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Original Research Article

Sustainable management of artisanal fisheries in Algeria: The contribution of an empirical approach

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Abstract

The irreversible character of the management of a renewable resource, in this case halieutic, makes the intervention of public authorities urgent. In addition, this intervention must be directed by an economic analysis. In our case, an appeal for the economic analysis of fishing via bio-economic modelling becomes a necessity. On the other hand, the lack of data conjugated into unreliable statistics, the marginal interest given to the research in this field and the absence of multi-disciplinary approaches, make the approach increasingly difficult in developing countries. In this context, the purpose of this paper is to put into evidence the possibility of offsetting the different conceptual and methodological constraints in return for empirical approaches based on investigations. The forward setting of the contribution of such approaches to help taking decisions, by the conception of lasting development models while endowing managers of the fishing sector with relevant information, is also one of the objectives of this paper.

Keywords: Bio-economical approach, empirical, fisheries, model, public intervention, resources, sustainable management

INTRODUCTION

Generally speaking, Small Scale Fishing in south Mediterranean countries helped decrease poverty and build food security (FAO, 2005). In Algeria, despite the efforts made by the public authorities to alleviate financial constraints and allow a take-off in the Small Scale Fishing sector, the results obtained remained far behind the envisaged effects (Chakour et al., 2007). Fisheries and marine resources are at the heart of real socio-economic, environmental and food challenges (FAO, 2012). With 1280 km of coastline, Algeria grants in recent years a particular interest in the fisheries sector. Like nearly all of the Mediterranean fisheries, fishing in Algeria is artisanal (Sahi et al., 2003). National fishing fleet (Period 2011-2012) is mainly composed of small-scale coastal fishing; with nearly 61% of the fleet this type of fishing activity dominates the fishing fleet in Algeria. Furthermore, the race to the exploitation of the resource, in the absence of a sustainable fisheries management negatively affects the sustainability of the resource. The irreversible character of the management of marine source makes the intervention of public authorities urgent. In addition, this intervention must be directed by an economic analysis. In our case, an appeal for the economic analysis of fishing via bio-economic modelling becomes a necessity.

METHODE AND TOOLS

Method

Our approach consists of pursuing the fishing activity over five years on the level of the port of Ziama whose surface of activity is limited to the gulf of Ziama in Algeria. The choice of this site is catalysed by a double report: i- the existence on the level of the port, in the absence of trawlers, of two fishing systems namely the "small trade" and the sardine boat. ii- and by the fact that all unloading are done on the level of the port of Ziama. Under these conditions, the analysis of the two fishing systems, Sardine boats and small trades, becomes, methodologically, approachable.

Observations

We gathered all information daily on the whole of the flotilla. We constituted a data base concerning the port of Ziama and the fishing activity ensured by the flotilla. The later is the targeted subject in our model.

The data base structure

In addition to the two principal variables targeted by our search of information, namely the fishing effort of the flotilla (E_{pm}) and the *captures* realised (C_{pm}), it is necessary to note the collection of lots of information related to the fishing activity especially artisanal fishing which we called "Small trade".

Data base principal variables

The registered flotilla: It is a matter of counting the whole of the registered flotilla, i.e. administratively registered on the level of the competent administration (Fishing Services and Coast Guard National Service). This variable informs us on the potential investment, therefore on the capacity of potential fishing on the level of the port in a given time T.

The active flotilla

It corresponds to the number of operational and active fishing "units" for the period of observation.

The number of embarked sailors

It is about the crew which corresponds to the active flotilla, in other words, it is the active labour force for the period of observation

The Fishing Effort E_{pm}

The concept of fishing effort is central to fisheries economics and management. (Dales Quires, 1987) It is difficult to accurately measure the Fishing effort, and comparisons between different types and sizes of boats and different gears are difficult to make. (J G Shepherd, 2002) The Fishing Effort is the number of exits carried out by the active flotilla for the period of observation, which is also the determinant (explanatory) variable we are interested in. (Paul Marchal and others, 2006) Bearing in mind, we compare the fishing effort to the number of exits. In addition, we suppose that the output of an effort unit (an exit) is the same whatever the month, other things being equal.

