

CHAPTER IV

DISTRIBUTION AND STATUS OF HILL STREAM, ENDEMIC AND THREATENED FISHES IN SOUTHERN KERALA

4.1 Introduction

Many of the existing laws on protected areas, wildlife, forestry etc. promote conservation of biodiversity but not its sustainable utilization. Therefore, the laws on biodiversity should take into account various interconnected activities (Pachauri and Sridharan, 1998). The Western Ghats are a region of high diversity and high endemism of fish fauna, perhaps because of the latitudinal and altitudinal phenomenon. Recently a national assessment was made for freshwater fishes of India, which included the distribution, threats and status of the species (Zoo's Print, 1999). The Western Ghats are one of the selected biodiversity hot spots in the world important for fishes, molluscs and availability of cold water fishes of India, especially in Himalayas and the Western Ghats. They concluded that the degradation of environment due to natural and man-made activities is the major cause of depletion of cold water fishes. The factors responsible for the disappearance of species, and the role of the Red Data Books in conservation are clearly documented by Lelek (1996). The only two species listed as endangered in IUCN Red List are *Horaglanis krishnai* (family: Clariidae) and *Schistura signiensis* (family: Balitoridae) (IUCN, 1990). Kulkarni and Ogale (1978) presented some information on the status of endangered genus *Tor* (mahseer) and provided notes on the artificial propagation of *Tor khudree*.

Kurup (1994) made an account of the threatened fishes of River systems flowing through Kerala based on market survey. Recently Shaji and Easa (1998) assessed the status and distribution of endemic freshwater fishes in Kerala based on data collected from some of the stations in Kerala. All these assessments lack good information, as the data was taken only from selected stations.

Considering all the above factors, an assessment was made based on the collections from various localities in all the river systems of southern Kerala and all the available literature from the area.

4.2 Methods

4.2.1 Distribution in southern Kerala

The distribution of fish species in various river systems south of Palghat gap in Kerala, and specific locations of threatened, rare, and endemic species collected finds a detailed analysis in the present study.

4.2.2 Geographical distribution

Geographical distribution of the hillstream, endemic and threatened species recorded in the thesis is based on standard volumes of Ichthyological studies. The source of information is specifically noted for all species.

4.2.3 Status of Fish

According to the IUCN (1990) criteria, the fishes of Kerala can be grouped into two categories . Threatened and Non-threatened. The category of the Threatened is further divided into (1) Critically Endangered (CR), (2) Endangered (EN), and (3) Valnerable (VU). The Non-threatened category is divided into (1) Low Risk-nearly threatened (LR-nt) and (2) Low Risk of least concern (LR-lc). These criteria are more applicable to a single river. Since the southern Kerala covered 20 rivers, the IUCN criteria adopted only with some modifications. In the present analysis species status are classified based on restricted distribution of the species, area of occupancy of the species, and the number of species recorded. The criteria adopted are as follows.

Critically Endangered : (a) species with distribution restricted to a single river, (b) area of occupancy limited to a single location in that river, and (c) the number of species estimated to be less than five in the collection site

Endangered . (a) species with distribution restricted to 1-3 rivers, (b) area of occupancy of less than 5 collection sites in the rivers from where they are recorded, and (c) the number of species estimated to be less than 10 in the collection sites.

Vulnerable . (a) species with a distribution restricted to 4-8 rivers, (b) area of occupancy of less than 10 collection sites in the rivers from where they were

collected, and (c) the number of species estimated to be less than 10 in the collection sites.

Low Risk-nearly threatened : (a) Species with wide distribution in 8-15 rivers, (b) area of occupancy of more than 20 collection sites in the rivers from where they were recorded, and (c) the number of species estimated to be less than 15 in the collection sites.

Low Risk-least concern : (a) Species with wide distribution in more than 15 rivers, (b) area of occupancy of more than 20 collection sites in the rivers from where they were recorded, and (c) the number of species estimated to be more than 15 in the collection sites.

(In southern Kerala some rivers are very small having a length less than 50 km, and hence collections were carried out less than 20 locations. A slight modification for number of collection sites in criteria was adopted for these rivers)

4.3 Results

Distribution in southern Kerala, wildlife sanctuaries and national park, Geographical distribution, and status of hillstream, endemic and threatened species recorded are given below :

4.3.1 Distribution in southern Kerala and Geographical distribution

1. *Notopterus notopterus* (Pallas)

Distribution in southern Kerala : Kundai and Trikur areas of Karuvannur river.

Geographical distribution : India, Pakistan, Nepal, Java, Bangladesh, Myanmar, Sumatra, Thailand, Malayasia, Indonesia and Philippines (Talwar and Jhingran, 1991; Kottelat *et al.*, 1993; and Jayaram, 1999).

Status : Endangered

2. *Anguilla bicolor* McClelland

Distribution in southern Kerala : Pooyamkutty area of Periyar river.

Geographical distribution : From east Africa to Pakistan, India, Sri Lanka, New Guinea, Philippines, Indonesia and Australia (Munro, 1955; Talwar and Jhingran, 1991; Kottelat *et al.*, 1993; and Jayaram, 1999).

Status : Critically Endangered.

3. *Pisodonophis boro* (Ham.)

Distribution in southern Kerala : Mulamkuzhy area of Periyar river and Mallesseri area of Achancoil river.

Geographical distribution: India, Pakistan, Bangladesh, Malaysia and Myanmar (Day, 1865; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

4. *Hypselobarbus curmuca* (Ham.)

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Muvattupuzha, Meenachil, Manimala, Pamba, Achankovil, Kallada, Ithikkara, Vamanapuram, Karamana, Neyyar and Pambar rivers.

Geographical distribution : The Western Ghats of India (Talwar and Jhingran, 1991; Menon and Rema Devi, 1995; and Jayaram, 1999).

Status : Low Risk- nearly threatened.

5. *Hypselobarbus kolus* (Sykes)

Distribution in southern Kerala : Hilly areas of Bharathapuzha, Chalakudy, Periyar, Muvattupuzha and Karamana rivers.

Geographical distribution : Rivers in Peninsular India (Hora and Misra, 1942; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable.

6. *Hypselobarbus micropogon periyarensis* (Raj)

Distribution in southern Kerala: Idukki reservoir and streams flowing into it of the Periyar river

Geographical distribution : Periyar lake of Kerala; Dakshina Kannada of Karnataka and Cardamon hills of Tamil Nadu (Talwar and Jhingran, 1991; Jayaram, 1999).

Status : Critically Endangered.

7. *Hypselobarbus thomassi* (Day)

Distribution in southern Kerala : Malayattur and Pooyamkutty areas of Periyar river.

Geographical distribution : Canara and Cardamom hills of the Western Ghats in India (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

8. *Labeo calbasu* (Ham.)

Distribution in southern Kerala : Kappayam and Bhutathankettu areas of Periyar river, and Thattekkad Bird sanctuary.

Geographical distribution: India, Bangladesh, Myanmar, Nepal, Pakistan, Thailand, Siam and South China (Datta Munshi and Srivastava, 1988; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

9. *Labeo dussumieri* (Val.)

Distribution in southern Kerala : Periyar and Pamba rivers.

Geographical distribution : Western Ghats upto north Canara; Surat district of Gujarat state; Rajasthan; (Talwar and Jhingran, 1991; Kurup, 1997; and Johal *et al.*, 1993).

