Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.6, No.12, 2015

Pescatourism Contribution to Sustainable Development of Artisanal Fisheries in Algeria

Salah Eddine GUEDRI [1]
PhD Student, University of Jijel, Algeria.

Saïd Chaouki CHAKOUR [2]
PhD , Senior Lecturer, University of Jijel, Algeria.

Abstract:
As part of the integrated development of tourism and fishing, some Mediterranean experiences have proven themselves. Given its role in the economy of fisheries, the artisanal fishery has attracted in recent years a special interest of the public authorities in Algeria. However, despite the efforts, the community of artisanal fishermen continues to suffer the impact of reduced fishing yields.

This paper is part of this context, and aims to make and analysis designed to inform and guide decision makers, through an empirical and prospective study, and to highlight the relationship between pescatourism and sustainable development of artisanal fishery. Our research defends the thesis: "The pescatourism can be a solution to sustain the activity of artisanal fishery in terms of sustainable management of halieutic resources and allow improving the socio-economic situation of artisanal fishermen, while ensuring sustainable balance between ecological, biological and socio-economic interests of artisanal fishermen." This article attempts, moreover, to highlight the interest of pescatourism as a central element of the integrated development of coastal areas.
Keywords: Pescatourism, Sustainable Development, artisanal fishery, Halieutic Resources, Integrated Development, Algeria.

1. Introduction:

Since many years, fishing in the world has been facing an unprecedented crisis due to the progressive overexploitation of fish stocks and degradation of the environment(FAO, 2014). Commercial productivity of the oceans and seas is at its lowest level, since 75% of the most important fishing areas of the world are overexploited, including the Mediterranean countries (FAO, 2014). All over the world, both marine ecosystems and populations suffer from the consequences of unsustainable fishing (AGTER, 2012).

In Algeria, artisanal fishery is an ancestral activity, it is a legacy of historical and cultural heritage. With over 1600 km of coastline, Algeria is indeed one of the Mediterranean countries where fishing is an essential activity. However, this activity is, in recent years, facing several challenges: declining yields, pollution, illegal and illicit fishing systems. That is why Algeria is working, like many countries, to protect its marine environment for future generations, through actions to halt the deterioration of halieutic resources and protect the marine ecosystem by the adoption of a strategy to ensure sustainable management of marine resources without forgetting improving the well-being of fishermen (Aquapêche, 2014). Among the various systems to set up by this strategy, we will mention "marine protected areas" (MPAs), which are considered as one of the most efficient solutions for sustainable management of marine resources and protection of the marine ecosystem (MPRH, 2014; Michel Fabinyi 2008; Chakour S. C., 2013). This system would both permit to protect marine resources and ensure rational and sustainable exploitation. Its success requires, however, the development of an approach taking also into account the protection and improvement of the socio-economic situation of artisanal fishermen.

Ecotourism[23] can be, for that purpose, of a large intake. In this context, our research aims to highlight the contribution of pescatourism as an ecotourism activity and its contribution to the sustainable management of halieutic resources, on the one hand, and sustainability, on the other hand, of the artisanal fishery as a national socio-cultural heritage. This article attempts, therefore, to answer the question: ***How can pescatourism contribute to the sustainable management of halieutic resources and the sustainability of artisanal fishery in Algeria?***

[23] . Ecotourism is tourism that takes into account the sustainability of ecosystems, but also the improvement of the well-being of the local population. For further information, confer to: (Chakour.S.C et Chaker.A , 2015).

To answer to this question we have formulated the following hypothesis: the pescatourism could contribute to the sustainable management of halieutic resources and the sustainability of artisanal fishery in Algeria, through the realization of a sustainable balance between the ecological and biological interest, on the one hand, and the socio-economic interest of artisanal fishermen, on the other hand.

2. Method And Tools.

An analysis of data and works carried out on the pescatourism would initially highlight the place of pescatourism in local development. Our research is also based on a quantitative (prospective) study which, nevertheless, takes resource in a qualitative and retrospective approach whose main tools are questionnaires and interviews. Thanks to the questionnaires carried out, we identified, through an economic calculation, telltale indicators that could contribute to the economic analysis of artisanal fishery in Algeria. This first step allowed us, after the modeling of historic data by applying the *Matrix Method Pencil*, to come out onto a simulation (a prospective approach on the horizon of 2030) to predict the trend of the performance of small-scale fishing units in Algeria.

In collaboration with the *PNTaza* in the *WWF's SEA-Med* project, surveys "with artisanal fishermen and tourists" lasted four months "between August 2014 and November 2014" in the ports "Boudis and "Ziama M." and stranding beaches of the territory of Jijel. A total of 40 owners of small businesses of «small-scale fishing» were questioned among 316 identified throughout the study area, which represents 12% of the fishermen community «This percentage is calculated on the basis of statistics of 2014». In addition, a questionnaire was sent to 1,500 tourists to assess the potential demand for this new eco-tourism activity that combines artisanal fishery and tourism.

3. Results And Discussion.

3.1. Results of the analysis of the works on the pescatourism and protection of coastal areas:

Our analysis of the works done on ecotourism and protection of the resource has confirmed the agreement of the scientific community about the potential contributions of pescatourism in local development.

The use of ecotourism was successful in many countries, particularly in the enhancement and protection of the marine space in coastal areas (Isabelle Thomas, 2010; Xuejia Zhuo, 2012). Among these approaches, we will mention; among other ones, the pescatourism, which is an ecotourism activity that was launched in Italy in 1998 and developed in France between 2009 and 2011 (Aline Delamare, 2010; European Commission, 2011).

