

NATIONAL REPORT

-BRAZIL-

Ierecê Lucena Rosa
Universida de Federal de Paraiba
CCEN, Departamento de Sistematica e Ecologia,
CIDADE Universitaria,
58058-800 Joao Pessoa, PB Brazil
ierece@dse.ufpb.br

Data presented in this report were obtained through surveys conducted by the author and collaborators along the northeast coast of Brazil, and in Santa Catarina and Rio de Janeiro states. Supplementary information was obtained through visits to scientific collections, environmental agencies, loan of specimens and through underwater surveys carried out by the author, colleagues and local divers. Additionally, collection permits issued by the Brazilian federal environmental agency IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis), were examined for the following states: Ceará, Paraíba, Pernambuco, São Paulo and Bahia.

I. Information on Wild Populations

Two seahorse species are recorded in Brazil: *Hippocampus erectus* (Perry, 1810), a medium-sized deep-bodied species, usually marked with horizontal lines and *H. reidi*, the slender seahorse, a medium-sized species (Lourie *et al.*, 1999). Both species exhibit morphological variation and distinct color patterns that deserve further investigation from a taxonomic viewpoint (Dias *et al.*, 2002; Rosa *et al.*, 2002). Records of other species of seahorses in Brazil, such as *Hippocampus kuda*, result from misidentifications. *H. erectus* and *H. reidi* are found throughout Latin America, as far south as Argentina and southern Brazil. Within Brazil, *H. erectus* is known to occur in Bahia to Rio Grande do Sul, while *H. reidi* has been recorded in Pará to Rio Grande do Sul.

Both *H. erectus* and *H. reidi* are exploited for the dried and live trade in Brazil although traders did not discriminate one species from the other. Published biological data obtained in the wild is limited to Dias (2002) and Dias and Rosa (2003). In 2001, Argentinean biologists were about to research the basic biology of *H. erectus* in the wild. Both of these species are listed as Vulnerable (A2cd) by the IUCN (Hilton-Taylor, 2000). In the states of São Paulo and Rio de Janeiro they were considered a threatened species; population status has not been evaluated in the other states.

Seahorses were mostly strongly associated with mangroves (particularly in northeast Brazil), reefs and rocky areas, at depths ranging from 10cm to 30m. These fishes are also known to occur in deep areas and seahorse captures were reported to occur at depths ranging from 30-75m. Nine seahorses (six in October, two in November and one in December) have been found in the stomach of the oceanic dolphins *Coryphaena hippurus* captured off the southeastern and southern Brazilian coast (Zavala-Camin, 1986). In northeastern Brazil, one seahorse was found in the stomach of a *C. hippurus* captured in January 1999,

60 miles off the Ilhéus coast (Cláudio Sampaio, pers. comm., July 2001). Seahorses have also been captured in research trawls (depth 30m) in northeastern Brazil (A. Vera, pers. comm., February 2001). Respondents reported that seahorses were mostly found in areas where algae, sponges or corals covered the bottom suggesting that they prefer these conditions.

Lack of Monitoring

A major cause of concern for seahorse conservation stems from the near total lack of monitoring of the marine aquarium trade and the poor collection-permit system. After receiving the authorization, few traders reported on how seahorses were actually captured. Captures by unregistered traders occurred, at least in some northeast Brazilian States, and exerted an additional pressure on wild seahorse populations. This aspect is particularly relevant given the fact that since 1995 seahorses have become one of the top species in the Brazilian marine aquarium trade (Monteiro-Neto *et al.*, 2000).

Population Declines

Most fishermen (n=25/29) interviewed reported declines in seahorse catches since 1990. One reported that, while in 1990 he could catch 500 seahorses daily and had a choice of colors, in 2000 he caught no more than five or six per day. Another, who could catch 150 per day in 1990, had since stopped collecting seahorses because it was no longer financially attractive. Six other fishermen indicated that seahorses, previously common, had disappeared locally.

Most respondents mentioned heavy fishing pressure as the cause for these declines. Additionally, two fishermen from Alagoas expressed their concern about blast-fishing and reported seeing a small number of dead seahorses floating after some of the explosions. Two fishermen in northeast Brazil mentioned pollution as a possible cause for the observed decline in seahorse numbers. Finally, one trader expressed his concern about the effects of trawling and disorganized tourism on reef fishes in general.