Status : Endangered.

10. *Osteobrama bakeri* (Day)

Distribution in southern Kerala : Bharathapuzha, Karuvannur, Chalakudy, Periyar, Muvattupuzha, Meenachil, Manimala, Pamba and Achankovil rivers.

Geographical distribution : Kerala state, Kallada river (Roy, 1995; Talwar and Jhingran, 1991. and Jayaram, 1999).

Status : Vulnerable.

11. *Osteobrama cotio peninsularis* Silas

Distribution in southern Kerala : Chelamattam- Aluva area of Periyar river.

Geographical distribution : Peninsular India, Andhra Pradesh, Maharashtra, and Orissa (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

12 *Osteochilus longidorsalis* Pethiyagoda and Kottelat

Distribution in southern Kerala : Parambikulam wildlife sanctuary area of Chalakudy river

Geographical distribution : Chalakudy river in Kerala (Jayaram, 1999).

Status : Critically Endangered.

13. *Osteochilus nashii* (Day)

Distribution in southern Kerala : Urulanthanni area of Periyar river.

Geographical distribution : The Western Ghats of Kerala and Karnataka (Mukerji, 1932; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Critically Endangered.

14. *Osteochilus thomassi* (Day)

Distribution in southern Kerala : Kalady and Edamalayar areas of Periyar river

Geographical distribution : The Western Ghats of Karnataka (Hora, 1942; Talwar and Jhingran, 1991, and Jayaram, 1999).

Status : Critically Endangered.

15. *Barbodes carnaticus* (Jerdon)

Distribution in southern Kerala : Hilly areas of Bharathapuzha, Chalakudy, Periyar, Muvattupuzha, Pamba, Achankovil, Kallada, Karamana, Neyyar and Pambar rivers.

Geographical distribution : Cauvery and Krishna river systems, Nilgiri, Wayanad and Canara hills. Introduced into Ooty lake (Francis, 1908; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Low Risk -- nearly threatened.

16. *Puntius arulius* (Jerdon)

Distribution in southern Kerala : Kolathupuzha and Tenmala areas of Kallada river; and Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Tamil Nadu, Karnataka and Kerala (Day, 1875-78; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered

17. *Puntius conchoni* (Ham.)

Distribution in southern Kerala : Meenakara and Chemmanampati areas of Bharathapuzha river, and Mundakkayam area of Manimala river.

Geographical distribution : Ganga, Brahmaputra, Mahanadi and Cauvery river systems, and Bihar, Orissa, Uttar Pradesh and West Bengal in India; Indus river drainage in Pakistan; Nepal; and Bangladesh (Talwar and Jhingran, 1991; and Jayaram, 1999)

Status : Endangered

18. *Puntius denisonii* (Day)

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Manimala, Pamba and Achankovil rivers.

Geographical distribution : Travancore hill ranges (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

19. *Puntius dorsalis* (Jerdon)

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar and Muvattupuzha rivers.

Geographical distribution : Cauvery and Krishna river systems of India (Andhra Pradesh, Karnataka and Kerala), Mahanadi in Orissa; Narmada at Hoshangabad; Madhya Pradesh and Rajasthan; and Sri Lanka (Munro, 1955; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

20. *Puntius jerdoni* (Day)

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar and Meenachil rivers

Geographical distribution : Kerala, Tamil Nadu, Karnataka and Maharashtra (Talwar and Jhingran, 1991; Jayaram, 1999).

Status : Vulnerable

21. *Puntius melanampyx* (Day)

Distribution in southern Kerala : Throughout in all rivers.

Geographical distribution : Peninsular India (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Low Risk- least concern.

22. *Puntius melanostigma* (Day)

Distribution in southern Kerala: Upper area of Bharathapuzha and Pallivasal area of Achankovil rivers.

Geographical distribution: Bhavani and Cauvery river systems in Kerala and Tamil Nadu, and Deolali in Maharashtra (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

23. *Puntius ophicephalus* (Raj)

Distribution in southern Kerala: Vandiperiyar area of Periyar river.

Geographical distribution : Pambiyar river and its tributaries; and Periyar lake, Kerala (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Critically Endangered.

24. *Tor kudree* (Sykes)

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Muvattupuzha, Pamba, Achancoil, Kallada, Vamanapuram, Karamana, Neyyar and Pambar rivers

Geographical distribution : Kerala, Tamil Nadu, Karnataka, Maharashtra, Bihar, Rajasthan and Madhya Pradesh states of India; and Sri Lanka (Thomas, 1897; Motwani and David, 1957; Sarma and Kulshreshtha, 1981; Talwar and Jhingran, 1991; Das, 1994, and Jayaram, 1999).

Status : Low Risk- nearly threatened.

25. *Chela fasciata* Silas

Distribution in southern Kerala : Anaimalai hills in Kerala (Talwar and Jhingran, 1991; and Jayaram, 1999)

Status : Endangered.

26. *Salmostoma acinaces* (Val.)

Distribution in southern Kerala : Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Hooghly river in West Bengal, Poona of Maharashtra, Cauvery river system and Bhavani river in Kerala (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status: Endangered

27. *Salmostoma clupeiodes* (Bloch)

Distribution in southern Kerala : Kalady and Chelamattam areas of Periyar river.

Geographical distribution : Eastern and Western Ghats, Maharashtra, Madhy Pradesh and Gujarat; and Myanmar (Day, 1878; Talwar and Jhingran, 1991; and Jayaram, 1999)

Status : Endangered.

28. *Amblypharyngodon microlepis* (Bleeker)

Distribution in southern Kerala: Bharathapuzha, Periyar and Pamba rivers.

Geographical distribution: Eastern and Southern India; and Bangladesh (Talwar and Jhingran, 1991, Jayaram, 1999).

Status: Vulnerable.

29. *Barilius bakeri* Day

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Muvattupuzha, Meenachil, Manimala, Pamba, Achankovil, Kallada, Ithikkara, Vamanapuram, Karamana, Neyyar and Pambar rivers.

Geographical distribution: The Western Ghats of Kerala (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Low Risk-nearly threatened.

30. *Barilius bendelisis* (Ham.)

Distribution in southern Kerala : Bharathapuzha, Chalakudy and Pambar rivers; Parambikulam and Chinnar wildlife sanctuaries.

Geographical distribution : India, Bangladesh, Nepal, Myanmar, Pakistan and Sri Lanka (Datta Munshi and Srivastava, 1988; Talwar and Jhnigran, 1991; and Jayaram, 1999).

Status : Vulnerable

31. *Barilius canarensis* (Jerdon)

Distribution in southern Kerala : Pudupati area of Bharathapuzha and Kuttikkal area of Manimala rivers.

Geographical distribution : The Western Ghats of Kerala and Karnataka, Krishna and Tungabhadra river systems (Talwar and Jhingran, 1991; and Jayaram, 1995, 1999).

Status: Endangered.

32. *Barilius gatensis* (Val.)

Distribution in southern Kerala: All the rivers except Puzhakkal, Keechery, Ayroor, and Mamom rivers.

Geographical distribution : The Western Ghats in Maharashtra, Karnataka, Kerala, and Nilgiri hills in Tamil Nadu (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Low Risk - least concern.

33. *Esomus danricus* (Ham.)

Distribution in southern Kerala : Bharathapuzha, Karuvannur, Chalakudy, Periyar, Muvattupuzha, Meenachil and Pambar rivers.

