

CATCHING EELS IN PACIFIC ISLAND COUNTRIES AND TERRITORIES

Introduction

The eel is a fascinating creature and has long been studied in great detail. Reports indicate that since the time of the ancient Greeks, people have wondered where eels came from and where they spawned. Eels have been considered a gourmet delicacy for thousands of years in many parts of the world.

Eels are found in marine, brackish and fresh waters worldwide and reports suggest there are 15–19 species in total, with about 10 species in tropical waters and 5 in temperate waters (Fig. 1). Of these species, the Japanese eel (*Anguilla japonica*) is most important in East Asia (China, Japan and Taiwan), the European eel (*A. anguilla*) in Europe (mainly Italy and the Netherlands), *A. australis* and *A. reinhardtii* in Australia, and *A. bicolor*, *A. megastoma* and *A. marmorata* in PNG and other Pacific Island countries and territories (PICTs).

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Eels are consistently fished because of their accessibility and market demand. According to the United Nations Food and Agriculture Organization (FAO), there has been a global decline in the eel catch, from a peak of 18,600 t in 1994 to 12,700 tonnes in 2000 (Europe 5300 t; Asia 2400 t; Oceania 1600 t; North America 1100 t). A portion of these catch figures refer to glass eels and elvers. The International Council for Exploration of the Sea (ICES) declared the eel spawning stock to be over-exploited from safe biological limits (FAO 2002). Some of the reasons attributed to the decline in catches are river development and dam construction, overfishing and environmental degradation.

World aquaculture production of freshwater eels has increased over the past decade and about 233,000 t were harvested in 2000, with a value of USD 978 million (FAO 2002). The artificial propagation of eels has not yet been achieved commercially. For aquaculture, glass eels or elvers must be caught from the wild for stocking in culture facilities. The increasing worldwide demand for eels and the overexploitation of many eel fisheries present an opportunity for eel culture. Pacific Island countries offer a good environment in which to culture eels, as they grow rapidly in tropical climates, preferring a temperature range of 23–28° C, and a pH range of 7.0–8.0. In ideal conditions they grow to marketable size (150–200 g) in 10 to 20 months, although their growth rates can be extremely variable. For pond-based aquaculture, the best site is one with a constant water supply; other pond features are generally similar to those required for tilapia and prawns.

Eels are consumed in PICTs and particularly in Fiji, where it is an important source of protein for the rural indigenous population. In some localities, high demand has led to the collection of young eels from the wild for culture in tilapia ponds.

In Fiji, elvers and juvenile eels are caught from estuaries, mountain tributaries, swamps and ditches using various types of local gear. These eels are grown to marketable size in ponds designed for tilapia culture and sold live at FJD 10.00 per kg at Suva and Nausori markets. An artisanal capture fishery also exists in Fiji, with small volumes of wild adult eels captured from the wild and sold at some municipal markets.



Figure 1: *Anguilla obscura*
(Photo by Pierre Laboute, © IRD)

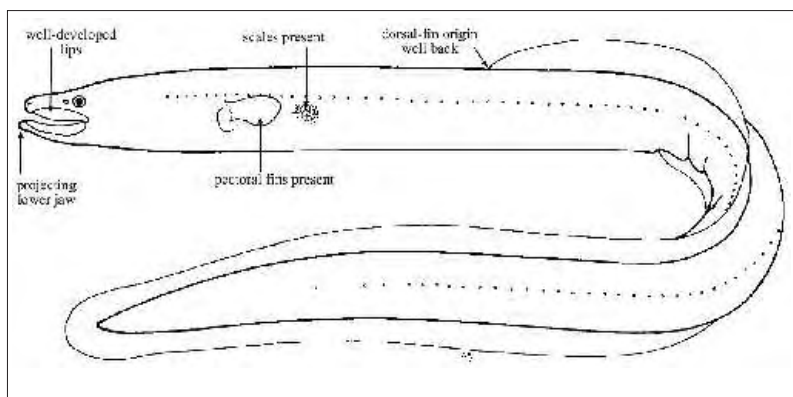


Figure 2: Eel morphology

Eels are still largely under-utilised in PICTs, despite the present shortage of many more established marine food fish. One reason may be that the public remains unfamiliar with eels, and there may be little awareness of eels as a potential candidate for aquaculture. With sufficient clean water and available land for aquaculture, and given the dwindling international supply of eels, PICTs have the opportunity to develop an eel capture fishery and culture industry. Some agencies have expressed their desire to help develop this industry by funding research to gain knowledge of the availability of the species in the wild, due to the fact that eel culture is totally dependent on the availability of wild glass eels and elvers.

