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Balance Economic, Environmental and Renewable Biomass Using Nanotechnology

Zatirostami-Ahmad

Department of Physics, Sciences and Research Branch, Islamic Azad University, Mazandaran, Iran.

Abstract: For the exploitation of natural resources, both renewable and made from the variety of functions such as the biomass of fish prey for exploitation, the extraction of underground resources such as petroleum and the exploitation of the forest to hunt for animals and birds we used. When the operation is done in various activities. Since each action takes place simultaneously with efforts to exploit every function, there is a cost function. The cost of the operation and function are not separate and occur simultaneously. Factors that alter the operation, the cost function are changed. The aim of this paper is that the cost of the fishing and we examine it, then the relationship between behavior and the amount of fishing effort in terms of balancing economic and environmental uses of nanotechnology to achieve.

Key words: Nano, Fishing, Model, Biomass , Function, Growth.

INTRODUCTION

If H_t at time t the size of the fish biomass of the adult population can be added to the original. (Figure 1) at time t H_t is the catch rate of adult mass (W_t) S_t is the size of the Hunters and the rest fled in time t +1 is added to the initial population.

$$X_{t+1} = X_t + S_t \quad (1)$$

According to Figure 1 - $W_t = S_t + H_t$ S_t, which determines the relationship (1) alternative
We write the final result as follows:

$$X_{t+1} = X_t + W_{t-H\,t} \quad (2)$$

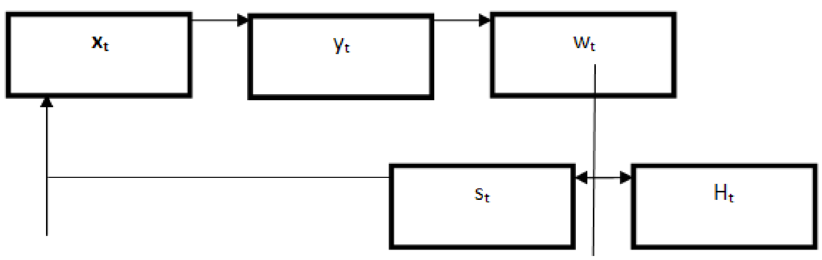

Diagram 1:

According to equation (2) reduce the size of the fish biomass in the next period. Equation (2) changes in biomass will be summarized as follows:

$$\Delta X_t = W_t - H_t \quad (3)$$

Where $\Delta X_t = X_{t+1} - X_t$ And Is $\Delta t=(t+1)-t=1$. If the catch rate of H_t and time zero, we assume a continuous variable in this equation (3) will be written as follows:

$$\dot{X} = W - H \quad (4)$$

Where $\dot{X} = \frac{dX}{dt}$ And X is the time t is derived.

2 - Fishing Technical:

Corresponding Author: Zatirostami-Ahmad, Department of Physics, Sciences and Research branch, Islamic Azad University, Mazandaran, IRAN
E-mail: Zati@iausari.ac.ir<mailto:Zati@iausari.ac.ir

Coupled with the variety of fishing activities in the first factor is the effort. Fishing activities to the benchmark index is the combination of various institutions such as the number of hours worked and number of hours of fishing tools are made. Fishing boats are fishing tools and accessories. Energy and fuel needed to launch a fishing boat is taken into account. All the tools and manpower needed and fishing activities and coordinate the inputs to make up the index. These indicators show the E. The effort is now possible in this case, all components of the index terms are used for a few hours or a few hours of work boats and the boats and of fuel and energy have been used so as to index E = E (b, O, L) where L is the force, b the number of fishing boats or fishing equipment and fuel used in power tools and O is fishing. If the amount in the fisheries and the number b is more important in this case the number of fishing boats will be attempted. The institutions used in the total fishing effort is considered as an indicator. Because the fish populations of fish are caught, their size is another important factor that should be written in the fishing. If the fish mass is more convenient and easier in this mode of fishing is done in a short amount of fishing is better. Conversely, if fishing in places where there are fewer fish in these fisheries will be more difficult to achieve, and longer fishing time is required. Thus, the fishing in general, be written as follows:

$$H = H(E, X) \tag{5}$$

Where X is the volume of biomass. The X value is greater than the H and H on the reduced value of X will be less. Relationship (5) indicates that X is a unit of E is different from the unit. So that X is based on the number of fish, and E is an index of all fishing activities. For each of the separation of X and E in the H . We, the fishing (5) to write the following:

$$H = h(X).E \tag{6}$$

In this regard, (X) h the average catch per unit effort will tell. If the volume of biomass is more modest efforts to increase efficiency. Rather than average returns with less mass will survive. The derivative of h with respect to x is positive.