Geographical distribution : Throughout India, Malaya, Siam, Bangladesh, Myanmar, Nepal, Pakistan and Sri Lanka (Datta Munshi and Srivastava, 1988; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

34. *Esomus thermoicos* (Val.)

Distribution in southern Kerala : Vandazhi and Thippallikkayam areas of Bharathapuzha river; and lowland areas of Chalakudy and Periyar rivers.

Geographical distribution : Kalakkad wildlife sanctuary in India; and Sri Lanka (Munro, 1955; Talwar and Jhingran, 1991; Remadevi, 1992; and Jayaram, 1999).

Status : Vulnerable

35. *Garra maclellandi* (Jerdon)

Distribution in southern Kerala : Bharathapuzha and Periyar rivers.

Geographical distribution : Cauvery drainage in India (Silas, 1958; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

36. *Garra menoni* Rema Devi and Indra

Distribution in southern Kerala : Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Silent Valley national park of Kerala (Jayaram, 1999).

Status : Endangered.

37. *Garra hughi* Silas

Distribution in southern Kerala : Chinnar wildlife sanctuary and Eravikulam national park areas of Pambar river.

Geographical distribution : Cardamon and Palni hills of the Western Ghats (Talwar and Jhingran, 1991, and Jayaram, 1999).

Status : Endangered

38. *Garra gotyla stenorhynchus* (Jerdon)

Distribution in southern Kerala : Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Cauvery and Krishna drainages of the Western Ghats (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

39. *Garra surendranathanii* Shaji *et al.*

Distribution in southern Kerala : Chalakudy, Periyar and Pamba rivers; and Parambikulam wildlife sanctuary.

Geographical distribution : Orukomban tributary of Chalakudy, Ayyappankovil area of Periyar, and Mookkmpally tributary of Pamba rivers (Jayaram, 1999).

Status: Endangered

40. *Horlabiosa joshuai* Silas

Distribution in southern Kerala : Eravikulam national park and Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Tamaraparni river in the Western Ghats (Jayaram, 1999)

Status : Critically Endangered.

41. *Bhavana australis* (Jerdon)

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Muvattupuzha, Pamba, Achankovil, Kallada, Vamanapuram and Neyyar rivers.

Geographical distribution : Kerala; hill streams in Mysore, Nilgiris; Kalakad wildlife sanctuary, Tamil Nadu (Hora, 1920, 1950; Talwar and Jhingran, 1991; Rema Devi, 1992; and Jayaram, 1999).

Status : Low Risk-nearly threatened.

42. *Balitora mysorensis* Hora

Distribution in southern Kerala : Thippallikkayam area of Bharathapuzha river.

Geographical distribution : Cauvery and Tungabhadra river systems of Karnataka; and Kolhapur in Maharashtra (Menon, 1987; Talwar and Jhingran, 1991; and Jayaram, 1999)

Status Critically Endangered

43. *Travancoria elongata* Pethiyagoda and Kottelat

Distribution in southern Kerala : Athirapilly, and Parambikulam wildlife sanctuary area of Chalakudy river.

Geographical distribution : Chalakudy river (Shaji and Easa, 1999; Jayaram, 1999).

Status : Critically Endangered.

44. *Travancoria jonesi* Hora

Distribution in southern Kerala : Parambikulam wildlife sanctuary area of Chalakudy river

Geographical distribution : High ranges of northern Travancore and Anamalai hills (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Critically Endangered.

45. *Nemacheilus denisoni* Day

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Muvattupuzha, Manimala, Pamba, Achankovil, Kallada, Neyyar and Pambar rivers.

Geographical distribution : Peninsular India, Chota Nagpur plateau (Bihar) and Bastar (Madhya Pradesh) and Javadi hills, Eastern Ghats. (Menon, 1987; Talwar and Jhingran, 1991; and Jayaram, 1999)

Status : Vulnerable

46. *Nemacheilus evezardi* Day

Distribution in southern Kerala: Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Krishna and Godavari basins of the Western Ghats; and Pachmarhi hills, Satpura ranges (Hora and Nair, 1941a; Talwar and Jhingran, 1991; and Jayaram, 1999)

Status : Critically Endangered.

47. *Nemacheilus guentheri* Day

Distribution in southern Kerala : Bharathapuzha, Karuvannur, Chalakudy, Periyar, Muvattupuzha, Manimala, Pamba, Achankovil, Kallada, Vamanapuram, Neyyar and Pambar rivers

Geographical distribution : The Western Ghats of India (Menon, 1987; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Low Risk- nearly threatened.

48. *Nemacheilus keralensis* (Rita *et al.*)

Distribution in southern Kerala : Rajamalai and Karintiri areas of Periyar, Vagamon area of Menachil and Kaitapara area of Muvattupuzha rivers.

Geographical distribution : The Western Ghats of Kerala (Menon, 1987; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

49. *Nemacheilus monilis* Hora

Distribution in southern Kerala : Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Bhavani river, Mettupalayam, and Nilgiri hills (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Critically Endangered.

50. *Nemacheilus pambarensis* Rema Devi and Indra

Distribution in southern Kerala: Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Pambar river, a tributary of Cauvery river (Jayaram, 1999).

Status : Critically Endangered.

51. *Nemacheilus pulchellus* Day

Distribution in southern Kerala: Periyar and Pambar rivers.

Geographical distribution: Bhavani river, base of Nilgiri hills, the Western Ghats (Talwar and Jhingran, 1991; Jayaram, 1999).

Status: Endangered.

52. *Nemacheilus semiarmatus* Day

Distribution in southern Kerala : Chinnar wildlife sanctuary area of Pambar river.

Geographical distribution : Cauvery basin in Wayanad, Nilgiris and Mysore; and Silent Valley of Bharathapuzha basin (Menon, 1987; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

53. *Nemacheilus triangularis* Day

Distribution in southern Kerala : All the rivers except Ayroor and Mamom.

Geographical distribution : The Western Ghats of Kerala and Tamil Nadu (Menon, 1987; and Talwar and Jhingran, 1991).

Status : Low Risk- least concern.

54. *Pangio goaensis* (Tilak)

Distribution in southern Kerala : Mallapally and Kottangal areas of Manimala river.

Geographical distribution : Chaliyar river in Kerala and Colem river in Goa (Talwar and Jhingran, 1991; Shaji, 1998; and Jayaram, 1999).

Status : Endangered.

55. *Lepidocephalus thermalis* (Val.)

Distribution in southern Kerala : All the rivers.

Geographical distribution : Kerala, Karnataka, Maharashtra, south of Krishna river system; and Sri Lanka (Munro, 1995; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Low Risk-least concern.

56. *Horabagrus brachysoma* (Gunther)

Distribution in southern Kerala : Keechery, Karuvannur, Chalakudy, Periyar, Muvattupuzha, Meenachil, Manimala, Pamba, Achankovil and Ithikkara rivers.

Geographical distribution : Kerala; and Canara (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Low Risk- nearly threatened.

57. *Horabagrus nigricollaris* Pethiyagoda and Kottelat

Distribution in southern Kerala : Vazhachal and Parambikulam wildlife sanctuary area of Chalakudy rivers

Geographical distribution : Vettilapara area of Chalakudy river (Jayaram, 1999).

Status : Endangered

58. *Batasio travancoria* Hora and Law.

