

The Contribution of Fisheries Sector to Achieving Food Security in Algeria: An Analytical Study

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Abstract:

Achieving food security is an important priority in public policy, as the world has witnessed a significant increase in demand for food in recent years. Like all countries in the world, Algeria seeks to obtain resources that can contribute to food security. Among these resources are fishing resources, which are one of the most important sources of food for humans due to their high nutritional and economic value.

The current study intends to examine the contribution of the fisheries sector to contribute food security in Algeria by providing and ensuring the sustainability of fishing resources in order to support food security policies, through the use of mathematical equations that determine the food gap from fish consumption between 2010 and 2019 in Algeria, based on statistics from the National Statistics Office and the fish consumption rate set by the World Health Organization at 6.2 kg per person per year.

The results showed that the contribution of the fisheries sector to supporting food security policies in Algeria is very limited, due to several particular biological reasons, also imports from this sector are still far from achieving global consumption rates of fishing resources.

Keywords: Fisheries; Fish mass; Food security; Algeria.

(JEL) Classification: O13, Q22, Q210.

1. Introduction:

Most of the world's countries are in the process of achieving and maintaining food security through the search for the necessary resources, and the fisheries sector is a critical strategic sector given the significant potential role it can play in nutrition, especially by contributing effectively to the supply of renewable fish (Guedri & Chakour, 2015), in addition to stimulating marine food industries and thereby contributing effectively to achieving food security and sustainability that coastal regions are of great importance for most countries. In addition to their content of marine biological natural resources (Guedri, 2021) also the Algerian coast represents an important natural capital thanks to its tangible and intangible heritage which makes it an attractive territory because of its resources and its socio-economic activities (Messali & Chakour, 2018), the latter which is the source of life for most of the populations of this coastal communities (Guedri, Bendhiba, & Boussalem, 2017). Algeria as a coastal State, has a coastal strip estimated at more than 1,600 km (Guedri & Chakour, 2015), and a sea area subject to national jurisdiction devoted to marine fishing is estimated at 9.5 million hectares within the Mediterranean, of which 15% is for sea pocket, and Algeria's marine fisheries reserve is estimated at 500,000 tons (Chakour & Guedri, 2014), the Algerian coast also has a large reserve of red coral and sponges, as well as an enormous stock of fish wealth estimated at more than 1940 species and to sustain fisheries and manage resources more

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effectively, international conventions such as the Convention on Biological Diversity it reference to protection the biodiversity (Boubekri, Mazurek, Borhane Djebbar, & Amara, 2022) (Boubekri, Caveen, Abdallah, Amara, & Mazurek, 2018). In this context, Algeria has given special attention to the fisheries sector in the hope that it will be a sector that contributes effectively to food security and thus to the country's national security.

1.1. Research Problematic:

Through this study, we will try to reveal the level of the impact of fisheries sector on the food security in division of fisheries resources in Algeria, by answering the following question:

What is the contribution of the fisheries sector to achieving and supporting food security policies in Algeria?

1.2. Study hypotheses:

To answer the problem, we will make a key premise for our study:

The fisheries sector can contribute to the achievement of food security in Algeria by providing fishery resources and increasing national consumption of such resources, as well as stimulating various food industries related to fisheries resources.

1.3. Research Aims:

Through this study, we seek to achieve the following objectives:

- The role played by fisheries sector in Algeria to achieving food security.
- Through the provision of various fisheries resources in the markets to consumers in sufficient quantities and at reasonable prices, thereby supporting Algeria's various policies for national security.
- Research on eliminating the large food gap in fish consumption per person in Algeria.

1.4. Research Methodology:

The descriptive analytical method and mathematical equations was used in this research, through a quantitative analysis of available data at the national level (statistics of the National Statistical Office (NSO) between 2010 and 2019 for the fishing and fisheries sector), and the fish consumption rate set by the World Health Organization (WHO) at 6.2 kg per person per year as well as a qualitative analysis based on a series of interviews with a group of fishermen.

