

## ARE THE OCTOPUS POTS USED BY THE MAURITANIAN SMALL-SCALE FISHERY DANGEROUS FOR THE RESOURCE?

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The common octopus *Octopus vulgaris* is very abundant off the coast of NW Africa, where it is exploited on such a large scale that it is the most valuable fishery product of Mauritania (Jouffre, 1998). Trawling for this species has been active on this shelf since the late 1960s (Hatanaka, 1979; Caddy, 1983; Guerra, 1997) and a small-scale fishery using canoes (also called an “artisanal fishery” in the sense of Gulland and Garcia (1984)), commenced in Mauritania in the late 1980s targeting the same resource (Lamboeuf, 1997).

Conflict between the industrial and artisanal sectors has resulted in accusations by the industrial sector that the pots used by the artisanal fishers are selective for brooding females and therefore endangering the resource (Dia et al., 1996). The present study was initiated to determine the selectivity of the pots and thereby to answer this issue.

### MATERIALS AND METHODS

Experimental fishing for *O. vulgaris* was carried out off Nouadhibou (Fig. 1), in different seasons and at different depths (Table 1), aboard the Mauritanian research vessel NDIAGO, using identical methods and the same gear as the small-scale fishing. The majority of fishing operations (50 from a total of 58) were within the main zone of artisanal fishing (Fig. 1), the others being made in deeper zones in order to collect some information about how the pots behave at depths greater than those reached by the artisanal fishers. The experimental design is shown in Figure 2. One hundred pots per line and one to six fishing operations were carried out each month between May 1993 and April 1994 (Table 1).

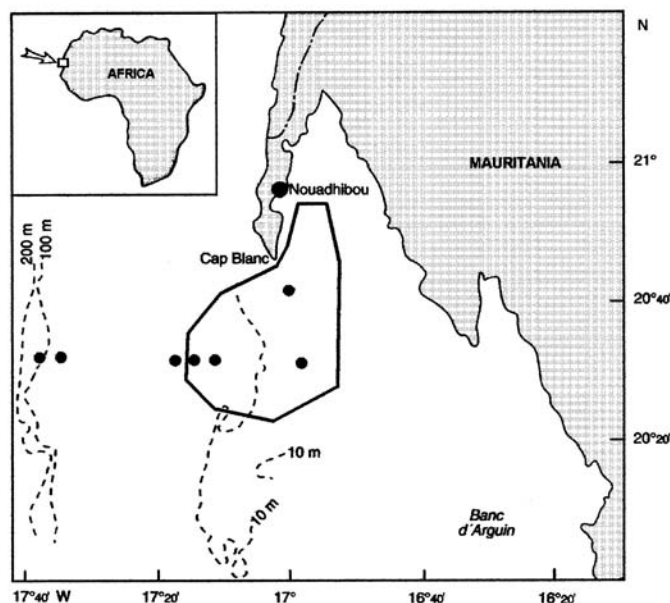


Figure 1: Location of the study area. Dots represent the positions of the experimental lines. The main small-scale fishing area of operation is delimited by the bold line.

Table 1. Distribution of the experimental fishing operations with time and in the different depth ranges (each fishing operation being made with a line of 100 pots).

Depth ranges	<10m	10–12 m	12–18 m	18–30 m	30–80 m	80–100 m	Total
May 1993		2			1	1	4
June 1993		1					1
July 1993		2	1		1		4
Aug. 1993		1			1		2
Sep. 1993		4					4
Oct. 1993	2	2					4
Nov. 1993		2					2
Dec. 1993		3		1			4
Jan. 1994		3	1				4
Feb. 1994		2	1				3
Mar. 1994			1				1
Apr. 1994		2					2
May 1994		2	1	1		2	6
June 1994		1					1
July 1994		2	1	1			4
Aug. 1994			2	2		1	5
Sep. 1994		1					1
Oct. 1994	3					1	4
Nov. 1994	2						2
Total	7	30	8	5	3	5	58

For each octopus the wet weight, sex and sexual maturity were recorded. The soak time of the lines was normally between 12 and 20 h, but this time was shorter (between 4 and 11 h) or longer (between 21 and 52 h) in a few cases (i.e., respectively in five and nine times on a total of 58 fishing operations, without apparent influence on numbers caught).

## RESULTS

Depth did not impact on numbers caught per line (one way ANOVA test performed according to the depth ranges presented in Table 1:  $F = 0.32$ ,  $df = 5$ ,  $P = 0.89$ ). The observed sex ratio [ $1.08 = 63/58$ ] males:females for the total number caught is not significantly different from the equilibrium between the two sex (Chi-square test:  $\chi^2 = 0.21$ ,  $df = 1$ ,  $P = 0.65$ ) and it did not change significantly on a month basis (Chi-square test performed on the observed sex-ratio of the 15 mo with non empty catches:  $\chi^2 = 10.96$ ,  $df = 14$ ,  $P = 0.90$ ). Pot occupation was unrelated to a particular phase of the life cycle of caught females (Fig. 3).