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Manimala, Pamba and Achankovil rivers

Geographical distribution : The Western Ghats of Kerala (Hora and Law, 1941; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

59. *Mystus bleekeri* (Day)

Distribution in southern Kerala : Ottasekharamangalam area of Neyyar river.

Geographical distribution : Generally confined to northern India, the southernmost limit being the Mahanadi headwaters; Bangladesh; Nepal; Myanmar; and Sumatra (Hora, 1940; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Critically Endangered.

60. *Mystus malabaricus* (Jerdon)

Distribution in southern Kerala : Bharathapuzha, Chalakudy, Periyar, Muvattupuzha, Pamba, Kallada, Neyyar and Pambar rivers.

Geographical distribution : The Western Ghats of Kerala, Karnataka and Maharashtra (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

61. *Mystus montanus* (Jerdon)

Distribution in southern Kerala : Bharathapuzha, Periyar, Pamba, Achankovil and Kallada rivers.

Geographical distribution : Kerala, Karnataka, Maharashtra, Hoshangabad (Madhya Pradesh), and Assam (Jayaram, 1953, 1999; and Talwar and Jhingran, 1991).

Status : Vulnerable

62. *Mystus punctatus* (Jerdon)

Distribution in southern Kerala : Karikadavu area of Karuvannur river.

Geographical distribution : Nilgiri hills of Tamil Nadu and the Western Ghats (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Critically Endangered.

63. *Mystus vittatus* (Bloch).

Distribution in southern Kerala : Thundam and Ayyappankovil areas of Periyar river.

Geographical distribution: Throughout India, Bangladesh, Myanmar, Nepal, Pakistan, Thailand, and Sri Lanka (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status: Endangered.

64. *Clarias dussumieri* Val.

Distribution in southern Kerala : All the rivers except, Kallada, Ayroor, Vamanapuram and Karamana rivers.

Geographical distribution : Kerala, Karnataka, Goa and Pondicherry (Hora, 1936, 1941a; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

65. *Heteropneustes fossilis* (Bloch)

Distribution in southern Kerala : All the rivers except Puzhakkal, Meenachil, Achankovil, Ayroor and Vamanapuram, rivers.

Geographical distribution : India, Bangladesh, Laos, Myanmar, Nepal, Pakistan, Basrah of Iraq, Sri Lanka, and Thailand (Hora, 1936; Islam, *et al.*, 1982; Talwar and Jhingran, 1991; Vijayakumar *et al.*, 1998; and Jayaram, 1999).

Status : Vulnerable

66. *Ompok malabaricus* (Val.)

Distribution in southern Kerala: Anapantham area of Karuvannur and Kannankuzhi area of Chalakudy rivers.

Geographical distribution : Goa and Kerala (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered.

67. *Pseudeutropius mitchelli* Guinther

Distribution in southern Kerala : Bhutattankettu and Penavur areas of Periyar river.

Geographical distribution : Kerala (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered

68. *Glyptothorax annandalei* Hora

Distribution in southern Kerala : Mullarinkadu and Mulamattam areas of Muvattupuzha river

Geographical distribution : The Western Ghats and the Vindhyas; and Nepal (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Endangered

69. *Glyptothorax housei* Herre

Distribution in southern Kerala: Bharathapuzha, Chalakudy, Periyar and Muvattupuzha rivers.

Geographical distribution: Anamalai hills, Puthuthottam estate of Kerala (Jayaram, 1979, 1999; Talwar and Jhingran, 1991).

Status: Vulnerable

70. *Glyptothorax lonah* (Sykes)

Distribution in southern Kerala : Nelliampathy and Karappara areas of Chalakudy river

Geographical distribution : Deccan plateau, Godavari and Krishna river systems; Orissa and Madhya Pradesh (Silas, 1951; Menon, 1954; Talwar and Jhingran, 1991; Jayaram, 1999)

Status : Critically Endangered.

71. *Glyptothorax madraspatanum* (Day)

Distribution in southern Kerala : Bharathapuzha, Periyar, Muvattupuzha, Pamba, Achankovil and Vamanapuram rivers.

Geographical distribution : Anaimalai, Nilgiri hills, and Cauvery river of the Western Ghats (Hora, 1923; Talwar and Jhingran, 1991; Jayaram, 1999).

Status : Vulnerable

72. *Pristolepis marginata* Jerdon

Distribution in southern Kerala : Bharathapuzha, Karuvannur, Chalakudy, Periyar, Muvattupuzha, Pamba, Achankovil, Kallada, Ithikkara, Karamana and Neyyar rivers

Geographical distribution : The Western Ghats of Kerala (Talwar and Jhingran, 1991, and Jayaram, 1999).

Status : Vulnerable

73. *Sicyopterus griseus* (Day)

Distribution in southern Kerala : Chalakudy and Periyar rivers.

Geographical distribution : South Canara and Madras; and Sri Lanka (Mishra and Krishnaⁿ_K, 1996; Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

74. *Channa marulius* (Ham.)

Distribution in southern Kerala : All the rivers except. Pallickal, Ayroor, Vamanapuram, Mamom and Pambar rivers.

Geographical distribution : Throughout India, Pakistan, Sri Lanka, Bangladesh, Nepal, Myanmar, Thailand and China.

Status : Low Risk nearly threatened.

75. *Channa orientalis* Bloch and Schneider

Distribution in southern Kerala : Bharathapuzha, Keechery, Puzhakkal, Karuvannur, Chalakudy, Periyar, Muvattupuzha, Pamba, Achankovil and Neyyar rivers.

Geographical distribution : Throughout India, Afghanistan, Bangladesh, Borneo, Iran, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka and Thailand (Talwar and Jhingran, 1991; and Jayarmam, 1999).

Status: Vulnerable

76. *Channa punctatus* (Bloch)

Distribution in southern Kerala: Keechery, Karuvannur and Periyar rivers.

Geographical distribution : Throughout India; Afghanistan, Bangladesh, China, Malaya, Myanmar, Nepal, Pakistan, Polynesia and Sri Lanka (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

77. *Channa striatus* (Bloch)

Distribution in southern Kerala: Bharathapuzha, Keechery, Puzhakkal, Karuvannur, Chalakudy, Periyar, Muvattupuzha, Meenachil, Manimala and Ithikkara rivers.

Geographical distribution : Throughout India, Bangladesh, Borneo, South China, Malaya, Malay Archipelago, Pakistan, Philippines, Thailand, and Sri Lanka (Talwar and Jhingran, 1991; and Jayaram, 1999).

Status : Vulnerable

78. *Tetraodon travancoricus* Hora and Nair

Distribution in southern Kerala : All the rivers.

Geographical distribution : Pamba river of Kerala (Hora and Nair, 1941; Talwar and Jhingran, 1991).

Status : Low Risk- nearly threatened.

4.3.2 Fish fauna of wildlife sanctuaries and national park

Out of 127 species recorded from southern Kerala a total of 95 species belonging to 49 genera and 23 families were represented in various streams of wildlife sanctuaries and national park of the area (Table 4.1). The most abundant order was Cypriniformes, followed by Perciformes and Siluriformes. The family with the maximum number of representatives was Cyprinidae. The most abundant genus was *Puntius* followed by *Nemacheilus* and *Mystus*. The following are considered as endemic species : *Puntius denisonii*, *Osteobrama bakeri*, *Garra surendranatham*, *Osteochilus longidorsalis*, *Travancoria elongata*, *T.jonesi* and *Batasio travancoria*.

