

TUNA CATCHES BY MASDHONIS IN THE FIRST YEARS OF MECHANIZATION

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The Republic of Maldives has undergone very rapid development over the last 15 or 20 years. Mechanization of the tuna fishing fleet was one of the most significant steps on this rapid road to modernization. The Ministry of Fisheries maintains records of fishing activity and catches dating back to 1959. Mechanization of masdhonis started in 1974, but the catches of mechanized and sailing masdhonis were not recorded separately until 1979. The main purpose of this article is to present authorized estimates of catch and effort by the 1975 - 78. These may be of value for the purpose of stock assessment and management, and for socio-economic analysis.

The tuna fishery has long been the mainstay of the Maldivian economy. For centuries lateen-rigged masdhonis have caught small tunas using the livebait pole and line technique in the oceanic waters just outside the atolls. Some of the catch was consumed locally, but most was boiled, smoked and dried to produce Maldive fish for export to Sri Lanka. This time-honoured pattern of life in the Maldives continued right up until the early 1970's, when three major events changed it for ever. First, the introduction of tourism produced a lucrative and rapidly expanding alternative source of employment. Secondly, a foreign currency crisis in Sri Lanka led to an effective ban on imports; the sudden loss of the only export market for the Maldives' only export product did cause some immediate hardship, but fortunately the government was able to change quickly to the export of frozen and then canned tuna. Nevertheless, this switch did have a number of far reaching consequences on socio-economic conditions in the fishing islands, some of which are dealt with in the accompanying article. The third major change was the mechanization of the pole and line masdhoni fleet, starting with one vessel in 1974 but rapidly increasing thereafter (Table 1, Fig. 1).

Table 1

Number of masdhonis in the Maldives, 1974 - 1978

	1974	1975	1976	1977	1978
Mechanized masdhoni	1	42	218	413	548
Sailing masdhoni	2131	2040	1940	1801	1631
Total masdhoni	2131	2082	2158	2214	2179

Mechanized craft were of course known before 1974. For example, a boatyard on Hulule in the 1960's had built a number of mechanized wooden craft, mainly of a Sri Lanka style, some of which were used for longline fishing, others as general work boats (a few can still be seen around Male'). However, the impact of this project was rather local. There was no national-scale progress until after 1974 when the mechanization of the sailing masdhoni fleet started. The government provided considerable stimulus with an immensely successful credit scheme administered by the Ministry of Fisheries. The provision of fuel, spare parts and repair facilities in outlying atolls was a rather more difficult undertaking and caused a number of problems in the early years. Nevertheless, mechanized masdhonis proved so much more efficient than sailing masdhonis that, despite all problems, boat owners rushed to install engines. Before the end of 1977 there were mechanized masdhonis based in every atoll (Anderson, 1984; table 43) and 1978 catches by mechanized masdhonis exceeded those by sailing masdhonis (Fig. 3). On average, mechanized masdhonis caught about twice as much fish as sailing dhonis (Anon., 1977), but they carry fewer crew. Thus earnings are higher, even with the extra fuel and engine costs. Mechanized vessels catch more fish than sailing ones because they are faster, therefore spending less time travelling to the baiting and fishing grounds and more time actually fishing, and because they can travel in any direction in relation to the wind, thus making it much easier to chase tuna schools. Mechanized vessels can carry fewer crew than sailing ones because they do not need the manpower to tend the sail, row in calm weather, or constantly hand bail the bait well.

For the years 1974 - 1978 inclusive there are no separate catch and effort statistics for sailing and mechanized masdhonis. The only records are numbers of sailing and mechanized masdhonis (Table 1; Fig. 1), and catch by species and number of days fished by the total masdhoni fleet (Table 2).

Table 2

Catch (MT) and fishing effort by total masdhoni fleet during 1975 - 78 (source Anderson, 1984)

	1975	1976	1977	1978
Skipjack catch	14,601	19,603	14,032	13,549
Yellowfin catch	3,512	4,481	4,123	3,214
Little tuna catch	147	191	160	133
Frigate tuna catch	3,894	2,419	2,816	1,455
Total tuna catch	22,154	26,694	21,131	18,351
Reef fish catch	484	718	720	2,035
Total catch	22,638	27,412	21,851	20,385
No. days fished	176,008	175,339	146,243	108,539

