

Estuarine & Marine Decapods of Karnataka *Inventory*

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Abstract

The inventory of estuarine and marine decapods of Karnataka State of India has been prepared. This list has 42 species of shrimps/prawns, 112 species of brachyuran crabs, 14 species of hermit crabs and nine species of lobsters, collected from eight estuaries and coastal/ offshore waters of Karnataka State. The status of the exploitation of the important species in the inventory and the need for their conservation are highlighted in this paper. The study also brings out the first records of the decapods from the coast. The finding of the present study will serve as a baseline information to know the temporal changes taking place in decapod diversity of south-west coast of India as a whole and of Karnataka State in particular as a result of the technological developments in fisheries and other anthropological activities in estuarine marine ecosystems.

Introduction

For conservation and management of an ecosystem, one of the basic tools that

is commonly used by managers is inventories. Inventories can be maps, lists, point source information, or numbers describing or monitoring some aspects of animals, plants or ecosystems through space or time. For management and conservation of an ecosystem, an enormous array of inventories over components of biodiversity is essential. The inventories of various components act as a baseline information to know the temporal changes in the ecosystem consequent to changes in species abundance and their diversity. Decapod crustaceans, comprising numerous edible species of shrimps, lobsters and crabs and inhabiting different ecosystems, form a significant portion of aquatic food resources of the world. Conservation of these resources is important from commercial as well as ecological point of view. India has ever remained one of the major contributors of marine crustacean production to the world. Among crustaceans, shrimps are the most commercially exploited group and they hold premier rank by virtue of their

importance as an esteemed food of gourmets and because of their high export value. As in the case of most countries of tropical region, the shrimp fishery of India is also in the nature of multi-species composition. The common species supporting the shrimp fisheries of India belong to two major categories namely the "penaeids" and "caridean". The penaeid shrimps form the backbone of the seafood industry of the country as a major foreign exchange earner as well as a source of livelihood of millions of fish workers (Nandakumar and Maheswarudu, 2003). Almost all the shrimps and lobsters are having

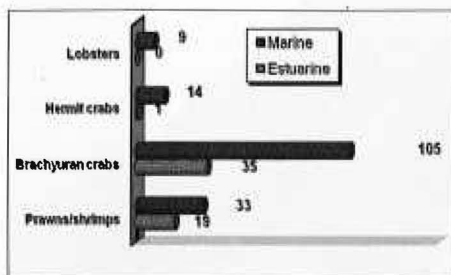


Fig.2. Species diversity of decapods crustaceans along Karnataka coast.



Fig.3: *Parapenaeus fissuroides indicus*

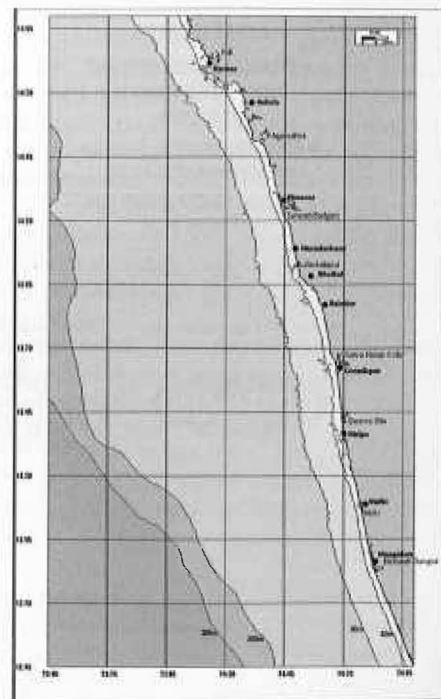


Fig.1. Coastal areas and estuaries of Karnataka surveyed for making the inventory.



Fig.4. *Rhynchocinetes durbanensis*



Fig.5. *Portunus (monomia) gracillimanus*



Fig.6. *Nephropsis stewartii*

commercial value as human food. Crabs, especially true crabs, or 'brachyuran crabs' form a major constituent of the decapod fauna in terms of their species diversity. Apart from edibility value, most of the species of this group play a key role as a major link between primary and secondary producers. The burrowing members are of immense use in the recycling of organic matter in the ecosystem (Ajmal Khan *et al.*, 2005). Decapod crustaceans form a major food item for most of the demersal fishes.