Seven of the 95 species were introduced. The most abundant family was cyprinidae in all the protected areas. The largest number of species were recorded from the Thattekkad Bird sanctuary (67 species), followed by Parambikulam wildlife sanctuary (61 species). Most of the families were represented in these sanctuaries. Least representation of families is in Eravikulam national park (2 families), followed by Chinnar wildlife sanctuary (4 families). Compared to the other national park and sanctuaries in Kerala, the fish diversity of Eravikulam national park is much less. This may be due to high altitude, low water temperature and high gradient. All the streams, including the Eravikulam before the introduction of the Rainbow trout, *Salmo gaudneri*, were full of an indigenous fish, *Glyptothorax madraspatanus*. This species was not represented in the present collections. Damming of rivers and introduction of exotics created problems for the existence of hillstream fishes, especially in protected areas.

Table 4.1: Fish fauna of wildlife sanctuaries and national park of southern Kerala.

No.	Name of Species	1	2	3	4	5	6	7	8
	1. Family : Anguillidae								
1	<i>Anguilla bengalensis</i> (Gray)	+	+	-	+	+	+	+	-
	2. Family: Clupeidae								
2	<i>Dayella malabarica</i> (Day)	-	-	-	+	+	+	+	-
	3. Family : Cyprinidae								
3	<i>Catla catla</i> (Ham)	+	+	-	+	+	+	+	-
4	<i>Cirrhinus mrigala</i> (Ham.)	+	+	-	+	+	+	+	-
5	<i>Ctenopharyngodon idellus</i> (Val.)	-	-	-	+	-	-	+	-
6	<i>Cyprinus carpio communis</i> Lin.	+	+	+	-	+	+	+	-
7	<i>Hypselobarbus curmuca</i> (Ham.)	+	+	-	+	-	+	-	-
8	<i>H. kolus</i> (Sykes)	-	+	-	-	-	+	-	-
9	<i>H. micropogon periyarensis</i> Raj	-	+	-	-	-	-	-	-
10	<i>H. thomassi</i> (Day)	-	-	-	+	-	-	-	-
11	<i>Labeo rohita</i> (Ham.)	+	+	-	-	-	+	+	-
12	<i>Osteobrama bakeri</i> Day	+	-	-	+	-	-	-	-
13	<i>Osteochilus longidorsalis</i> Pethiyagoda and Kottelat	-	-	-	-	-	+	-	-
14	<i>O. thomassi</i> (Day)	-	-	-	+	-	-	-	-
15	<i>Barbodes carnaticus</i> (Jerdon)	+	+	+	+	-	+	-	-
16	<i>B. sarana subnasutus</i> (Val.)	+	+	-	+	+	+	+	-
17	<i>Puntius amphibius</i> (Val.)	+	+	-	+	+	+	+	-
18	<i>P. arulius</i> (Jerdon)	-	-	+	-	-	-	-	-
19	<i>P. chola</i> (Ham.)	-	-	-	+	+	+	+	-
20	<i>P. denisonii</i> (Day)	-	-	-	+	-	+	-	-
21	<i>P. dorsalis</i> (Jerdon)	-	+	-	-	-	+	-	-
22	<i>P. filamentosus</i> (Val.)	+	+	+	+	+	+	+	-
23	<i>P. melanampyx</i> (Day)	+	+	+	+	+	+	+	-
24	<i>P. parrah</i> Day	-	+	-	+	+	+	+	-
25	<i>P. sophore</i> (Ham.)	-	-	-	+	+	-	+	-
26	<i>P. ticto</i> (Ham.)	+	+	+	+	+	+	+	-
27	<i>P. vittatus</i> Day	+	+	-	+	+	+	+	-
28	<i>Tor khudree</i> (Sykes)	+	+	+	+	-	+	-	-
29	<i>Salmostoma acinaces</i> (Val.)	-	-	-	+	-	-	-	-
30	<i>S. boopis</i> (Day)	+	+	-	+	-	+	+	-
31	<i>Amblypharyngodon melettinus</i> (Val.)	+	-	-	+	+	+	+	-

32	<i>Bariilus bakeri</i> Day	+	+	-	+	-	+	-	-
33	<i>B. bendelisis</i> (Ham.)	-	-	+	-	-	+	-	-
34	<i>B. gatensis</i> (Val.)	+	+	+	+	-	+	-	-
35	<i>Danio aequipinnatus</i> (McClelland)	+	+	+	+	+	+	+	-
36	<i>D. malabaricus</i> (Jerdon)	+	+	+	+	+	+	+	-
37	<i>Parluciosoma daniconius</i> (Ham.)	+	+	+	+	+	+	+	-
38	<i>Esomus danicus</i> (Ham.)	-	+	+	-	+	+	-	-
39	<i>Garra menoni</i> Rema Devi and Indra	-	-	+	-	-	-	-	-
40	<i>G. mullya</i> (Sykes)	+	+	+	+	+	+	+	-
41	<i>G. hughi</i> Silas	-	-	+	-	-	-	-	+
42	<i>G. gotyla stenorhynchus</i> (Jerdon)	-	-	+	-	-	-	-	-
43	<i>G. surendranathanii</i> Shaji et al.	-	+	-	+	-	+	-	-
44	<i>Horalabiosa joshuai</i> Silas	-	-	+	-	-	-	-	+
4 Family : Balitoridae									
45	<i>Bhavana australis</i> (Jerdon)	+	+	-	+	-	+	-	-
46	<i>Travancoria elongata</i> Pethiyagoda and Kottelat	-	-	-	-	-	+	-	-
47	<i>T. jonesi</i> Hora	-	-	-	-	-	+	-	-
48	<i>Nemacheilus denisonii</i> Day	-	+	+	-	-	-	-	-
49	<i>N. evezardy</i> Day	-	-	+	-	-	-	-	-
50	<i>N. guentheri</i> Day	+	+	+	+	+	+	-	-
51	<i>N. keralensis</i> (Rita et al.)	-	-	-	-	-	-	+	+
52	<i>N. monilis</i> Hora	-	-	+	-	-	-	-	-
53	<i>N. pambarensis</i> Rema Devi and Indra	-	-	+	-	-	-	-	-
54	<i>N. pulchellus</i> Day	-	-	+	-	-	-	-	-
55	<i>N. semiarmatus</i> Day	-	-	+	-	-	-	-	-
56	<i>N. triangularis</i> Day	+	+	+	+	+	+	+	-
5 Family : Cobitidae									
57	<i>Lepidocephalus thermalis</i> (Val.)	+	+	+	+	+	+	+	-
6 Family : Bagridae									
58	<i>Horabagrus brachysoma</i> (Gunther)	-	+	-	+	-	-	-	-
59	<i>H. nigricollaris</i> Pethiyagoda and Kottelat	-	-	-	-	-	+	-	-
60	<i>Batasio travancoria</i> Hora and Law	-	-	-	+	-	+	-	-
61	<i>Mystus armatus</i> Day	+	+	-	+	+	+	+	-
62	<i>M. cavasius</i> (Ham.)	-	+	-	+	-	-	-	-
63	<i>M. malabaricus</i> (Jerdon)	+	-	-	+	+	+	+	-
64	<i>M. montanus</i> (Jerdon)	-	-	-	+	-	+	-	-
65	<i>M. oculatus</i> (Val.)	+	+	-	+	+	+	+	-