The captures C_{pm}: Economists have long been interested in the relationship between fishing effort and stock size, and the impact on catch levels. The primary interest lies in the stock elasticity with respect to catch. (Nils-Arne and Daniel, 2010) In our case, the captures represent the dependent variable which is one of the main information we are looking for, and without it the model cannot be elaborated.

The investigation has ended in constituting a data base which includes, in addition to the variables mentioned above, other complementary ones.

The Observation Period

The observation period is, more or less, long since it is spread out over five years with daily statistical data.

The number of observations

For methodological reasons, we opted for gathering daily data in monthly data. Thus, the number of observations is sixty, namely 12 months X 05 = 60 months. The model, rising there, becomes statistically representative, which validates the results of this research.

Hypotheses and tools

Since our goal is mainly methodological, the main hypothesis is that, other things being equal, the output of an effort unit (an exit) is the same whatever the month. Meaning, we suppose that there are no seasonal effects.

After constituting the data base stemming from the investigation (in collaboration with the local fishing services), we tried to model the evolution of captures according to the fishing effort. This could be done due a statistical treatment. The statistical treatment is followed firstly, by analyzing the correlations between the dependent variable (C) and the explanatory variable (E) (namely the fishing effort) and secondly, by analyzing tendencies and trying a modelling due to the regressions analysis. By doing so, we are getting closer to the best representative model. The finality is to come out onto a function: $F(E) = C$ expressing the level of captures according to the fishing effort and translating the reality as regards fisheries in the study zone. The latter would be used as a model for aiding decision as regards the

Table 1. Descriptive statistics related to effort and captures
Units. Effort: in exits per month. - Captures: in tons per month.

Descriptive Statistics

	N	Minimum	Maximum	Average	Difference
Small trade effort	60	.00	494.00	106.3667	102.4179
Small trade captures	60	.00	107.80	17.9758	24.4099
N valid (list wise)					

Source: Investigation statistical treatment results.

Table 2. Correlation between effort and captures

Correlations

		Small trade effort	Small trade Captures
Small trade effort	Pearson's Correlation		
	Sig. (bilateral)		
	N		
Small trade captures	Pearson's correlation	.729**	
	Sig. (bilateral)	.000	
	N	60	

**. The correlation is significant at level 0.01 (bilateral).

Source: The investigation statistical treatment results

choice of development policy by elaborating a bio-economic model able to allow simulations and permitting to see the incidences of certain measurements on the fishing economy in Algeria.

INVESTIGATION RESULTS AND DISCUSSIONS

1 Descriptive statistics (Table 1)
2 Analysis of the dependent variable (C_{pm}) and explanatory variable (E_{pm}): (*C* represents captures (the dependent variable), whereas **E** is the fishing effort (the explanatory variable). (Table 2)
C_{pm}: Captures realised by small trades. E_{pm}: Fishing effort of the small trades.

The above table shows a strong relation between the dependent variable, namely captures realised by the small trades, and the variable that we have considered as explanatory, in this case the fishing effort of small trades. Sure enough, with a very significant Pearson's correlation, about 0.729, one can confirm that the level of captures C_{pm}, realized by the small trades, is strongly dependent on of the effort E_{pm}, exerted by these.

Methodologically, one can search for the tendency of C_{pm}, in other words, identify the function $C_{pm} = F_{pm}(E_{pm})$ while proceeding to a mathematical modelling. (Figure 1)

Interpretation and Discussion

With a coefficient of determination, *0.714*, the quadratic correlation is very significant. This means that, in our case, the captures realised by the small trades remain dependent on the fishing effort exerted by these, and that the evolution of captures according to the fishing effort, for this fishing system, must without any doubt go under a law. Thus, the fitting curve enabled us to identify this relation where the results attest that the captures vary in relation with the fishing effort according to the following form $y = a.x^2 + b.x$ whose the representation is:

$$C_{pm} = F_{pm}(E_{pm}) = -0.0002 E^2 + 0.2206 E \qquad (6)$$

At first glance, The results appear, quite interesting because this tendency comes closer to the classical theoretical models in this case the Gordon –Schaefer model (Gordon, 1953; Schaefer, 1957) where the