Initiatives to monitor the trade are being carried out in Bahia, Rio de Janeiro, Santa Catarina, Pernambuco and Ceará, as part of the broader study “Biology, population parameters and analysis of the seahorse trade (Teleostei: Syngnathidae: *Hippocampus*) in Brazil”, coordinated by the author of this report, in partnership with IBAMA – Brazil’s Federal Environmental Bureau.

II. Nature of Seahorse Fisheries

Seahorses were caught for the aquarium trade along most of the Brazilian coast. Fisheries directed at live seahorses occur at least in the following states: Pernambuco (one company licensed in 2000), Bahia (two companies licensed in 2002), Ceará (eight companies licensed in 2000), Alagoas (one company licensed in 2000) and Espírito Santo (8 companies licensed in 2002 – Iberê Sassi, personal communication). These fisheries were mostly conducted by self-taught divers, who generally also practiced subsistence fishing, or by former artisanal fishermen. Exporters bought catches from several locations and even from different states, either directly from fishermen or through intermediate buyers. In 2000, each company was authorized to capture a total of 10,000 seahorses (5000 of *H. erectus* and 5000 of *H. reidi*) per year. However, one collection permit examined by the author had four color morphs listed as separate species, potentially resulting in the collection of 20,000 seahorse specimens.

Fisheries regulations were not well enforced in Brazil. For instance, Brazilian law prohibits blast fishing and ichthyotoxics but both practices were known to occur in northeast Brazil. One fisherman explained that in the past he used ammonia and insecticide to aid in the collection of fishes for the aquarium trade and that in 2000 he used commercial anesthetic. Beach seines with stretched mesh sizes below

30mm (Raul Borba, pers. comm., June 2001) were prohibited by law, however enforcement was virtually non-existent. Furthermore, fishing was allowed in most existing protected areas. In fact, seahorses were captured for commercial purposes within the boundaries of at least two Marine protected areas in northeast Brazil (APA Mamanguape in Paraíba and APA do Litoral Norte in Bahia).

However, concern regarding the marine aquarium trade was growing. In November 2000, IBAMA promoted a workshop specifically to analyze the marine fish trade and to gather information to support the first statutory regulations of the trade. Additionally, when interviewed some traders of live specimens showed disposition to collaborate with monitoring initiatives. Additional technical meetings were promoted by IBAMA to analyze the marine ornamental trade. The main goal of the 2003 technical meeting was to conclude the preparation of the first national regulatory measure for the marine ornamental trade.

III. Extent of International Trade

- **Dried Trade**

Large quantities of dried seahorses have been exported from several South American countries in recent years. *Hippocampus erectus* and/or *H. reidi* were exported from Brazil to Hong Kong (240kg in 2001). Seahorses were incidentally caught, mostly in shrimp trawls, and also beach seines and were targeted or incidentally caught in cast-nets.

Beach seining was an important source of seahorses for the dried trade in the northeastern states; shrimp trawler fishery was the main source of dried seahorses in southeastern and southern Brazil. Fishermen from small coastal towns where the seahorse trade was not established explained that they released captured individuals or sometimes took them home and dried them for use as medicinal remedies, decoration or gifts. Where seahorse fishing had been commercialized, however, the vast majority of seahorses caught in nets were sold into the domestic dried trade.