66	<i>M. punctatus</i> (Jerdon)	-	-	-	-	+	-	-	-
67	<i>M. vittatus</i> (Bloch)	-	+	-	-	-	-	-	-
	7 Family : Clariidae								
68	<i>Clarias dussumieri</i> (Val.)	-	+	-	+	+	+	+	-
	8 Family : Heteropneustidae								
69	<i>Heteropneustes fossilis</i> (Bloch)	-	+	-	+	+	-	+	-
	9 Family : Siluridae								
70	<i>Ompok bimaculatus</i> (Bloch)	+	-	-	+	+	-	+	-
71	<i>Wallago attu</i> (Schneider)	+	+	-	+	+	+	+	-
	10 Family : Schilbeidae								
72	<i>Pseudeutropius mitchelli</i> Gunther	-	-	-	+	-	-	-	-
	11 Family : Sisoridae								
73	<i>Glyptothorax madraspatanus</i> (Day)	-	-	-	+	-	-	-	-
74	<i>G. lonah</i> (Sykes)	-	-	-	-	-	+	-	-
	12 Family : Salmonidae								
75	<i>Salmo gairdneri irredius</i> Richardson	-	-	+		-	-	-	+
	13 Family : Belonidae								
76	<i>Xenentodon cancila</i> (Ham.)	+	+	-	+	+	+	+	
	14 Family : Aplocheilidae								
77	<i>Aplocheilus lineatus</i> (Val.)	+	+	-	+	+	+	+	-
	15 Family : Ambassidae								
78	<i>Parambassis dayi</i> (Bleeker)	+	-	-	+	-	-	-	-
79	<i>P. thomassi</i> (Day)	+	+	-	+	+	+	+	-
	16 Family : Nandidae								
80	<i>Nandus nandus</i> (Ham.)	-	-	-	+	-	-	+	-
81	<i>Pristolepis marginata</i> Jerdon	+	+	-	+	+	+	-	-
	17 Family : Cichlidae								
82	<i>Etroplus maculatus</i> (Bloch)	+	+	-	+	+	+	+	-
83	<i>E. suratensis</i> (Bloch)	+	+	-	+	-	+	+	-
84	<i>Oreochromis mossambica</i> (Peters)	+	+	-	+	+	+	+	-
	18 Family : Gobiidae								
85	<i>Glossogobius giuris</i> (Ham.)	+	+	-	+	+	+	+	-
86	<i>Sicyopterus griseus</i> (Day)	-	-	-	+	-	+	-	-
	19 Family : Anabantidae								
87	<i>Anabas testudineus</i> (Bloch)	-	-	-	+	-	-	+	-
	20 Family : Belontiidae								
88	<i>Macropodus cupanus</i> (Val.)	-	-	-	+	-	+	-	-
	21 Family : Channidae								

89	<i>Channa marulius</i> (Ham.)	+	+	-	+	+	+	+	-
90	<i>C. orientalis</i> Bloch and Schneider	+	+	-	+	+	+	-	-
91	<i>C. punctatus</i> (Bloch)	-	-	-	-	+	-	-	-
92	<i>C. striatus</i> (Bloch)	-	-	-	+	-	-	+	-
	22 Family : Mastacembelidae								
93	<i>Mastacembelus armatus</i> (Lacepede)	+	+	-	+	+	+	+	-
94	<i>Macrogathus guentheri</i> (Day)	-	-	-	+	-	+	-	-
	23 Family : Tetraodontidae								
95	<i>Tetraodon travancoricus</i> Hora and Nair	-	-	-	+	+	-	-	-
	Total	44	51	28	67	42	61	43	4

1 Neyyar wildlife sanctuary (WLS), 2. Idukki WLS, 3. Chinnar WLS, 4. Thattekkad Bird Sanctuary, 5. Chimmony WLS, 6. Parambikulam WLS, 7. Peechi – Vazhani WLS, 8. Eravikulam National Park

4.4 Discussion

A total of one hundred and twenty seven species belonging to ten orders were distributed in the freshwaters of southern Kerala. Order Osteoglossiformes were represented by only one species, *Notopterus notopterus*. Chacko (1948) reported it from the Periyar lake of the Periyar river, and Shaji (1998) recorded it from Kabini river in Wayanad. In the present study this featherback was represented only in Karuvannur river, and may be considered as first report from the study area after the report made by Chacko (1948). During the recent studies conducted in Periyar lake, (Indra and Remadevi, 1990; Arun *et al.*, 1996; and Zacharias *et al.*, 1996) this species was not recorded indicating the unfavourable conditions for the species in the lake.

Anguilliformes were represented by three species, two freshwater and one rice-paddy eel. *Anguilla bengalensis* was recorded from almost all the river systems of southern Kerala, while *A. bicolor* is distributed only in Periyar river. Previously it was reported only from the Periyar lake (Chacko, 1948), Shertallai (Jayasree *et al.*, 1993) and Chaliyar river system (Shaji, 1998). The present report confirms its occurrence in Periyar river basin. *Pisodonophis boro*, the rice-paddy eel was recorded by Day (1865) from Kerala and recently George *et al.* (1999) reported it from the Periyar river. Shaji (1998) however did not agree with the observation of George *et al.*,

(1999) siting imperfect drawings and absence of primary habitats. The present record of this eel from Periyar and Achankovil rivers confirms its availability in wetland areas connected to various rivers.

The only clupeiform member, *Dayella malabarica* is a commonly distributed species. Cyprinids outnumber all the other species represented by various genera. Most of the species are common, widely distributed, and require no more discussion about their distribution. Regarding the genus *Hypselobarbus*, four species are distributed in southern Kerala, of which two (*H.micropogon periyarensis* and *H.thomassi*) are restricted to Periyar river only. *Hypselobarbus micropogon periyarensis* was originally described by Raj (1941) from Periyar lake, Kerala; this was followed by Zacharias *et al.* (1996) from the same locality. The present record is from streams just joining the Idukki reservoir, in Periyar river. Thobias (1973) mentioned the occurrence of *H.thomassi* in Chalakudy river. During the present study it is collected from the Periyar river, and compared to the earlier record, a drastic reduction in the numbers is observed. This species could not be located from the Chalakudy river. There may be a possibility for the movement of the species from the Chalakudy river to the Periyar through the mixing of waters at lowlands of both rivers due to some environmental factors. Vairavel *et al.* (1998) recorded *H. kolus* from Malakkappara area of Chalakudy river for the first time in Kerala (this species was first mentioned by Antony (1977) from Chalakudy river system as *Puntius kolus*). It is available in Bharathapuzha, Chalakudy, Periyar, Muvattupuzha and Karamana rivers, indicating its occurrence in hillstreams of southern Kerala. *Hypselobarbus jerdoni* was recorded from Chalakudy river by Antony (1977). The present study confirms its occurrence in Bharathapuzha, Chalakudy, Periyar and Meenachil rivers. *H.curmuca* is distributed in almost all major rivers in the study site.

