# Fresh Water (The Nile And Its Branches) As One Of The Ways For The Development Of Fish Protein Sources In Egypt

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**Abstract:** This study aimed to identify the freshwater fisheries in Egypt in terms of its evolution of fish production, the economic significance of the geographical distribution of the fish with identifying the seasonal productivity and measuring the impact of effort done on the fish production with emphasis on ways of development of those fisheries. The study had been adopted to achieve its goals on both economic analysis and descriptive statistical. The most important results were as follows: The fish production increased from river Nile fisheries from 57.8 thousand tons in 1995 to 79.7 thousand tons in 2008, after interest in the development of this source to provide fry tilapia and carp used in the development of water bodies.The study has been identified on the most important species and their relative importance, which represents about 72.3% of the average fish production during the study period, estimated at approximately 87500 tons. The tilapia, catfish, carp, and bayad are the most important varieties of high production are estimated the relative importance of 32.5%, 17.8%, 12.7%, and 9.8% respectively. While, the order comes after that in the arrangement, Nile perch, Shelan, (unicornfish) Albesaria, Nile lebeo, Eel, and barbal with an estimated relative importance of 3.9%, 3.6%, 3.3%, 2.1%, and 0.8%, respectively. The 96% of the annual variability production is due to changes in the productivity of varieties perch, catfish and tilapia. The middel Delta region (Desouk, Kafr El-Zayat, Menouf, Qanatier, and Benha) of the most important productive areas for fish in the River Nile, where a production of about 39.1%, followed by the region of the Nile Valley, which includes (Cairo, Giza, Fayoum, Beni Suef, Minya, and Assiut) represents 26.1%, while the production of Aswan region, represent 16.3%, which include (Sohag, Qena, Aswan).With regard to the employment and fishing boats, has decreased from 16400 boats in 1990 to about 11800 boats in 2008. While, the employment of fishing has decreased at high rates, which dropped from 51.5 thousand fishermen in 1990 to about 7.9 thousand fishermen in 2008, mostly working through the primitive ways, which have lacked in the safety manner. Furthermore, the number of boats licensed reflects the non reality where, the manual boat needed two or more person to complete the various operations on the boat, which indicates an increase in employment of fishing, non-licensed in those fisheries. The average production of the boat has increased with an average annual increase of productivity of 0.28 kg, while the average annual increase of productivity of a fisherman about 0.72 kg per year. However, the number and the productivity of boats are affected by 98% due to the annual changes of the production. Regarding, the examining of seasonal productivity and using seasonality index after excluding the effect of the general trend shows that, production is more than the overall average in the months of May, June, August and December. Whilst, the production is lower than of the overall average in the rest of the year months. Now there are a lot of efforts for the development of freshwater fisheries, through a variety of development programs (i.e. protect fisheries from pollution, fishery Seed supply, determine the appropriate fishing effort, and re-evaluate the characteristics and working methods of fishing). The targeted development plans to increase fish production through the overall development and coordination between the various parties to prevent the pollution of water resources and expansion in the construction and clearing waterways of plants, and re-stocking, especially carp fish, the Nile fish varieties, which became extinct with the quiet water stream, and made use of fish production.

## 1. Introduction

At the moment, the problem of providing food is one the largest and most difficult problems of development in developing countries, especially in Africa. During the past years, a number of Arabs and African countries plans to address the problem of providing food and focused on the exploitation of fishery resources that constitute reserves important to meet the needs of the animal protein. In addition to, create a fundamental basis for the manufacture of fish products and their derivatives. Especially, the countries which have bodies, and waterways large as the Arab Republic of Egypt, which could take advantage of this wealth and make up the shortfall in

animal production, which contain beaches on capture fishery area is estimated by 13.9 million acres, which constitute, and include more than 200 varieties of different fish, 71 species of molluscs and about 14 types of cephalopods to other shrimp, crustaceans and other items, in addition to the varieties of freshwater. The importance of freshwater fisheries (the river Nile and its branches) in being the lifeblood of Egypt, which extends for a distance of about 1600 km, and is divided into two branches in the Delta region, and forks from small branches and channels cover a large area, and empty its waters in Mediterranean sea. Due to the fresh water utmost importance for all agricultural activities and industrial water needs of the Egyptian, as well as being one of the resource Fish Egyptians, which represents production of about 7.5% of the total fish production, the Egyptian in 2008, although the area is estimated at 178 thousand acres represent about 1.3% of the total area of fishery Egyptian according to the evaluation of the General Authority for Fish Resources Development in 2008. [1]