Our data strongly suggest that most dried seahorses exported from Brazil, and the vast majority of specimens traded domestically in southeastern and southern Brazil are caught incidentally in Brazil's commercial shrimp trawl fisheries operating between Espírito Santo and Rio Grande do Sul. *H. erectus* possibly is the most caught species in shrimp trawls. Dried seahorses are also supplied by artisanal fisheries (beach seines and throw nets), divers, or lobster nets (Ceará, Maranhão and Pará states) to both coastal and inland areas for sale in markets, *umbanda* (Afro-Brazilian religion) article shops, dried marine products/crafts shops, and by street vendors. In 2002, interviews carried out during landings at the Itajaí port, Santa Catarina state (n=51 boats) resulted in a mean daily seahorse catch rate of 0.44 per boat. By combining the daily catches and the reported maximum number of days at sea (30 days), it is estimated that 13.2 seahorse specimens may be caught per month per boat. In 2002, 374 Santa Catarina boats equipped with shrimp trawls known as *arrasto duplo*, operated in southeastern and southern Brazil (UNIVALI, 2003). Since shrimp trawls that operate from the border of Bahia and Espírito Santo to Rio Grande do Sul can legally fish for nine months of the year (no fishing is allowed between March 1 to May 31 due to federal legislation), it is estimated that 44,433 seahorses may be brought to the Itajaí port by the *arrasto duplo* boats alone. Seahorse landings were reported at other four states: Rio de Janeiro, Ceará, Pará and Paraná, however no information on catch rates was available.

One hundred vendors of dried seahorses were located in Brazil (encompassing *umbanda* article shops, dried marine products or crafts shops, folk medicine booths in markets), and estimate that the domestic trade consumed a total of 15,000 seahorses (7-14 kg, depending on the species) annually. *Umbanda* shops and folk medicine booths in markets were the main places of sale. Seahorses were traded from one state to another, throughout the coast and in various inland municipalities, usually in

conjunction with other marine products, such as starfishes and shells. Seahorses were sold either directly from the fishermen to the distributor or through intermediate buyers. Retailers from Bahia State distributed seahorses to the coastal states of Paraíba, Pernambuco, Alagoas, Sergipe, São Paulo and Santa Catarina, and to some inland municipalities. We located one wholesaler in Rio de Janeiro who distributed specimens to Santa Catarina and Goiás – a landlocked state.

The dried seahorse trade is unregulated in Brazil. Exports of dried seahorses have not been officially recorded in the country but Hong Kong Customs data indicate that Hong Kong imported 240kg (approximately 110,000-220,000 specimens, depending on the species) of dried seahorses from Brazil in 2001.

Two fishermen from Paraíba mentioned in 2000 that they had been asked to sell dried seahorses to fishermen working on Taiwanese vessels operating in Cabedelo municipality, suggesting that seahorses may have been exported to Taiwan. One dealer from Santa Catarina mentioned that a member of the crew of a Japanese fishing vessel had 15,000 dried seahorses (7-14 kg, depending on the species) to be sold in China. Unofficial records of exports to Honk Kong were obtained in Rio de Janeiro and Espírito Santo (n=2 dealers). It is likely that dried seahorses were also being exported from Brazil to Hong Kong, China and Taiwan but remained unreported. The frequencies with which seahorses were exported, and volume estimates are unknown. Interview and monitoring of one dealer in southern Brazil suggested that minimally 15,000 dried specimens were traded in 2001. Only two other dealers reported sales of 10,000 or more seahorses per annum (one at Rio de Janeiro, another at Espírito Santo). One boat owner interviewed in Espírito Santo state informed that most exported specimens were from Rio de Janeiro, and were sold by the kilogram, through trader levels 1 to 4. Many dried specimens were sold domestically, mainly for medicinal purposes.

Seahorses were largely (but not exclusively) collected in the northeastern states of Espírito Santo and Rio de Janeiro, the southeastern state of Santa Catarina, southern Brazil, and traded from one state to another. Traders in Rio Grande do Norte may have also supplied dried specimens to the Alagoas market for medicinal and religious purposes. One trader at an *umbanda* store mentioned that she imported seahorses from the Red Sea and India through a retailer in São Paulo, however we found no sound evidence of seahorse imports.

Only occasionally were specimens displayed to consumers; they were generally kept hidden in cans. Most traders interviewed (n=38) expressed their concern about being caught by environment officials because they perceived their activity as being illegal. Five traders believed that the trade was illegal because seahorses are under threat of extinction. Two traders reported that IBAMA officials had seized their stock of dried seahorses because “selling seahorses was illegal”. Numbers of seahorses traded are difficult to estimate at this point. The number of traders in the seven markets visited in the northeast ranged from one to 30 and each had a standing stock of 30 to 150 seahorses. Five respondents mentioned they usually bought 100 seahorses at a time but they could not say how long on average it took to sell the specimens. One informant mentioned that she could sell 12 seahorses per day while another said he once sold 30 per day. Traders usually sold other dried animal products, such as sloth’s claw and starfish, along with seahorses.

