

Table 1: Repeated measures analysis of total weight and total length in *Stichopus mollis*

Animal	Weight range (g)	Mean (g)	S.D. (g)	Length range (cm)	Mean (cm)	S.D. (cm)
1	178.1 - 205.0	189.4	8.3	17.5 - 20.5	18.5	1.0
2	178.2 - 206.1	198.3	8.8	17.0 - 21.5	19.4	1.3
3	138.6 - 156.9	145.6	6.1	16.5 - 19.5	17.9	0.9
4	146.4 - 159.0	154.7	6.2	14.5 - 20.0	16.9	1.9
5	173.6 - 194.4	183.9	7.1	16.0 - 22.0	18.1	1.9
6	183.2 - 193.1	188.1	3.4	18.0 - 19.5	18.9	0.5
7	103.8 - 115.6	107.1	3.4	12.5 - 17.0	14.8	1.4
8	148.6 - 166.1	156.8	5.7	16.0 - 19.5	18.1	0.9
9	154.7 - 163.8	158.7	3.1	15.5 - 19.0	17.7	1.1
10	175.9 - 203.7	191.6	7.5	18.5 - 20.0	19.4	0.5

of the ten measures (Sewell, 1990). A high correlation was also found between total weight and the drained weight used in the calculation of the gonad index ($r=0.95$, $n=480$), suggesting that total weight was a reasonably accurate and non-destructive measure of size in this species.

So in conclusion, a reasonable measure of weight could be obtained by the following protocol for *Stichopus mollis*

- (i) Empty the alimentary canal in such a way that sea cucumbers cannot reconsume the sediments released as faeces;
- (ii) Allow a relaxation period in the tank;
- (iii) Squeeze excess water from the respiratory trees;
- (iv) Blot quickly and weigh.

These methods were found to be suitable for calculation of gonad indices; however, if animals are to be reweighed for estimates of growth a number of measurements should be taken, and a mean calculated. The method described here reduces some of the variation, by at least ensuring that all the animals have empty guts before measurement.

References:

- Choe, S.(1963). *Namako no kenkyu* (Biology of the Japanese common sea cucumber *Stichopus japonicus*, Selenka). Pusan National University, Japan, 226 pp. (in Japanese with English summary).
- Conand, C. 1989. Les holothuries Aspidochirotés du lagon de Nouvelle-Calédonie: Biologie, écologie et exploitation, Etudes et thèses, ORSTROM., Paris, 393 pp.
- Conand, C. 1981. Sexual cycle of three commercially important holothurian species (Echinodermata) from the lagoon of New Caledonia, *Bull. Mar. Sci.*, 31 (1981) 523-543.
- Sewell, M.A. (1990). Aspects of the ecology of *Stichopus mollis* (Echinodermata: Holothuroidea) in north-eastern New Zealand. *N.Z. J. Mar. F.W. Res.* 24: 97-103.

Recent trends in sea cucumbers exploitation in New Caledonia

by C. Conand¹ and C. Hoffschir²

¹Labo. Océanographie Biologie, UBO, France
²O.R.S.T.O.M, Nouméa, Nouvelle Calédonie

The history of the sea cucumber fishery in New Caledonia has been traced back to the nineteenth century from various documents and statistics. The exports have shown wide fluctuations in connection with political and socio-economic events, as well as with the status of the biological resource (Conand, 1989, 1990).

Evolution of the exports

The most recent period of revival started in 1983, when a few New Caledonians of Chinese origin undertook to organise the fishing, processing and trade. As the catches in

New Caledonia are all exported, the export statistics provide easily obtainable accurate data.

Table 1 shows the fluctuations in tonnage between 1983 and 1990. For this period, the mean annual export was 103 tons. Production was not constant but oscillated between years, giving peaks in landed volume during 1984, 1986, 1988 and 1990.

Table 1. Evolution of the recent beche-de-mer exports from New Caledonia

Year	1983	1984	1985	1986	1987	1988	1989	1990
Tonnage	15	150	89	180	77	135	55	126
exporters	2	4	7	6	4	3	3	4

The general tendency of the fishery appears to be towards a slow decline in the landed volume of beche-de-mer. The total value of the exports in 1990 was 156 million CFP, which corresponds to a mean price of 1,233 CFP per kg.

The number of companies exporting beche-de-mer operating in New Caledonia (see Table 1) has also fluctuated. Although up to twelve different companies have occasionally exported beche-de-mer, only three of them share the major part of the market. Their respective importance has also fluctuated, as shown in Figure 1. The exports of the first company (1) fell to only 200 kg in 1990. The third one (3) increased and now holds the major share while another one (4) started in 1990 with an initial 20 per cent of exports.