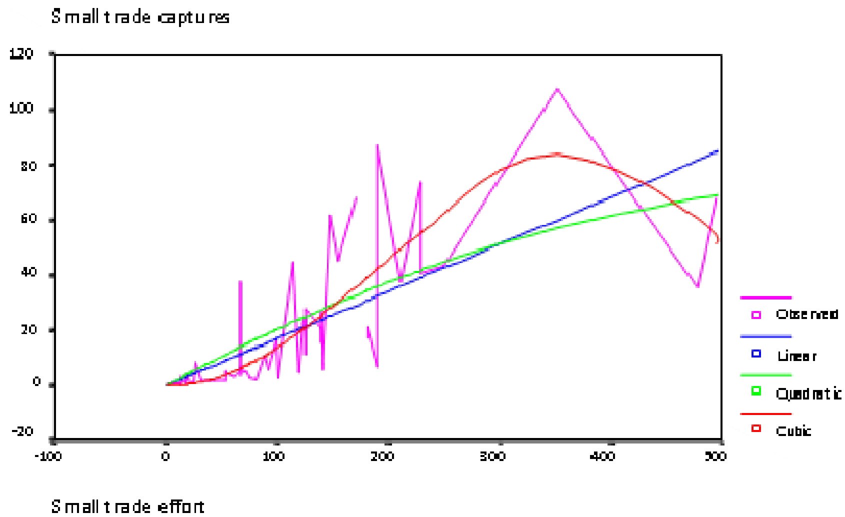

Figure 1. Adjustment's results

Source: The investigation statistical treatment results.

variation of captures according to the fishing effort is in the form: $C = - a.E^2 + (a.b).$ E where *a and b>0.*
By identification we have:

$$\begin{cases} \boldsymbol{a} = -0.0002 & (7) \\ \text{and} & \\ \boldsymbol{a.b} = 0.2206 & (8) \end{cases}$$

If, for the Gordon –Schaefer model, *a* and *b* represent the biological parameters, in our case we cannot give a biological meaning to these two parameters.

(7) and (8) $\Longrightarrow$ $b = 0.2206/ 0.0002 = 1103$ (9)

Via this field investigation, we could come out onto a model likely to help us in making decision. Yet, we argue it is useful to move to another stage related to the applicability of the model. Considering that, the next stage consists of testing the “applicability" of the results. In other words, is this modelling able to contribute to the decision making aid and how can it orientate the public intervention in the sustainable management of fishing?

Model application to the decision-making aid: the case of small trades

Marine fisheries worldwide are now, at the beginning of the 21st century, in a state of crisis, Extreme overfishing of many species in many areas is widely documented In many cases, even intensively managed fisheries have been severely depleted, sometimes to the point of collapse. Yet there are signs of hope, as new management strategies are gradually being introduced. These new strategies recognize both the biological and economic realities of the fishing industry (Colin and Clark, 2006). Such a change in the approach to fisheries management is not surprising considering wide scale failure in managing fish stocks. (Viktoria and Claire, 2008). The bioeconomic framework is an example that ties all the components of decision making together in a unifying framework (Gentner et al., 2013). Yet only a few examples of fisheries managed by the principles of the bioeconomic theory exist (Soile, 2009).

The objective was to try, on the basis of an empirical approach based on a "wakefulness" system permitting the collection of information on a reduced panel, to come out onto models suitable for informing us on the evolution of captures according to the fishing effort to ensure optimal management of fishing. As a second step, we will try to demonstrate, how these results could, partially, orientate the public intervention. In addition, it should be noted that the objective of this research is primarily methodological; the decision-making ought to be, in this case, taken with precautions.