The pescatourism is a form of responsible travel to maritime areas which contributes to the protection of the environment and ensures the improvement of the well-being of artisanal fishermen. This activity provides the opportunity for the fishermen to welcome tourists aboard their boats, to help them discover their fishing activities and the practices of an ancestral profession. It also allows the fisherman to make their traditional profession known to the public, and make them perceive all the difficulties and hazards. (Rémi Bellia et al, 2011; FARNET, 2013). We can therefore consider pescatourism as a new authentic ecotourism approach with artisanal fishermen on board their boats, carrying a traditional human activity that still enriches an ancestral cultural and social heritage, as part of a specific natural environment. The "tourist material" which is exploited in this manner is subdivided, according to Rémi Bellia (2011), into two parts:

- A natural dimension: the sea, the reliefs of the marine coasts, the halieutic resource;
- A human dimension: the professional small-scale fishing, traditional ships, its different crafts and technology, its culture through its knowledge and history.

Our analysis leads to the confirmation of the hypothesis that the principles of pescatourism are based on those of sustainable development as shown in the graph above:

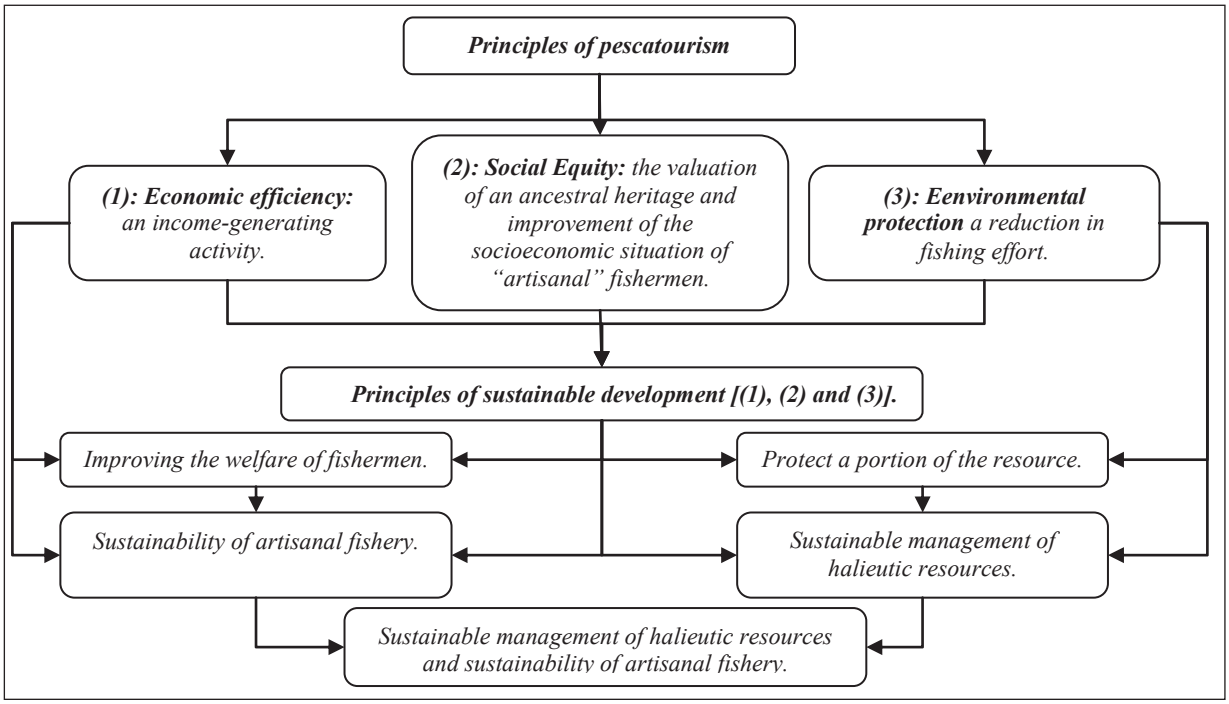


Figure 1. Contribution of pescatourism to the sustainable management of halieutic resources and the sustainability of artisanal fishery.
Source: Result of our research.

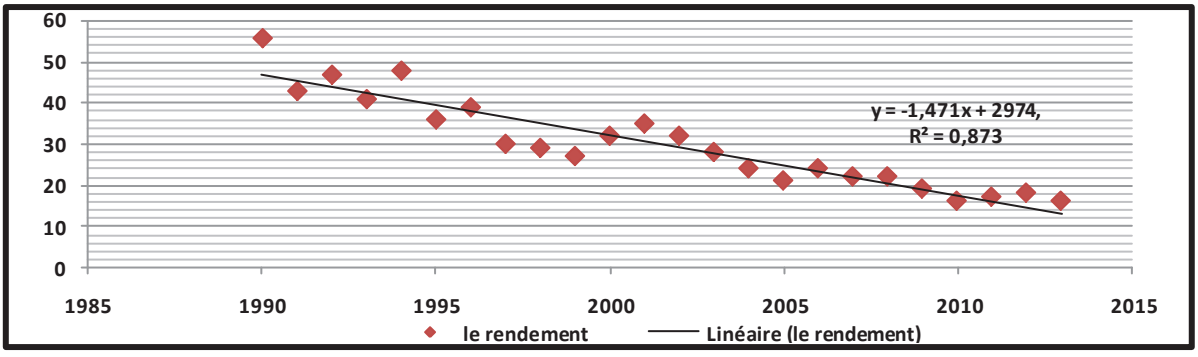
3.2. Results Of The Empirical Approach.