India is endowed with a rich fauna of edible crustaceans, several of them supporting commercial fisheries since times immemorial. At present, as many as 150 crustacean species mostly form a regular part of the commercial catches and an occasional part at some centres. Decapod crustaceans are commercially the most important crustaceans forming a part of faunistic record of Indian decapod crustaceans, constituting as many of 117 species of shrimps and prawns. 17 species of lobsters and 12 species of edible crabs inhabit marine and contiguous estuarine area that comes under the domain of commercial fishing (Suseelan, 1996). Estuaries and backwaters have an important role in the survival of many crustaceans. They provide a permanent habitat for many of them, while many others utilise these areas as their nursery and breeding grounds. About 70 species of shrimps and prawns are known to occur in the estuarine systems of India. Of these, 28 are penaeid shrimps, four are sergestid shrimps and 25 are caridean prawns (Suseelan, 1996). While a good account of brachyuran fauna was given by Chapgar from Bombay (Mumbai) waters as early as 1957, in recent years, as compared to the records available from the east coast of India, published information from the west coast is very meagre. Chapgar (1957) reported 81 species of crabs along Bombay coast. According to the recent reports (Venkataraman and Wafer, 2005), total carcinological fauna of west coast waters of India consists of 254 species of crabs, belonging to 120 genera under 24 families.

Due to the technological developments in the marine fishery sector, the exploitation of the fishery is being continuously extended to deeper grounds. As a result, non-conventional crustaceans are being added to the inventory of decapod crustaceans every year (Dineshbabu *et al.*, 2001). Due to heavy fishing pressure along the coast, many species are facing drastic stock depletion, since several of them are targeted species and few are caught as by-catch. For the estimation of biodiversity changes occurring due to these anthropogenic changes, a database of baseline information is essential and this baseline will help in future management and conservation of these resources. While biology, distribution and management of commercially important species of marine waters off Karnataka coast are well studied and documented, information regarding non-edible species, especially 'true crabs' and 'hermit crabs' is not available in a documented form. Wide distribution of brachyuran crabs in the various ecological systems, such as sandy beaches, rocky foreshores, mud flats, marshes and mangrove swamps etc., make comprehensive study of the group very difficult. Eventhough studies of non-edible crabs were carried out by students and faculty of various universities, there is no authentic published report available on the species diversity of brachyuran crabs from waters off Karnataka coast, so is the case with hermit crabs also.

Study Area and Methodology

Marine shrimps, crabs and lobsters were collected from commercial catches of marine and estuarine waters of Karnataka during the period 2001-2007. In 2006, intensive survey for preparing an inventory was carried out in eight important estuaries, from Kali estuary in the north to Netravathi-Gurupur estuary system in the south (Fig. 1), five islands, Kurumgad island in the north and St. Mary's island in the south and ten inter-tidal areas representing the entire coastline of Karnataka. Estuarine collections were carried out by cast netting and drag netting. Collections out of gillnet and other entangling net catches from estuarine

fishermen and from local market were also used for making the inventory. The identification was carried out using standard references (Chapgar, 1957; George, 1969 and Chan, 1998) and with help from the taxonomical websites (<http://www.itis.gov> and animal diversity web). Information from earlier works of the Institute is also included in the inventory.

Estuarine zone: From the 8 estuaries of Karnataka, 19 species of shrimps belonging to 4 families; 13 species of brachyuran crabs belonging to 9 families; and one hermit crab species belonging to Diogenidae family were collected. Species diversity of the decapod crustaceans along Karnataka coast is given in figure.2. Out of the 19 species of shrimps, 7 belong to Palaemonidae, one belongs to Alpheidae and one belongs to Atyidae family. Eight species of shrimps belonging to Penaeidae family and two Alpheid shrimp were collected from both marine and estuarine environment. Considerable quantity of penaeid shrimp juveniles were also caught from these estuaries.

Thirty-five species of brachyuran crabs belonging to 9 families were collected from the estuarine area including mangroves. 10 species of Grapsidae family, 8 species of Portunidae family, 7 species of Ocypodidae family and 3 species of Xanthidae family formed the majority of estuarine crabs. Crabs of Portunidae family, especially *Scylla serrata*, *S. tranquebarica*, *Portunus pelagicus*, *P. sanguinolentus*, *Charybdis feriatus* were of commercial importance. Fishing of these species is carried out in most of the estuaries. Among these commercial species, *Portunus pelagicus* was the most abundant in occurrence in estuaries, represented mostly by juveniles. Only one species of hermit crab, *Clibenarius padavensis* was collected from estuaries.