1.5. Organization of the study:

To familiarize ourselves with all aspects of the study, we have decided to divide this paper into three parts:

- ✓ **The Fisheries sector relationship to food security.**
- ✓ **Method and Tools: The reality of fish consumption in Algeria.**
- ✓ **Results and discussion: Reality of the contribution of the Fisheries sector to the promotion of fish consumption and food security in Algeria.**

2. The Fisheries sector relationship to food security:

2.1 Concepts on fisheries resources:

Fisheries resources are one of the most important sources of food for human beings, given their high

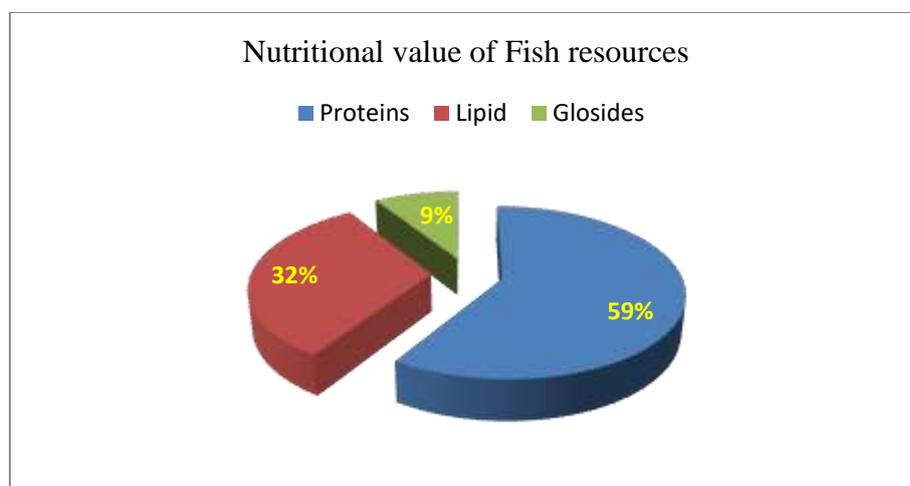
nutritional value. Many countries are investing heavily in marine fishing sectors in order to promote a culture of consumption of fishery resources in large quantities and affordable prices.

2.1.1 Definition of fisheries resources : Before addressing the definition of the term fisheries resources, the term "natural resources" must be addressed. Scientists disagreed on the definition of the term "natural resources" in their different affiliations. biologists have addressed the term in terms of its scientific value, and economists have addressed it in terms of its economic and social value biologists consider that the concept of natural resources is closely linked to the concept of the ecosystem and the activity of its living components, the productivity of a particular place under the influence of natural factors only (Chakour, 2013), natural resources can be divided according to their biological characteristics into two parts: non-renewable natural resources, which have limited stock in nature and renewable resources and which are self-replenishing over time, such as a fish resource. Economically, natural resources are non-woven inputs used in the production process. Through the foregoing, fishery resources are regarded as renewable natural resources through reproductive processes, comprising different species, including Fish, Slugs, Crustaceans and others, living in the seas or oceans, both at their bottom and on their surface.

2.1.2 Importance of fisheries resources: Fisheries resources are a renewable source of one of the best food commodities, a pillar of food security and one of the most important comprehensive and sustainable development indicators, as an area of investment, employment and reduction of unemployment. The main purpose of the fishery resource is to provide food to the world's population. It contributes to food security. In turn, it attracts many income-producing and foreign exchange-saving investments for many States and contributes to the elimination of unemployment by providing various employment opportunities for the local population through artisanal fishing or for cooperatives and institutions specializing in fishing for all people.

- **Its importance as a source of food:** Fish resources are a highly valuable food source, with many animal proteins, minerals, fatty acids and mineral salts essential to humans. They are a major source of nutrition and proteins. Fish account for 16% of proteins consumed by humans (Guedri & Chakour, 2015). The nutritional value of fish resources can be summarized in the figure 01 below:

Figure (01): Nutritional value of fish resources



Source: prepared by researchers based on (Chakour, 2013).