3.2.1. Modeling Of The Future Performance Of Artisanal Fishing Units In Algeria.

Despite its global importance, «the artisanal fishery »is a concept used by everyone, but no common definition of it has been given. (Remi Debeauvais 1985; Mamadou Diallo, 1995; Ridha MR et al. 2011).

Artisanal fishery is considered to be the dominant type of fishing in Algeria (Père Oliver and Ramon Franquesa 2005; S. C. Chakour, 2013). It is a coastal fishing whose fleet represents an average of 61% (2797 Ships) of the national fleet and produces more than 5% of the national total production (MPRH, 2014). artisanal fishery in Algeria is practiced by small boats called " Small-scale fishing " of a size ranging from 4 to 12 meters, with a power ranging from 5 to 40 HP, and a crew from two (2) to twelve (12) fishermen depending on the used vessel (Sahi Mohand Akli and Mohamed Bouaicha, 2003). It is a source of life for fishermen supplemented in some cases by other activities such as agriculture and trade.

Depending on the development of small-scale fishing effort (based on the number of trips) and fish production during the period (1990-2013), we can calculate the evolution of the performance of the artisanal fishery units over time. The results of which are as follows:



Graph 1. Linear regression and modeling of the evolution of the future yields of artisanal fishery units over time in Algeria (period: 1990-2013). Unit: (kg/trip)
Source: Personal realization based on MPRH 2014 data and the field survey, Excel processed.

With a negative slope of 1.47, linear regression presented in the above table shows that the average yield of artisanal fishery units in Algeria is steadily declining. However, the linear evolution, with a coefficient of determination $R^2 = 0.873$, appears representative.

The yield of an effort unit for the artisanal fishery is, on average, between 16 and 56 kg. In addition, from 1990 to 2013, the yield decrease is 40 kg per trip, a loss of about 71.42%. This trend is becoming increasingly worrying, especially with the characteristic properties of the halieutic resource and its status as a "common good" (Ostrom, 2010; Jean Boncoeur , S et Bertrand Le G, 2000;Viktoria K. and Claire A., 2008; Chakour, 2013). Any unreasoned increase in fishing effort would lead to a drop in production (André E. Punt, 2014; WWF, 2011; Colin W. Clark 2006; S. C. Chakour and S. E. Guedri 2014). This pushes people living in coastal areas, particularly economically vulnerable areas, to exploit, often, these resources in unsustainable manner[24].

3.2.2. Essay Of Prediction Of The Yield Of Artisanal Fishery Units In Algeria For The Period 2014-2030.

- *The Adopted Model:* We used the « Pencil »[25]method of identification to accurately represent the function of evolution of the yield of artisanal fishery units in Algeria. The model describes the series as a sum of complex exponentials. We have:

$$y(t) = x(t) + n(t) \approx \sum_{i=1}^{M} R_i \exp(s_i . t) + n(t)$$

y : The "estimated" predicted values of the yield of artisanal fishery units;

t : Time;

N : The sample size "in our case, N = 24";

M : The number of relevant poles "in our case, M = 8";

S_i : The pole with its damping term and its oscillatory term, "$S_i = a_i + jw_i$":

R_i : The residue,

$n(t)$: Noise observed in the series.

Through the "Pencil" method, after determining the number of relevant poles "M" and using MATLAB, we get the order of the appropriate model, as shown in the table below:

Table 1. Values of "poles and residues" for the series “unit yield of artisanal fisheries in Algeria”.

Indice i	*The residues* $\sum R_i$		*The pôles* $S_i = a_i + j\omega_i$	
-	$\lvert R \rvert$	θ	a_i	ω_i
1	18.40	-3.14	-0.33	3.14
2	6.98	2.01	-0.34	2.33
3	6.98	-2.01	-0.34	-2.33
4	1.38	-0.48	-0.01	1.05
5	1.38	70.48	-0.01	-1.05
6	3.61	-2.73	-0.09	0.68
7	3.61	2.73	-0.09	-0.68
8	49.56	0	-0.04	0

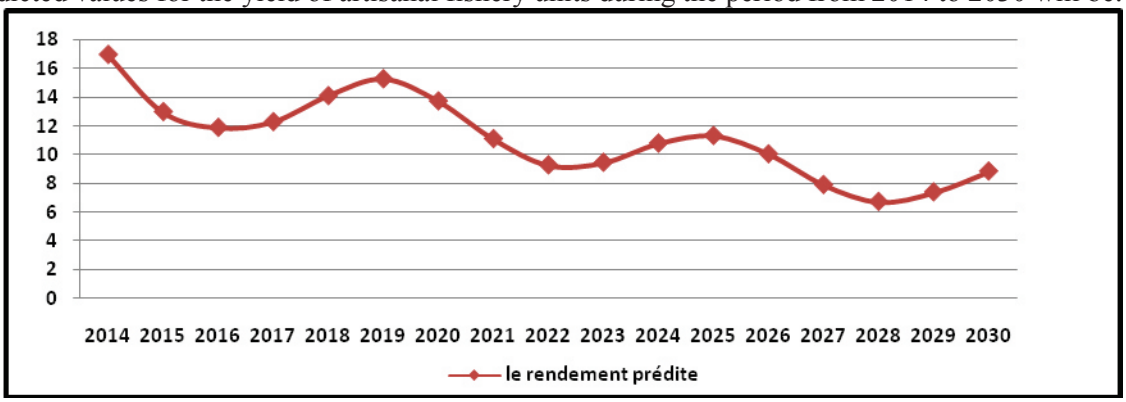
Source: Result of processing the database by MATLAB.