The species recorded are skipjack tuna or kalhubilamas (*Katsuwonus pelamis*), yellowfin tuna or kanneli (*Thunnus albacares*), frigate tuna or raagondi, (*Auxis thazard*) and little tuna or latti (*Euthynnus affinis*), all other species are lumped together as 'reef fish'. To estimate catch and effort by sailing and mechanized masdhonis separately a number of assumptions were made. For 1974, it is assumed that the single masdhoni mechanized during the course of the year had effectively no catch, at least on the scale of the national total. For the years 1975 - 78 it is assumed that each mechanized masdhoni had 100 days fishing per year. (Sailing masdhonis fished an average of 100 days in 1973 and 95 days in 1974, while the mechanized masdhonis that replaced them fished an average of 98 days in 1979 and 103 days in 1980). Catches of each species by sailing and mechanized vessels were then estimated taking in to account the total catch, the number of days fished by each vessel type, and their relative catch rates. Adjustments were made in the case of sailing masdhonis, which changed their pattern of fishing during this period, i.e. the relative catch rates of different species changed with time. (As the mechanized masdhonis became more effective, sailing masdhonis could no longer compete on the offshore tuna fishing grounds. They either mechanized, stopped fishing, or fished within the atolls doing more trolling and reef fishing). For both sailing and mechanized masdhonis catches were estimated for each species individually, and for total catch, only minor adjustments being required for compatibility. Estimates of catches by sailing masdhonis during 1975 - 78 are given in Table 3, and for mechanized masdhonis in Table 4. The data are presented graphically in Figs. 1 - 3.

Table 3

Estimated annual catches (MT) and fishing effort
by sailing masdhonis during 1975 - 78

	1975	1976	1977	1978
Skipjack catch	13,921	14,777	6,935	3,338
Yellowfin catch	3,348	3,569	2,530	1,324
Little tuna catch	140	157	112	78
Frigate tuna catch	3,713	1,971	1,863	720
Total catch	21,122	20,474	11,440	5,460
Reef fish catch	461	592	517	1,263
Total catch	21,583	21,066	11,957	6,723
No. days fished	171,808	153,539	104,943	53,739

Table 4

Estimated annual catches (MT) and fishing effort
by mechanized masdhonis during 1975 - 78

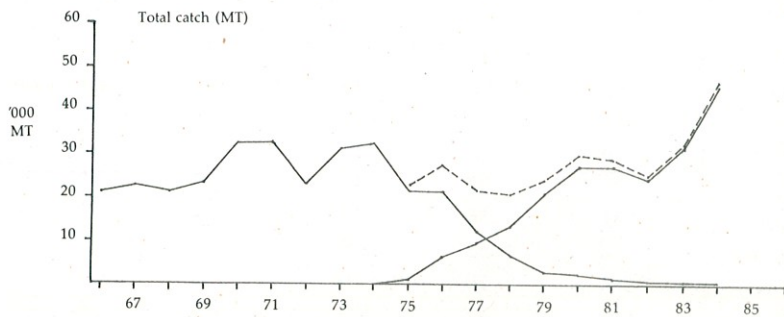
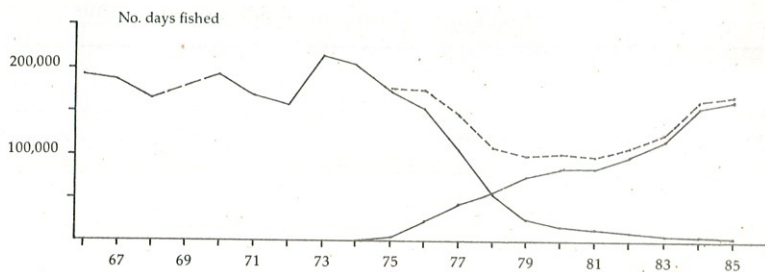
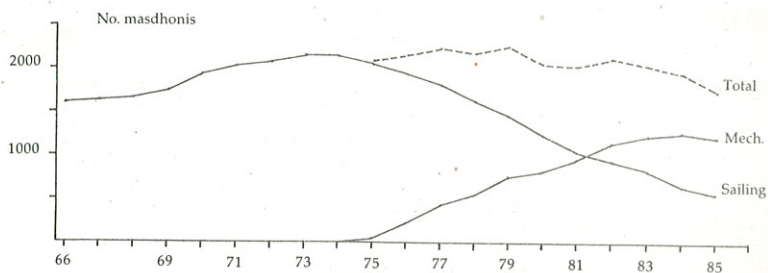
	1975	1976	1977	1978
Skipjack catch	680	4,826	7,097	10,211
Yellowfin catch	164	912	1,593	1,890
Little tuna catch	7	34	48	55
Frigate tuna catch	181	448	953	735
Total tuna catch	1,032	6,220	9,691	12,891
Reef fish catch	23	126	203	772
Total catch	1,055	6,346	9,894	13,663
No. days fished	4,200	21,800	41,300	54,800