Many recent studies have also shown that eating fish reduces and protects against many cancers and diseases (such as cholone cancer, most common in digestion), and reduces the risk of hypersensitivity to glucose, and various cardiovascular diseases.

- **Its importance as a source of employment:** Fisheries resources play a significant role in the provision of jobs and the fight against unemployment according to the World Food and Agriculture Organization FAO, where they are the mainstay of other fishing-related occupations and activities, such as manufacturing, mobilization, marketing and distribution.
- **Its importance as a source of income:** Fisheries resources are an important source of financial revenues for many of the world's countries, providing many investment opportunities from food industries, chemical and pharmaceutical industries, feed industries and various raw materials. These industries increase the volume of exports, thereby increasing national income rates in the hard currency of countries. These financial resources contribute to various development processes.

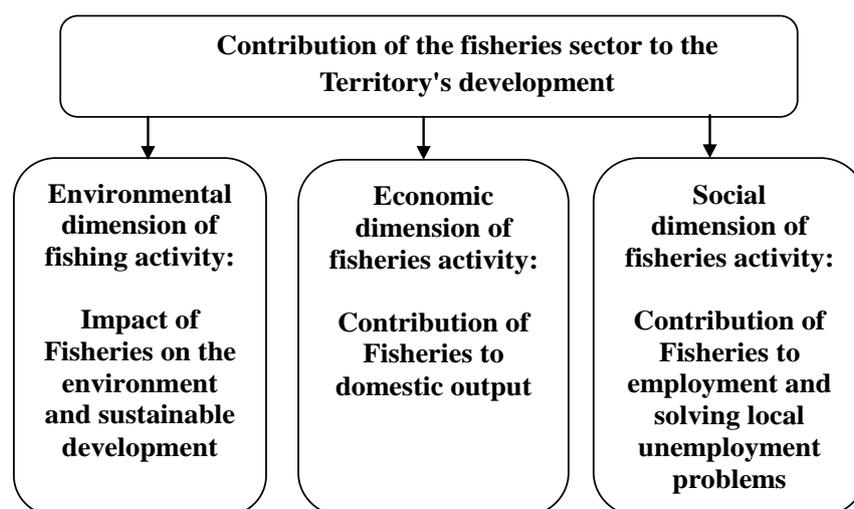
2.2. Fisheries sector's relationship to food security:

The offshore fisheries sector is one of the most important contributors to food security, as it provides various marine biological resources. Fish wealth is the primary supporter of food security, through direct fish consumption or contribution to the creation of marine food industries, job creation, wealth growth and investment opportunities.

Given the great importance of this sector in achieving food security, Algeria has, since independence, strengthened this sector with the necessary resources to strengthen its place in the structure of the national economy. As a result, a self-contained ministry responsible for this sector, the Ministry of Fisheries and Fisheries Resources, has been established. in order to preserve, value and exploit fishery wealth in order to achieve the Territory's development and food security.

The contribution of the fisheries sector to the Territory's development will be illustrated in the following figure:

Figure (02): Contribution of the fisheries sector to the Territory's development



Source: prepared by researchers based on (Chakour, 2013).

3. Method and Tools: The reality of fish consumption in Algeria:

Algeria's coastline extends over a large area of 1280 km, and the area allocated for fishing activity is approximately 9.5 million hectares (Guedri & Chakour, 2016), Algeria also has a diverse and significant biological potential and an important reservoir of fish resources estimated at more than 1984 of high commercial and food value, Algeria's fishing activity is carried out in waters under national jurisdiction under Law No. 01-11 of 3 June 2001 of fisheries and aquaculture, as follows:

- Coastal fishing area;
- Fishing area at sea;
- Large fishing zone.