In PICTs, eels are caught with hand lines, spears, cane knives and push nets. This gear is designed to capture a wide range of fish and crustaceans and is not specific to capturing eels. In other parts of the world, specially designed traps, otter trawls, long lines, fyke nets, haul seines and other gear types are used to catch eels. In some localities in PICTs, the indigenous population has traditional knowledge of the best times to capture eels; in others, stories are told about eels. This article presents some basic information on eel catching methods and a brief description of eels. Future articles will

address eel capture, life history, the potential for aquaculture and other aspects. We urge readers to send any information or stories that they wish to share with us and others in the region.

General description

The eel has an elongated snake-like body, is very slimy and is without scales. A pair of pectoral fins is positioned just behind the small head, and there is a small gill opening in front of each fin. The back and anal fins are very long and merge with the tail to form a

continuous soft-rayed fin fringe (see Fig. 2). The freshwater eel varies in colour from dark brown to greenish, black, yellowish white, and golden yellow on the belly. Eels are found in rivers, streams, creeks, swamps, lakes, pools, reservoirs, wells, fish ponds and along the coast. Eels feed on a variety of feeds such as fish, molluscs, crustaceans, and terrestrial and aquatic insects.

In Fiji, when the word “duna” or “bham” is used, it is certain that the fish referred to is the so-called common eel, *Anguilla*, which occurs in most of the islands. The taxonomic classification of eel is as follows:

- Kingdom: Animalia
- Phylum: Chordata
- Class: Osteichthyes
- Order: Anguilliformes
- Family: Anguillidae
- Genus: *Anguilla*

The family contains a single genus *Anguilla*, with about 15–19 species. The eel species identified so far are given in Table 1, along with the areas of

Table1. Some of the eel species found in the world.

Species	Distribution
<i>Anguilla reinhardi</i>	Australia, Fiji, New Caledonia, PNG
<i>A. australis</i>	Australia, New Zealand, Fiji, PNG
<i>A. marmorata</i>	Fiji, Samoa, American Samoa, PNG, New Caledonia
<i>A. bicolor</i>	PNG, Philippines, Indian Ocean
<i>A. megastomata</i>	Fiji, PNG, Tonga, Samoa, Solomon Islands, Tahiti
<i>A. obscura</i>	Fiji, PNG, Tonga, Samoa, Tahiti.
<i>A. japonica</i>	Japan, China
<i>A. bengalensis</i>	Indian Ocean
<i>A. mauritiana</i>	Central Pacific
<i>A. borneensis</i>	Borneo
<i>A. mossambica</i>	Indian Ocean
<i>A. nebulora</i>	Indian Ocean
<i>A. celebesensis</i>	Philippines
<i>A. pacifica</i>	East Pacific
<i>A. anguilla</i>	Europe, Iceland, North Africa
<i>A. rostrata</i>	North America , Greenland

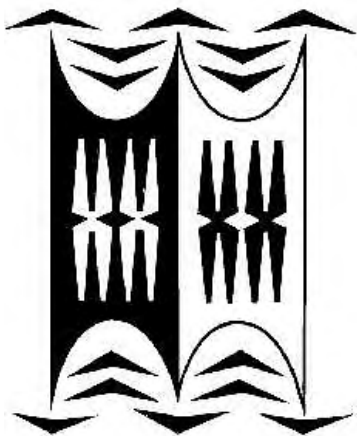
Source: Lane (1978), Allen (1991)

the world where they normally occur (this is not a complete list of species or distribution).