There can be little doubt now that mechanization was one of the most significant developments in the long history of the Maldivian tuna fishery. Mechanized masdhonis are so much more efficient than sailing masdhonis that the latter were soon put out of business. By 1979 the total catch by sailing masdhonis was less than one sixth that by mechanized masdhonis, even though the number of sailing masdhonis was still virtually twice the

number of mechanized masdhonis. By 1984, only 10 years after the start of mechanization, sailing masdhonis caught less than 1% of the total tuna catch. Impressive though this is, mechanization would probably not have taken hold so rapidly were it not for other developments taking place at the same time. Thus, the loss of the Maldivé Fish market in Sri Lanka forced a change to frozen fish exports. This required the deployment of a fleet of collector vessels – a near ideal means of distributing fuel to distant islands. At the same time frozen fish purchasing led to the development of cash economies in the islands which, despite any social problems which this may have provoked, was an important step for boat owners who now had regular fuel costs, credit repayments and engine repair costs to meet. The mechanization program was also closely linked with the development of tourism. Mechanization allowed higher catches to be made by smaller crews, thereby releasing a large proportion of the workforce for employment in other sectors, without a drop in total annual catch (and therefore fisheries export earnings). As labour demands from these sectors exceed those that can be met from the fisheries 'surplus' then increasing numbers of foreign workers will have to be imported. Nevertheless, unless incentives to remain in fishing are sufficient, more fishermen will leave and total annual catch is bound to be adversely affected.

References:

- Anderson, R.C. (1984) Republic of Maldives tuna catch and effort data, 1970 – 1983. Ministry of Fisheries, Male'. 9 pp. 50 tables.
- Anon. (1977) Comparison of catch by mechanized dhonis and sail dhonis. Ministry of Fisheries, Male'. 2 pp.



دستة فویریندوئی مورقنه یرسه 1986

BASIC FISHERIES STATISTICS 1986

1982 یرسه 1986 یرسه دستة فویریندوئی مورقنه یرسه 1986
FISHERMEN AND FISHING FLEET 1982 - 1986

		1986	1985	1984	1983	1982
Fishermen	دستة فویریندوئی	22,245	19,671	21,028	22,262	21,727
Mechanized Dhoni	یرسه یرسه یرسه	1,358	1,202	1,296	1,231	1,166
Sailing masdhoni	یرسه یرسه یرسه	507	561	651	811	952
Sailing vadhu dhoni	دستة فویریندوئی	3,278	3,115	3,021	3,448	3,428
Row boats	دستة فویریندوئی	537	358	306	-	-

1986 یرسه 1986 یرسه دستة فویریندوئی مورقنه یرسه
NUMBER OF FISHING UNITS IN DECEMBER 1986

Atoll	Fishermen	Mechanized Masdhoni	Sailing Masdhoni	Sailing Vadhu dhoni	Row Boats
H.A.	1489	93	36	193	56
H.DH.	1048	52	49	325	12
SH	1679	56	20	395	33
N.	1083	46	22	198	63
R.	2115	129	22	262	13
B.	1422	88	8	227	25
LH.	1085	57	4	78	4
K.	1118	68	20	89	6
A.	1727	122	96	305	92
V.	261	24	1	24	11
M.	883	56	5	59	14
F.	365	30	35	53	39
DH.	611	42	13	105	89
TH.	1428	96	11	186	12
L.	1632	92	11	83	26
G.A.	1221	78	12	94	4
G.DH.	1388	82	8	197	2
GN.	484	10	9	90	0
S.	317	42	125	315	36
MALE	889*	95	NA	NA	NA
TOTAL	22245	1358	507	3278	537

* Source: M.P.D. Census - 1985

دستوردهای ماهیگیری (۱,۰۰۰ مرتبه)

NUMBER OF FISHING TRIPS ('000s)