The increase in the fisheries is considered a statistical increase rather than substantive, due to expansion in the scope of registration and registration by the traditional fishing sector so that it includes additional landing sites.

### Research problem

The main problem of fish production in Egypt is the inability of fish production, to fulfill the needs of consumer, although the contribution of all sources of production, including fresh water (the Nile and its branches), which exposed many of the changes that have affected the production capacity and hence ecological balance and Chemical composition, varieties  and the disappearance of some fish species as a result of these changes as well as the lower contribution of this source in the production, so the strategy for the development of freshwater fisheries (the Nile and its branches) is considered one of the most important axes of fish production in Egypt.

### Objective of the study

The aims of this research are to study the Egyptian freshwater fisheries in terms of (1) the development of fish production, (2) the economic importance of these fisheries, (3) the geographical distribution of fish varieties, (4) seasonal productivity of freshwater fisheries, (5) measuring the impact of efforts done on fish production, and (6) ways of development of those fisheries.

### 2. Material and Methods
### Data Source

The study Adopted in achieving its goals on descriptive and quantitative manners in the interpretation and description of economic variables, using the simple statistical methods such as simple percentages and averages, as well as the use of a linear model to estimate rates of production of freshwater fish, in addition to the regression model to measure Fish varieties and effort aspired on the total production.

### Methods

The study relied on two main sources of data; the secondary data are derived from published annual statistical bulletins issued by the Ministry of Agriculture and Land Reclamation represented in the records of the General Authority for Fish Resources Development as well as some references, thesis and scientific research on the subject of study.

### 3. Results
### Economic importance of fish production and development of freshwater aquaculture (the Nile and its branches)

The economic importance of these aquacultures is concerning with productivity, employment, and fishing fleet, as well as the highly productive fish varieties. In spite of the misguided area compared to Egyptian aquacultures area where production is estimated at 37.9 thousand tons in 1990 represents representing 12.8% of the total fish production, including Egyptian equivalent to about 159.1 million pounds representing 9.3% of the total income of fish. Identifying the effectiveness of the five years plans strategy's of the General Authority for Fish Resources Development [2] toward the development of freshwater aquaculture, has been shown that, production was estimated at 67.9 thousand tons in 1995, representing 16.7% value of 305.4 million pounds, which represents 14.4% of the value of fish production, increasing to an estimated 80.3 thousand ton in 2000, accounting for about 11.1% with an estimated value of 483.4 million pounds, which represents about 8.5% of the value of fish production in the same year, while estimated at 83800 tons in 2005 represents 9.4% of the total fish production Egyptian in the same year, worth estimated 559.7 million pounds represent 7.2% of the value of fish production for the same year declined due to changes to about 79.7 thousand tons, representing 7.5% a value of 654.2 million pounds, which represents 9.5% of the value of fish production in 2008. This contribution is a little for the Egyptian fish production and needs attention for the development as shown, relatively low contribution in production in spite of the increase in production, as

well as the low percentage of the successive production values.

Studying the evolution of the production of freshwater aquaculture through the study period was characterized by fluctuations between high and low, when it was estimated at 57.9 thousand tons in 1995 increased until it reached a peak in 2002 to an estimated 120.8 thousand tons, then dropped to 83 800 tons in 2005 and then increased again to an estimated 104 thousand tons in 2006. These aquacultures constitute an important source for the population in the Central Delta and the Nile Valley in reliance on consumption of fresh fish, representing the central area for production also the amount of production based upon the fry and fingerlings used in the development of water bodies in previous years.