The life history of the species that have been studied is similar. Eels migrate downstream to the sea upon reaching sexual maturity. Spawning occurs in centralized locations in the deep ocean. The small larvae (leptocephali) swim and are carried by ocean currents to coastal areas, where metamorphosis occurs and the young gradually assume the appearance of adults (elvers) and migrate upstream. Eels have very muscular bodies and are well adapted to reach remote streams high in the mountains, and even travel across damp land. Reports indicate that eels may take as long as 10–20 years to attain sexual maturity before making their migration back to the sea.

Fishing methods and gear

The catching of eels in Fiji and other Pacific Islands normally involves inexpensive and very simple gear, which include: baited hook and line, spears, push nets, hollow bamboo piece or PVC pipes, baited trap, and seine nets. Of these, the first three methods are the most commonly used. The choice of method may be governed by the types and costs of materials available in villages. The author is unaware of any regulations regarding the type of gear that can be used for catching eels, as



the catch is mainly for subsistence use. Generally, the gear types that are used target edible-sized eels and do not capture juveniles or disturb the habitat. In some localities, villagers wish to limit the number of eels, which would otherwise prey upon other species of fish in pools, ponds and rivers.

Baited line

A fishing line with baited hooks is used in a number of ways in rivers, creeks, streams, lakes, drainage canals and swamps and pools in Fiji and in some other PICTs.

The most common approach is to use a small baited line (10–20 kg test) attached to a two to three-meter wooden pole and cast into the stream, river or pool water. This method is usually practiced by women for catching eels in streams after flash floods or rainfall. The bait used usually consists of earthworms and fishes (such as mosquito fish, *Gambusia*). Another method uses a fishing line with baited hooks (no pole used), which is cast into rivers, streams and lakes. The bait usually consists of chicken gut (something smelly) or fish such as *Gambusia*. The line may be set in the evening and checked at hourly intervals, or set at night and hauled in the morning. This method allows catching of eels with minimum damage to the body; eels may be kept in moist baskets for sometime before being sold in markets, roadside stalls or cooked.

Eel spears

Several types of spears are used, although a thin iron rod fixed to a wooden pole (see Fig. 3) is the most common type in Fiji. In some designs, the spearhead (the end of the iron rod) is sharp and has a small spike in the front portion, permitting capture of the eel by spearing and

pulling it up. If the spearhead lacks spikes, the capture of the eel is by spearing and then gripping it or holding it down and hauling it up by hand.

The spears are usually used in shallow streams or creeks when visibility is sufficient to distinguish the eel moving or lying idle in the water; at most times the eel's head will be jutting out of an "eel hole", a dead wooden trunk or a bamboo pole. Eels are most commonly speared at night with the aid of a bright light.

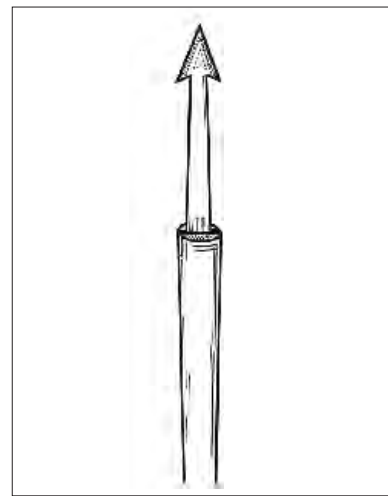


Figure 3: Eel spear

Push net

A push net or hand net is used in estuaries, streams and swamps for catching eels along with other local fishes and crustaceans, usually by fisherwomen. A net up to 0.5–1.5 m long and 0.5–1.5 m wide, and with a mesh size of 4–10 mm is manageable. The net is operated by pushing it in slow moving water over a smooth bottom in estuaries that are covered or partially covered with grass. The net may also be fixed into a deep portion of an estuary by pushing the ends of two poles into the ground and disturbing the water so that fish and eels move into the net. Eels hiding in crevices and holes are disturbed by pushing a hand inside them,

permitting the eel to move into the net; eels may also be caught by hand and pulled out and transferred into the basket.

PVC pipe or bamboo method

Various types of pipe or hollow pole are used: PVC pipe (dia 25–100 mm), polyethylene pipe, iron pipe, hollow bamboo, etc. PVC pipe (dia 75–100 mm and length 1–3 m) is usually preferred (see Fig. 4). One end of the pipe is closed with chicken wire mesh. A string or rope is tied to the other end to permit hauling on the pipe. Some pipes have a small hole in the central portion for placement of bait. The pipe is placed on the bottom of a river, swamp or estuary, with the mesh-covered end facing the current to allow water to flow through it. The eels usually move inside the pipe and “sleep” inside these tubes. The

pipes are usually set in the evenings and hauled the following day. This pipe method is also used for removing eels from prawn and tilapia ponds.

Cane knife

Villagers who do not have the above-mentioned gear use a cane knife to catch eels by chopping them at whichever place the knife strikes the animal. In some instances, the blunt side of the knife is used to strike the head of the eel. But some fear their eel may escape unless chopped in half. This method is usually used for catching eels in shallow streams or creeks at night with a bright light.

Other methods

Other methods of catching eels, such as baited traps, fyke nets

(see Fig. 5), longlines, shore seines and electric fish traps are not used in PICTs and are thus not mentioned here. Fishers are encouraged to use baited traps, however, many types of portable traps have been used including empty buckets or any trap-shaped structure.

References

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 Lane P.J. (1978). Eels and their utilization. Marine Fisheries Review. 40(4):1–20