	<u>1986</u>	<u>1985</u>	<u>1984</u>
Mechanized masdhoni <small>مکانیزه شده ماهیگیری</small>	162	162	153
Sailing masdhoni <small>سایه ماهیگیری</small>	3	5	6
Sailing vadhu dhoni <small>سایه ماهیگیری</small>	79	110	108
Row boats <small>قایق‌های کوچک</small>	2	3	3

دستوردهای ماهیگیری (۱,۰۰۰ مرتبه) - دستوردهای ماهیگیری (۱,۰۰۰ مرتبه)

FISH PRODUCTION - BY VESSEL TYPE ('000 MT)

	<u>1986</u>	<u>1985</u>	<u>1984</u>
Mechanized Pole & Line <small>مکانیزه شده ماهیگیری</small>	54.4	53.7	46.4
Sailing Pole & Line <small>سایه ماهیگیری</small>	0.4	0.6	0.6
Sailing Trolling <small>سایه ماهیگیری</small>	3.9	6.8	7.8
Row Boats <small>قایق‌های کوچک</small>	0.1	0.2	0.2
Miscellaneous <small>سایه ماهیگیری</small>	0.4	0.6	0.1
TOTAL <small>مجموعه</small>	50.2	61.9	55.1

دستوردهای ماهیگیری (۱,۰۰۰ مرتبه) - دستوردهای ماهیگیری (۱,۰۰۰ مرتبه)

FISH PRODUCTION - BY SPECIES ('000 MT)

	<u>1986</u>	<u>1985</u>	<u>1984</u>	<u>1983</u>	<u>1982</u>
Skipjack <small>سکپ‌جک</small>	45.4	42.6	32.0	19.7	15.6
Yellowfin <small>یelowfin</small>	5.3	6.1	7.1	6.2	4.0
Other tuna-related species <small>سایه ماهیگیری</small>	2.9	5.0	5.0	5.6	4.0
Reef fish <small>سایه ماهیگیری</small>	5.6	8.2	11.0	7.0	6.7
TOTAL <small>مجموعه</small>	59.2	61.9	55.1	38.5	30.3

دستوردهای ماهیگیری (۱,۰۰۰ مرتبه)

NUMBER OF FISHING TRIPS ('000s)

	1986	1985	1984
Mechanized masdhoni <small>دستوردهای ماهیگیری مکانیزه</small>	162	162	153
Sailing masdhoni <small>دستوردهای ماهیگیری بادیه</small>	3	5	6
Sailing vadhu dhoni <small>دستوردهای ماهیگیری بادیه</small>	79	110	108
Row boats <small>کایاک</small>	2	3	3

دستوردهای ماهیگیری - دستوردهای ماهیگیری (۱,۰۰۰ دستوردهای ماهیگیری)

FISH PRODUCTION - BY VESSEL TYPE ('000 MT)

	1986	1985	1984
Mechanized Pole & Line <small>دستوردهای ماهیگیری مکانیزه</small>	54.4	53.7	46.4
Sailing Pole & Line <small>دستوردهای ماهیگیری بادیه</small>	0.4	0.6	0.6
Sailing Trolling <small>دستوردهای ماهیگیری</small>	3.9	6.8	7.8
Row Boats <small>کایاک</small>	0.1	0.2	0.2
Miscellaneous <small>دستوردهای ماهیگیری متنوع</small>	0.4	0.6	0.1
TOTAL <small>جمع</small>	50.2	61.9	55.1

دستوردهای ماهیگیری - دستوردهای ماهیگیری (۱,۰۰۰ دستوردهای ماهیگیری)

FISH PRODUCTION - BY SPECIES ('000 MT)

	1986	1985	1984	1983	1982
Skipjack <small>سکپجک</small>	45.4	42.6	32.0	19.7	15.6
Yellowfin <small>یelowfin</small>	5.3	6.1	7.1	6.2	4.0
Other tuna-related species <small>دستوردهای ماهیگیری تن ماهی</small>	2.9	5.0	5.0	5.6	4.0
Reef fish <small>دستوردهای ماهیگیری مرجانی</small>	5.6	8.2	11.0	7.0	6.7
TOTAL <small>جمع</small>	59.2	61.9	55.1	38.5	30.3