[24] . According to the results of the survey conducted by the Ministry of Fisheries and Halieutic Resources, whose socio-economic survey on fisheries (conducted from 20 May to 20 July 2013) based on a stratified random sampling, the investigation had reached more than 800 respondents in 19 fishing ports distributed over all maritime wilayas and 03 strata (boss fisherman, mechanics and sea-fishermen) for a margin of error of 5 %. The majority of fishermen, namely 96%, derive their income from no other resource than halieutic exploitation.

[25] . This method shows an improvement in terms of variance estimators compared to other methods. For further information, confer to: (José. E.R and Tapan.K, 1996 ; Yingbo.H and Tapan.K.S, 1990 ; Régis.B et Michel.T, 2004 ; Tapan.K.S and O.Pereira,1995 ; H.Najmeddine, 2009).

- *Prediction Results.*

Given the above results and the "Pencil" method guidelines, and using MATLAB [4], the predicted values for the yield of artisanal fishery units during the period from 2014 to 2030 will be:



Graph 2. Predicting the yield of artisanal fishery units in Algeria "2014-2030"
Source: Results of the simulation using MATLAB.

The results of the prediction give evidence of the gradual decline in the yield of artisanal fishery units in 2030. This means that the sustainability of both the resource and artisanal fishery activity in Algeria would be immediately threatened.

3.2.3. The Potential Reasons For The Decline In Yields Of Artisanal Fishery Units.

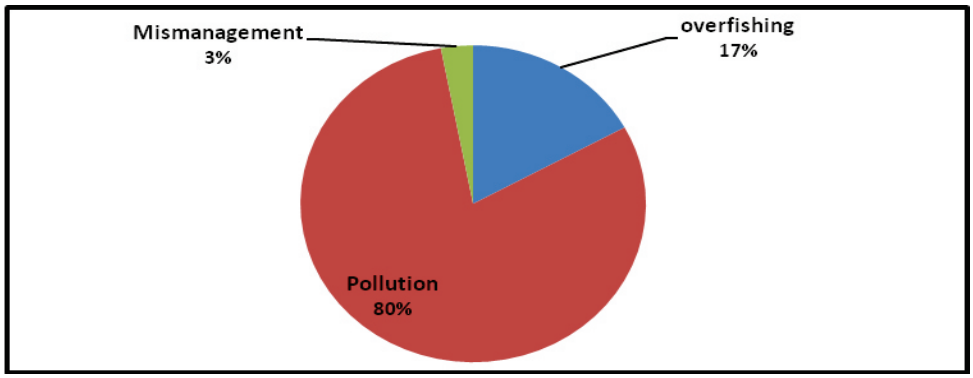


Figure 2. The reasons for the deterioration of fish yield according to the opinions of artisanal fishermen.
Source: Personal realization based on the field survey, 2014.

97% of fishermen interviewed confirmed that pollution and overfishing are the main reasons for the decrease in fishing boat's yields, as shown in the following figure:

Numerous studies and researches have shown the negative effects of pollution and overfishing on the halieutic resources and the marine ecosystem. (Sylvain Couvray et al, 2011; Chakour.S.C, 2013). To protect and control access to the resource for its reproduction, we recommend the development of marine protected areas. (Marina Gomei and Giuseppe Di Carlo, 2012; Enrique Oracion et al, 2005; Chakour S. C. and Dahou T, 2009). Still protection alone may negatively influence, on the one hand, the financial capacity of artisanal fishermen and, on the other hand, the socio-cultural aspect of this activity. In this context, we believe that the pescatourism, as an ecotourism approach, is able to manage these areas efficiently, by reducing fishing effort as well as by preserving and improving the socioeconomic conditions of artisanal fishermen. That is what we try to show in what follows, through the simulation of the evolution of the turnover of pescatourism and of its contribution to strengthening the financial capacities of artisanal fishermen.

3.3. The Pescatourism As A Complementary Activity And Source Of Income For Artisanal Fishery.

3.3.1. Contribution Of Artisanal Fishermen In Pescatourism.

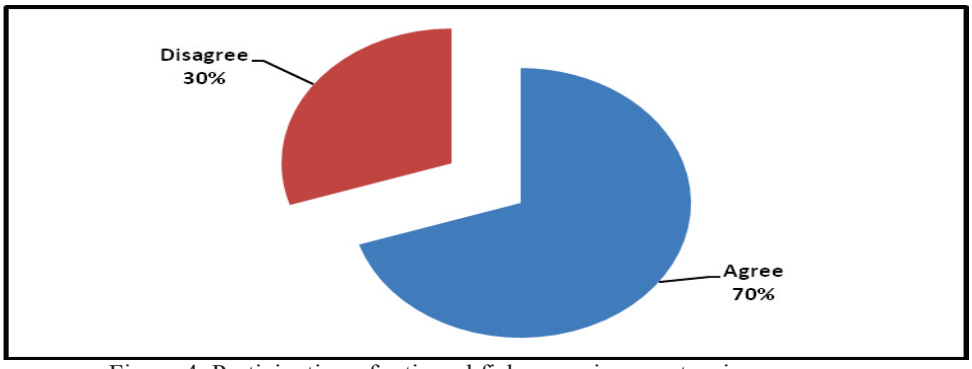


Figure 4. Participation of artisanal fishermen in pescatourism.
Source: Personal realization based on the field survey, 2014.

Following the field survey, we tried, through a participatory approach, to explain first this new ecotourism approach and its strengths. According to the survey, we found that 100% of artisanal fishermen respondents have never heard about pescatourism. Through our investigations, it appears that 70% of fishermen have agreed to practice pescatourism as a complementary activity to the business of artisanal fishery.