With regard to fishing vessels operating in these fisheries has been shown that it is estimated at 16.4 thousand in 1990, mostly boats of the third degree, which is on the decrease until estimated at 11.8 thousand boats in 2008. The employment of fishing has decreased at high rates, as estimated at 51.5 thousand fishermen in 1990 decreased by up to an estimated 7.9 thousand fishermen in 2008, mostly working through the primitive manner which has lacks in safety procedures for the fisherman and production and, hence, the number of boats licensed reflects the non reality where, the manual boat needed two or more person to complete the various operations on the boat, which indicates an increase in employment of fishing, non-licensed in those fisheries.

Study the general time trend for the production of freshwater aquaculture of their respective areas to identify the development and production growth during the period (1995 - 2008). This reflects the impact of Productivity policies for the development and growth of fish production from natural sources.

Form the data, it has been shown from the following equation that fish production from freshwater increasing annually by 31.7 thousand tons. Significantly, the statistical estimate in accordance with the coefficient of determination ($R^2$) is 36% of the changes to the annual production of fresh water due to factors related to time.

As indicated by the following formula:

$$P^e = 63385.4 + 31743.18\ T_e$$
$$\quad (6.205) \qquad (2.645)\ *$$
$$\quad R^2 = 0.36 \qquad F = 217.3\ *$$

Where:
$P^e$ = the amount of fish production from freshwater per Ton

$T_e$= time in years 1, 2, 3, ….., 14
* Significant at level of 0.01

## The relative importance of the most important fish species

There are many different species and varieties of fish as well as the quantity of production areas as a result of the impact of natural (i.e. the inventory diversity of flora and fauna located in rural water), climatic (i.e. temperature, light and movement of water) and surrounding biological factors. The influence of these factors on quality and quantity of fish has been identified the most important fish species of freshwater aquaculture in accordance with the fishing of different species during the period (1995 - 2008).

Table (1) shows, the most important varieties and their relative importance, which represents about 72.3% of the average fish production during the study period, estimated at 87500 tons. The tilapia, catfish, carp and bayad are the most important varieties of high production, estimated at 32.5%, 17.8%, 12.7%, and 9.8%, respectively and then comes in the arrangement Nile perch, Shelan, Albesaria, lebeo, eel and barbal with a relative importance of 3.9%, 3.6%, 3.3%, 2.1%, and 0.8% respectively. Studying the impact of fish species on the fish production from freshwater aquaculture, shows that the best models estimated is the double logarithmic as the following equation:

Where, the fish production of fresh water identified as a dependent variable (y) on one hand and the production of varieties, on the other hand, in the form of an independent and is in the tilapia (x1), Aqraamit (x2), Schall (x3), perch (x4), bayad (x5), eel (x6), barbal (x7), lebeo (x8), Albesaria (x9) and carp (x10).

$$\text{Log } y^8_n = \log\ 2.686 + 0.143\ \log X4 + 0.440\ \log X2 + 0.323\ \log X1 \quad \text{(equation 1)}$$
$$\quad (1.847) \quad (0.143)* \qquad (6.747)*$$
$$\quad (2.551)*$$
$$\quad R^2 = 0.96 \qquad\qquad\qquad F = 61.25$$

Where:
$y^8_n$ = quantitative estimates for the total production of fresh water
X4 = annual production of fish Nile perch.
X 2 = annual production of fish, catfish.
X 1 = annual production of tilapia.
Xn = variable time in years 1, 2, 3 ................, 14.

  * Significant at 0.01 level

It is clear from equation (1), change of 10% in the production of Nile perch (x 4) leads to the change OK in the total production is estimated at

10.4%, (2) change of 10% in the production of catfish (x 2) leads to a change approved in the total production estimated at 4.4%, (3) change of 10% in the production of tilapia (x1) lead to a change in the total production estimated at 3.2%, (4) 96% of the changes in annual production of freshwater aquaculture due to annual changes in fish species, according to the coefficient of determination ($R^2$), and (5) proved to be significant at the level of a probabilistic model better than 0.001.