RESULTS INTERPRETATION AND BIO-ECONOMIC SIGNIFICANCE

We could demonstrate that the levels of captures vary in accordance with the fishing effort while obeying a law that is translated by:

$C_{pm} = F_{pm} (E_{pm}) = -0.0002 E^2 + 0.2206 E$ (10)

Where the curve of captures C_{pm} will have the tendency hereafter. (Figure 2)

We can deduce that the small trades' captures vary in two phases, a phase is represented by the part of the

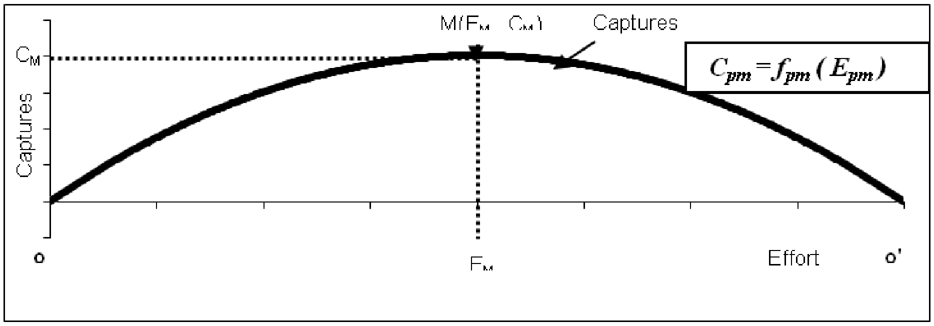

Figure 2. The curve of captures $C_{pm} = f_{pm} (E_{pm})$

Source: Personal realization.

curve (OM) during which any increase in the effort $\Delta \boldsymbol{E}$ is accompanied by an increase in the captures $\Delta \boldsymbol{C}$. Biologically, this could be explained by the phase where a pressure on the resource does not reach its critical phase i.e. an exploitation allowing a relative renewal of the halieutic resource.

The second phase is represented by the part of the curve (M O'). Beginning from the point M, the response of the independent variable C to any increase in the effort will have negative, biologically and economically, effects since any increase ΔE in the effort is not associated with an increase in ΔC of the captures but is associated , rather, with a decrease in these. Biologically, this could be explained by effects of the load on the resource, therefore, the optimum is realised at the point M where the captures are maximum. It is a question, therefore, of a threshold above which any increase in the effort will be associated with a decrease in the biomass (In the Gordon-Schaefer model (and undoubtedly in reality), any increase in the effort of fishing induces a decrease in the biomass of balance, whether it is before or after the effort corresponding to MSY) and as a result of the captures. This finds explanations in the theories treating dynamics of the population (Malthus, 1798; Shaefer, 1957).

Economically, the point M represents a threshold, where the revenues, which are not other than the product of captures by the unitary price, will reach their maximum at the point M (André E. Punt, 2014; WWF, 2011).

Starting from the point M, the revenues will decrease. Therefore, beginning from this point and even beforehand, any increase in the effort, will become, economically, useless, even unadvised since it will generate a reduction in revenue RT. Now, whatever its level, the increase in the effort E would generate additional variable costs, which will result in a reduction of the level of profits by affecting the profitability of fishing units (Chakour et al., 2008).

The model and its contribution to the decision-making aid

It proves that the statistical results as well as the modelling of fishing activity, particularly the captures according to fishing effort, in the gulf of Ziama, could contribute to the decision-making aid for a sustainable fishing management. How?

Indeed, we can already propose, due to the model, the "fishable" limit. The latter will be used as a basis for controlling the fishing effort; this could also be limited by taking into account overexploitation, renewal and recruitment of the resource.

From the model, the public's intervention orientation depends on the intentions of deciders and the objectives sought, and consequently on choosing one of the following objectives:

- Maximizing the total revenues of fishery by targeting the MSY. In this case, it will be a question of searching for an equilibrium called the Maximum Sustainable Yield (biological).
- Maximizing the profits within the framework of a controlled equilibrium.
- Determining the break-even point of fishery in the case of a free access to the resource. In this case, it will be a question, only, of equipping deciders with information on the profitability of fisheries. (Table 3)

Determination of indicators necessary for orientating the public intervention: Use of the Pêchakour model

The durable management of fishery in question will be possible due to the use of the bio-economic model Pêchakour (Chakour and Boncoeur, 2005) where the application remains dependent on biological, economic and technical data emanating, in our case from an

Table 3. Presentation of the three equilibriums on the basis of bio-economic model Pêchakour.