## DISCUSSION

The main result of this study is to show that the pots are not selective for brooding females. It is to be stressed that it was not possible to state this from commercial catches, because in this Mauritanian fishery the octopuses are eviscerated on board (so sex determination is difficult and sex maturity impossible to estimate after landing). This experimental result contributes to simplifying the debate between the artisanal and industrial

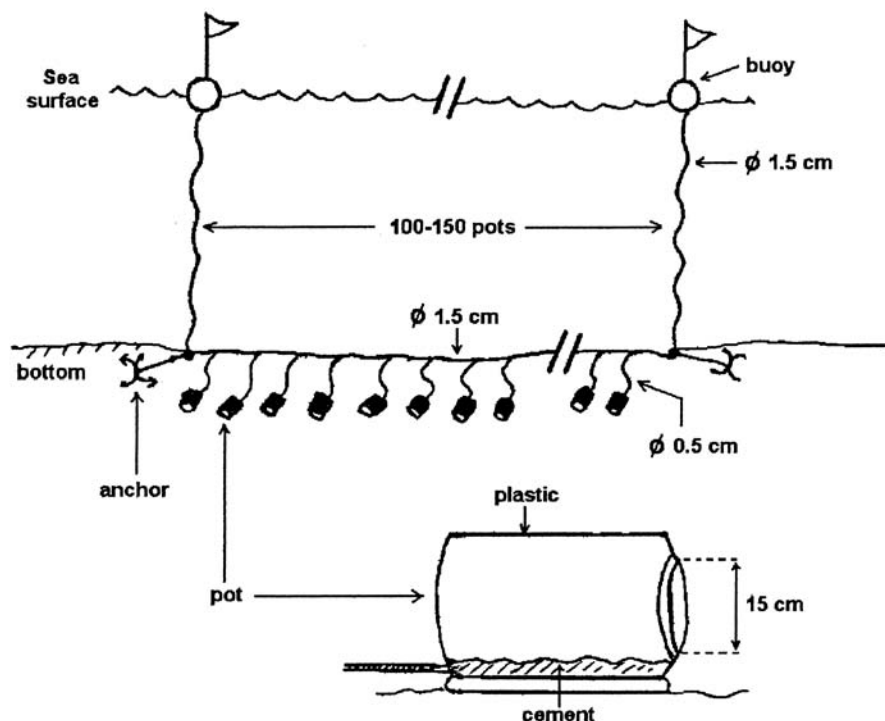


Figure 2: Structure of a line of the pots used in Mauritania for the octopus fishing.

fisheries sectors in Mauritania (Diop et al., 1996) because it implies that the main argument used to discredit the small-scale fishing method was not founded. This result is also consistent with the observation by Sanchez and Orbat (1993) concerning the catch from clay pots on the Spanish Mediterranean coast. It is clear now that the problems to be focused on concerning this artisanal versus industrial fishery interaction in Mauritania (Dia, 1988; Chavance and Girardin, 1991; CNROP, 1991; FAO, 1995, 1999; Dia et al., 1996; Lamboeuf, 1997) are those of the sharing of the total fishing effort allocated to the same resource (inevitably limited) between two activities not easily compatible on the same site, rather than the way that the pots impact on the resource. The Mauritanian fishery authorities aim to resolve the situation by allocating the coastal zone (inside the line of 6 mi from the coast) to small-scale fishing, the complementary zone (beyond the 6 mi) being assigned to trawlers (FAO, 1999). Nevertheless this regulation is not always respected and the trawlers make frequent incursions into the zone of the small-scale fishers, causing serious damage to the lines of pots and the permanence of the conflicts between the two fishers communities.

But going further, we can suggest that this spatial interaction, which is of course damaging for the fishery in the short term (and a source of conflict), may also have another and beneficial consequence in the long term. In fact, many pots (detached from their lines) are now lying across the whole continental shelf (Jouffre, 1998; Jouffre et al., in press) because the trawlers have dragged them deeper when operating in coastal sectors. So, these lost pots do actually represent a new opportunity (and the unique one in some

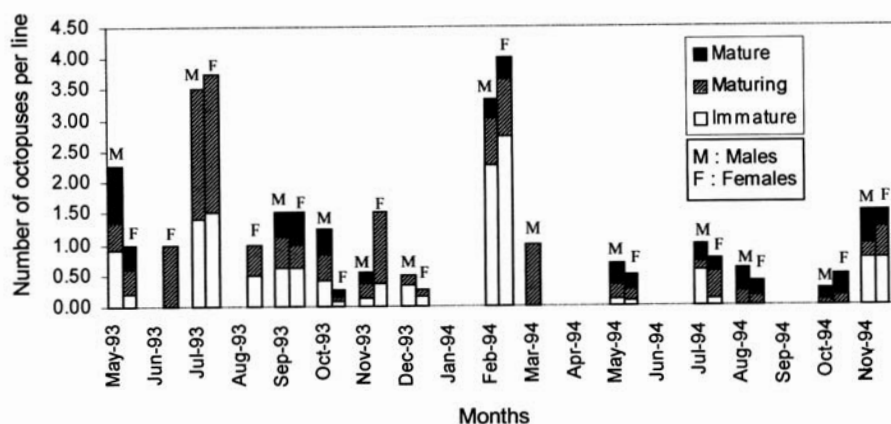


Figure 3: Numbers of octopuses captured monthly during the study (i.e., average numbers per fishing operation made with a line of 100 pots) separated by sex and maturity stage.