**Table (1) the development of fish production per ton, classified as freshwater fisheries during the period (1995-2008).**

Collected and calculated from:
- Central Agency for Public Mobilization and Statistics, Bulletin of fish production, Oaadadmokhtlvp, period (1995-

| Statement | Tilapia | Aqraamit | Chillan | Peel Perch | Perch | Eel | Barbal | Lebeo | Bassaria | Carp | Other | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1995 | 21914 | 10755 | 1799 | 840 | 5390 | 274 | - | 1632 | 908 | 349 | 14012 | 57873 |
| 1996 | 25504 | 11310 | 1715 | 795 | 5826 | 193 | - | 1441 | 875 | 534 | 16210 | 64403 |
| 1997 | 26402 | 12317 | 5902 | 787 | 273 | 1553 | - | 1386 | 935 | 3603 | 12377 | 65535 |
| 1998 | 26566 | 11613 | 5723 | 1223 | 201 | 1581 | 887 | 1230 | 3559 | 218 | 15451 | 68252 |
| 1999 | 27260 | 10951 | 1777 | 1248 | 5665 | 327 | 58 | 783 | 158 | 1592 | 14161 | 63980 |
| 2000 | 30885 | 14486 | 2563 | 1671 | 8395 | 377 | 15 | 1217 | 1731 | 11142 | 7839 | 80321 |
| 2001 | 22955 | 23215 | 3923 | 3745 | 15472 | 269 | 449 | 1716 | 3657 | 14550 | 19936 | 109887 |
| 2002 | 33854 | 25439 | 5494 | 4265 | 19026 | 475 | 389 | 1608 | 4843 | 1648 | 23811 | 120852 |
| 2003 | 28881 | 25158 | 5985 | 7481 | 16437 | 514 | 479 | 2237 | 4305 | 18054 | 8769 | 118300 |
| 2004 | 36290 | 12992 | 1843 | 8453 | 10228 | 466 | 860 | 2562 | 2036 | 23712 | 5558 | 105000 |
| 2005 | 27874 | 13422 | 1454 | 2917 | 7900 | 350 | 636 | 2111 | 1745 | 22317 | 3077 | 83803 |
| 2006 | 34187 | 15532 | 2038 | 5939 | 11952 | 2105 | 779 | 3501 | 4205 | 19435 | 5303 | 104976 |
| 2007 | 30198 | 15295 | 1843 | 4536 | 6668 | 976 | 920 | 2359 | 6881 | 21629 | 6405 | 97710 |
| 2008 | 24256 | 14685 | 1903 | 3982 | 5647 | 411 | 629 | 1908 | 4431 | 16911 | 4925 | 79688 |
| % | 32.5 | 17.8 | 3.6 | 3.9 | 9.8 | 0.8 | 0.5 | 2.1 | 3.3 | 12.7 | 12.9 | 100 |

2008).
- Ministry of Agriculture and Land Reclamation, the General Authority for the development of fisheries, fish production statistics (1995-2008).

**The relative importance of the most productive areas (the geographical distribution of Nile fish)**

To study the relative importance of the production of fish from fresh water (the Nile and its branches), the production areas were divided according to the General Authority for Fish Resources Development, which divided production areas into six areas as follows: the Damietta, includes (Damietta, Mansoura, and Zagazig), Western Region includes (Behaira), the meddle Delta includes (Desouk, Kafr El-Zayat, Menouf, Qanatir, and Benha), the eastern region includes (Al-Salam Canal, Ismailia Canal area), the Nile Valley includes (Cairo, Giza, Fayoum, Beni Suef, Minya, and Assiut area) and Aswan includes (Sohag, Qena, and Aswan).