Labeo calbasu was recorded from Chalakudy river by Antony (1977). According to the local fishermen it was a common fish of Chalakudy river in 1970's, but now it is unfamiliar even to the local fishermen. Presently it is inhabiting only Periyar river

Two *Osteobrama* species are available in Kerala, the endemic one, *O. bakeri* was originally reported from Kottayam of Kerala (Day, 1873), also recorded from Travancore (Hora and Law, 1941) and Chaliyar river (Easa and Basha, 1995), Raghunathan, 1995. This species is commonly reported from the lowland areas of rivers of central Kerala, especially areas between Periyar and Achankovil rivers. *Osteobrama cotto peninsularis* was originally recorded from Poona. During the present study it is collected only from the lowlands of Periyar river. There is a possibility of the presence of the species rivers south of Palghat gap in Kerala (lowland sampling was mostly done in Periyar river, due to easy accessibility from field station at Kalady and Mulamkuzhy areas of Periyar river basin).

Three species of genus *Osteochilus* were recorded. The *O. longidorsalis* was originally described from Vettilappara area of Chalakudy river (Pethiyagoda and Kottelat, 1994). This endemic species could not be located from the type locality, but is abundant in upstreams of Athirapilly falls, especially in Parambikulam wildlife sanctuary. According to Easa and Basha (1995), *O. nashii* was reported from Kabini, Chaliyar, and Bhavani rivers of Nilgiri Biosphere Reserve in Kerala. It is distributed only in Periyar river of southern Kerala. Silas (1951), and Antony (1977) recorded *O. thomassi* from the Chalakudy river, but during the present study it collected only from the Periyar river. *Osteochilus (Kantaka) brevidorsalis* reported by Shaji (1998) from Kabini river could not be located from the study area.

Genus *Barbodes* represented in the collections by *B. carnaticus* is available in almost all the major rivers in the study area. Out of the fourteen species of the genus, *Puntius*, seven are widely distributed and common in freshwaters of the study area. Among the puntids, *P. denisonii* and *P. ophicephalus* are considered to be endemic to Kerala. Raj (1941) originally described *P. ophicephalus* from Kallar tributary of Pamba river near Periyar lake. The present survey reveals its occurrence in Periyar river also. According to earlier workers *P. arulius* was collected from Travancore (Hora and Law, 1941); Periyar lake (Chacko, 1948); Kabini river (Easa and Basha, 1995); and Kottayam (Remadevi *et al.*, 1996). But during the present study it is available only from Kallada and Pambar rivers. The other rare species of the genus *Puntius* are *P. conchoniatus*, *P. dorsalis*; and *P. melanostigma*.

Since the findings of the observation is limited to only one species of Mahseer, the discussion on distribution of that particular species is consequently restricted. *Tor khudree* is distributed in almost all major river systems of the area, and more abundant in Chalakudy, Periyar and Neyyar rivers. Earlier records were from Travancore (Hora and Law, 1941); Periyar lake (Chacko, 1948; and Zacharias *et al.*, 1996); Vandiperiyar river (Silas, 1951); Anaimalai hills (Silas, 1951); southern Travancore (Silas, 1949); Nilgiri Biosphere Reserve (Easa and Basha, 1995). The other species, *Tor mussullah* recorded from Travancore (Hora and Law, 1941), Meenmutty in Kerala (Jayaram, 1997), and Chaliyar river (Shaji, 1998), could not be located from the study area.

Among the two species of *Chela* recorded from Kerala, only *Chela fasciata* is distributed in Bharathapuzha and Chalakudy rivers of southern Kerala. The other species, *C. laubuca* was recorded from Travancore (Hora and Law, 1941); and Kabini river (Shaji, 1998). So far three species of *Salmostoma* was reported from Kerala, of which *S. boopis* is a widely distributed species of this area. *Salmostoma acinaces* was recorded from Chinnar wildlife sanctuary (Easa and Shaji, 1996) and Nilgiri Biosphere Reserve (Easa and Basha, 1995). The present study documents its availability only from the Pambar river of the area; and *S. clupeoides* in Periyar river.

Four barilians were recorded from the study area of which *Barilius bakeri* and *B. gatensis* are distributed in hilly areas of almost all rivers of the study area. *Barilius bendelisis* is distributed in Bharathapuzha, Chalakudy and Pambar rivers; while *B. canarensis* was available only from the Bharathapuzha and Manimala rivers. The survey indicates that the Bharathapuzha river was the most diversified river system in respect to Barilians.

Flying barb is represented by only two species, *Esomus danricus* and *E. thermoicos*. Among these, *E. thermoicos* is a rare species and distributed only in Bharathapuzha, Chalakudy and Periyar rivers. It is more common in Bharathapuzha river system than in other rivers.

Hora (1921) gave a detailed information on evolution and taxonomy of the genus *Garra*. Of the six species of *Garra* recorded from the southern Kerala, only *Garra mullya* is abundant and widely distributed. *Garra mclellandi* was recorded from Chahiyar river (Easa and Basha, 1995), and Periyar Tiger Reserve (Arun *et al.*, 1996) of Kerala. Presently it is collected from Bharathapuzha and Periyar rivers. *Garra menoni*, *G. hughi*, and *G. gotyla stenorhynchus* are available only from the Pambar river, of which *G. hughi* is collected from high altitude streams of Eravikulam national park also. Shaji *et al.* (1996) originally described *G. surendranathanii* from Chalakudy, Periyar and Pamba rivers of southern Kerala. The present study confirms its occurrence in Parambikulam wildlife sanctuary area of Chalakudy river, Pooyamkutty area of Periyar river and Perumthenaruvi area of Pamba rivers.

Silas (1953) described *Horlabiosa joshuai* as a new genus and species from headwaters of Tambraparni river at Singampatti. Remadevi and Menon (1992) recorded it from Silent Valley national park of Kerala as the first report. During the present study it was collected from Chinnar wildlife sanctuary and Eravikulam national park of the study area. These collection localities indicate their presence only in the high altitude streams. The second species described under this genus was *Horlabiosa palaniensis* (Remadevi and Menon, 1994) from Palani hills of the Western Ghats. It could not be located from the study area.

The Balitorine loaches included in the collection are *Bhavana*, *Balitora* and *Travancoria*. The only species collected under the genus *Bhavana*, *B. australis* was previously recorded from Travancore (Hora and Law, 1941; and Silas, 1951), Periyar Tiger Reserve (Arun *et al.*, 1996), and Nilgiri Biosphere Reserve (Easa and Basha, 1995). In the present study it is reported from almost all the major rivers of the study area. Shaji (1998) recorded *Balitora mysorensis* from east flowing rivers of Kabini and Bhavani of Kerala part of the Nilgiri Biosphere Reserve. The present observation of this species from the Bharathapuzha river confirms its occurrence in a west flowing river. This is the first report from south of Palghat gap and also from a west flowing river in Kerala. The other genus *Travancoria* is represented by two species, *T. elongata* and *T. jonesi*. Both the species are available only from the southern part

of Palghat gap in Kerala. *Travancoria elongata* was recently described from the Chalakudy river at Vettilappara (Pethiyagoda and Kottelat 1994). During the present study it is collected only from the upstreams of Athirapilly waterfalls. The species could not be located from the type locality. The other species, *T. jonesi* was recorded from Nelliampathy hills (Silas, 1951), Periyar Tiger Reserve (Zacharias *et al.*, 1996) and from Travancore (Hora and Law, 1941). Presently it is reported only from the Parambikulam wildlife sanctuary area of Chalakudy river.

