochei</i>	Bugudi	
46	Tuna	<i>Euthynnus affinis</i>	Bugudi	
47	Seer fish	<i>Scomberomerus commerson</i>	Surmai, Ison	Surumai
48	Seer fish	<i>S. guttatus</i>	Surmai	Surmai
49	Seer fish	<i>S. lineolatus</i>	Srumai	Surmai
50	Pomfret, white	<i>Pampus argenteus</i>	Paplet, Bili manji	Dave Paplet
51	Pomfret, Chinese	<i>P. chinensis</i>	Paplet	Paplet
52	Pomfret, black	<i>Parastromateus niger</i>	Kari paplet	Kal paplet
53	Cat fish	<i>Arius maculatus</i>	Shyade	Sangat
54	Giant cat fish	<i>A. thalassinus</i>	Shyade	Sangale
55	Giant cat fish	<i>A. thalassinus</i>	Shyade	Sangale
56	Pearl spot	<i>Etroplus surattensis</i>	Kaagalsi	Kaleram Kagalsi
57	Shark	<i>Scoliodon laticaudus</i>	Sorrah, Mori	Mori
58	Grey dog shark	<i>S. palasorrah</i>		
59	Grey dog shark	<i>S. sorrakowah</i>		
60	Tiger shark	<i>Stegostoma varius</i>		
61	Whale shark	<i>Rhinocodon typus</i>		Rare
62	Shark	<i>Sphyrna blochii</i>	Kebichatte	
63	Shark	<i>S. zygaena</i>		
64	Shark	<i>Carcharhinus melanopterus</i>	Sorrah, Mori	Mori
65	Shark	<i>C. limbatus</i>		
66	Shark	<i>C. temminckii</i>		
67	Shark	<i>C. menisorrh</i>		
68	Shark	<i>Galeocerdo tigrinus</i>	Pil thatte	
69	Shark	<i>Chiloscyllium griseum</i>		
70	Shark, balck-tip	<i>Eulamia spallanzani</i>		
71	Shark, hammerheaded	<i>Sphyrna zygaena</i>		
72	Painted sawfish	<i>Pristis cuspidatus</i>		
73	Small-toothed sawfish	<i>P. microdon</i>		
74	Guitar fish	<i>Rhinobatus djiddensis</i>	Haradatte, Fadka	Yelar
75	Skate	<i>R. granulatus</i>		
76	Whip tail sting ray	<i>Himantura bleekeri</i>		Wagala
77	Ray fish	<i>Dasyatis sephen</i>	Kottai thorake	
78	Javanese cow-ray	<i>Rhinoptera javanica</i>		Wagala
79	Painted eel	<i>Gymnothorax favagineus</i>	Kolaav	
80		<i>Narcine brunnea</i>		
81	Ribbon fish	<i>Lepturcantus savala</i>	Kamble, Hambli	
82	Ribbon fish	<i>Lepturus sp</i>	Baale	

83		Mugil sp.		
84		Gerrus sp.		
85		Polynemus sp.		
86	Mud-skipper	Pterythalmus sp.		
87		Caraux sp.		
88		Therapon sp.		
89		Sciaenid sp.		

\*\*Estuarine and fresh water; \*\*\*Marine, estuarine and fresh water

### 3. 2 State of domesticated/semi-domesticated species/varieties

Uttara Kannada has various ecological zones in the district and the cultivated diversity is different in each of these ecological zones. In this SAP an attempt is made to identify the existing status of cultivated diversity in the district and to evolve an action plan to conserve these resources. Uttara Kannada is somewhat representative of the state of Karnataka having the humid coastal region and the *Malenadu* or the hill region, and the drier eastern plains with rolling hills merging with the semi-arid to arid Deccan Plateau. These three regions are three different agro-climatic zones and account for the tremendous domesticated diversity of the district.

#### *i. Coastal region*

The coastal region where saline water intrusion is present with mangrove ecosystems is unique. In this region sustainable traditional prawn cultivation is done. In addition to this the farmers grow saline resistant paddy varieties known as '*Kagga*'. Similarly the coastal Kumta town is well known for its coconuts. This is a special variety with aroma and taste.

#### *ii. Foot hills of Western Ghats*

The foothills in Bhatkal taluka are well known for cultivation of scented paddy variety. Similarly Yana village in Kumta region is well known for good quality of coconuts with good yield and size. The foothills are also the resource base of NTFP collectors.

#### *iii. Crestline region*

This region mainly consists of Sirsi, Siddapur and Yellapur taluks. While the evergreen forest belt of this region is rich in wild biodiversity, the small narrow valleys are cultivated by farmers with arecanut, spices and paddy. The cardamom, pepper, areca, nutmegs and cocoa are the crops of the spice gardens.

#### *iv. Edge of ghats and plains*

The eastern parts of the district on the edge of Western Ghats are unique for horticultural crops and rained paddy varieties. In horticultural crops, the Pala region is famous for growing mangoes.