Table (2) shows, the relative importance of fish production to the average period (1995-2008), it was found that, the meddle Delta is the most important areas of production, producing about 39.4% of the production of fresh water at an average

production estimated at 34,183 tons. While, the Nile Valley comes in the second ranked, which estimated at 26% of the fresh water production at an average production estimated at 22,553 tons, whilst the Aswan region comes at a third ranked, producing about 15.3% of the production of fresh water at an average production estimated at 13,325 tons, whereas the Damietta region occupies the fourth ranked, where it produces about 14.4% of the average production of fresh water production estimated at 12,466 tons, while the eastern region came in fifth ranked, where it produces about 2.8% of the average production of fresh water production estimated at 2427 tons, while the western region occupies rank where the final output is estimated at 1.3% of the average production of fresh water production is estimated at 1094 tons, during the study period (1995-2008). From the abovementioned discussion clearly, the productions of fish freshwater are concentrated mainly in the central Delta.

**Table (2) the ratio of the important areas of fish production in the River Nile during the period (1995 - 2008).**

| Statement | Damietta region | Western region | West delta region | Eastern region | Nile valley region | Aswan region | Grand Total |
|---|---|---|---|---|---|---|---|
| 1995 | 10232 | - | 33686 | - | 6169 | 7389 | 57872 |
| 1996 | 10270 | - | 35219 | - | 7584 | 9100 | 64403 |
| 1997 | 10984 | - | 33736 | 1267 | 9294 | 10254 | 65535 |
| 1998 | 12811 | - | 32334 | 1593 | 12861 | 10121 | 68252 |
| 1999 | 12943 | - | 21344 | 2000 | 16004 | 11251 | 63981 |
| 2000 | 13776 | - | 31377 | 3194 | 17236 | 13728 | 80321 |
| 2001 | 13840 | 2288 | 43583 | 2951 | 30632 | 16593 | 109887 |
| 2002 | 15515 | 2636 | 41151 | 3378 | 38525 | 19647 | 120852 |
| 2003 | 15298 | 3165 | 33620 | 3266 | 41649 | 21302 | 118300 |
| 2004 | 12970 | 2601 | 27984 | 4159 | 31539 | 25747 | 105000 |
| 2005 | 12946 | 2105 | 30667 | 3783 | 27509 | 5793 | 83803 |
| 2006 | 12816 | 1243 | 38055 | 2305 | 31727 | 18830 | 100476 |
| 2007 | 9954 | 745 | 41683 | 3535 | 26142 | 15651 | 97710 |
| 2008 | 10173 | 528 | 34127 | 2553 | 18866 | 1143 | 79688 |
| General average | 12466 | 1094 | 34183 | 2427 | 22552 | 13325 | 86863 |
| % | 14.4 | 1.3 | 39.4 | 2.8 | 26 | 15.3 | 100 |

Collected and calculated from
- Central Agency for Public Mobilization and Statistics, Bulletin of fish production, different issues, period (1995-2008).
- Ministry of Agriculture and Land Reclamation, the General Authority for the development of fisheries, fish production statistics (1995-2008).

| Statement | Production per ton | | | | | | | | | | | | General average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | January | February | March | April | May | June | July | August | September | October | November | December | |
| Tilapia | 2531 | 2310 | 2511 | 2694 | 2680 | 2773 | 2314 | 2658 | 2589 | 2480 | 2344 | 2275 | 30159 |
| Aqraamit | 1975 | 1812 | 1798 | 1777 | 1732 | 1665 | 1652 | 1645 | 1702 | 1708 | 1646 | 1671 | 20783 |
| Chillan | 1217 | 1155 | 1157 | 1197 | 1325 | 1315 | 1263 | 1184 | 1179 | 1171 | 1161 | 1061 | 14385 |
| Peel Perch | 332 | 321 | 332 | 333 | 360 | 355 | 369 | 348 | 348 | 345 | 336 | 325 | 4104 |
| Perch | 703 | 618 | 667 | 718 | 750 | 773 | 715 | 727 | 675 | 633 | 634 | 626 | 8239 |
| Eel | 493 | 533 | 385 | 399 | 375 | 377 | 456 | 418 | 438 | 468 | 402 | 423 | 5167 |
| Barbal | 234 | 211 | 209 | 206 | 192 | 194 | 226 | 224 | 230 | 189 | 203 | 188 | 2506 |
| Lebeo | 152 | 148 | 166 | 166 | 142 | 138 | 138 | 152 | 136 | 159 | 156 | 162 | 1815 |
| Bassaria | 72 | 80 | 91 | 102 | 87 | 79 | 91 | 94 | 51 | 59 | 52 | 49 | 907 |
| Carp | 96 | 88 | 70 | 66 | 59 | 50 | 64 | 43 | 40 | 43 | 48 | 48 | 715 |
| Other | 442 | 436 | 423 | 439 | 435 | 431 | 432 | 438 | 422 | 421 | 402 | 389 | 5110 |
| Total | 8247 | 7712 | 7809 | 8097 | 8137 | 8150 | 7720 | 7931 | 7810 | 7676 | 7384 | 7217 | 93890 |