3.3.2. Participation Of Tourists To Pescatourism.

The pescatourism, being an ecotourism product, consists of a tourism demand and supply. The results shown in the following figure show the potential demand for this eco-tourism.

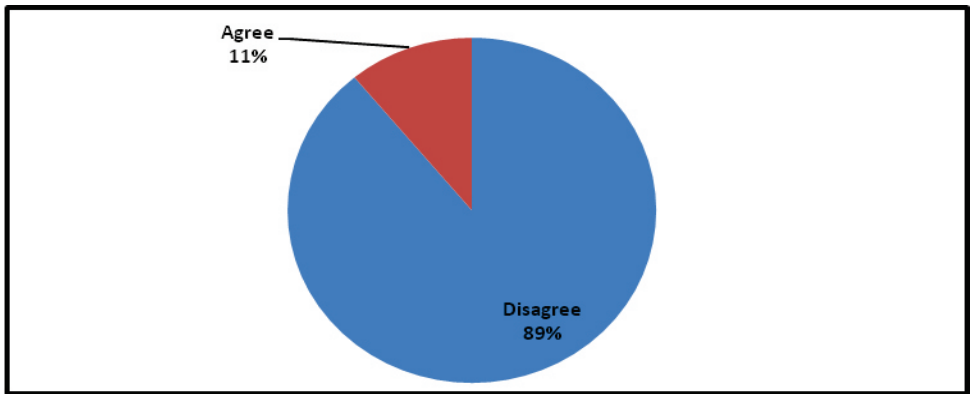


Figure 5. Participation of tourists in pescatourism.
Source: Personal realization based on the field survey, 2014.

According to the graph above, the majority of tourists surveyed, namely 89%, are willing to participate in pescatourism. This means that the demand for this eco-tourism product is a potential tourism one. The pescatourism can, thus, contribute to the modernization of the tourism industry in Algeria and the development of eco-tourism approaches in coastal areas, through the contribution to the protection of the environment and the ecosystem and improvement of the well-being of the local populations, especially the fishermen community.

3.4. Demonstration Of The Pescatourism Contribution To The Tourism-Fishing Integrated Development.

3.4.1. Modeling Of The Annual Turnover According To The Degree Of Pescatourism Activity.

3.4.1.1. The Method Of Estimation "Algorithm Presentation".

This algorithm is the result of our modest reflection on the tools of prediction of pescatourism efforts on the sustainable development of artisanal fishery.