Function (5) can have different shapes. One of their relationship (6) is expressed. Subject to further technical studies and applied research in fisheries that are used, can be written as follows:

$$H = bEX \tag{7}$$

Where b is a parameter. According to equation (7) increasing the volume or biomass, catch rates also increased. E is the assumed level of effort. (Figure 2). With the increase of the level of effort E_1 To E_2 The amount of fishing $H_1=bE_1X$ To $H_2=bE_2X$ And increasing the amount of effort E_2 To E_3 Levels of fishing H_2 To H_3 Increases. Fishing in the transfer function curve, we assume that the amount of biomass as a unit. Namely $_{X=0}$ With increasing fishing effort and therefore the upward curve shows the change.

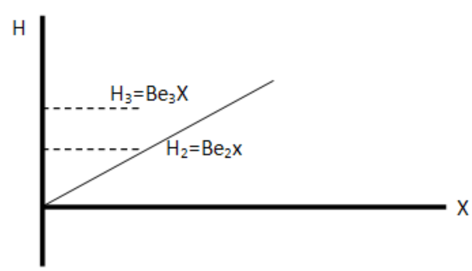

Diagram 2:

In general, the curve E to H of the equation (5) we have plotted, assuming a fixed value of X and if X has changed, the curve is passed. (Figure 3) with increasing biomass of the X_1 X_2 curve is shifted upward and caught the specified amount of fishing effort E_1 H_1 H_2 to increase Finds.

Figure 3 shows that with increased effort, fishing as a result of increased human activity. But more effort is going beyond a certain level of fishing is reduced.

3 - Cost of Fishing:

Suffering and inconvenience and cost of a type of fishing is not without cost. The fishing is catch and release fees. The technical factors that can affect fishing, the fishing costs are also affected. If fishing is a function of the amount of effort, cost too much fishing effort to comply. Under these conditions, with increased efforts, the cost will increase. When fishing the function H = H (E), and fishing as well as the cost function C = C (E) will be written. To determine the value of the supply function and the cost to replace it. In this case, the cost of fishing is obtained as follows:

C = C (E) = C (h (H)) = G (H) (8)

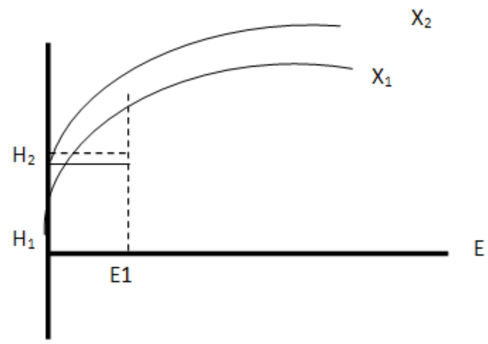

Diagram 3:

Where E = h (H) is the inverse function H = H (E) is. In relation (8) The final cost of fishing is a positive. Derived from the C to H is positive and the Is written $\frac{dc}{dh} = MC > 0$. If the fishing is more, the cost will be more fishing.

If fishing is to find a gathering place in the form of biomass needed to supply the volume of biomass, catch rates increase supply and reduce fishing costs. In this case, the cost of fishing will be summarized as follows:

C = C $_{(E,}$ X) (9)

Derived from the C to E is positive but the X-negative. The fact $\frac{ac}{aE} > 0$ And $\frac{aC}{aX} < 0$ Will. In general, the supply of fishing function H = H (E, X) of E to E = h (H, X) we determine that the cost function (9) and substitute the following result write:

C = C (h (H, x), x) = G (H, X) (10)

Where $\frac{ac}{aE} > 0$ And $\frac{aC}{aX} < 0$ The cost function derived from the amount and size of fishing alive. Increase the amount of fishing will be more expensive. If the increase in biomass will reduce the cost of fishing.