ދިވެހިސަރުކާރުގެ ގެޒެޓް، ޖުމްހޫރީ ޖަނަވަރީ 1986

FISH UTILIZATION AND EXPORT VALUE

	1986	1985	1984	1983	1982
ޖުމްހޫރީ ޖަނަވަރީ 1986 (e/1000)					
Total landing ('000 MT)	59.2	61.9	55.1	38.5	30.3
ޖުމްހޫރީ ޖަނަވަރީ 1986 (e/1000)					
Total exports ('000 MT)	35.6 ^{1/}	34.8 ^{1/}	22.6 ^{1/}	15.1	16.9
ސޯކް					
Stock	3.5 ^{2/}	3.0 ^{2/}	3.7 ^{2/}	-	-
މިއަހަރުގެ ސޯކް ގެ ގޮތުގައި ބަލާ ފަރާތްތަކުގެ ތެރެއިން					
Local constpt. ('000 MT)	23.2	27.8	31.5	23.4	13.6
ޖުމްހޫރީ ޖަނަވަރީ 1986 (މިލިއަން ރުފިޔާ)					
Tot. value of exp. (mill. Rf)	116.4	110.2	74.1	49.6	25.2

1/ Export (including previous year's stock)

2/ Stock of current year.

ސޯކް ގެ ގޮތުގައި ބަލާ ފަރާތްތަކުގެ ތެރެއިން

PRICE PAID FOR FUEL OIL

	ޖުމްހޫރީ ޖަނަވަރީ 1986	ޖުމްހޫރީ ޖަނަވަރީ 1985
	Price Revision Date	Price Paid for Fishermen
Diesel ޖެލްޓް	31.08.1986	2.60/litre ޖެލްޓް
Rotella 30 30 ޖެލްޓް	05.12.1985	12.00/litre ޖެލްޓް

ދިވެހިސަރުކާރުގެ ގެޒެޓް - 1986

PRICE PAID TO FISHERMEN - 1986

Species: ވަލްޖެރު	ޖުމްހޫރީ ޖަނަވަރީ 1986	ޖުމްހޫރީ ޖަނަވަރީ 1985
	Price Revision Date	Price/kg (Rf)
Fresh Tuna ފްރެޝް ޖެލްޓް		
Under 2 kg 2 ޖެލްޓް ޖަނަވަރީ 1986	10.12.1985	1.30
Over 2 kg 2 ޖެލްޓް ޖަނަވަރީ 1986	10.12.1985	1.80
<u>(Smoked and Dried Tuna)</u>		
Maldive Fish ދިވެހި ސަލްޖެރު		
	10.12.1985	9.50
	28.08.1986	7.50

Dry Salted Fish دري سالتد فيش1) Tuna تونا

1 st Grade	/ ١٠٠٠	19.10.1985	5.15
2 nd Grade	2 ١٠٠٠	19.10.1985	4.00
1 st Grade	/ ١٠٠٠	28.08.1986	6.15
2 nd Grade	2 ١٠٠٠	28.08.1986	5.00

2) Reef Fish (Mullet) ريف فيش (موليت)

1 st Grade	/ ١٠٠٠	19.10.1985	6.50
2 nd Grade	2 ١٠٠٠	19.10.1985	4.00
1 st Grade	/ ١٠٠٠	14.03.1986	6.60
2 nd Grade	2 ١٠٠٠	14.03.1986	5.10
1 st Grade	/ ١٠٠٠	01.04.1986	4.15
2 nd Grade	2 ١٠٠٠	01.04.1986	3.00

3) Reef Fish ريف فيش(Jack, Rainbow Runner) (جك، رينبو رنر)

1 st Grade	/ ١٠٠٠	19.10.1985	7.80
2 nd Grade	2 ١٠٠٠	19.10.1985	5.70
1 st Grade	/ ١٠٠٠	14.03.1986	9.20
2 nd Grade	2 ١٠٠٠	14.03.1986	7.10
1 st Grade	/ ١٠٠٠	01.04.1986	5.00
2 nd Grade	2 ١٠٠٠	01.04.1986	3.50

4) Reef Fish ريف فيش(Shark and Wahoo) (شارك، واهو)

1 st Grade	/ ١٠٠٠	19.10.1985	10.01
2 nd Grade	2 ١٠٠٠	19.10.1985	7.70
1 st Grade	/ ١٠٠٠	14.03.1986	12.35
2 nd Grade	2 ١٠٠٠	14.03.1986	9.50
1 st Grade	/ ١٠٠٠	01.04.1986	6.85
2 nd Grade	2 ١٠٠٠	01.04.1986	5.75

Spiney Dog Fish Shark Oil (Litre)سبيني دوغ فيش شارك اويل (لتر)

20.10.1985 19.00

Commission مكوسمه 2.00