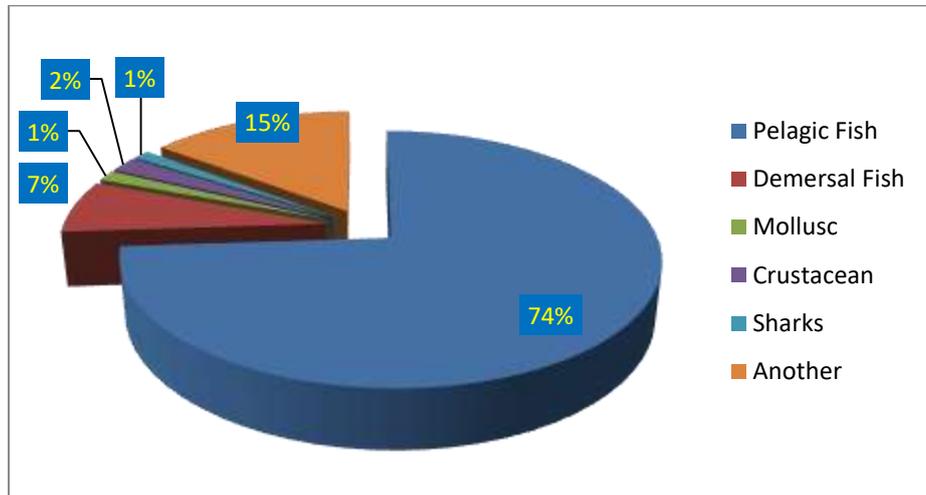
Algeria's coastline also consists of 14 coastal states, with more than 40 shelters and seaports, which are important structural bases that frame more than 43,000 fishermen nationally (قدري، 2017). The government is also working through national fishing schemes to refurbish fishing vessels and build new ones, particularly the sectoral strategy that was established between 2020 and 2024. This is designed to improve the composition of facilities and also encourage fishermen to engage in fishing by providing concessions for work, especially in the area of social insurance and retirement.

Algeria's fish production is based on geographical areas and fish varieties, as follows (قدري، 2017) :

- **Surface Fish:** Known as blue fish living near the sea surface between the facade and depths, the most important features of this species are rapid reproduction and large regeneration capability, divided into three subsets: Small Surface Fish Like Sardines And Patient Fish Anchoix... etc, medium surface fish, the most important of which is the bonitos, and thomines fish, and large surface fish mainly formed by red tuna fish, Aposev fish... etc.
- **Bottom Fish:** They are deep fish, characteristic of being non-migratory and can include several groups, the most important of which are white fish, such as whiting, sea breams fish... etc, sharks such as shark, sea dog, etc., crustaceans such as red and white shrimp, crab they are highly commercially valued fishery resources, slugs like squid, Kalmar, sea shells, coral, where Algeria has significant stores of red coral and marine sponges, and these suppliers are still not formally exploited.

The following format builds the development of Algeria's fisheries production by fish category for 2010-2019:

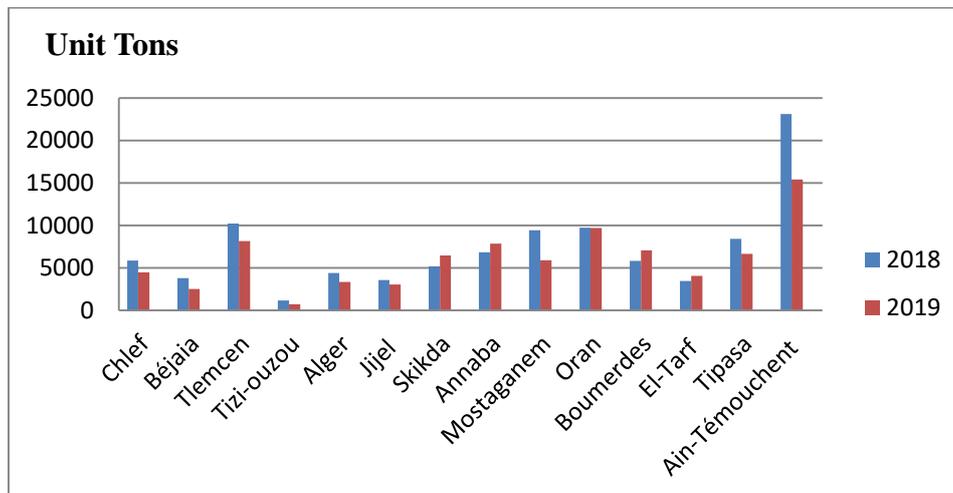
Figure (03): Development of production of fisheries resources in Algeria by category of fish for 2010-2019



Source: prepared by researchers based on (National Statistics Office, 2022).