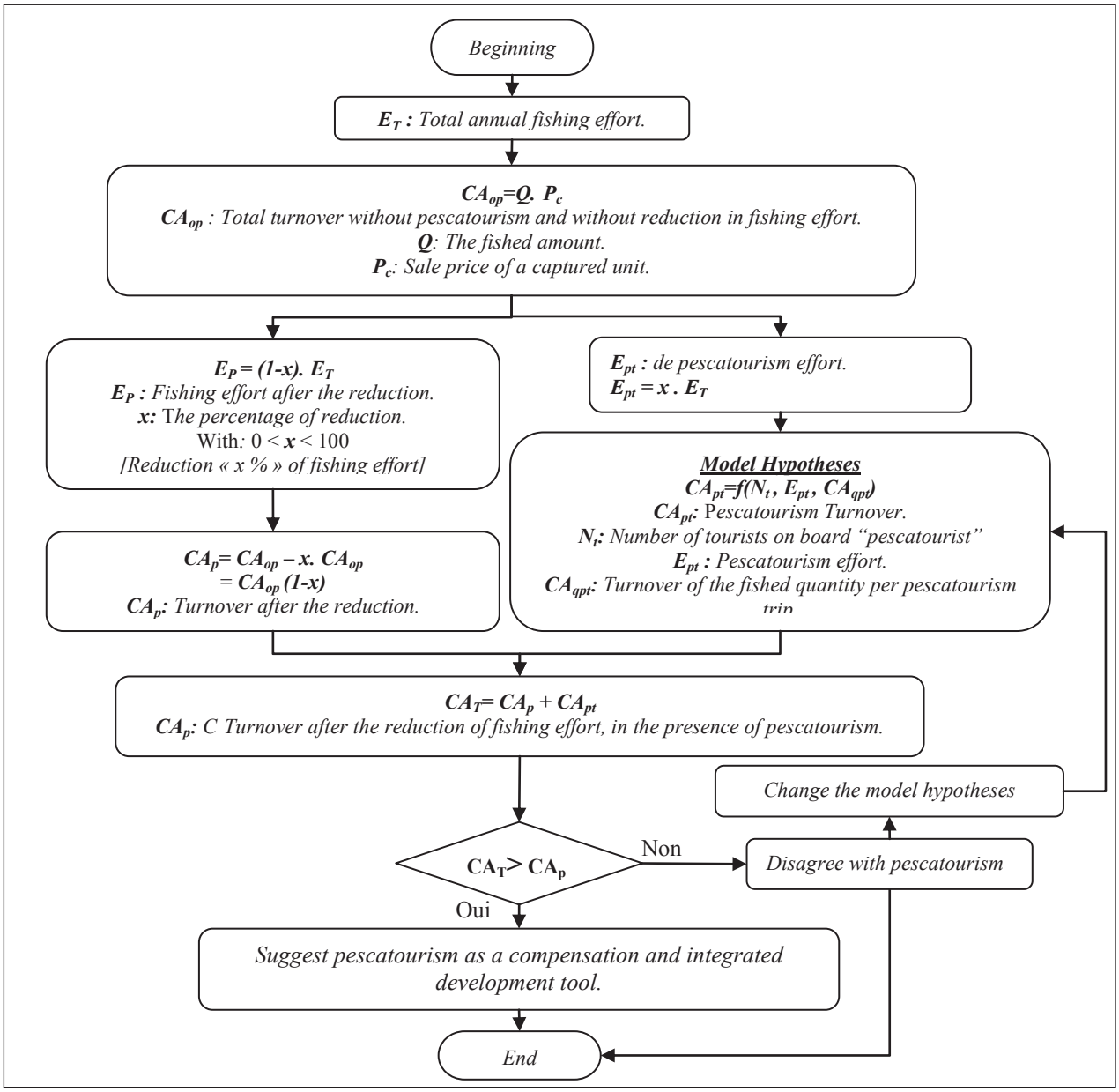


Figure 3. The algorithm of prediction of the turnover of artisanal fishermen.
Source: Personal realization; results of our study.

3.4.2. Test Estimation Of The Turnover Of The Artisanal Fishermen..

3.4.2.1. Hypotheses Of The Model.

To make this estimate, we put forward the following hypotheses:

- We assume that the quantity of fish caught in a pescatourism trip represents twenty percent (20%) of that of traditional fishing, thereby permitting to reduce the pressure on halieutic resources by eighty percent (80%) for each pescatourism trip.
- We assume that there are two pescatourism trips per day, with 05 pescatourists, on average, for each pescatourism trip.

In the study area, the average turnover is between 20000 and 30000 DZD per fishing effort, according to the type of vessel and the number of crew members with 125 trips as an annual average. From the data gathered through field surveys with tourists, we were able to determine the amount of 3000 DZD for each pescatourist.

3.4.2.2. Presenting The Scenarios Of The Estimate.

Given that:
E_T: Estimated Total Fishing Effort;
E_p: Estimated Small-scale Fishing Effort;
E_{pt}: Estimated Pescatourism Effort;
We have:
$E_p = (1-x).\ E_T$
$E_{pt} = x.\ E_T$
With: $E_p + E_{pt} = 1$

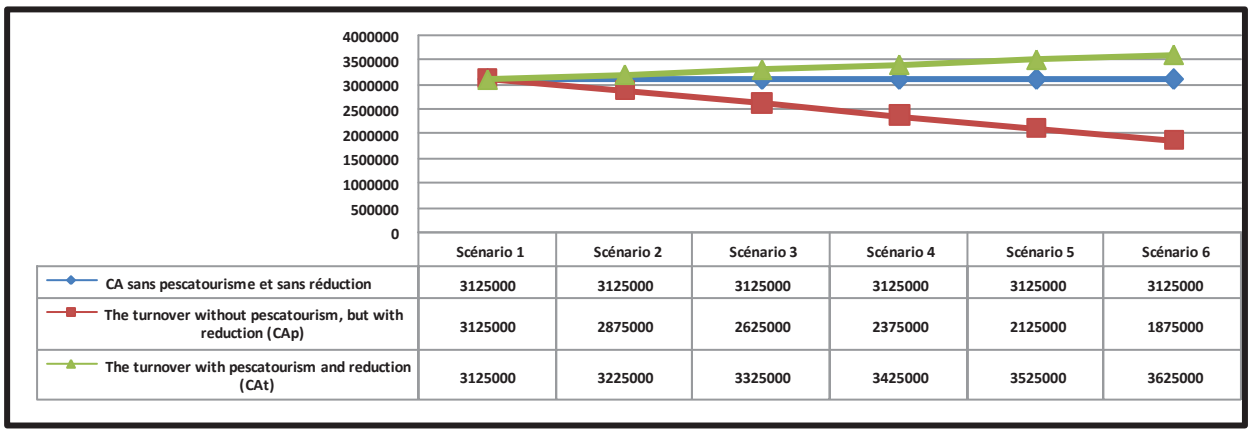
Table 2. Scenarios for estimating the turnover of artisanal fishermen.

-	-	Unit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
(1)	E_T	percentage	1	1	1	1	1	1
(2)	E_p	percentage	1	0.92	0.84	0.76	0.68	0.6
(3)= (1)- (2)	E_{pt}	percentage	0	0.08	0.16	0.24	0.32	0.4

Source: Personal realization.

3.4.2.3. Estimate Results.

On the basis of the results presented above, and surveys of artisanal fishermen and tourists, we were able to get the results that we represent in the graph below: [5]



Graph 3. Estimated annual turnover of artisanal fishermen depending on the share of pescatourism.
Unit: DZ / year
Source: Personal realization based on the field survey, 2014.

The result of this is that the resort to pescatourism as a maneuver of compensation and enhancement of the financial capacity of artisanal fishermen improves their income according to each scenario, to name just one example, i.e. the pescatourism in the context of reducing the pressure on the resource (reduction of the fishing effort) would improve the fishermen's incomes up to 3%, for the scenario 2, and to 16% for the scenario 6.

4. Conclusion:

Artisanal fishing is considered as one of the essential activities in the coastal areas in Algeria, in so far as that it helps create jobs and integrate many social fringes in the labor market. But despite the efforts, the sector is facing many problems, including those related to pollution and overfishing. This is not without adverse effects on the marine ecosystem and, hence, on the socioeconomic situation of the fishermen community. So, we need to act to preserve these resources and protect the marine space through the creation of efficient marine protected areas "MPAs". These areas, through the sustainable management of the resources they offer, may have a real impact on natural capital constituted, in our case, of halieutic resources and marine ecosystem.