**Table (3) Monthly averages for the fish varieties of fresh water during the period (1995-2008)**

Source calculated and collected: collected and calculated from:
- Central Agency for Public Mobilization and Statistics, Bulletin of fish production, Oaadadmokhtlvp, period (1990-2004).
- Ministry of Agriculture and Land Reclamation, the General Authority for the development of fisheries, fish production statistics (1990-2004).

**Seasonal production (seasonal ratios after excluding the effect of the general trend)**

Seasonal fish production means, all changes in fish production, with systematic successive periods of time less than twelve months, also known as seasonal concentration of production in certain periods of the year or decline or lack in the remaining months of the year, leading to changes in price. These fluctuations are attributable to a number of influences, which is mostly systematic. Study the seasonal production is useful to identify seasonal periods of low or increase production to avoid the effect's changes in productivity for the product and the consumer as well as policy planners [4].

Studying the seasonal fluctuations of fish production to the most important fish species's aquaculture of the Nile during the study period, as shown in Table (4) shows, a fluctuating seasonal pattern, where the production rise and decline from the annual average year, estimated at 7829 tons during the period from January until December, where reach the maximum in January, 8247 tons, then reduced to a minimum during December, to estimated 7214 tones, due to the multiplicity of varieties of fish from River Nile aquaculture and the different patterns of seasonal products to another, which requires analysis of the fluctuations of the most important species for production, especially tilapia, catfish, bayad and carp (Table 4).

The results have been shown that, the seasonal fluctuations of fish tilapia rise and fall as well as the fluctuation of seasonal monthly production during the study period, with reduced production from the total average monthly of the year about 30.2 thousand tons during the period from January to December, culminating in June by seasonal amounted to about 9.2% and then production to fall below during december, as the percentage of seasonal 5%. As it turns out seasonal fluctuations of catfish production, which reduced production from the average monthly year of about 14.4 thousand tons during the period of January to December, where production diminished to below during February, the seasonal rate reached about 8%, while peaked in June by seasonal amounted to about 9.1%.

As for the carp is characterized by a pattern of clearly seasonal and determined by two periods, firstly, start from January to April, where more than production during that period than the average annual year, estimated at 20.8 thousand tons, reached its maximum in January, with average seasonal amounted to 9.5% and then secondly, start from May to December, it is characterized by a decrease of production from the total average annual, reached the lowest level in August by seasonal amounted to 7.9%.

Regarding to the bayad fish, it has been shown, the increase in production for the general average of 8.2 thousand tons during the period from January to December. The production fell to below during the month of February, it reached about 7.5%, while peaked in june by seasonal reached about 9.4 %.

**Table (4) Seasonal productivity of the fish Nile**

| Statement | Average Monthly | Directional values | Average Monthly | Seasonal Guide |
|-----------|-----------------|--------------------|-----------------|----------------|
| January | 8247 | 8166.7 | 101.0 | 99.1 |
| February | 7711 | 8105.4 | 95.1 | 93.3 |
| March | 7809 | 8044.1 | 97.1 | 95.2 |
| April | 8098 | 7982.8 | 101.4 | 99.5 |
| May | 8138 | 7921.5 | 102.7 | 100.8 |
| June | 8150 | 7860.2 | 103.7 | 101.7 |
| July | 7717 | 7798.9 | 98.9 | 97.1 |
| August | 7995 | 7737.6 | 103.3 | 101.4 |
| September | 7809 | 7676.3 | 101.7 | 99.8 |
| October | 7676 | 7615 | 100.8 | 98.9 |
| November | 7385 | 7553.7 | 97.8 | 95.9 |
| December | 7214 | 6032.0 | 119.6 | 117.3 |
| Total | 93949 | 92494.2 | 1223.2 | 1200 |
| Average | 7829 | | | |