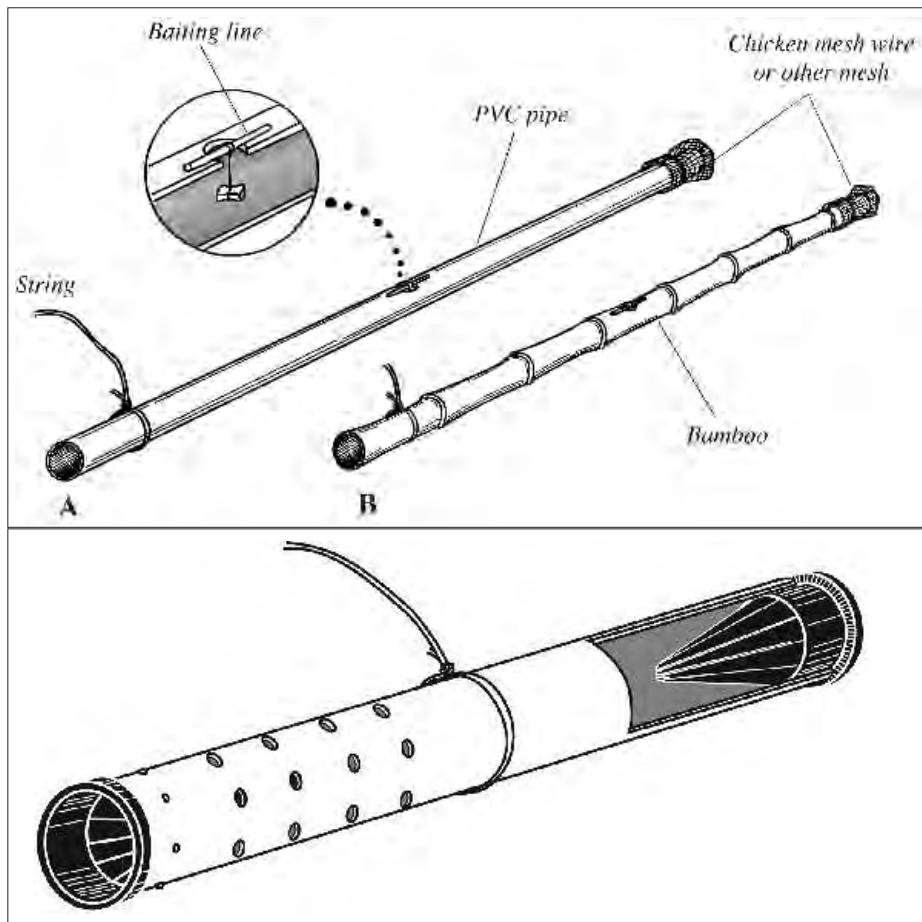


Figure 4: PVC pipe or bamboo method

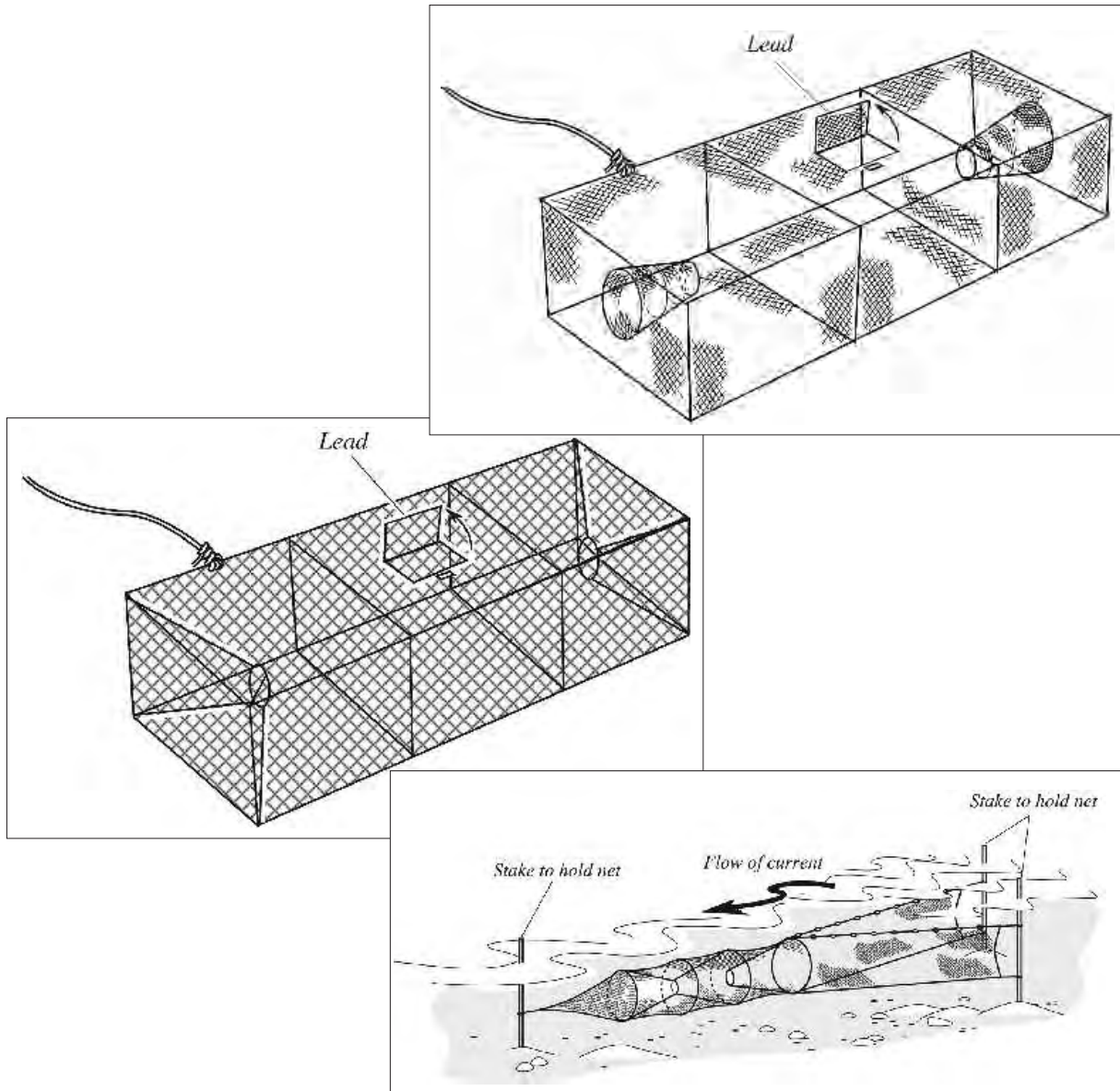


Figure 5: Baited traps and fyke nets



Juvenile eel caught from a prawn grow-out trial pond at Futuna on 26/10/05