List of decapod crustaceans collected from estuaries of Karnataka

Shrimps (4 families and 19 species)
Family 1 : Alpheidae
Alpheus malabaricus

Results and Discussion

Total number of decapod crustacean families and species collected from waters along Karnataka coast

	Total		Estuarine		Marine	
	Families	Species	Families	Species	Families	Species
Prawns/shrimps	10	42	4	19	8	33
Brachyuran crabs	19	112	9	35	18	105
Hermit crabs	2	14	1	1	2	14
Lobsters	3	9	0	0	3	9

Alphius palaudicola

Alphius rapax

Family 2: Atyidae

Cardina gracilirostris

Family 3: Palaemonidae

Macrobrachium equidens

Macrobrachium rosenbergii

Macrobrachium idea

Macrobrachium lamerei

Macrobrachium malcolmsonii

Leandrites celebensis

Family 4: Penaeidae

Metapenaeus affinis

Metapenaeus dobsoni

Metapenaeus monoceros

Penaeus canaliculatus

Fenneropenaeus indicus

Fenneropenaeus merguensis

Penaeus monodon

Penaeus semisulcatus

Crabs (9 families and 35 species)

Family 1: Eriphiidae

Myomenippe hardwickii

Family 2: Grapsidae

Sesarma tetragonum,

Metopograpsus maculatus,

Varuna litterata,

Pseudograpsus elongates,

Pseudograpsus intermedius,

Sesarma quadratum, *Sesarma edwardsi*,

Sesarma lanatum, *Percnon planissimum*,

Grapsus tenuicrustatus

Family 3: Hymenosomatidae

Neorhynchoplax demeloi,

Elamena cristatipes

Family 4: Leucosiidae

Philyra globosa, *Philyra corallicola*

Family 5: Majidae

Menaethius monoceros

Family 6: Ocypodidae

Gelasimus marionis, *Gelasimus annulipes*

Gelasimus dussumieri, *Macrophthalmus*

latreille, *Macrophthalmus depressus*,

Macrophthalmus crinitus, *Uca annulepis*

Family 7: Portunidae

Charybdis riversandersoni, *Charybdis*

feriatus, *Charybdis lucifera*, *Portunus*

pelagicus, *Portunus sanguinolentus*, *Scylla*

serrata, *Scylla tranquebarica*, *Thalamita*

crenata

Family 8: Potamididae

Potamides cingulatus

Family 9: Xanthidae

Pilumnus longicornis, *Atergatis floridus*

Atergatis roseus

Hermit crabs

(1 family and one species)

Family: 1. Diogenidae *Clibenarius*

padavensis

Marine zone

Shrimps: Shrimp resources of Karnataka are a well studied group since all the species belonging to this group are commercially important. A total of 33 species of shrimps, belonging 8 families were collected from coastal and marine zones of Karnataka. Penaeidae was the largest family with 16 species and all the species belonging to the family were collected from within 50 m depth zone and these are commercially very important. *Metapenaeus dobsoni*, *M. monoceros*, *M. affinis*, *Fenneropenaeus (Penaeus) indicus*, *F. merguensis*, *Penaeus monodon*, *P. canaliculatus*, *P. semisulcatus*, *Parapenaeopsis stylifera*, *Trachysalambria (Trachypenaeus) curvirostris* and *T. sedelli* form regular part of the shrimp fishery, whereas others were found seasonally and some times in stray numbers. *Parapenaeus fissuroides indicus* is the first record from Indian coast (Fig.3). Solenocera family along Karnataka coast is represented by species from mid-shelf (*Solenocera choprai* and *S. pectinata*) and from deep-sea (*S. hextii*). *S. choprai* is a commercially very important species which was caught in huge numbers from a depth of 60 to 100 m off Mangalore and Malpe. Other deep-sea varieties belong to Aristidae, Pandalidae and Sicyonidae families. Out of these, Aristidae is commercially the most important family. *Aristeus alcocki*, known as 'red-rings' and belonging to Aristidae were caught in good numbers from a depth of 150 to 500 m off Mangalore-Kundapur. From the same fishing ground, 6 species belonging to Pandalidae family were also caught, of which *Heterocarpus gibbosus* was found in good numbers and all others represented in stray numbers. 'Jawala shrimps' (*Acetes* spp) belonging to Sergestidae family were found distributed along the coast and they seasonally formed a good fishery and most importantly these shrimps form major food items of most of the carnivorous fishes and other marine fauna. *Rhynchocinetes durbanensis*, shrimps belonging to Rhynchocinetidae family, were collected from Netrani island and these were the first record of the species from the coast (Fig.4). Commercially, this very important ornamental species is having heavy demand all over the world.