Retailing prices varied with the size of individuals, their origin and degree of preservation, and ranged (n=730) from 1.00 to 6.50 Reais (approximately equivalent to US\$0.45 to \$3.00 at the time the surveys took place). One trader said that when there was a shortage of seahorses, prices reached US\$5.00 to \$7.50. Retailers buy dried seahorses from fishermen, usually for less than US\$0.50. Specimens were unbleached and sometimes had small sections of the body missing owing to mouse bites or insects. Seahorses imported to Hong Kong had a declared value of HK84,000 (US\$10,769.36), equivalent to 44.87/kg.

The lack of control of the dried trade is also a major cause for concern. Numbers of traded seahorses should be further investigated in localities such as Rio de Janeiro, Guarapari and Vitória (Espírito Santo State), Paranaguá (Paraná State), Itajaí (Santa Catarina), Camoçim and Sobral (Ceará).

- **Live Trade**

In South America, live seahorses were traded predominantly by Brazil. Brazil is one of the world's leading exporters of ornamental fishes and was among the 15 most important global traders between 1995 and 1997 (FAO, 1999). In a recent review of the global trade in marine ornamental fishes, Wood (2001) considered the Brazilian fishery for marine ornamental as large, involving 23-25 wholesalers. *Hippocampus erectus* is Brazil's sixth most important marine ornamental export (Monteiro-Neto *et al.*, 2000). Live seahorses were exported from Brazil to 20 countries in the Americas, Asia and Europe; according to Brazilian Custom's data the United States is the main market for these fishes.

Live seahorses were also traded domestically in Brazil. Permits were required to trade live seahorses but quotas were not well enforced. In 2000, live seahorse traders had to register at the Ministry of Agriculture and then request an authorization from IBAMA to capture a given number of seahorses. Traders generally did not have to indicate collection sites or final destination of the specimens. Generally, each company authorized to catch seahorses for the aquarium trade was allowed to catch a maximum of 10,000 seahorses per year (5000 each *H. reidi* and *H. erectus*). However, owing to misidentification, permission to capture 5000 *H. kuda* was also frequently given, thus inflating the quota. Color morphs were also listed as species on a few permits, thus artificially increasing the quota. Additionally, one marine fish dealer reported that because the contents of the live fish shipments were not checked, when the maximum quota for seahorses was reached they were sold as another species. In 2003 each company could export 2000 seahorses per year (1000 each *H. reidi* and *H. erectus*).

To export live seahorses, traders had to obtain an additional license that indicated the number of exported seahorses. However, officials did not check the numbers of both captured and exported seahorses provided by traders and figures provided by different sources differed markedly from one another. Live seahorses were exported under the general commercial category 'ornamental fishes' (code 0301.10.00 of '*Nomenclatura Comum do Mercosul*') that also included freshwater species. Thus pertinent Governmental offices had no export statistics for the live trade.

Although all marine aquarium fishes exported from Brazil are combined into the single commercial category of 'ornamental fishes', upon request Brazilian Customs sorted out seahorses from other ornamental fishes exported and provided official numbers of the trade. According to 1999 Brazilian Customs data, 1050 seahorses were exported to eight countries. However, that year in a monitoring program carried out by one IBAMA office, a single wholesaler from northeastern Brazil declared to IBAMA that he exported 3215 seahorses, more than the supposed total for all of Brazil. The discrepancies in numbers of exported seahorses clearly indicate the need to monitor trade and to integrate the various levels of data collection. In 2000, according to information provided by Brazil's Customs, 11,519 seahorses were exported to 19 countries; in 2001 (between January and April) 5561 were exported to 13 countries, the United States being the largest importer (2611 seahorses imported). In northeastern Brazil, seahorses were mainly exported through wholesalers located in Ceará, Pernambuco and Bahia. To a lesser extent, Alagoas also exported seahorses. In southeastern Brazil, exporters existed at least in the state of São Paulo and Espírito Santo. Apparently the southern states did not have a significant role in seahorse exports.