The size of Algeria's fish production can be explained by the division of the coastal states as shown in the following figure:

Figure (04): Development of fish production in Algeria by states during 2018-2019

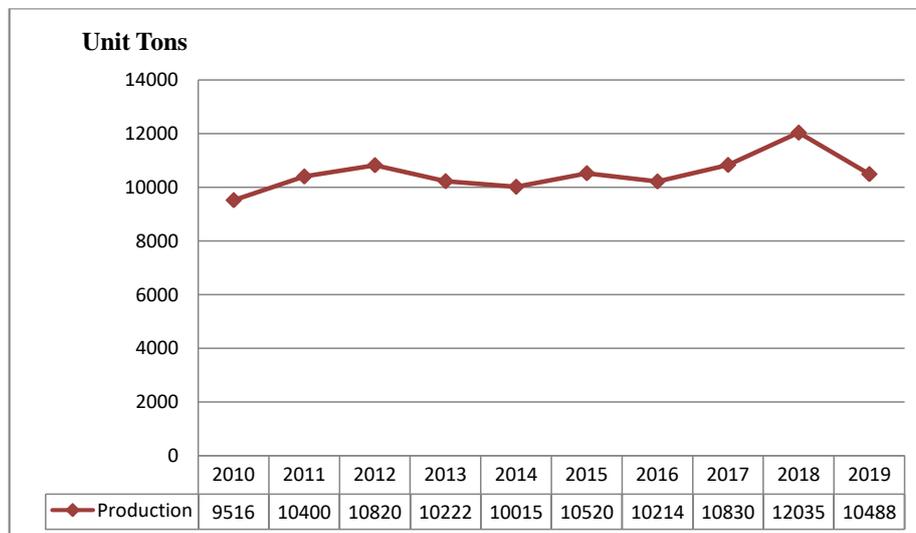


Source: prepared by researchers based on (National Statistics Office, 2022).

Through the above figure we note that Algeria's highest level of fish production was during 2018 and 2019, in each of the states: Ain Temouchent, Tlemcen, Oran and Mostaganem, any western side of the homeland, is due to the geological and biological composition of the depths of the Algerian Sea. The deepest sea in the western Algerian Sea is rich in fish resources, being located near the Strait of Gibraltar through which the Atlantic Ocean feeds the Med Mediterranean Sea with plankton and plants.

The exploitation of Algeria's fisheries has gone through several stages through natural fisheries (natural fisheries = offshore fisheries production + continental fisheries production). Figure 04 below shows the development of fisheries production in Algeria from 2010 to 2019 (National Statistical Office quoted by the Ministry of Fisheries and Fisheries Resources):

Figure (05): Development of the production of fish resources in Algeria during 2010-2019