Brachyuran crabs: Among decapod macro-fauna, brachyuran crabs or true crabs are the most abundant in terms of species diversity. 105 species of true crabs belonging to 18 families were

collected from Karnataka coast. Among others collected were those of Portunidae and Xanthidae, the biggest families with 19 and 17 species respectively. From a commercial angle, Portunidae is the most important family for the reason that it mostly consists of edible species. Portunidae is represented by 19 species, out of which *Portunus pelagicus*, *P. sanguinolentus* and *Charybdis feriatus* are the major species forming a commercial fishery. *C. lucifera* is also considered as edible species. *Scylla serrata* and *S. tranquebarica* which belong to the estuarine ecosystem also occur in coastal waters of Mangalore. *C. smithi* which is caught from deeper waters also is an edible species, landed occasionally. *P. gracillimanus* was identified in the catches from west coast of India (Fig.5) and this as the first record of its occurrence in the west coast. Even though many of the crabs are non-edible, these crabs are caught as by-catch by trawlers and are used for making fish meal. From catches of commercial trawlers, 9 species of coral reef related crabs (7 species from Xanthidae family and 2 from Carpiliidae family) were collected. This is indicative of the presence of a submerged coral reef off Karnataka coast. As far as zonal distribution is concerned, Portunid crabs *Portunus pelagicus*, *P. sanguinolentus*, *Charybdis lucifera*, *C. feriatus*, *C. annualta*, *Scylla serrata*, *S. tranquebarica*, Grapsid crabs *Grapsus albolineatus* and *G. tenuicrustatus*, Parthenopid crab *Ashtoret (Matuta) lunaris*, Ocypod crab *Uca (Celuca) annulipes* and Xanthid crab, *Leptodius exartus* had been found to have a wide distribution throughout the coast.

Lobsters: Nine species of lobsters belonging to 3 families were collected from Karnataka coast. While coastal species like *Panulirus homarus*, *P. polyphagus*, *P. versicolor* and *Thenus orientalis* could be collected in few numbers, deep-sea species, *Puerulus sewelli* and *Nephrosis stewartii* (Fig.6), caught from deep waters (beyond 150m) off Mangalore coast, were found in good numbers. *P. polyphagus* and *P. versicolor* were found on the coral reef around Netrani island and other coastal species were collected from trawl collections. Until late 1970s, while there were reports that good number of *P. homarus* were caught from Mangalore coast, during the period of survey the catches of this species were in few numbers. In the case of *T. orientalis* also there was alarming reduction in the distribution and now the species is recorded as a rare occurrence.



Hermit crabs: Fourteen species of hermit crabs were collected from the marine regime of Karnataka waters. Out of these, 13 belonged to Diogenidae family and one belonged to Paguridae family. Four more species of these crabs also were collected from inter-tidal area and one (*Clibanarius aequabilis*) was collected from Devghad island.

List of species collected from marine zone along Karnataka coast.

Shrimps (8 families and 33 species)

Family 1: Alpheidae

Alpheia malabaricus; Alpheia palaudicola

Family 2: Aristeidae *Aristeus alcocki*.

Family 3: Pandalidae

Heterocarpoides levicarinata;

Heterocarpus gibbosus;

Heterocarpus sibogae

Heterocarpus woodmasoni

Plesionika spinipes

Plesionika martia

Family 4: Penaeidae

Fenneropenaeus indicus

Fenneropenaeus merguensis

Metapenaeopsis and amanensis

Metapenaeus affinis

Metapenaeus dobsoni

Metapenaeus monoceros

Metapenaeus moyebi

Metapenaeus brevicornis

Parapenaeus fissuroides

Parapenaeus longipes

Parapenaeopsis stylifera

Penaeus canaliculatus

Penaeus monodon

Penaeus semisulcatus

Trachysalambria curvirostris

Trachysalambria sedilli

Family 5: Rhynchocinetidae

Rhynchocinetes durbanensis

Family 6: Sergestidae *Acetes*

indicus. Acetes erythraeus Acetes johni

Family 7: Sicyoniidae *Sicyonia lancifera*

Family 8: Solenoceridae *Solenocera*

choprai Solenocera hextii Solenocera

pectinata

II. True crabs

(18 families and 105 species)