Efforts on behalf of the firm's manufacturing index components are controlled. For example, the firm's workforce may be more or less, or fishing vessels to change in the fuel and energy needed to change, so all components of the index is to provide a manufacturing firm. If the size of the biomass and reproduction of a foreign agent and its environmental conditions such as water temperature, water quality, seed and food requirements, it depends on the location and capacity. The size of the fish biomass in foreign savings are created. Because it increases the cost per unit of effort is reduced in size. Since the function (9) the value of E and X are different and the unit cost of fishing is not the same. Because the function (9) can be summarized as follows:

C = E, AC (X) (11)

Where (X) AC is the cost per unit effort. With X amount of AC (X) is reduced. Derived from the AC (X) to X, ie Is negative $\frac{dAC}{dX}$, it makes the cost per unit of X to be reduced and there is economic efficiency. If the X value is too low, the cost per unit will be more effort. In this case X in the fishing does not save the economy.

4 – Balance:

In general, the equilibrium level of fishing when biomass growth rate is equal to the net. The catch rate is enough to determine the amount equal to the volume of mass-produced live. For example, if the net growth rate is 2 percent, to fish size is 2 percent. With these conditions, the biomass does not change over time. Biomass is a reduction of fishing capacity. This chart is based on the ecological balance of the relationship at any time is the following:

$$W = H \tag{12}$$

In which H catch rate and W is the net growth rate. Relationship (12) in relation (3) and thus $X_{t+1} = X_t = \bar{X}, \Delta X_t = X_{T+1} - X_t = 0$ we can replace In this case, the volume of biomass during the Is determined (Figure 4).

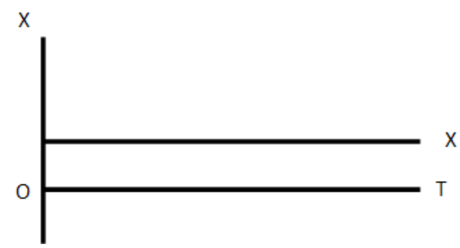

Diagram 4:

Amount Mass balance during live shows. In fact, much of the volume of biomass a year to be added to the fish is done.

We offer fishing is using nanotechnology and growth over time has proved that the logistic function by equation (12) showed. This balance economic and environmental uses of nanotechnology can be written as follows:

$$aX(1 - \frac{X}{K}) = H \tag{13}$$

Relationship (13) through the curve, we analyze. Figure 5 - Draw a logistic growth curve function and the constant and the number of H is considered. In this graph the axes H_0, H_1, H_2 of the fishing Plotted values are constant over time. Growth curve in the K X-axis that cuts in the bearing capacity of the environment and the maximum biomass growth is zero. If H_0 the amount of fishing It is $H_0 > W$. From this population of K during caught all the time and biomass generation will soon become extinct. If H_1 the amount of fishing $H_1 = W$ Is M and the balance comes to the amount of biomass in the Is $\frac{K}{2}$. If the amount of fishing. Points F_2, F_1 is Will balance the economic environment.

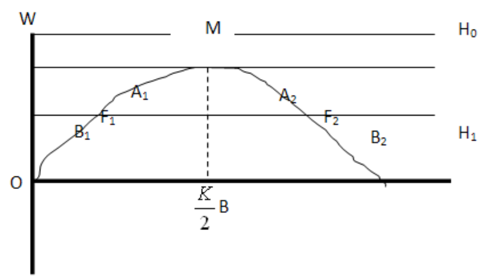

Diagram 5:

If a deviation occurs in the F_1, the deviation remains stable and does not result from the interaction. For example, if points A_1 and B_1 F_1 to the shift in $A_{1\text{-point}}$ higher growth rate of fish biomass and increases in population and in area B $_1$ of the growth rate exceeds the rate of fishing and decreases in population biomass. Thus the F $_1$ state is stable and reversible changes in the state's primary. If the point A $_2$ and B $_2$ F $_2$ to be transported, the areas will stabilize and move toward the point F $_{2.}$ A $_{2\text{-point}}$ growth in the amount of fishing is that it tends to increase the population. B $_{2,}$ but the growth rate is less than the amount of fishing is that it tends to reduce the population.