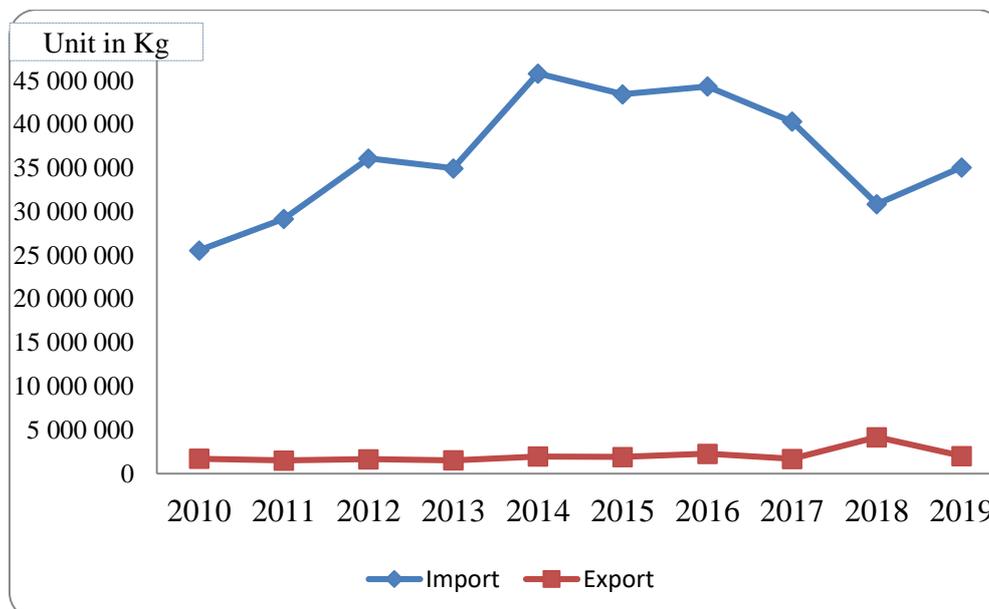


Source: prepared by researchers based on (National Statistics Office, 2022).

The above figure indicates that fisheries production evolved from 2010 to 2012 and decreased in 2013, 2014 compared to 2012, and in 2015 it rose to 10520 tons. The year 2018 also marked the largest increase, with production estimated at 12035 tons.

The following figure and table also shows the movement of Algeria's fisheries exports and imports during the period 2010-2019:

Figure (06): Exports and imports of fish resources in Algeria during 2010-2019



Source: prepared by researchers based on (National Statistics Office, 2022).

From the above figure, imports of fisheries resources far exceed exports, with imports amounting to 36093708 kg in 2012, against an estimated 1637860 kg exports during the same year. Annual per capita

consumption for 2012 is estimated at 4.112 kg/year per person, somewhat far from the World Health Organization's estimated 6.2 kg/year per person. exports during 2019 were estimated at 35064639 kg compared to estimated imports of 1999311 kg during the same year, Corresponding to annual consumption rate not exceeding 3,478 kg/year per person according to Ministry of Agriculture and Rural Development statistics and it is calculated that the value of exports plus imports does not cover and if only a few of the national market's requirements for fish consumption, it contributes a small proportion to food security in this division.

4. Results and discussion: Reality of the contribution of the Fisheries sector to the promotion of fish consumption and food security in Algeria:

Fish consumption in Algeria is characterized by a significant decrease compared with the population According to statistics from the Ministry of Agriculture, Fisheries and Fisheries Resources, Algeria's annual per capita consumption for 2012 was estimated at 4.112 kg/year per person compared with an estimated population of 37.1 million for the same year, The required level of growth consumption of this substance is estimated at 6.2 kg/year per person according to World Health Organization WHO.

According to the foregoing, Algeria's consumption rate during 2019 was only 3,478 kg/year per person for an estimated 10488 tons of population census estimated at 43 million in 2019, and the decrease in per capita consumption of Algeria has been affected, inter alia, by fluctuating fish production. The evolution of the population, the absence of a culture of improving the social status of fishermen and fishing professionals, Exports and imports of fisheries, as well as high prices of such fisheries and their difficult access to consumers in some regions.

❖ Algeria's food gap for fish consumption:

The food gap for fish is the difference between the total demand for fish and its total supply, where it will be addressed through the following mathematical and computational equations:

D_p : Total demand for fish;

O_{p1} : Overall supply for fish;

O_{p2} : The total supply of fish with the calculation of exports and imports;

M_a : Annual rate proposed by the World Health Organization WHO;

N_p : Population numbers;

P_g : Total production;

R_a : The food gap from national production;

R_A : The national food gap, taking into account exports and imports;

R_{ai} : The individual's food gap;

X_h : Exports of fisheries resources;

M_h : Imports of fisheries resources;

From the above we find the following:

$$O_{p2} = P_g - X_h + M_h$$

$$D_p = M_a \cdot N_p$$

$$R_a = D_p - O_{p1}$$

$$R_A = D_p - O_{p2}$$

We also assume that the growth rate of aquaculture of all kinds is = 0%.