Family 1: Eriphiidae

Myomenippe hardwickii

Family 2: Calappidae

Calappa philargius; Calappa lophos;

Calappa gallus

Family 3: Carpiliidae

Carpilius convexus

Carpilius maculatus

Family: 4. Dorippidae

Dorippe frascione

Family 5: Dromiidae

Cryptodromia hilgendorffii

Dromia dehaani

Family. 6: Grapsidae

Sesarma tetragonum

Metopograpsus maculatus

Varuna litterata

Pseudograpsus elongatus

Pseudograpsus intermedius

Sesarma quadratum; Sesarma edwardsi

Sesarma lanatum; Percnon planissimum

Grapsus tenuicrustatus

Grapsus albolineatus;

Metopograpsus messor

Metaplex indica; Metaplex distincta

Family 7: Hymenosomatidae

Neorhynchoplax demeloi

Elamena cristatipes

Family 8: Leucosiidae

Leucosia sima

Leucosia pubescens

Myra fugax; Leucosia anatum;

Ebalia malefactorix;

Philyra scabriuscula; Leucisca squalina

Eucrate dentate; Philyra globosa

Philyra corallicola

Family 9: Majidae

Ophthalmias cervicornis

Naxioides hirta; Schizophrys aspera

Aethra scruposa; Doclea ovis Achaeus

lacertosus; Dehaanius limbatus

Menaethius monoceros

Doclea hybrida; Menaethius monoceros;

Doclea gracilipes

Family 10: Menippidae

Menippe rumphii

Family.11: Ocypodidae

Uca annulepis

Ocypode ceratophthalma

Ocypode cordimana

Macrophthalmus parvimanus

Macrophthalmus brevis

Scopimera proxima; Dotilla myctiroides

Dotilla malabarica

Macrophthalmus latreille

Macrophthalmus depressus

Macrophthalmus crinitus

Family 12: Parthenopidae

Matuta planipes; Galene bispinosa

Cryptopodia angulata; Ashtoret lunaris;

Pinnotheres placunae

Family 13: Pinnotheridae

Pinnotheres placunae;

Pinnotheres gracilis

Family 14: Plagusidae

Plagusia tuberculata

Family 15: Portunidae

Scylla serrata; Scylla tranquebarica

Thalamita crenata; Charybdis japonica

Charybdis annulata; Charybdis natator

Charybdis smithi; Charybdis helleri

Charybdis hoplites; Podophthalmus vigil

Portunus gracilimanus; Thalamita danae

Thalamita integra; Thalamita prymna

Charybdis riversandersoni

Charybdis feriatius; Charybdis lucifera

Portunus pelagicus; Portunus

sanguinolentus

Family 16: Raninidae

Ranina ranina

Family 17: Trapiziidae

Tetralia cavimana

Family 18: Xanthidae

Etisus levimanus; Leptodius exaratus

Zozymus aeneus; Pilodius areolatus;

Phymodius monticulosus; Phymodius

ungulatus; Phymodius nitidus;

Chlorodiella nigra; Pseudoliomera

speciosa; Atergatis subdentatus; Atergatis

integerrimus; Menippe rumphii; Ozius

rugulosus; Ozius tuberculatus;

Epixanthus frontalis; Pilumnus

vespertilio; Eurycarinus orientalis

III. Hermit crabs

(2 families and 14 species)

Family 1: Diogenidae

Paguristes incomitatus; Clibanarius

infraspinus; Clibanarius padavensis;

Clibanarius aequabilis; Clibanarius

arethusa; Diogenes Diogenes; Diogenes

affinis; Diogenes planimanus; Diogenes

villoaceus; Diogenes miles; Diogenes

avarus; Dardanes setifer; Troglpagurus

manaarensis

Family 2: Paguridae

Pagurus kulkarnii

IV. Lobsters (3 families and 9 species)

Family: 1. Nephropidae

Nephropsis stewartii

Family: 2. Palinuridae

Panulirus homarus; Panulirus

polyphagus; Panulirus versicolor

Panulirus ornatus; Panulirus penicillatus

Panulirus longipes; Puerulus sewelli

Family: 3. Scyllaridae

Thenus orientalis

Shrimps of Penaeidae family, except *Parapenaeus*, *Parapenaeopsis* and *Tachysalambria* genera need estuaries and low saline coastal waters for the growth and survival in their larval and juvenile stages. Changes in the estuarine ecosystem were found to influence the recruitment of this species to the adult fishery. Protection to the stock of this species at a sustainable level depends on its conservation in estuarine and coastal waters. Rapid shore-based advancements like large scale reclamation, construction of seawater barriers, impact of pollution of various origins are continuously changing the nature of estuarine ecosystem, which in turn has the effect of reducing survival status of the estuarine dependant marine decapods and lead to reduction of marine stock of commercially important decapods, especially shrimps.