Seahorses were sold either directly from fishermen to exporters or through intermediate buyers (up to three). Seahorses caught by artisanal fishermen were either taken immediately to the wholesaler or kept with the fisherman, possibly for up to one week. Fishermen, who worked on boats owned by the wholesalers, took seahorses directly from the boat to the holding facility. Three dealers mentioned that they could sell as many colorful seahorses as they could obtain. No estimates of daily sales were obtained but at one holding facility 150 seahorses were in stock to be sold when the author visited. One fisherman mentioned that one intermediate level buyer from northeastern Brazil shipped 300 seahorses to Rio de Janeiro.

During visits to two holding facilities in northeastern Brazil, a large number of pregnant seahorses were found. The quality of holding facilities varied greatly, ranging from one facility with inadequate sanitary conditions and tanks with precarious aeration systems, to a few well-equipped companies who had invested in equipment, such as UV filters and skimmers. At two holding facilities visited in northeast Brazil specimens were individually packed; the maximum number of seahorses shipped daily mentioned by respondents was 300.

Fishermen were paid between US\$0.45 and (unusually) US\$3.50 for each seahorse. Prices mostly depended on color, with red, orange and yellow specimens being most, and black ones least, valuable. One trader in northeast Brazil claimed that the price of black specimens had decreased in the last 10 years whereas the price of colored ones had markedly increased. One buyer (Level 2) in northeast Brazil mentioned that seahorse prices tripled at each level. In hobby shops seahorses were sold for prices ranging from US\$7.50 (Alagoas) to 20 (Santa Catarina). United States import data from January 1996 to April 2000 show that Brazilian seahorses were imported, at a price of US\$0.80-18.00 each. On a North American Internet site, Brazilian seahorses were advertised at US\$45 each.

A high number of pregnant seahorses (live and dried) were found for sale. One fisher explained that in order to avoid problems with environment officials, whenever he found pregnant seahorses he squeezed the pouch to get rid of the offspring. Traders of live specimens said that newborn seahorses usually died shortly after birth; three collectors said that they occasionally released the newborn in the wild.

Habitat Destruction

Mangrove destruction and pollution of estuaries represent additional threats for seahorses (especially in northeast Brazil). Despite being protected by law, some mangrove areas were being lost to logging and clearance for aquaculture ponds. For example, aquaculture ponds are found in Rio Jaguaribe in Pernambuco, and Rio Mamanguape in Paraíba. Aquaculture brings additional threats: three fishermen (from Santa Catarina) and one biologist (from northeast Brazil) who cultivated oysters stated that many seahorses were found in the aquaculture ponds, using the culturing lines as holdfasts. One of the fishermen, as a result, had decided to place all caught seahorses in a confined area to sell them.

Conclusions for Brazil

Brazil exported dried seahorses to Hong Kong in 2001 (240kg), and has been a major exporter of live seahorses at least since 1999. There is a need to integrate the various steps in data collection and to closely monitor the trade at least to guarantee that reliable capture, mortality and dried and live trade estimates are obtained.

In order to conserve seahorse populations in Brazil the following recommendations should be considered: trade regulations should be implemented and enforced; quotas should be reviewed to avoid overexploitation of local seahorse populations; education programs and small-scale aquaculture initiatives

should be promoted; further research on taxonomy, population parameters and ecology should be stimulated; suitable sanctuaries should be delimited, where fishing is prohibited or strictly regulated.

In 2002, the Brazilian Institute of the Environment and Natural Resources, IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) had no list of marine fishes that could be captured (such a list exists for freshwater fishes). Hence, captures were authorized by IBAMA regardless of the species. A list of authorized marine fishes would facilitate control of the live seahorse trade because, for example, it could be updated to accommodate population declines in a State or area. An unpublished list of threatened marine fish species prepared in 2000 by the Brazilian Society of Ichthyology listed both *H. erectus* and *H. reidi*.

Customs/CITES Involvement at Ports

During our surveys no involvement at ports was observed. With regards to interactions between CITES and Fisheries agencies, as far as the seahorse trade goes, no evidence of information exchange or collaboration was found.

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