From the following table, we will calculate the food gap from fish commencement in Algeria according to the World Health Organization for the period 2010-2019:

Table (01): Food Gap from Fish Consumption in Algeria 2010-2019

Variables	2010	2019
D_p	35600000	43000000
M_a	6.2	6.2
$D_p = M_a \cdot N_p$	220720000	266600000
$O_{p1} = P_g$	95168000	104880000
R_a	125552000	161720000
X_h	25552216	35064639
M_h	1696399	1999311
$O_{p2} = P_g - X_h + M_h$	71312183	71814672
$R_A = D_p - O_{p2}$	149704817	194785328

.Source: prepared by researchers

Based on the table above, we find the following:

- While fish consumption almost doubles on a per person basis in the five years the world's past 50 per person consumption is currently estimated at about 19 kg per year, according to World Health Organization statistics. Algeria's food gap from fish consumption remains high
- In he year 2010 amounted to an estimated 67.82% of total consumption, representing 1.47 kg/year per person consumption, rising to an estimated 73.06%, or an estimated 1.36 kg/year per person consumption during 2019.
- We noted that there has been very little increase in the food gap from fish consumption estimated at 0.11 kg per person per year in 10 years, which is what we have come up with by comparing 2010 to 2019 in the table above.
- Imports of these resources remain limited and do not significantly affect the food gap from the consumption of fishery resources, and have risen by a very small amount in 10 years from 1696,399 kg to 1999,311 kg
- From the foregoing, we note that the contribution of the fisheries sector to food security in Algeria remains very limited.

5. Conclusion:

What has been addressed in this study the fisheries sector plays important economic and social roles in it, which shows the interest that public policy in Algeria, are paying to this sector to make it one of the main engines of local development. However, despite all the efforts made in this area, this sector contribution to achieving and supporting food security policies in Algeria remains very limited on the

basis of the rates stipulated by the World Health Organization, in addition to imports of these resources, the consumer gap of these resources persists.

One of the reasons for this is the weak potential allocated to this sector, its provision of fishing boats, fittings, etc., as well as pollution in the Mediterranean territorial waters, which has significantly affected fisheries, in addition to the lack of investment in the fishing sector, especially foreign, Algeria is working today to give effect to the legal provisions governing the fishing sector, particularly fishing on the high seas, and control its work and territorial competence, as this activity creates self-sufficiency in the consumption of fishery resources and reductions in imports as well as the creation of a clean marine industry at the coastal territorial level.

-Recommendations: As recommendations for the effectiveness of the fisheries sector and the provision of fisheries resources in order to contribute to food security, we propose the following:

- We need to encourage investment in aquaculture in the sea, especially in light of the limited capacity of the Mediterranean Sea, as increased investment in this sector through the injection of new fishing units will not have a consequence on catches and directly contribute to food security.
- We need to invest in Marine Protected Areas is to restore degraded ecosystems on the one hand and increase the supply of fish on the other, especially white fish
- Accelerate the establishment of new legal texts regulating the fisheries sector in order to regulate fishing and protect and proliferate fisheries resources in order to achieve food security;
- Regulate the action of fishermen's quotas and various activities in order to avoid various conflicts, particularly with regard to fishing activity resulting from tourism, and control of various fishing and fishing activities in coastal territories.
- Encouraging investment in the fisheries sector, especially foreign investment, to obtain new technologies for this activity.
- Promote the granting of privileges and incentives to artisanal fishermen and encourage them to fish legally.
- Encouraging the formation of craftsmen within this activity, in particular the creation of specializations commensurate with this activity within universities and vocational training centers.
- Engaging experts, actors and university professors to give a clear vision for the future functioning of this sector in order to achieve food security.
- Work on the establishment of Marine Protected Areas, especially since such reserves serve to conserve the fish wealth and increase its proliferation on the one hand and to conserve marine biodiversity on the other.
- To promote mechanisms for coordination among the various sectors active in the fisheries sector, especially since international environmental forums are now calling for the adoption of the blue economy of sustainable management of marine resources.

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