Equilibriums	Equilibrium point	Effort necessary for equilibrium
1)-Equilibrium in the case of the free access to the resource.	*M (E_M , RT_M)*	$E_1 = [(- A + p_c . a . b) - \sqrt{\Delta}] / (2. p_c . a . b)$ $E_2 = [(- A + p_c . a . b) + \sqrt{\Delta}] / (2. p_c . a . b)$ Where : $E_1 < E_2$ $A = (\beta . I / n) + p_e$ $B = \alpha . I + CF$
2) - The durable biological maximum or durable maximum income.	*M (E_M , RT_M)* $E = E_M = b/2$	*M (b/2 , RT_M).* $E = E_M = b/2$
3 –Equilibrium with controlled access or assigned property.	θ (E_θ , RT_θ)	$E = E_\theta = ½ [b – (B. I /n) + p_e] / (p_c . a)$

empirical approach. Thus, the data hereafter originates from investigating and pursuing the fishing activity done by the flotilla "small trades" in the gulf of Ziama. (Table 4)

In this case, it will be a matter of looking for an equilibrium called "Maximum Sustainable Yield MSY "

This scenario must emanate from a logic developed by deciders whose main goal would be to maximize the total fishing revenues without however being interested in maximizing the profits.

The choice can be strategic and can be put, for instance, within the valorisation framework of halieutic potential with an extraversion policy, taking into account the very interesting commercial value on the European markets (Père Oliver et Ramon Franquesa, 2005). Therefore, the only concern of the public authorities will be the maximization of revenues which will have positive effects on the balance of trade of fishery products, without however being concerned with the evolution of generated costs.

Determining the effort limit corresponding to the MSY

It is a question, in fact, of determining the fishing effort which corresponds to the captures' maximum value; it is a question of the bearable level of maximum capture represented by Anglo-Saxon abbreviation MSY (Clark, 1931; Benoit, 2003 Mesnil). Mathematically, this goes back to determining the point M (E_M, C_M) of the curve (C) which is, in our case, a maximum.

$C_{M} = \max \Longrightarrow dC/dE = 0$ (11)

However, $C_{pm} = F_{pm} (E_{pm}) = -0.0002 E^2 + 0.2206 E$

$dC/dE = 0.0004 E + 0.2206 = 0 \Longrightarrow E = E_M = 0.2206/0.0004 = 551,5 \approx 552$ (12)

$E = E_M = 551,5 \approx 552$ exits per month

Interpretation

The control of fishing activity for the small trades must be based on delimitating the fishing effort, so that the fishing effort does not exceed, in any case, the limit that is not other than*:*

$E = E_{M} = 551,5 \approx 552$ exits per month.

From this resolution, we can:

- Determine the size of the flotilla being able to exert in the gulf.
- Determine the volume of captures authorized within the framework of quotas.
- Determine the quotas per fishing unit for the local flotilla.

Determining the size of the flotilla being able to exert in the gulf

Having the effort limit, how to determine the size of the flotilla?

Based on the norms emanating from the fishing administration (To consult table 01 in Appendices), we can calculate (estimate) the average number of exits which can be carried out by a small trade. It will be a matter of estimating the average of monthly effort exerted by a small trade. This data will be used for determining the size of the flotilla.

If we consider:

E_U, Monthly effort average of a fishing unit small trade,

- E_M, Number of exits limit (effort limit).

Table 4. Data resulting from the investigation

Information type	Data	Definition	Value	Unit
Biological	*a*	Biological parameter of the capture function.	0.0002	Coefficient
	b	Biological parameter of the capture function.	1103	Coefficient
Economical	I_m	Average value of acquisition of a fishing unit.	3000	Thousands of dinars
	Taxes	It is the total value of taxes for the whole of the flotilla and marine personnel per period of analysis (month).	09	Thousands of dinars per period (month)
	Insurance	It is the total value of insurances for the whole of the flotilla and marine personnel per period of analysis (month).	05	Thousands of dinars per period (month)
	Role	It is the total value of roles for the whole of the flotilla and marine personnel per period of analysis (month).	08	Thousands of dinars per period (month)
	p_e	Cost per effort unit.	03	Thousands of dinars per effort unit (exit)
	p_c	Selling price of a captured unit.	300	Thousands of dinars per ton
	α	Expresses the share of equipments' depreciation independently of the effort.	0.001	Rate with $\alpha \in [0, 1]$.
Technical	*N*	Size of registered flotilla exerting in fisheries.	40	Number of fishing units.
	T	Lifespan of a fishing unit (in year) (*S* and T are used to calculate N: lifespan in equivalent effort. It is a matter of the number of effort units, necessary to amortise a fishing unit. With: $N = S.\ T.$)	20	Years.
	S	The average number of exits per fishing unit and per year.	150	Exits per year.
	Analysis period.	The period of analysis is dependent on the period of observation in the case empirical approaches.	month	The month.

Source: CHAKOUR, S. C. (2006); *Economy of fishing in Algeria*; Thesis of Doctorate, INA, Algiers, p303.

- $N_{éq,}$ Size of the flotilla necessary to reach the captures level corresponding to a durable biological maximum C_M

Then, the size $N_{éq}$ of the fleet "small trade" which can operate in the gulf would be thus: $N_{éq} = E_M / E_U$ (13)

In our case: $E_M = 551{,}5 \approx 552$ *and* $E_U = 12.5$

From where $N_{éq} = E_M / E_U = 44.12 \approx 44$ fishing units "small trade".

Regarding the decision, we must take into account this constraint, namely:

In medium-term, the number of fishing units "small trade" exerting in the gulf of Ziama should not exceed 44.12 ≈ 44 units.

Orientation of the public intervention

How to manage this situation i.e. how to limit the fishing effort while taking into account the number of fishing units exerting in the gulf in question and the effort's threshold not to be exceeded?

To authorize an increase in the number of fishing units, while raising what the economists call "the barriers to entry". If for political, economic or social reasons, depending on its sector development strategy, the administration is being regarded as "obliged" to let it done i.e. to authorize investment in the small trade; Then, only one decision would be able to answer the problematic posed, namely to ensure a durable fishing activity of small trades for the whole fleet "small trade", while allowing a biologically acceptable fishing, therefore a sustainable fishing. In this case, the best decision to be taken would be to choose the system of quotas. *How, and what limits will be?*

The principle is the following: Whatever the number of fishing units *N*, the total captures should not in any case exceed the threshold, namely the level of captures C_M corresponding to the effort E_M.

Determining the "fishable" level of capture C_M

Since the effort limit not to be exceeded is not other than $E_M = 551.5$ *exits per month,* then, the small trades activating in the gulf of Ziama should not exceed, together, an effort of 551.5 exits per month. One can determine C_M, knowing that the captures are dependent on the fishing effort following the model already established, namely $C_{pm} = -0.0002\ E^2 + 0.2206\ E$

Thus: $\begin{cases} E_M = 551.5 & (14) \\ C_M = -0.0002\, E^2 + 0.2206\, E & (15) \end{cases}$

(14) and (15) $\Longrightarrow$ *C_M = 60.83045 tons per month.*
Thus: The monthly average level of captures, not to be exceeded by the small trades in the gulf of Ziama is: CM = 60.83045 tons per month.

Managing the Output: Determination of quotas

Thus, whatever the number of fishing units "small trade" exerting in the gulf of Ziama, the captures, for each unit, would be divided into quotas so that each quota is equal to: $q_n = C_M / N = (60.83045 / N)$ (tons per month and fishing unit small trade). Where N is the number of registered fishing units exerting in the fishery.

Managing the input: Determination of effort

Principle

In this case, it will be a question of an indirect control of access to the resource by limiting the total effort of the flotilla while acting on the investment and opting for the policies of barriers to entry in the small trade fishing investment.

In this case, does one have to choose the system of quotas?