The major markets for beche-de-mer (Figure 1) were Hong Kong and Singapore. In 1987 and 1988, the tonnage exported to Singapore declined strongly and since 1989 Singapore has disappeared from the statistics. In 1989 and 1990, the exports were mostly destined for Hong Kong (with a further 3.7 tons to Taiwan in 1990).

Other sources of variability that caused production to fluctuate from year to year were the species targetted for collection, the locations selected for harvesting, and the organisation of the fishing and processing.

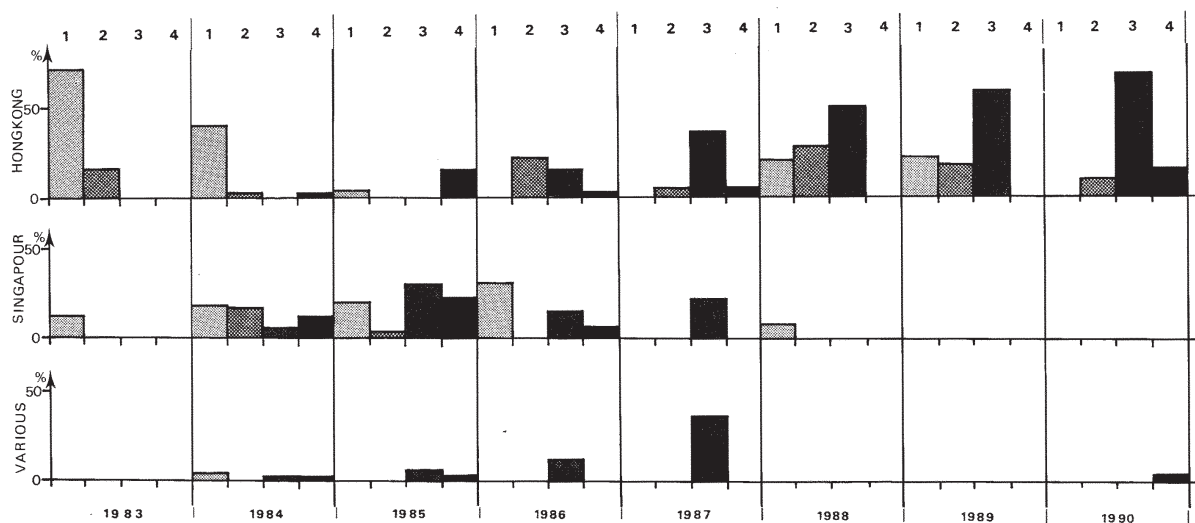


Figure 1: Exports of beche-de-mer by company and by destination, in percentage of the annual tonnage
1,2 & 3: main companies; 4: other companies

Organisation of the fishery and processing

There are now approximately one hundred fishermen involved in the sea cucumber fishery. Most of them are grouped by their respective tribes or in cooperatives located principally on the north-east coast. On the west coast, a few individual fishermen sell their captures to the processors or exporters.

Harvesting takes place at low tide on the reef-flat (Figure 2). Each fisherman collects the sea cucumbers in a restricted area, filling up his sacks, which are left on the fishing ground until high tide.

Changes in the composition of the species collected have occurred recently. Among the species of the first category (Conand, 1989), only *Holothuria scabra* (sandfish or **tavo** in New Caledonia) and *Holothuria*

scabra versicolor (white sandfish or **mouton**) are still collected in some localities. They are traditionally processed, then sold to the exporter at prices according to their grade. For *H. scabra versicolor* grade A, which is the largest, the export price can reach around US\$ 30 per kg. Meanwhile, more than 75 per cent of the production is from the blackfish, *Actinopyga miliaris*, which is a very common species found in dense populations on the reef-flats of the north-east coast. As it is processed the day after the harvest (Figure 3), the individuals have spontaneously eviscerated and the traditional stages of slitting and gutting are unnecessary, as is the smoke-drying. The export price for this species does not reach more than US\$10 per kg.

The introduction of species and grade categories in the customs statistics is recommended to improve the monitoring of this multispecies artisanal fishery.

References

Conand, C. 1989. Les Holothuries Aspidochiotes du lagon de Nouvelle-Calédonie: biologie, écologie et exploitation. *Etudes et thèses*. ORSTOM, Paris. 393 p.

Conand, C. 1990. The fishery resources of Pacific Islands countries. Part 2: Holothurians. *FAO Fisheries Technical Paper*. Rome, 272-2: 143 p.



Photo: C. Hoffschir

Figure 2. Harvesting in New Caledonia. The sacks full of sea-cucumbers are shipped



Photo: C. Hoffschir

Figure 3. Processing of blackfish at Arama