#### *v. Riverine forests*

The forests on the banks of the small streams/ rivers in the district produce a unique ecosystem with diverse plant species. The special wild mango varieties used for pickles known as *appemidi* is found in this belt.



*vi. Livestock*

Livestock is an integral part of the agricultural system in the region. Farmers keep cattle for ploughing and to meet the demand of milk. The local *Malenad Gidda* varieties of oxen and cow are the indigenous stock of the region. In recent years the cross breeding with the jersey stock has resulted in evolution of a cross bred stock that is used as draught as well as for milk. The farmers also keep goat and poultry. The local varieties are popular in the region. The Gawli tribes are specialised in rearing the buffalo which is popularly known as 'Gawli Buffallo.' Very little is done on the indigenous poultry of the district.

*vii. Honey bees*

Bee keeping is one of the important components of cultivated diversity. Bees play major role in conservation of biodiversity through pollination of crops, especially horticultural crops such as areca, mango, guava etc. There are three major species of honeybees in Uttara Kannada, namely the Rock bee (*Apis dorsata*), Indian bee (*Apis cerana indica*) and sting less bees (*Apis florea*)

Paddy, legumes and sugarcane are important agricultural crops of the district. There are traditional varieties as well as modern HYV (High Yielding Varieties) in each of these crops, which are adopted by the farmers. The diversity within each of these crops and several others is quite high though most of it is yet to be surveyed systematically. Despite small area under rice the local varieties grown are many, despite our incomplete documentation, as shown in Table 3.7 More details on some of the rice varieties are given in Annexure-1.

**Table 3.7 The traditional rice varieties of Uttara Kannada**

Ajaga	Kannuru
Arya	Karabele
Aryahalaga	Karibatta
Aryakempi	Karichitka
Banka	Koondooru
Bantavala	Kumbharjaddu
Bilibatta	Masakaai
Biliekkka	Mottahalaga
Bilikabagga	Mugenbelaga
Chitka	Mullare
Dasala	Pandya
Dasapatte	Rangoona
Doddapandya	Ratnachooda
Gowri	Sannabatta
Halaga	Sannamalaga
Halagempi	Sannamullarya
Hurutaga	Sannapandya
Jaddikempi	Shetgi

Jadduhalaga	Siddasali
Jattu	Sundari
Kagga (both black and yellow husked)	Tebbal
Kanchutti	Theppadarya

Numerous horticultural crops are important in the economy of the region. The spice gardens in the narrow valleys in the Ghats have played key role through ages in the prosperity of the district. The pepper varieties known to be cultivated in the district during the past and present times are *Dadiga*, *Giddakare*, *Kudrugutta\**, *Mallisara\**, *Tirpagare\**, *Waddakare*.<sup>\*</sup> The decline of the traditional varieties due to disease has made farmers resort to growing of hybrid pepper. The evergreen-semievergreen forests are rich in different species of wild pepper; although over the years, due to neglect and unplanned exploitation it is difficult to sight good yielding pepper in the wild.

Banana is widely cultivated in the district. the notable varieties are *Boodibale*, *Chipsbale*, *Currybale(Anbale)*, *Karibale*, *Mitka*, *Mysore mitka*, *Nenibale*, *Rasabale*, *Pachebale*, *Sakkarebale*. Some exotics and hybrids are also grown in the district. Over the last ten years also, mainly due to the "Bunchy-top disease" the bananas are on the decline.

Arecanut is a major crop in the district, being cultivated in nearly 10,000 ha. As paddy cultivation today is nearly unprofitable many farmers have taken to arecanut. As arecanut needs more water there has been, of late, a wave of encroachment into the forests, along the streamsides, to raise small-scale areca gardens, causing further decline and endangerment of the already threatened *Myristica* swamps and decline of the climax streamside vegetation. Watershed value of stream catchments are negatively affected too.

The diversity of fruit trees in the region is high. They can be found in domesticated and wild ecosystems. Mention may be made of the wild '*appemidi*' mango variety, which is favourite for pickling. Similarly the jack fruit varieties are also many in the district. There are numerous varieties of wild fruits that are used by forest dwellers and children. These include wild mangoes, kokum, *uppage* jackfruits, jujube, black berries (*neerilu*), gooseberries etc. These are on the decline due to the decrease in forest diversity.

### 3.3 Relation between wild and domesticated varieties

The district is well known as a forest district. The farmers have domesticated many wild varieties of plants such as pepper, cardamom, cinnamon, nutmeg, mango, jack, kokum etc. The forests the scrub and many other habitats of the district shelter several wild relatives of cultivated plants. These include, apart from the ones mentioned above, wild relatives of rice, millets, bitter-gourd, snake gourd, lady's finger, grapes, legumes, ginger, turmeric, yams, gooseberry etc. As crops like pepper and banana are suffering from diseases in the cultivated farms, farmers have attempted to bring the wild varieties into the farming system. These wild varieties are resistant to pests and diseases. Wild rice is found in many ponds of the malenadu region. It is important to conserve the wild relatives of cultivated plants, for future genetic improvement.

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\* Feared to be extinct from the district