The Nemacheilinae fishes represented in the collection include nine species. Of these five species are available only from the Pambar river. These species include *N. evezardi*, *N. monilis*, *N. pambarensis*, *N. pulchellus* and *N. semiarmatus*. It is the only east flowing river in southern Kerala and is a tributary of Cauvery river, an important river of south India. *N. keralensis* is a loach of high altitude streams located only in Periyar, Muvattupuzha, and Meenachil rivers. The most abundant and uniformly distributed species is *N. triangularis*. *N. evezardi* was recorded from Travancore (Hora and Law, 1941) and Periyar Tiger Reserve (Zacharias *et al.*, 1996). Easa and Basha (1995) reported *N. monilis* from Bhavani river in Kerala part of Nilgiri Biosphere Reserve. The record of *N. pambarensis* is a first report after its original description by Remadevi and Indra (1994). The report of occurrence of *N. pulchellus* is the first record from Kerala. *N. semiarmatus* was located from Kabini and Bhavani rivers (Easa and Basha, 1995) and also from Silent Valley national park (Talwar and Jhingran, 1991).

The cobitidae fishes collected from the study area include one species each from the genus *Pangio* and *Lepidocephalus*. The record of *Pangio goaensis* from Manimala river is a first report from streams south of Palghat gap. Previously it was known only from Goa (Tilak, 1972), and Chaliyar river of Kerala (Remadevi *et al.*, 1996; Easa and Shaji, 1997; and Shaji, 1998). The *Lepidocephalus thermalis* is an abundant and uniformly distributed species.

The Bagrid cat fishes represented in the collection include species from three genus - *Horabagrus*, *Batasio*, and *Mystus*. The *Batasio travancoria* was originally described from Travancore by Hora and Law (1941). Latter Silas (1949) reported this species from the Travancore and also from the Anaimalai hills (Silas, 1951).

Recently it was reported from Chaliyar river (Easa and Basha, 1995) and Deviyar stream at Mannambandam (Remadevi *et al.*, 1996). During the present study it is found to be located in Bharathapuzha, Chalakudy, Periyar, Manimala, Pamba and Achankovil rivers Pethiyagoda and Kottelat (1994), originally described *Horabagrus nigricollaris* from the Chalakudy river of Kerala. Collection of the species from various localities of Chalakudy river confirmed its occurrence in the river and there is a possibility to obtain this species from the Periyar river also (there are some lowland connections between these rivers). The other species *H. brachysoma* is distributed in almost all the rivers of southern part, but more common in central Kerala. Remadevi *et al.*, (1996) reported it from the Vembanad lake of Kerala. However, the species was distributed in Kerala and Canara (Talwar and Jhingran, 1991; and Jayaram, 1999), and is still considered as endemic to Kerala. The distributional range was recently clarified by reporting it from Canara by Remadevi (*pers. comm.*). Regarding the genus *Mystus*, *M. bleekeri*, *M. punctatus*, and *M. vittatus* are recorded only from single river. *Mystus bleekeri* is restricted to Neyyar river. It was collected from streams in Thiruvananthapuram district of Kerala

Mystus vittatus was recorded from Travancore (Hora and Law, 1941) and Periyar lake (Chacko, 1948). The present record confirmed its occurrence in Periyar river. *Mystus punctatus* is recorded for the first time from the west flowing river. Easa and Basha (1995) located it in the east flowing river Kabini of Nilgiri Biosphere Reserve. The other rare species recorded is *Mystus malabaricus* and *M. montanus*. *Mystus oculatus* is distributed in all the river systems of the study area.

Clarias dussumieri and *Heteropneustes fossilis* are recorded from almost all the rivers, but their number is found to be very less according to the local inhabitants. Among the Silurids, *Ompok* is represented by two species, *O. bimaculatus* and *O. malabaricus*, and *Wallago attu*. Of these *O. malabaricus* is a rare species and its distribution is restricted to Karuvannur and Chalakudy rivers. Recently Shaji (1998) reported it from Kabini and Chaliyar rivers of northern Kerala. The Schilbid cat fish, *Pseudeutropius mitchelli* is restricted to Periyar river only. Hora and Law (1941) reported it from the Travancore area. Presently this species is considered as endemic to Kerala.

The Sisorid fishes represented in the collection include four species *Glyptothorax unmandalie* is recorded only from Muvattupuzha river. It was reported from Silent Valley (Remadevi and Indra, 1986; and Shaji, 1998).

The report of *G. lonah* from Chalakudy river is an addition to the Sisorid catfishes of Kerala. Among *Glyptothorax* genus, *G. madraspatanum* is common and is distributed in Bharathapuzha, Periyar, Muvattupuzha, Pamba, Achankovil and Vamanapuram rivers. It was recently recorded by Shaji (1998) from Chaliyar, Kabini and Bhavani river systems of Nilgiri Biosphere Reserve in Kerala. Hora and Law (1941) included it in the fishes of Travancore.

Pristolepis marginata was recorded from Travancore by Hora and Law (1941). Recently Shaji (1998) reported it from Chaliyar and Kabini rivers of northern Kerala. During the present study it is collected from almost all rivers of the study area. It was considered endemic to Kerala (Talwar and Jhingran, 1991; Shaji, 1998; and Jayaram, 1999). But the reports of Yadav (1996) and Remadevi *et al.* (2000) showed its distribution along further north of the Western Ghats. They recorded it from Krishna drainage system; and Dakshin Kannada, Kodagu and Biligiri Rangaswamy wildlife sanctuary area of Karnataka respectively. The occurrence of this genus with Malayan affinities in different areas of the Western Ghats is of ichthyological significance (Hora, 1944; Menon, 1973).

Sicyopterus griseus is reported from Chalakudy and Periyar rivers of the study area. According to Talwar and Jhingran (1991), this fish is fairly common in the Madras backwaters. Hora and Nair (1941) recorded it from Travancore. It was recorded from Chaliyar river of northern Kerala (Shaji, 1998) and considered as endemic to Kerala. Occurrence of this species from rivers of northern Karnataka by Arunachalam *et al.* (1997) and the reports of Talwar and Jhingran (1991) reveals its wide distribution in Kerala, Tamil Nadu and Karnataka states of south India.

The Channids represented in the collection are *Channa marulius*, *C. orientalis*, *C. punctatus*, and *C. striatus*. Of these *C. punctatus* is rare and restricted to Keechery, Karuvannur and Periyar rivers. The freshwater puffer, *Tetraodon travancoricus* is distributed throughout the rivers in the study area. It was originally

described from Pamba river of Kerala (Hora and Nair, 1941). Subsequently it was recorded from brickyards at Pudukad of Thrissur district (Inasu, 1993) and also from Chaliyar river (Easa and Basha, 1995). Till Remadevi *et al.* (2000) it was considered as endemic to Kerala. They recorded the species from the waters of the evergreen forests of the Western Ghats of south Kanara; and suggested the occurrence of this species along a major stretch of the coastal belt of the Western Ghats, and in several rivers which drain into the Arabian sea. In the present study it is noticed that this species is uniformly distributed in the low land areas of all the rivers in the study area.

Based on the available literature the following species are considered as endemic to Kerala: *Puntius denisonii*, *Osteobrama bakeri*, *Garra surendranathanii*, *Osteochilus longidorsalis*, *Chela fasciata*, *Travancoria elongata*, *T. jonesi*, *Nemacheilus pambarensis*, *Horabagrus nigricollaris* and *Batasio travancoria*.