very large sandy and muddy areas) for the female octopuses to find a solid support onto which to fix their eggs (Mangold, 1983). This situation certainly have a positive impact on the octopus population of Mauritania whose zone of brooding has been artificially increased. This hypothesis is also consistent with the observation in this area of both higher occurrence and larger range of habitat of this species compared to the others species of the same demersal community (Jouffre, 1998).

#### LITERATURE CITED

- Caddy, J. F., ed. 1983. Advances in assessment of world cephalopod resources. FAO Fish. Tech. Pap. 231. 452 p.
- Chavance, P. and M. Girardin, eds. 1991. L'environnement, les ressources et les pêcheries de la ZEE mauritanienne, Bulletin du Centre Nat. de Recherches Océanogr. et des Pêches, Nouadhibou (Mauritanie) 23. 227 p.
- CNROP. 1991. Rapport du groupe de travail Céphalopodes de Mauritanie. CNROP, du 1 au 4 décembre 1990. Centre Nat. Rech. Oceanogr. et des Pêches, Nouadhibou (Mauritanie). 78 p.
- Dia, A. D., M. Diop and D. Jouffre. 1996. Pêcheries au coeur d'un enjeu de développement, les picheries démersales mauritaniennes du poulpe et des crevettes côtières. Confrontation entre stratégies des acteurs et mesures institutionnelles. Eléments d'analyse. In IIFET 96 symposium acts, Marrakech, 1-4 juillet 1996, International Institute for Fisheries Economics and Trade. 22 p.
- Dia, M. 1988. Biologie et exploitation du poulpe *Octopus vulgaris* (Cuvier, 1797) des côtes mauritaniennes, Thèse de Doctorat 3e cycle, Univ. Bretagne Occidentale, Brest, France: 164 p.
- FAO. 1995. Evaluation des stocks et des pêcheries mauritaniens. Voies de développement et d'aménagement. Rapport du troisième Groupe de travail CNROP, Nouadhibou Mauritanie, 20-26 novembre 1993; Rome: FAO [COPACE/PACE Series 95/60]. 114 p.
- \_\_\_\_\_. 1999. Evaluation des stocks et aménagement des pêcheries de la ZEE mauritanienne. Rapport du 4<sup>ème</sup> groupe de travail CNROP, Nouadhibou Mauritanie 7-13 décembre 1998; Rome: FAO [COPACE/PACE Series 99/64]. 103 p.
- Guerra, A. 1997. *Octopus vulgaris*: review of the world fishery. Pages 91-97 in M. A. Lang and F. O. Hochberg, eds. Proc. Workshop on The Fishery and Market Potential of Octopus in California., Smithson. Inst. Washington.

- Gulland, J. A. and S. García. 1984. Observed patterns in multispecies fisheries. Pages 155–190 in R. M. May, ed. *Exploitation of marine communities*, Dahlem Konferenzen, Berlin, Heidelberg, New York, Tokyo: Springer-Verlag.
- Hatanaka, H. 1979. Studies on the fisheries biology of common octopus off the northwest coast of Africa. *Bull. Far Seas Fishery Research Lab.* 17:13–124.
- Jouffre, D. 1998. Octopus vulgaris as a component of the benthic fauna of the NW African coast: A note on an investigation of species community organisation using multifactorial analysis. *S. Afr. J. Mar. Sci.* 20: 93–100.
- \_\_\_\_\_, C. Inejih and M. Simier. (in press). Cycle biologique du poulpe (*Octopus vulgaris*) au large du Cap-Blanc (Mauritanie). In *Quatrième Forum Halieumétrique. Les espaces de l'Halieutique. Colloques et Séminaires*, Éditions IRD, Paris.
- Lamboeuf, M., ed. 1997. Rapport du groupe de travail ad hoc sur les céphalopodes. Rome, FAO, COPACE/PACE Series /97/63. 103 p.
- Mangold, K. 1983. *Octopus vulgaris*. Pages 335–364 in P. R. Boyle, ed. *Cephalopod life cycles*, vol. I. Species accounts. Academic Press, London. 475 p.
- Sanchez, P. and R. Orbatí. 1993. The biology and fishery of *Octopus vulgaris* caught with clay-pots on the Spanish Mediterranean coast. Pages 477–487 in T. Okutani, R. K. O'Dor and T. Kudobera, eds. *Recent advances in cephalopod fisheries biology*. Tokay Univ. Press, Tokyo. 752 p.

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