Suseelan and Nair (1994) termed *Metapenaeus dobsoni*, *M. monoceros*, *F. indicus* and *P. monodon* and crab *Scylla serrata* as a highly vulnerable and endangered species, taking into consideration heavy exploitation of the juveniles and adults from estuarine and coastal waters. Apart from these species, Suseelan (1996) categorised the species like *M. affinis*, *M. brevicornis*, *Parapenaeopsis stylifera*, *P. semisulcatus*, *Acetes indicus*, *Macrobrachium idella*, *M. malcolmsonii*, lobsters *Panulirus homarus*, *P. ornatus*, *P. polyphagus*, *P. sewelli* and *Thenus orientalis* and crabs, *C. feriatius*, *C. lucifera*, *P. pelagicus* and *S. tranquebarica* as those of "high level exploitation" in Indian waters. Changes in the river flow pattern as a result of anthropological changes, especially construction of dams, is one of the major obstacles for the reproductive migration of decapods. *Metapenaeus dobsoni*, *M. monoceros*, *F. indicus* and *P. monodon* and crab *Scylla serrata* are highly vulnerable to stock depletion, taking into consideration heavy exploitation of the juveniles and adults from estuarine and coastal waters. *Macrobrachium rosenbergii* which moves into estuaries for breeding are also vulnerable for heavy exploitation. James (1994) stated that spiny lobsters and sand lobsters would also come under the category of vulnerable resources. Stock improvement of these lobsters by habitat improvement can be attempted to increase lobster production from the coast. The study revealed that coastal lobsters are

available along Karnataka coast and that revival of lobster fishery in this zone could be achieved. Nine species of crabs collected from Karnataka coast (7 species of Xanthidae family and 2 of Carpiliidae family) and 'Candy shrimps', *Rhynchocinetes durbanensis* were reported to be coral reef associated species and conservation of the coral reefs is essential for their survival.

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COASTAL AQUACULTURE AUTHORITY (Ministry of Agriculture, Government of India)

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E-mail : aquaauth@vsnl. net, aquvaauth@bsnl. in F. No. 56-3/2010-Tech. Dated the 11th January, 2011

PUBLIC NOTICE

Attention: Import of SPF brood stock of *Litopenaeus vannamei* and seed production by shrimp hatchery operators.

Applications are invited for consideration to grant permission by CAA to import SPF brood stock of *L. vannamei* and seed production from shrimp hatcheries in the country to those who fulfill the following criteria:

- i) Hatcheries should already have been registered under the provisions of Coastal Aquaculture Authority Act, 2005.
- ii) Hatcheries should be having the required bio-security facilities viz. fencing, tyre baths, footwash, handwash, etc., and separate implements for each section.
- iii) There should be a PCR Laboratory with the required kits and reagents having a qualified laboratory technician.
- iv) ETS should be functional in the hatcheries.

Applications may be sent to the CAA in the prescribed format for import of brood stock from the approved list of suppliers available in the website of CAA (www.caa.gov.in). A processing fee of Rs. 5,000/- (Rupees five thousand only) per annum to be paid through demand draft drawn from any nationalized bank in favour of the Coastal Aquaculture Authority payable at Chennai shall accompany the application. Approval of the facility for rearing SPF *L. vannamei* shall be granted by CAA only after due inspection of the facility. After the approval of the CAA, the hatchery operators are required to obtain the Sanitary Import Permit (SIP) from the Department of Animal Husbandry, Dairying and Fisheries before importing the brood

stock. All imports of SPF *L. vannamei* brood stock shall have to undergo strict quarantine procedures at the quarantine facility located at the Rajiv Gandhi Centre for Aquaculture (RGCA) facility at Neelankarai, Chennai to be operated by MPEDA and in accordance with the guidelines brought out in the Notification of DAHD&F, available in the website of CAA.

Applications shall be scrutinized and processed by the CAA during the month of March 2011 to enable the selected hatcheries to commence seed production of SPF *L. vannamei* from April 2011 onwards for meeting the requirement of *L. vannamei* seed for the financial year 2011-12.

Member Secretary