Environmental and Economic Evaluation for the Breeding of Grass Carp in Egypt's Water Channels

Ahmed Mohammed Ahmed[1], Dr. Abdelbaky Mousa Abdelbaky Elshaib[1], Abdelmagid Hassan Abdelmagid[2]

[1] Department of Agricultural Economics, Tanta University, Tanta, Egypt

[2] National Water Research Center, Cairo, Egypt

Abstract

Research aims to evaluate the biological control of weeds for the culture of fingerlings fish grass carp, by highlighting the economic, environmental and social, based on this research to the economic analysis descriptive and quantitative to estimate and explain the phenomena related to the subject matter on the basis of measurements studies feasibility and evaluation of economic projects, and noted the results of research to the return of the production of fingerlings of about 1.02, 1.36, 2.635, million pounds in cases production current expectancy and full capacity respectively. The yield indirect has been estimated at about 46.28, 61.7, 1119.55, one million pounds for the cases of three respectively were estimated payback period for the project in case of return of direct 45, 18.5 4, the year of the three cases respectively while the estimated internal rate of return of 2% , 5%, 25% of the cases of three The yield indirect has increase than 100% and recommended that the results of research that denominated biological led to raising the efficiency of use of water resources, increase production fish, increase the agricultural area, to increase agricultural production, reduce water loss 0.71 at about 1.033 billion cubic meter annually as equivalent to 1.9% of Egypt's share of the Nile River where led to provide the amount of irrigation water in the light of these results, the study recommends the need to expand the dynamic resistance of aquatic weeds, especially fish farming Congratulations and grasses.

Keywords: the internal rate of return for the project (IRR),the percentage of benefits tocosts (B / C Ratio), Net present value(NPV), payback period(PBP). Water losses by evaporation transpiration (E.T):

1. Introduction

Aquatic weeds are considered one of the most dangerous problems that weaken the efficiency of irrigation and drainage networks because of the resulting obstruction of the flow of water and it does not reach to the ends of waterways in addition to the loss of large amounts of water by evaporation transpiration. The more spread aquatic weeds, the more snails spread disease-causing deadly epidemic of health are common in many developing countries.The issue of environment protection and preservation of various types of pollution is considered one of the most important contemporary issues facing both the developed and developing countries alike. Therefore, it was necessary to look for better ways to weed and maintain the environment at the same time. It had

been found that both of the manual and mechanical resistances lead to environmental pollution due to dumping products of removing weeds on the bridges of waterways that are de-weed them which is considered as a favorable environment for mice and insects especially mosquitoes epidemics and diseases harmful to the human health. Also, the mechanical resistance causes collapse for bridges waterways. Therefore, employing the biological resistance through using fish grass carp is the best option among these methods. Breeding grass carp has two important dimensions, where it increases fish production by converting useless aquatic weeds to an animal protein and then reducing the food gap, as well as reducing the wastage of fresh water and use that water in agriculture and reclamation of new agricultural lands.Research problem: The risks of aquatic weeds have been escalated recently in many parts of the world. The water is one of the most important sources of life, aquatic weeds affecting it perniciously by hampering flow of water in the canals as well as raise the water by pumps in irrigation projects, also caused damage to power plants hydroelectric, and lead to loosing water evaporation transpiration. Objective of this research: The research aims to assess the biological control of weeds farming fish grass carp fingerlings through indicating the economic, environmental and social effects of that method.

2. Research results:

2.1. Economic Analysis of the total costs and revenues of the hatchery:

Establishment of hatcheries for the production of industrial fish requires large amount of capital varies according to the used method of the hatchery, the types of fish that are spawned, hatchery's size and quality of the used raw materials and their prices. This section indicates the economic analysis of hatchery works for fish grass carp in waterfall of Aswan. Production costs of any project reflect the values paid for factors of production, or to ensure the continuation of production process during a period of time. In the short run, the total production costs are divided to fixed and variable costs. The fixed cost is the cost that paid annually as a fixed amount paid whether there was a production or not, such as the annual depreciation, insurance and taxes. The variable cost includes several items such as the price of used eggs, salaries, the cost of organic and chemicals fertilizers, feed costs, fuel costs, electricity, maintenance of equipment, and other costs related to the hatchery process.

2.1.1. Production costs of grass carp fish hatchery:

2.1.1.1. Fixed costs:

Table (1) indicates the hatchery's fixed costs. It reveals that the total fixed costs were estimated at nearly 5.3 million pounds.

fixed costs			operating costs		
Type	Cost (in Egyptian pound)	%	Type	cost (in Egyptian pound)	%
Land	2100000	39.7	Concentrated feed	352000	38.9

fixed costs			operating costs		
Basin's set up	831000	15.7	Green feed	3800	0.4
Buildings	560000	10.6	Pituitary gland, drags, chemicals, cotton, gauze and syringes	32500	3.6
Pumps	970000	18.3	Fertilizers	22700	2.5
Filters	300000	5.7	Employment	420000	46.5
Laboratories Tools	173500	3.3	Cleaning basins	4000	0.4
Mothers and future mothers	112250	2.1	Electricity, water, telephone	20000	2.2
Generator	12000	2.3	Maintenance of machinery and buildings	49000	5.4
machines and mixers for making feed	50000	0.9			
Refrigerator to store feed and raw materials	60000	1.1			
Pumping air blowers	15000	0.3			
Total	5291750	100	Total	904000	100

Source: Ministry of Irrigation and Water Resources, General Directorate of the Aswan irrigation, unpublished data

Table 1. fixed costs and operating costs of Aswan's hatchery works

2.1.1.2 Second, the variable costs:

Table 1 indicates the value of variable costs. It reveals that the total value of variable costs amounted to 904 thousand pounds per year.

2.2. Economic feasibility's Criteria

Table (2) shown that the discount and non discount criteria of economic feasibility for three cases, of Aswan's hatchery current, hoped, and full capacity for indirect returns and direct returns, direct returns include the sale of fingerlings but indirect returns include the saving water leaded to reclamation of new land in addition to providing employment opportunities, and food security

2.3. Indicators of social and environmental feasibility of the project

2.3.1. First, Indicators of social feasibility:

This project is considered one of the most important projects that have a vital role in the process of economic development. It leads to increasing the efficiency of one of the most important agricultural resources, which is the water, as well as increasing fish production which leads to narrowing of the food gap of fish. Also, these projects contribute to the increase in the agricultural area by adding new land to the agricultural area of old, leading to increased agricultural production and increase agricultural exports and reduce imports of agricultural and adjust the balance of trade in favor of Egypt, all of these social returns is working to improve living standards with increasing the efficiency of the Egyptian agricultural economy

Items	Full capacity	production can be hoped	the current production
In the case of calculating the direct return (The price of fingerlings)			
Standard non-discounted			
payback period of capital years	4.9	16.2	45.6
the internal rate of return for the project (IRR) of around %	20.3	6.2	2.2
Standard discounted			
the internal rate of return project (IRR)	25	5.4	2
Net present value NPV (million pounds)	5.81	2.08	3.33-
the percentage of benefits to costs (B / C Ratio)	131.37	85.4	74.4
Capital recovery period	4	18.53	50
In the case of calculating the return indirect			
Standard non-discounted			
payback period of capital years	first year	first year	first year
Internal rate of return IRR%	2039.2	1104.86	857.454
Standard –discounted			
Rate of return on invested capital	more than 100%	more than 100%	more than 100%
Net present value NPV (million pounds)	1066.6	519.3	407.3

Items	Full capacity	production can be hoped	the current production
the percentage of benefits to costs (B / C Ratio)	5858.9	3742.9	3230
payback period	first year	first year	first year

Source: Calculated from data tables No. (1), (3)

Table 2. Indicators of the financial evaluation of Aswan's hatchery.

2.4. Impact of the project implementation on food security:

The project is interested in saving water, which leads to increasing the cultivated area of Egypt, where the amount of water available per hectare is enough to plant about 0.34 acres in the year, which is used to produce the most important field crops, vegetable crops and crops, medicinal and aromatic plants and fruit crops, which enjoys cultivated in Egypt, and thus the project is able to raise levels of food security, increase area of wheat, which leads to increased self-sufficiency in wheat in addition to the production of oil crops, of which the main soybean export crops and most important of which onions and green beans as well as medicinal and aromatic plants and is characterized by a high demand it can increase exports Egyptian them greatly, as the project will add large amounts of agricultural production to the all.

In addition to the above, the implementation of the project will result in increasing fish production significantly and at the lowest possible cost, with support fish production here on the conversion aquatic weeds harmful to animal protein high nutritional value as the result as nearly 5.76 million kg in the year, which contributes to the reduce the food gap of fish at low cost and without the need for large capital investments or the cost of production, especially if we know that this type of fish up to large sizes and it is a kind of good taste, resulting in reduced imports of fish and reduce the burden on the balance of payments.

2.5. Impact of the project implementation on the redistribution of income:

The project provided a number of jobs and generating incomes for small-and medium-workers both in the field of agricultural production is estimated about 40 workers per acre per year was estimated at wages of about 1200 pounds per acre in the year or in the field of fishing as well as reducing the price of fish which would result in access poor and middle classes on the cheap animal protein which increases the real incomes of the poor and middle class, and it turns out that such projects be of a positive effect on economic well-being of society.

2.6. The feasibility of environmental indicators:

Became the issue of environment protection and preservation of various types of pollution and one of the most important contemporary issues faced by both developed and developing countries alike, especially after the increasing problem of climate change and global warming, and play a environmental impacts of a prominent role in the implementation of investment projects, particularly agricultural projects and water and that the most important projects of land recla-

mation projects and the disposal of agricultural waste, grasses and agricultural water due to the impact on the surrounding environment and public health for humans and animals. Get rid wrong from agricultural residues, aquatic weeds leads to the spread of diseases and epidemics, which affect the overall health of humans and animals which would result in lower productivity, leading to lower per capita incomes of the citizens. And this effect is reciprocal between agricultural projects and projects of the disposal of agricultural waste, water and the environment as the production of agricultural crops, and aquatic weeds heavily influenced by environmental factors in terms of temperature, humidity and soil type and quality of irrigation water and agricultural drainage water and other factors surrounding environment at the same time are affected by environmental agricultural practices and through the use of chemical fertilizers and pesticides as well as agricultural waste, water and how to get rid put them both on the shores of waterways or burn them and drainage. Hence the importance of environmental studies to identify the positive and negative effects of the implementation of the project as well as procedures for mitigating the negative effects of the implementation of the project

2.6.1. The positive environmental effects expected in the implementation of the project:

1. that the implementation of the project amounts to provide Evaporative water loss in transpiration rate of 2263 cubic meter per hectare.
2. Use of residues of harmful aquatic weeds for the production of animal protein, high nutritional value.
3. increase the cultivated area, which causes an increase of agricultural production and livestock production, fisheries and which leads to increased food security and improve the lives of human and non human exposure to diseases, especially diseases, anemia and diseases of food shortages.
4. Increase employment and the eradication of unemployment relative to where the project is working to provide about 40 workers per acre is farmed.
5. not throwing grass on the shores of waterways, which was the result in the spread of diseases and epidemics and affects the overall health of humans and animals which would result in lower productivity, low per capita incomes of the citizens.
6. bridges prevents the flow that occurs when using mechanical methods.
7. provides much of the cost of removing aquatic weeds where they are providing about 5255 pounds, compared to mechanical resistance of the grass and about 3125 pounds compared with manual resistance of the grass.

2.7. Water losses by evaporation transpiration (E.T):

Losses water is important factor that affect the efficiency of irrigation and drainage network and the River Nile. We have different views in Egypt, where the value of these losses showed the results of some research and studies vary widely in estimating the value of these losses, but these studies were not based on actual experiences. Given the importance of this subject, the Ministry

of Irrigation and Water Resources conducted a series of field studies and laboratory experiments to estimate the losses have concluded from these studies indicate that the average loss from operations of evaporation transpiration of water weeds about 0.62 cm3 / cm 2 / day annual average.(2)

E.T(Million cubic meter / year Evaporative transpiration losses)	the total area affected for more than cut (acres)	areas infected for more than a desolation of the different types of grass			Channel water
		floating	Gravis	sub-merged	
		Acre	Acre	Acre	
71	7468	4893	2233	342	River Nile
578.5	60863	11165	14935	34763	Irrigation network
383.2	40314	17125	14235	8954	Drainage network
1032.7	108645	33183	31403	44059	Total

Source: Departments of Irrigation and Drainage, unpublished data, 2009.

Table 3. the amount of water loss from evaporation transpiration for each of the River Nile and the irrigation and drainage networks in million cubic meters in 2009

Previous table shows the amount of evaporation loss from transpiration of the Nile River and irrigation and drainage networks in 2009. And it is clear gravity of the loss amounts, which amounted to approximately 1.033 billion cubic meters / year, equivalent to about 1.9% of Egypt's quota of Nile water. Where the amount of the loss of the Nile River as a result of evaporation transpiration of water weeds by about 0.071 billion cubic meters, while the estimated loss from the irrigation network of about 0.579 billion cubic meters, the total amount of the loss of a network of drainage about 0.383 billion cubic meters, and multiple methods of resistance of aquatic weeds in Egypt between manual methods, mechanical methods, chemical methods, biological methods.

3. Important Informatoion

The research aims to assess the biological control of weeds farming fish grass carp fingerlings through indicating the economic, environmental and social effects of that method. This will be assessed through evaluation of hatchery fish in Aswan, which produces fish grass carp fingerlings.

4. Acknowledgements

The study depends on collecting the secondary data to achieve its objectives. The data are extracted from General Authority for Fish Resources Development (GAFRD), Egypt's Ministry of Agri-

culture and Land Reclamation, Central Agency for Public Mobilization and Statistics (CAPMS), and Ministry of Irrigation and Water Resources.

5. References

[1] Prof. Dr .Ahmed Mohammed Ahemd. Investment Feasibility enterprise economics, 2005

[2] Central Agency for Public Mobilization and Statistics, Bulletin of Irrigation and Water Resources, 2010.

[3] Ministry of Irrigation and Water Resources, General Directorate of the Aswan irrigation, unpublished data

[4] General Directorate of the Aswan irrigation, unpublished data, Aswan, Egypt ,2009. Cairo, Egypt, 2009.

[5] Departments of Irrigation and Drainage