Function with respect to fishing (7) we consider the economic and environmental balance of the look. For this purpose, we draw the diagram 6 , $H_1 = bE_1 X$ $H_2 = bE_2 X, H_m = bE_m X$ Logistic growth curve function, respectively, and F_2, F_m, F_1 plotted the points Have been discontinued. These points represent a stable equilibrium. At this point the deviation is not stable over time and due to population increases or decreases over time the balance is restored. With the increase in the amount of H $_1$ To H $_m$ and H $_m$ to H $_{2,}$ the rate of growth varies with the fishing. These changes occur with a reduction in the population. Because the F $_1$ to F $_2$ F $_m$ to F $_m$ and the point will shift.

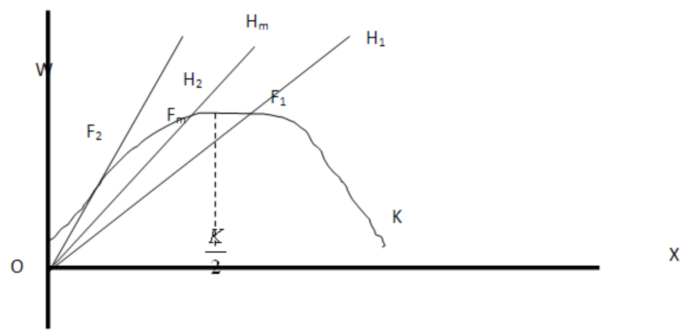

Diagram 6:

5 - Balancing Economic, Environmental And Advanced Biomass Growth Function:

One of the functions developed by the biological growth (15) for economic and environmental balance of the curve with the curve of the catch (7) in Figure 7 , are plotted.

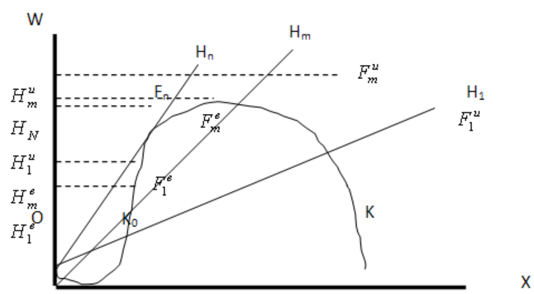

Diagram 7:

If H $_1$ is the equilibrium level of effort F_1^U And F_1^E Is obtained, which are respectively higher and lower levels of effort and to increase H$_m$, the balance F_M^U And F_M^E Are you trying to change the location of the H$_n$, economic and environmental point of balance would be Fn. Figure 7 shows that the balance F_1^U And F_M^U Stable because no wrong in them does not remain stable over time. If the equilibrium point will shift to the left, the biomass increases. The growth rate will be caught and if they move to the right because the population is reduced, the rate of growth will be fishing. Hence the Fn, And Are stable equilibrium points. In general the curve where the growth F_M^E and F_1^E function in the right spot, if prey Placed F_M^U, the balance will be achieved and sustained if they are on the left, the unstable equilibrium is achieved.

Conclusion:

Economic and environmental balance of the fish looked. The fishing activities and to firm or industry is concerned. The natural growth rate of biomass power and creativity depends on size and scope of the firm. If the growth rates of fish using natural biological and nano-technology is more and this situation persists for a long time, fish populations are faced with extinction. Hence in order to achieve this balance, the environmental sustainability of biomass was investigated. Sustainable fisheries and technical functions and features of the natural and biological function depends on growth. Technical function as a multiplier of the product of fishing effort alive in mass and growth rate assumed by the logistic function to show the balance of economic and environmental sustainability of our investigation. Through balancing the relationship between behavior and the amount of fishing effort using nanotechnology, and we determine the average yield and efficiency in the end we get caught. The average rate of return than the amount of fishing effort and efficiency derived from the behavior of the final amount of fishing effort than is available.

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