$y^n = 8227 - 61.3 \, x_n$

( 56.4)       (- 3.1)[*]          $R^2 = 0.69$                  F= 9.57[*]

Where:  $y^n$= Monthly average fish production from freshwater per ton

$x_n$ = time per months (January .. December)

* Significant at 0.01 level of significance

The decrease in the winter months to drop the fish to the depths as a result of cold, which is difficult to access fishing by the methods used, and explain the increased production of some species in the summer months due to the temperatures rise and the growth of phytoplankton close to the surface of the water, leading the fish to rise and thus increase the chances of fishing. Examining the seasonal productivity of fish production after excluding the impact of general direction and in accordance with the table (3) shows that, the production is more than the overall average in the months of May, June, August and December, down from the average year in the remaining months of the year Fig (1)
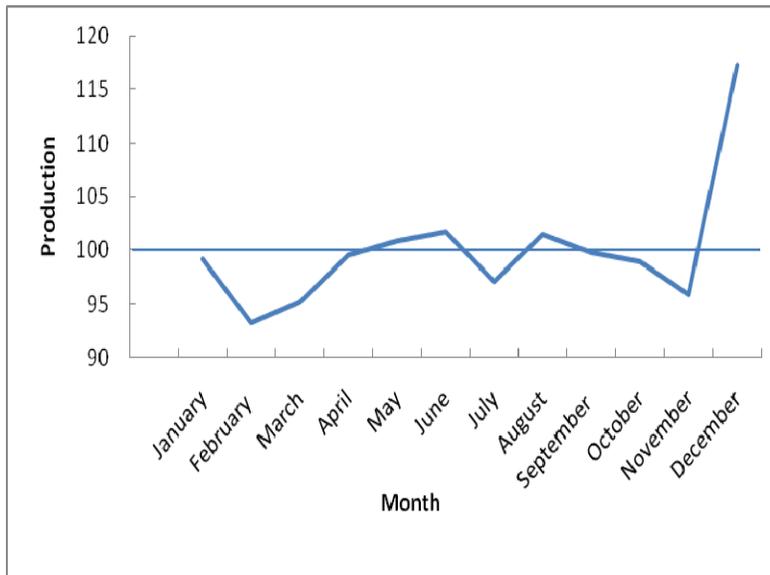


**Figure (1) Guide to the interposed seasonal production of fresh water during the period (1995-2008)**

**The impact of fishing efforts on production: -**

The number of workers, number of fishing boats and size of equipment affect largely on the quantity and quality of fish caught in addition to the productivity of the boat and fisherman,
The outcome of production is low, due to the disproportionate between the numbers of boats and the size of fish stocks available for fishing. It is clear from Table (5), the average number of boats operating in fresh water was about 15182 boats, whereas, the average productivity of the boat was about 5.1 tons and the average number of fishermen about 28491 while, the average productivity of a fisherman about 4.8 tons.

Studying the fishing effort on production, according to a model of multiple regression showed that the best models estimated [5] is the linear model in its following were identified as production of fresh water as the dependent variable (y) on the one hand, and the preparation of boats, on the one hand, as an independent variable (x1) and the average productivity of the boat (x 2) and the preparation of the fishermen (x 3) and the average productivity of a fisherman (x 4)

$$Y^8{}_n = -86355.2 + 5.58x_1 + 15216.2\ x_2$$
$$\quad (-10.59) \quad (12.86)^* \quad (26.57)^*$$
$$\quad R^2 = 0.98 \qquad\qquad F=363.6$$

Where=
$Y^8{}_n$ = estimated quantity of total production of fresh water
$x_1$ = number of vessels operating fishing in the fresh water.
$x_2$ = average productivity of the boats
$x_n$ = variable time in years 1,2,3 ..................., 14.