We have, through this research, attempted to identify the relationship between pescatourism and sustainable management of halieutic resources, on the one hand, and the sustainability of artisanal fishery as a national socio-economic component, on the other hand, in order to give artisanal fishermen an opportunity to

diversify their sources of income while continuing to live on the sea, and in order to adapt to the halieutic resource management issues through tourism.

The results lead to predict the importance of the added value that artisanal fishermen could achieve through pescatourism projects exploring other sources of extra income that complete those related to their fishing activities. The pescatourism permits also reduce the pressure on the halieutic resources.

The results reveal and confirm also that the pescatourism harmoniously integrates environmental issues in the field of fisheries, since it works to reduce fishing effort «in our case 80% in each pescatourism effort» and go, thus, towards a sustainable management of halieutic stocks.

Finally, the analysis of the results confirms that the pescatourism can be an effective solution for protection, sustainability and sustainable development of the concerned sector, which gives it a key role in the integrated development of coastal areas, especially in landlocked and economically vulnerable areas.

This article reinforces our thesis and show that the pescatourism must become a pillar of the Integrated Coastal Zone Management "ICZM" in Algeria.

However, this research has some limitations and requires in the future more targeted investigations through empirical studies on pescatourism contribution to local development of coastal areas economically vulnerable.

References

AGTER, 2012, Gestion durable de la pêche artisanale; France, [Online] Available: http://www.agter.asso.fr (january 10, 2014)

André E. P, 2014, Selecting relative abundance proxies for BMSY and BMEY, *ICES Journal of Marine Science*, , Volume 71, Issue 3, Oxford University, U.K, March/April.

Bellia.R et al, 2011, le projet pescatourisme 83, *Marco Polo Échanger Autrement*, France, juillet.

Boncoeur.J et Bertrand.G, 2000, Un modèle bioéconomique d'évaluation du coût social des rejets au sein d'une pêcherie complexe, *In Economie et prévision*, numéro 143-144 ,Avril - Juin.

Chakour. S.C and Guedri. S.E, 2014, Sustainable management of artisanal fisheries in Algeria: The contribution of an empirical approach, *Merit Research Journal of Business and Management*, Vol. 2(3), November.

Chakour.C.S, 2013, *Economie des pêche et des ressources halieutiques : une approche interdisciplinaire pour un développement durable de la pêche en Algérie*, Presses Académique Francophones, France, Edition N°01.

Chakour.S.C, 2013, L'approche socioéconomique et ses applications au Aires marines protégées. Fonds Mondial pour la Nature, Programme des Nations unies pour l'Environnement PNUE.

Chakour S.C et Dahou. T, 2009, Gouverner une AMP, une affaire publique ? Exemples Sud-Méditerranéens, *VertigO - la revue électronique en sciences de l'environnement*. Hors série 6. 2009.

Chakour.S.C et Chaker.A , 2015 ; Réflexion autour de la relation : Aires marines protégées, Ecotourisme et développement durable des territoires littoraux, *A paraitre dans la revue des Sciences Economiques de l'Université de Sétif*.

Colin W.C, 2006, Fisheries bioeconomics: why is it so widely misunderstood?, *populEcol 48*, University of British Columbia, Canada, p95.

Couvray.S et al, 2011, Pollution, pêche et modification d'habitats: quelles conséquences sur les ressources marines littorales?, *Mar.Life-Vol.17*, published electronically, october.

Debeauvais.R, 1985, le développement de la pêche artisanal, *économie rurale*, N 170, Vol 170 ; novembre-décembre.

Delamare.A, 2010, Diversification socio-économique des secteurs de la pêche et des cultures marines sur la façade Aglia, Association du Grand Littoral Atlantique. [Online] Available: www.aglia.org (march 12, 2014)

Diallo.M, 1995, Analyse des interactions entre la pêche artisanale et la pêche industrielle, *centre de recherches oceanographiques de DAKAR*, N199, Institut Sénégalais de recherche agricoles.

European Commission, 2011, Project Case Study, Pescatourisme83, Directorate-General for Maritime affairs and fisheries, lurch, p03, www. webgate.ec.europa.eu , consulté le: 16/03/2013

Fabyini.M, 2008, Dive tourism , fishing and marine protected areas in the Calamines Islands, Philippines, *journal of the Australian National University*, marine policy 32,Australia, p898.

FARNET, 2013, Conjuguer pêche et tourisme, *Farnet magazine*, N°09, ISSN1832-5747, p03.

FAO, 2014, The state of World Fisheries and Aquaculture 2014, Opportunities and challenges, *rapport of FAO*, ISNN1020-5489, Rome.

Gomei.M et Di Carlo.G, 2012, Assurer l'efficacité des aires marines protégees-Leçons tirées en Méditerranée, WWF Méditerranée.