In this case, and by limiting the number of fishing units, we are not obliged to control the effort of each fishing unit: since in any case, taking into account their fishing capacity, they will never be able to exceed (together) the threshold *C_M = 60.83045 tons per month*, knowing that the total effort of the fleet "small trade" will be, in this case, *E_M = 551.5 exits per month*.

CONCLUSIONS

The present article attempt makes it possible to equip fishing managers with relevant information able to help them in making decisions. In our case, the public intervention must take into account the following elements (Chakour, 2006).

- The administration of fishing, in its sector developmental program, must imperatively consider a certain number of constraints, in reality those related to the limit of fishing effort by acting on the number of ships small trades. In other words, for a durable management of the "small trade" fishing type in the gulf of Ziama, the size of the fleet "small trade" should not in any case exceed 44.12 units.
- Yet, if for strategic or exogenous reasons, the size *N* must exceed $N_{éq}$, it would then be necessary to react by installing a system of quotas which must be determined contently by each fishing unit. it is a matter of quota. In this case, it will be a question of distributing the wealth, durably exploitable, on the community of "small trade fishers", which would affect the profitability of each unit.

Moreover, if the control of unloading, therefore the resort to quotas, can prove to be difficult even almost impossible, it would be more interesting to control the fishing effort which would be easier by granting to each fishing unit a limited number of exits which will not be other than *the Number of exits = E_M / N.*

We have, therefore, seen how the information resulting from the empirical approach could be useful for orientating the public intervention; we took the case where the importance is rather given to the maximization of fishing total revenues.

In addition, the public authorities can have other objectives rather than the maximization of revenues; in this case, their choices can be founded on financial arguments as well as social. In what follows, we will present other scenarios emanating from different logics. Yet, we prefer, in these scenarios, the presentation of fundamental principles which will be used as a basis for orientating the public intervention, this by considering the complexity of calculations required.

Finally, throughout this research, we tried to highlight the interest and the need, at the same time, for an empirical work based on field-investigating for a possible bio-economic modelling which can help in making decision in the field of sustainable management of fishing in Algeria. It was, also, about showing the possibility of avoiding the constraints related to unavailability and reliability of statistics, on the one hand, and the difficulty met regarding the introduction of biological parameters, on the other hand.

Another objective of this work is to suggest, even in the absence of multidisciplinary approaches (which causes rather conceptual analysis difficulties than methodological), the possibility of designing simplistic models for orientating the public choices.

Our objective was, also, to come out onto indicators able to constitute a dashboard, basis even for any decision in the short and medium terms in a sustainable development context. This way, the identified limits and constraints will be used as basic information upon which optimization models and, as a consequence, development strategies will be founded.

Simplistic be it, this approach is, in our context, also able to orientate the public intervention for a sustainable development of the fishery sector and could, consequently constitute an approach that is able to offset the many constraints of a conceptual or/and methodological nature.

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APPENDICES

What would the average minimum level of capture be per fishing unit?
If it is considered that all fishing units use their all production capacity and if one opts for a maximum use of the means of production i.e. the number of units and the fishing effort are maximum for each unit, then, we will have:
- The size of the fleet "small trade" will be NR ≤ 44.12 *of fishing units.*
-With a maximum average monthly level of captures $C_M = 60.83045$ *tons per month. Therefore, whatever* $N \leq 44.12$*, the average minimum level of captures per fishing unit will be equal to or higher than (* q_p*) where:*
$q_p = C_M / N_{éq}$ = *(60.83045/44.12) = 1.3787 tons per fishing unit "small trade". In other words, each fishing unit will have like a share of captures, a volume at least equal to 1.3787 tons per month.*

Table 1. Production capacity (Day, Decade, Month) of small trades.

	Less than 10 years	**10 to 20 years**	**More than 20 years**
Year	10T/150 exits	10T/150 exits	10T/150 exits
Day	0.07 exits	0.07 exits	0.07 exits
Decade	4.11 exits	4.11 exits	4.11 exits
Month	12.5 exits (It will be considered, therefore, that on average, the number of exits per fishing unit, small trade, is 12.5 exits per month that is an average of 50 exits per four-monthly period.)	.5 exits	12.5 exits

Source: DPRH, Jijel.