* Significant at 0.01 level of significance

It is clear from the previous model that (1) Change one unit in the number of boats (x1), offset by corresponding change in the total production by 5.6 units, (2) change the amount of one unit in the average productivity of the boat (x2) counteract with change in the total production by (15216.2), (3) the independent variables explain 98% of the annual changes in the total production, and (4) proved to be

significant at the level of a probabilistic model better than 0.001.

**Table (5) the average productivity of the boat and fisherman from freshwater fisheries (the Nile and its branches)**

| Years | Production(ton) | Number of boats (boats/ boat) | Productivity of the boat | Number of fishermen | Productivity of fishermen (ton) |
|-------|-----------------|-------------------------------|--------------------------|---------------------|---------------------------------|
| 1990 | 37882 | 16353 | 2.317 | 51543 | 0.735 |
| 1991 | 41268 | 16614 | 2.484 | 50771 | 0.813 |
| 1992 | 39623 | 14233 | 2.784 | 44763 | 0.885 |
| 1993 | 49897 | 14230 | 3.506 | 44760 | 1.115 |
| 1994 | 57512 | 18025 | 3.191 | 58728 | 0.979 |
| 1995 | 57873 | 13701 | 4.224 | 42398 | 1.365 |
| 1996 | 64403 | 19360 | 3.327 | 42230 | 1.525 |
| 1997 | 65535 | 13728 | 4.774 | 42197 | 1.553 |
| 1998 | 68252 | 12094 | 5.643 | 30371 | 2.247 |
| 1999 | 63980 | 14308 | 4.472 | 23772 | 3.398 |
| 2000 | 80321 | 16757 | 4.793 | 17287 | 4.646 |
| 2001 | 109887 | 18036 | 6.093 | 14518 | 7.569 |
| 2002 | 120852 | 18039 | 6.699 | 11748 | 10.287 |
| 2003 | 118300 | 18360 | 6.443 | 14182 | 8.342 |
| 2004 | 105000 | 14725 | 7.131 | 10382 | 10.114 |
| 2005 | 83803 | 12399 | 6.759 | 10333 | 8.110 |
| 2006 | 104976 | 13914 | 7.545 | 10617 | 9.888 |
| 2007 | 97710 | 11806 | 8.276 | 12777 | 7.647 |
| 2008 | 79688 | 11773 | 6.769 | 7950 | 10.02 |

Collected and calculated from:

- Central Agency for Public Mobilization and Statistics, Bulletin of fish production, Oaadadmokhtlvp, period (1995-2008).

- Ministry of Agriculture and Land Reclamation, the General Authority for the development of fisheries, fish production statistics (1995-2008).

**Ways to the development of freshwater fisheries (the Nile and its branches)**

Five years plans for economic development, aimed to increase fish production from freshwater sources [6] can only be achieved through the comprehensive development of this source and coordination between the various parties to prevent the pollution of water resources and expansion in the construction and clearing waterways of plants, with re-stocking fingerlings, especially carp, fish Nile, which became extinct with the quiet power, and benefit from the research production of fry fish friendly environment away from pollution, and attention to guidance fish, especially in the area of development for the indirect fish farming in the rice fields, as well as improve the efficiency of freshwater aquaculture as being one of the renewable natural resources, which may dry up if used at rates that exceed natural regeneration, and therefore requires an amendment radical in the methods and systems and the use of freshwater fisheries by avoiding fishing small fish in the seasons of natural spawning with requiring fishermen to use nets legal with mesh wide, and to prevent over fishing, and modifying the licensing boats and fishermen, with the adoption of research on the dates of spawning of different items and regions so as to regulate fishing, and reliance on electronic record for statistical quantities produced so that data can be modified depending on the circumstances available and follow-up of production. Attention to raising the efficiency of workers with the fishery sector in freshwater fisheries through training in the field of limited interest in fish and abide by the laws and regulations of hunting, with regard to fishing boats can be equipped to suit the possibilities of fishing, with attention to fry fish collection sites used in providing those fisheries.

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