Halah.N, 2009, *Méthode d'identification et de classification de la consommation d'énergie par usages en vue de l'intégration dans un compteur d'énergie électrique*, thèse de doctorat en Électromagnétisme, UNIVERSITÉ BLAISE PASCAL - CLERMONT II.
Hua.Y and Tapan.K.S, 1990, Matrix Pencil Method for Estimating Parameters of Exponentially Damped/Undamped Sinusoids in Noice, *IEEE Transactions on Acoustics.Speech. And Signal Processing*, Vol.38, No.5, may.
José.EF and Tapan.K.S, 1996, Comparison between the Matrix Pencil Method and the Fourier Transform Technique for High-Resolution Spectral Estimation, *Digital Signal Processing 6*, Article No 0011, Academic Press.
Le pescatourisme sur le facade atlantique francaise, lettre d'information N°01, Décembre 2011, France, [Online] Available: www.delamar.aglia.fr (july 10, 2013)
MPRH, 2014, Enquête socio-économique sur la population des marins pêcheurs en Algérie», dans l'Atelier International sur l'Approche Socio-économique de la pêche et de l'aquaculture et les projets intégrés: un outil d'aide à la décision, MPRH, Alger, 20-21 janvier.
MPRH, 2014, «Secteur de la pêche et de l'aquaculture bilan(2012-2014) prospective 2030 & projet « Plan Aquapeche 2020 », Avril.
M'Rabet.R et all, 2011, La pêche artisanale à Ghannouch (Tunisie)- Passé, présent, avenir, *FAO-ArtFiMed* Développement durable de la pêche artisanale méditerranéenne au Maroc et en Tunisie. Malaga.
Oliver.P et Franquesa,R 2005, la pêche en méditerranée, *les notes d'analyse du centre international de hautes études agronomiques méditerranéennes*, N 03, juin, p01.
Olstrom.E, 2010, *Gouvernance des biens communs*, (Traduction française), Edition De Boeck Université, Bruxelles
Oracion.E and others, 2005 Marine protected areas for whom? Fisheries, tourism, and solidarity in a Philippine community, *Ocean & Coastal Management*, N°48, pp393-394.
Régis.B et Michel.T, 2004, Analyse des séries temporelles- Application à l'économie et à la gestion, *Dunod*, ISBN 2100484362, Paris, France.
Sahi.M et Bouaicha.M, 2003, La pêche artisanale en Algérie, *Document FAO Copemed,* Centre National d'Etudes et de Documentation pour la Pêche et l'Aquaculture, 2003.
Tapan.K.S and Pereira.O, 1995, Using the Matrix Pencil Method to Estimate the Parameters of a sum of Complex Exponentials, *IEEE Antennas and Propagation Magazine*, Vol.37, No.1, February 1995.
Thomas.I, 2010, Diversification des activités de pêche ou de conchyliculture, *le Conseil Régional de la Mer et de la protection du littoral*, Bretagne, p03.
Viktoria.K and Claire.A, 2008, Fishing on cold coral reefs: Abioeconomic model of habitat-fishery connections, *Working paper series in Economics and Management* , N°06/08, University of Tromoso, Norway, November.
WWF, 2011, Common Fisheries Policy Reform Getting MSY Right, More Fish For Healthy Seas, October, [Online] Available: www.WWF.eu (May 7, 2014)
Zhuo.X, 2012, Approaches to develop marine fishing tourism in a Norway and Chinese regions, *Department of Geography*, University of Bergen, p10.

Notes.

Note 1. Ecotourism is tourism that takes into account the sustainability of ecosystems, but also the improvement of the well-being of the local population. For further information, confer to: (Chakour.S.C et Chaker.A , 2015).

Note 2. According to the results of the survey conducted by the Ministry of Fisheries and Halieutic Resources, whose socio-economic survey on fisheries (conducted from 20 May to 20 July 2013) based on a stratified random sampling, the investigation had reached more than 800 respondents in 19 fishing ports distributed over all maritime wilayas and 03 strata (boss fisherman, mechanics and sea-fishermen) for a margin of error of 5 %. The majority of fishermen, namely 96%, derive their income from no other resource than halieutic exploitation.

Note 3. This method shows an improvement in terms of variance estimators compared to other methods. For further information, confer to: (José. E.R and Tapan.K, 1996 ; Yingbo.H and Tapan.K.S, 1990 ; Régis.B et Michel.T, 2004 ; Tapan.K.S and O.Pereira,1995 ; H.Najmeddine, 2009).

Note 4. See appendices 02.

Note 5. See appendices 01.

Appendices

Appendices 01: Estimated Turnover of Small-scale Fishermen Depending on the Share of the Pescatourism Activity

				Scenarios					
	-	-	***Unit***	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Estimated Total Fishing Effort	-	E_T	*Total Fishing Effort*	125	125	125	125	125	125
Estimated Small-scale Fishing Effort	(1)	E_p	*Fishing Effort*	125	115	105	95	85	75
Estimated Pescatourism Effort	(2)	E_{pt}	*Pescatourism Effort*	0	10	20	30	40	50
Estimated Number of Pescatourists	(3)	N_t	*Pescatourist / Day*	10	10	10	10	10	10
Estimated Amount for each Pescatourist Boarding	(4)	M_{pt}	*DZD/ Pescatourist*	3000	3000	3000	3000	3000	3000
Average Estimated Amount of a "Small-scale Fishing" Trip	(5)	M_P	*DZD/ Fishing Effort*	25000	25000	25000	25000	25000	25000
Estimated Annual Turnover of Small-scale Fishing	**(6)= (1). (5)**	CA_{op}	***DZD/Year***	**3125000**	**2875000**	**2625000**	**2375000**	**2125000**	**1875000**
Estimated Annual Turnover of the Fished Quantity per Pescatourism Trip	(7)= 1/5 . (2). (5)	CA_{qpt}	*DZD/Year*	-	50000	100000	150000	200000	250000
Estimated Annual Turnover of Pescatourism	(8)= [(2).(3).(4)]+ (7)	CA_{pt}	*DZD/Year*	-	350000	700000	1050000	1400000	1750000
Total Estimated Annual Turnover	**(9)= (8)+ (6)**	CA_t	***DZD/Year***	**3125000**	**3225000**	**3325000**	**3425000**	**3525000**	**3625000**

Source: *Personal realization based on the field survey, 2014.*

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar