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Research Article

Land Evaluation and its Effect on Sustainable Development of Natural Reserves in Egypt

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Abstract

Protected areas in Egypt suffer from severe negligence with regards to sustainable development. One of the reasons is the absence of the role of the planner, designer and evaluator, capable of evaluating protected lands, and convincing its residents and responsible organisations to draw up sustainable development plans, using the economic and environmental values of the land. This is because the residents prefer the economic value of the land only, as it achieves quick revenue by selling or by destructive exploitation of the environment. Often, this leads to encroachment on the land and natural areas of the reserve. Consequently, it affects the environmental systems present through the loss of the natural resources that should be protected. Examples of this include the clear encroachment of touristic activities in Sharm el Sheikh on the lower border of the Nabaq Reserve, the presence of a large commercial mall in the city of Shalatin to trade with the Sudan, in the center of Elba Reserve, the exploitation of the Nile Islands Reserve with residents building on the land, in addition to the attempt by the Housing Ministry to sell parts of the Petrified Forest Reserve to residents.The aim of this research is to show methods of evaluating land in general, and to find a method for evaluating protected areas both environmentally and economically, by creating a theoretical framework for the main elements used to evaluate protected areas. This is done through examining the profits resulting from a sustainable system that includes environmental, economic, social, and urban views, as well as those related to planning in one general framework, that provides the steps that all evaluators should follow when evaluating protected lands.The study shall apply this system to the Petrified Forest Reserve in New Cairo in Egypt to determine the aspects of negligence and the problems, from which this area suffers; in addition, the principles of guidance are applied to prevent its deterioration in order to solve the problem of sustainability in this reserve.

Keywords: *Protected areas, sustainability, protected, urban environments, sustainable development, and land evaluation.*

1. Introduction

The Petrified Forest Reserve in Maadi, Cairo governorate, is one of many natural reserves in Arab Republic of Egypt, and that is in accordance with the Law on Natural Reserves no. 102 of 1983. The reserve was established pursuant to the Prime Minister's decision no. 944 of 1989. (EEAA 1988) (www.eeaa.gov.eg)

2. Definition of petrified forest reserve

Petrified forests are formed of trees that time and circumstances have teamed up to change them into stone. An example is a forest in the state of Arizona in the United States of America that dates to 160 million years ago. When the trees died, some of them fell into the water stream, and were carried to a shallow sea near the area. Then, repeated volcanic eruptions covered the trees with volcanic ash, containing raw silica, in the water, and gradually changed the trees into quartz with beautiful colors. There are also semi-precious stones like agates and Yamani beads in abundance, and hence the place is named The Rainbow Forest. (Tourism Development Authority1998) (www.nationalparks-worldwide.info/ egypt)

The Petrified Forest in Maadi was formed millions of years since the Oligocene Age (35 million years ago), during the third age of the Cenozoic Eras, which is considered an important and rare part of geologic history. It is important to protect this natural treasure that is rare and unique as a cultural, scientific and touristic heritage. This Petrified Forest is given the name of Wood Mountain in many scientific references. It was mentioned many times in foreign references, making it interesting to scientists and researchers of geology departments in scientific faculties in both Egyptian and international universities. It is also for those interested in the history of the earth and its treasures, and natural history, as well as those who study sediments and fossils related to geological chemistry and geological physics. This area is considered a rare geologic monument that has no equivalent in the world regarding its spaciousness and completeness. (UIA1992) (www.eeaa.gov.eg).

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2.1 Location of the Petrified Forest Reserve

The Petrified Forest Reserve lies 18 kilometers to the east of Maadi city, Cairo governorate, and north of the Katameya-Ain El-Sokhna road with 2.2 kilometers facing the road and at a distance of 3 kilometers (off the road) and an average area of 5.5 km^2. The area lies between the longitudinal axes of $30^o28'31''$ – $30^o27'31''$ and the horizontal axes $40^o59'29''$ – $30^o58'29''$

Figure 1: Map site protected Petrified Forest source EEAA

Western border: from the point (a) on the northern limit of the road Katameya and a length of 2,803 km to the north up to the point (b), and so is the western border 200 meters from the eastern boundary of the campus Altgmaan Alamranyen 3.5 "brings the dawn Bdzeih South and North
Northern limit : from the point (b) and a length of 1.877 km up to the point (c) to the east.
It is the point (c) a length of 215 m to the north up to the point (d) to the east
Eastern boundary: from the point (d) and a length of 2.411 km to the south up to the point (e) on the northern limit of the road Katameya . It is the point (e) and a length of 557 m to the south up to the point (f) to the east.
Southern limit : from the point (f) and a length of 1.096 km up to the point (g) . It is the point (g) a length of 1.125 km up to the point (a) along the northern limit of the road Katameya . .(9 www.eeaa.gov.eg)

2.2 Surface geology of the site of the reserve:

It resembles an almost-flat hill with some groves and ridges that were eroded by the wind. Most of the reserve is covered by the Wood Mountain formation. In the Petrified Forest, there is a condensation of stems and roots of petrified trees that contribute to the Wood Mountain formation. The mountain is formed of layers of sand, pebbles, clay and petrified wood. Its thickness ranges from 70 to 100 meters. Although these sediments are poor in fossils and organic remains, they are significantly rich in roots and stems of large petrified trees, which take the shape of siliceous rocks with cylindrical cross-sections that vary in dimension from centimeters to few meters, and join together to form the Petrified Forest. The formation of the Petrified Forest in Maadi is attributed to that many geologic ages ago a branch of the Nile River carried these trees from distant areas to this location where they became petrified. (EEAA 1988)(www.eeaa.gov.eg).

Tree roots are present on the surface or intermingled with sand layers, forming the Wood Mountain. The roots and stems are arranged horizontally in two main directions, the first is 30 degrees north-east. The lengths of the stems of this group are about 15 meters, with an average diameter of 40 centimeters. The other direction is 20 degrees north-east, and this is the most abundant with roots reaching more than 25 meters in length and about 1 meter in diameter. It is worth noting that the direction of the roots coincides to some extent with the direction of the main faults in the area.

Figure 2: shows the Geology of the reserve site.

Hence the geologic history of the area can be summarized as follows: the formations of the lower and middle Eocene epoch precipitated under environmental marine circumstances. This era was followed by the retreating of the coast and the formation of a surface of erosion and decay, during which many drainage channels appeared. Under these circumstances, the layers of sand and gravel were formed and many trees were carried through these channels floating on water to the reserve site. .(3 UIA1992)(9 www.eeaa.gov.eg)

2.3 Economic Factors to Generate Income at the Natural reserve

2.3.1The Built Environment

Figure 3: shows the Reserve entrance and Visitors' Center

- Visitors' Center: There is a center to guide visitors at the entrance to the natural reserve but there are no areas allocated for private tours, a restaurant, a place to stay, shops or an area for the park's guards.
- Camping Areas: There are no camping areas in the reserve park or areas to hold primitive camps that can spread all over the part and on the roads of uninhabited areas. These roads should have many electrical cars to provide water for visitors. There ought to be large camping sites during the holidays with bathrooms and means for cooking nearby to accommodate them in the areas bordering the reserve. A camp site for trailers can also be created at a spot in the southern entrance provided that equipped trailers have certain length specifications. This area would be fit to host up to 25 trailers. Each trailer should be equipped with water and electricity, as well as a one-inch waste-disposal exit. This type of camp site will differ from one site to another. There are many areas that do not have water or toilets. Electric generators may be used in low-usage capacities. Other sites are jagged with medium heights and are often small and unfit for trailers. These sites can be reached by difficult roads, which require equipped vehicles driven by park personnel to drive in them. There are other sites with water tanks and toilets or means for waste disposal, that look like the holes, dug at certain areas but that do not have any waste disposal (treatment) station.

2.3.2 Infrastructure

- Roads: Streets inside the reserve are unpaved, large, many and unfit for cars. They are guarded by reserve guards and require permits for driving and camping. The reserve is surrounded by 12 km of paved roads and 8 km of unpaved roads in uninhabited areas. (Bicycle-riding is possible).
- Water Sources: Water sources are limited in the area. The soil is of a sandy texture and preserves good aspects of agricultural development. That is why, when attempting to plant trees in selected areas on the reserve, the types of trees chosen should be compatible with the environmental conditions and the surrounding soil. Such plants should have strong roots that can grow deep and spread wide in the earth. They should also be heat, dryness and wind resistant and capable of growing quickly and should be of long-lasting or durable kinds like palm trees.

Figure 4: shows the reserve is surrounded by 12 km of paved roads

2.3.3 Reserve Activities

There are many activities that visitors can practice at the reserve such as contemplating and exploring nature, holding camping and safari trips and exploring the valleys and mountains, photography, watching the rocks, taking

walks and horse-back riding. Walking and wandering about in the reserve allows visitors to value the reserve itself as it has a lot of beautiful scenery. Walking and wandering are also the best means to experience life in nature.

Managers of the visitors' center should plan and organise trips for park visitors depending on the time they have and can also offer night-time trips. The area for walking and wandering about the reserve is quite big and close to the inhabited areas. The closest service center, to the reserve, with a bank, hospital or mall is only 2 km away. Taking a tour around the reserve takes a minimum of one day and a maximum of two days.

2.4 Activities Visitors Can Perform at the Reserve and Activities They Cannot Perform

2.4.1 Activities Visitors can perform at the Reserve

Visitors can receive a permit to enter the reserve and stay there. They will need to carry at least one gallon of drinking water per person per day. They can collect all trash in a bag and dispose of it at the trash collection point. They can hold camps at least 100 yards away from the Wood Mountain. They will also need to prepare a first aid kit.

2.4.2 Activities Visitors cannot perform at the Reserve

Visitors may not start fires or bring pets to the park. They may not attempt to cut or climb rocky formations. Although it is unlikely that guests will meet unfriendly animals, still it is important to have a clean camp and to store food appropriately so that it is vulnerable to attack by animals.

2.5 Investment Activities that Do Not Contradict the Goals of the Reserve

There ought to be activities compatible with the goals of having a reserve in the surrounding area. These activities can include:

- Having an annual entry permit for EGP 200 or a monthly permit for EGP 20 or a weekly permit for EGP 7. More than 80% of revenues from permit sales can be allocated to priority projects that help and allow the reserve to perform its functions.
- Reserve guards or personnel can organise exploration trips for Scout students or children aged 7 to 15. Through such programmes, children can have several activities as well as receive certificates, medals and stickers. A book on children's activities can be sold for EGP 20, which children can attempt to complete the information contained in it to determine the activities suitable for them and the places of these activities on the reserve. In addition to a medal and sticker of the reserve, the child can also receive a booklet on how to deal with areas on the reserve.
- A beautiful and calm place for one-day tourism that is 2 km away from inhabited areas, where there is no connection between the people and the reserve.
- A good place to perform researches in various fields including animals, botany, geology. This area is considered a natural laboratory for university students majoring in geology.
- Being situated near New Cairo and announcing that it is a natural reserve will offer the opportunity to use the area surrounding the reserve in an environment-friendly way.

2.6 Problems Confronting Investment Activities

- Lack of environmental awareness, absence of an active role by the media to shed light on beautiful and valuable places that form natural and national heritage.
- Absence of means of transportation to take visitors from surrounding areas to the reserve directly.
- Absence of shaded areas across the reserve to allow visitors to sit underneath them, rest and watch the geological formations.
- Some visitors leave trash after their trip is over.
- Absence of vehicles and absence of means of making phone calls.
- Absence of a group to conduct scientific research and absence of technical equipment throughout the reserve.
- Absence of drinking water or multi-purpose areas like cafeterias.

2.7 Suggestions for Making Use of Investment Activities for Such Reserves

- Creating an architectural eco-building at the entrance to the reserve.
- Planting arable areas in the reserve with trees and endangered plants and using them as a research laboratory.
- Providing water and electricity as well as offering multi-service areas like cafeterias to encourage visitors to come to the reserve.
- Establishing special corridors and watch towers in high areas as well as building regular umbrellas for visitors to sit under and watch the geological formations.
- Supporting the reserves with equipped cars and with means of communication.
- Establishing a scientific research center and facilitating scientific research.
- Co-coordinating with various ministerial authorities and stimulating tourism in the area.
- Should some of the above points be taken into consideration, then there will be no doubt that there will be high revenues resulting from using the reserve.

3. Evaluating the land

Since the emergence of communities, and lands were a subject of benefit, and were not a value for trade. With the advancement of urbanisation, the value of land became clear, and work gave the land its worth; thus, evaluation

came to exist. The more crops the field yields, with the same amount of work, the more its value increases. The evaluation of any piece of land depends on the revenue so that it could have a realistic value. The land that is not used for production does not represent capital. Land as capital can grow like any means of production and as long as it produces benefit, it is capital land.

3.1 Important Aspects for Distinguishing Lands and Methods for Evaluating Lands:

3.1.1 Important Aspects for Distinguishing Lands

These are represented in the position (whether it is a main street, branching street, commercial road, public or private street), its condition, advantages, specifications and surface area, date of sale, kind of property, kind of use (allocation), conditions for erecting buildings (building percentage, height, type of use (whether managerial, commercial, residential, industrial or touristic), what the piece of land looks like, fascade to depth (off-the road distance) percentage, corner, surrounding utilities and services).

3.1.2 Methods for Evaluating Lands:

Experts agree that there are three main methods to evaluate assets, and they are:

- Calculating income resulting from renting an available asset

Method: the remaining value of the land or the value resulting from renting the land, which is a means of evaluating the land that requires applying profit and expense data, which are important aspects in an evaluation. This is done by performing a financial evaluation of the net profit that can be achieved from using a profit-generator. The required financial income is then subtracted from this net profit following the profit-generation enhancements. What is left from the profit belongs to the land and is capitalised to reach an indication of the value of the land.

This method depends on calculating the income resulting from the renting of assets that generate a financial income. This method depends on five main points, which are: The total annual income, determining the non-occupancy (or non-operation) level, determining annual operation costs, value of the asset, doubles of the total income). It is worth noting that the most important factor in this type of evaluation is the method for determining the net income.

- Method of comparing sales with recently sold similar assets in the same area

This method consists of a group of procedures through which the value indicator is reached by comparing the asset under evaluation with similar assets recently sold in the same area. This is done by applying appropriate units of comparison and by carrying out amendments to asset sale prices that are used as references for comparison. This method is used to determine the sale price value, so that a research-resident studies various factors that affect the asset; in addition, the history of sales generally plays an indirect role and so do local selling conditions (such as natural selling, prompted selling, the state of the market, the levels of supply and demand).

- Calculating the cost of building a similar asset

In this method, the current cost of erecting another asset or a similar asset is evaluated and the due depreciation is subtracted from the cost. In addition, the estimated cost and the profit are added to the equation. Amendments to the complete ownership value for the said asset may be added to reflect the value of the asset that will be priced. This method depends on several points that must be taken into consideration in evaluating the asset:

- Evaluating the price of the land (as though it were vacant with no buildings on it) to determine the best use for it.
- Evaluating the current cost of the building or asset.
- Evaluating depreciation (how the price of the original asset has dropped due to being used).
- The current cost of the building = Cost of building – depreciation cost
- The evaluation price = Evaluating the price of the land (as though it were vacant) + the current value of the building

A combination of these methods is often used and the evaluation is amended based on the average results. This method helps in reaching a more realistic value.

Other methods for evaluation:

- Calculating the price of a share (allocation) or percentage of the land and building
- Abstraction method (extraction method)
- Cost method (the engineering method)
- Resort development method.

3.2 Evaluating the Land by Applying Capitalisation of Income Resulting from Renting the Land

A number of alternatives is presented, which include making use of reserves to achieve environmental sustainability for these natural reserves in Egypt. These reserves are new to the country and can be used as a means to create environment-friendly recreational areas by using large open spaces for sports that do not harm the environment. The purpose of having such areas is to meet the needs of needy categories in the community to be able to provide areas for psychological rest and recreational areas so that these categories can be productive and capable of directly contributing to the development of the local surrounding areas. This comes as part of the strategy to achieve environmental sustainability for natural reserves in Egypt. This can result in a developmental government programme on the one hand and by local charities and associations on the other, through which they can create sports projects such as tracks for walking, running, horse-back riding…etc. Such a project can help needy categories in the community and can allow investors to contribute to creating an environment-friendly investment economy.

By examining and implementing these alternatives, it becomes clear that the developmental option is the option that has all the necessary conditions to achieve the concept of sustainability. Accordingly, using the model for evaluating reserve land can be used in making decisions to achieve the environmental sustainability of natural reserves in Egypt.

First Step: Determining the Positive and Negative Effects in the Present and Future:

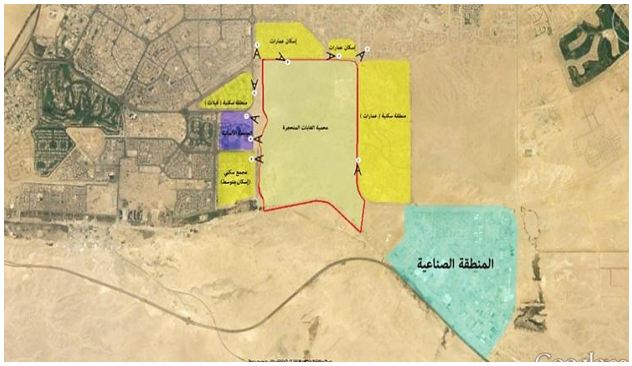
By creating a table to compare the evaluation based on an economic and environmental basis to the evaluation based on an economic basis only, the researcher merges several evaluation methods, either by trying to determine the possible alternatives that achieve a high level of revenues at the lowest cost possible or by trying to determine the expenses in advance by considering the costs that would be required to achieve the purpose of such a project. This can be carried out by examining the following:

- Direct costs (tangible and intangible) and indirect costs (tangible and intangible)
- Direct revenues (tangible and intangible) and indirect revenues (tangible and intangible)

In this step, we shall evaluate the land of the Petrified Forest Reserve through the project of renting the land so that we may apply the capitalisation of income resulting from renting the land (for environmental use only) to determine the value of the land and compare it to its value in the event of selling it as land for erecting buildings (for economic use only and ignoring its environmental value) in the framework of the following group of hypotheses.

Table 1 Most important items that are to be depended on when evaluating Petrified Forest lands in accordance with prevailing prices as at January 2013 (Source: Researcher Analysis).

Total reserve area	6.6 km^2
Area allocated for erecting buildings	In case of the environment: 3 km^2 In case of total space: 6.6 km^2
Price of one meter according to the prices of the New Urban Communities Authority (NUCA) as at January 2013 (price of one meter at the reserve without bearing cost of roads and services 50% + buildings on 50% of the land as compared to the current price of selling one meter at EGP 3200)	800/m^2
Price of one meter required for erecting buildings	EGP 1200/m^2
Hypothetical area needed for erecting buildings on land area	25% of the total area of the land
Pounders' area (1 km)	0.2 km^2
Price per 1 km of pounders	EGP 100/meter
Suggested number of workers needed to operate the reserve in the suggested activities and their qualifications	4 highly qualified persons, 4 with medium qualifications, 6 workers



The map shows the No. 5 map land uses surrounding the reserve (Source: The Researcher)

Costs: Investment expenses, salaries, electricity, water and maintenance 10%

1- Actual

1-1 Direct

1-1-1 Tangible. Cost of purchasing the land for building and cost of constructing sports centers

1-1-2 Intangible – Consulting offices

1-2- Indirect

1-2-1 Tangible. Constructing paved roads and health centers and providing public utilities (electricity, sewage, water, and telephone services)

1-2-2 Intangible damages that affect the fungal environment as a result of paving roads

Revenues: These have been estimated according to capacity of the reserve

1- Actual

1-1- Direct:

1-1-1 Tangible: Halting the encroachment of the desert and expanding sports centers, which have positive effects on the health of the citizens and on national income.

1-1-2 Intangible: Providing job opportunities through operating consultancy offices.

1-2 Indirect:

1-2-1 Tangible: Providing roads as well as health and safety services and providing public utilities (electricity, water supply, sewage and phone services)

1-2-2 Intangible: Providing a recreational environment including civil life requirements for citizens.

Second Step: Determining Monetary Values for Monuments (Total Annual Income, Vacancy Percentage, Effective Income, Annual Operational Costs, Annual Net Income, Asset Value, Doubles of Total Income)

After completing the process of predicting the positive and negative effects of the project under study, the evaluator must give values to these effects. He records the positives effects such as revenues and the negative ones like the costs and expenses. The standard evaluation criterion is money and the unit for measuring it is the currency; therefore we can evaluate the income by looking at the prices of sports services and leisure activities in the market.

Total Annual Income

In this step, the income resulting from renting land of the Petrified Forest reserve is evaluated according to a set of assumptions:-

- It is essential to get to know the region from a touristic perspective by putting it in the touristic map both internally and internationally.
- The activities in the reserve have been narrowed down to simple environmental activities like horse-back riding, scout trips for half days or full days, and camping.
- The average number of visitors was determined based on the average number of tourists in Egypt according to percentages of tourist nationalities - Report of the Tourism Promotion Authority as at 2010 on studying of the kinds and numbers of tourists coming to Egypt, which is represented in the following table:
- The revenue is the taxes for visiting the museum and the library, as well as annual and monthly membership visitation fees for the reserve; in addition to the entrance fees for cycling and walking trips, holding sports competitions for jogging and running activities, camping fees for numbers within the capacity of the reserve and fees for performing activities inside the reserve.

Table 2 shows the nationality and number of tourists coming to Egypt – Source: Report by the Egyptian Tourism Promotion Authority in 2010**.**

Statement	Arab	US	Europe	Asia	Others	Total
Percentage	18%	6%	69%	6%	1%	100%

Table3: shows the statement of expected revenue for the Petrified Forest reserve according to prevailing prices as at January 2013. The source is the researcher's analysis.

Revenue Statement	
Actual direct tangible revenue	
Reserve revenue: The number of visitors was determined according to capacity of the reserve	
Suggested price of camping (compared to other touristic areas in Cairo)	EGP 75 - EGP 100 per person per night
Suggested price for scouts trips	EGP 50 per person for half a day – EGP 100 for full day
Price of horse riding per hour	EGP 70 – EGP 100 per person per hour
Actual direct intangible revenue	
Actual indirect intangible revenue	Unavailable according to the Ministry of Environment's decision of not approving environmental urban building

Percentage of Non-Occupancy

It represents a percentage between 5% and 10%. It is time periods for allocated for maintenance. Through these time periods, we can calculate effective the income, which is equal to the total income after subtracting the non-occupancy value.

Measuring Annual Costs

In this step, the cost of renting the land of the Petrified Forest reserve is evaluated according to the assumption that the investment costs for the reserve were estimated according the alternative opportunity cost of the land. This is all based on the fact that the natural reserve under study is located on the outskirts of New Cairo and the price of the reserve is calculated according to the market price.

The costs are those for the preparation of development activities which include setting up guidance and instruction signs, paving roads, assigning locations for collecting wastes from camping, assigning locations for performing sports activities with consideration to the reserve's capacity, costs of salaries of the supervision and maintenance crews, costs of constructing visitors' buildings, stores selling equipment for activities, the environmental museum, the library and the cultural center.

Table 4: shows the Statement of Revenue expected from the Petrified Forest reserve according to the prices as at January 2013. The source is the researcher's analysis.

Statement of Costs	
Actual direct tangible costs	
Cost of land allocated for constructing buildings	396,000= Area of Land x Price of Land
Wages and salaries	170,400= Number of workers x Their governmental salaries
Maintenance costs	10% of operational costs
Actual indirect tangible costs	
Constructing pounders	123,000= Area of pounder x Cost of pounder
Costs of electricity and water supply	24,000 = Estimated consumption by the visitors' building

Net Income (Calculating net returns)

Costs and revenues were estimated to assess profitability from using the reserve land from an economic perspective only and then from both an economic and environmental perspective.

The First Model: Evaluation of Reserve Land by Using the Reserve in Environmental, Touristic and Recreational Activities (economical and environmental perspective):

n this step, the alternatives are defined, which are: using the reserve in environmental, touristic and entertainment activities like camping (revenues of EGP 75), scouts trips for half day, scouts trips for full day, horse riding (revenues of EGP 70 per hour). Their costs and revenues are analysed in order to know the extent of achieving economic efficiency in using the reserve's resources.

Table 5 The First Results from Analysing Model Costs and Revenues. The source is the researcher's analysis.

Statement	
Positive cash inflow	3768.07
Net cash inflow	2052.07
Average positive net cash inflow	136.80
Standard Payback Period	12.54
Average rate return on capital	7.97

Standard for profitability at a 7% price deduction	1.33
Standard for profitability at a 10% price deduction	1.11
Standard for profitability at a 15% price deduction	0.85
Standard of internal return rate (10%-15%)	7.17
Added value at 7%	571.64
Current salaries at 7%	1551.83
Rate of social return at 7%	-0.57
Added value at 10%	1905.82
Current salaries at 10%	1292.82
Rate of social return at 10%	0.35
Added value at 15%	1468.99
Current salaries at 15%	996.49
Rate of social return at 15%	0.27
Added value at 20%	1174.59
Current salaries at 20%	796.79
Rate of social return at 20%	0.22
Added value at 25%	969.61
Current salaries at 25%	657.74
Rate of social return at 25%	0.181

First: Profitability Standards from an Economic Perspective

- Standard of net cash inflows (added value):

The effect of the project on income is examined with regards to the added value that the project makes in fifteen years. It is worth noting that the added value that the project makes in the basic or model case is positive, and is about EGP 3768.07, which indicates the safety of using the reserve as a profitable project for the country.

- Social returns:

This standard measures the social returns. It represents the current value of the added value at a discount rate called the social discount rate (SDR). This rate was calculated according to discount rates of 7%, 10%, 15%, 20%, and 25%. The previous table shows that the highest value of the social returns was at discount rate 10%, where it reaches EGP 1905.82. This indicates that the project has passed the test. Then, the current value for the added value and the current value of wages should be compared. Notice that at discount rate of 10%, the current value of the added value is higher than the current value of wages, which means that the project is acceptable.

- Rate of social return:

It shows the actual surplus to the project investment. It is compared to the interest rate prevailing in the market. Notice that the highest rate of social return was at discount rate of 10%.

- Effect on workers:

Creating job opportunities is one of the main targets of development. That is why it is important, when evaluating any project, to estimate the number of job opportunities the project will create. Depending on the assumption made by the Organisation for Energy Planning (OEP) in 2004 in estimating the cost of a job opportunity, it is found that one job opportunity costs 70,000 Egyptian pounds (EGP). It was found that according to a model, the net value of cash inflows (added value) can create up to 29 job opportunities in the national economy. The capacity to create job opportunities decreases on evaluating the current value of the added value at a discount rate of 10%, and the project capacity becomes capable of creating only 2 job opportunities.

Reference: Ministry of Planning, "Energy Conservation Seminar", Arab Society for Petroleum and Mining, December 2004, page 41.

Second: Profitability Standards from a Commercial Perspective:

- Payback period:

It is one of the conventional methods that the investor finds important to regain their money. It is usually done either for the intention to reinvest or due to lack of confidence in economic circumstances. The payback period is the period during which the project regains the investment costs that were spent. The best project is the one that allows the investor to get back his money as soon as possible. According to this standard, the state can regain the costs of preparing this area for touristic purposes in twelve and a half years.

- Average return rate:

It depends on finding the percentage of the annual net profit average. To judge the feasibility and profitability of the project, it is important to compare its returns to those of an alternate opportunity, regarding average market interest rates or average likely cost; this is done in case of deciding on one alternative. Upon comparing to the market interest rate about 7.5%, it has been found that the average rate of the return is about 7.9% which is a little higher than the prevailing interest rates. This confirms the feasibility of touristic investment of the reserve.

- Current Net Value:

The current net value of the investment project points to the difference between the current value of incoming and outgoing cash flows from this project. If the net present value is positive, meaning the present value of cash inflows is more than cash outflows, the project is profitable, and vice versa. In the event of the presence of more than one investment project, the one that gives the highest net present value is preferable.

To judge the feasibility and profitability of touristic investment of the reserve, it is worth noting that the value of this standard reaches 571.721 in thousand pounds at discount rate of 7%, and reaches 189.889 in thousand pounds at discount rate 10% which is a positive value, confirming the feasibility of investing in the reserve.

- Proof of Profitability:

It is the result of dividing the present value of inflows from the investment project over the present value of the outflows for the same project. If the percentage is greater than one, the investment project is profitable, and vice versa. The proof of profitability is useful in arranging the competing projects according to profitability in order to choose which project is more profitable. Accordingly, this

standard has a value more than one, at discount rates of 7% and 10%, which confirms the feasibility of the investment.

- Internal return rate:

The standard of internal return rate is considered one of the most important standards in evaluation and differentiation between different investment projects. The World Bank uses it at present, in all types of financial and economic project analyses. Most international financial institutions use it to accept or reject projects presented to them for financing. This standard presents the rate at which the present value of cash inflows equals the present value of cash outflows for the investment project; in other words, it is the discount rate at which net value of the project equals zero. According to this standard, the discount rate that fulfils this is 15%, and the internal return rate reaches 7.2% which is less than the market interest rate.

Summary: The income resulting from renting the reserve can be capitalised, and the value of the land per square meter equals 2052070.00/660000=3.1 Egyptian pounds only.

The Second Model: Evaluation of Natural reserve Land by Using Reserve in Building Activities (Economic Only)

The revenue from selling reserve land in accordance with selling prices in 2013, the conditions of the New Urban Communities Authority (NUCA), which require that the percentage of the land allocated for construction does not exceed 50% of the total area of the land. Other conditions are concerned with services, green areas and roads. This means that the current price of the land, which is EGP 2200 per square meter; this means that the price per one meter is EGP 1100 only. After deducting the cost of utilities, roads and gardens whose prices are estimated, according to the New Urban Communities Authority during that period, at EGP 420, the price of the land for the state amounts to EGP 550 per square meter.

Revenue from selling land = total area x 50% x price per meter = 6600000 x 0.5 x 2200 =726,000,000.00 EGP.

Cost of selling a piece of land = Cost of utilities (such road –green area – water – ele) + cost of services (establishing service buildings and maintaining such mall – hospital – school)+ coast of maintenance for 25 year =660000 x(420+550+600) x .50=518,100,000.00 EGP.

Value of land = Revenue from selling land - Cost of selling a piece of land=726,000,000.00-518,100,000.00=207,900,000.00 EGP.

Summary: The value of the land per one square meter is=207900000.00/660000=315 EGP

4. Results

By comparing the first model to the second model in order to determine the extent of the alternative's success in achieving a sustainable income, and seeing that the return from using the reserve in sustainable development activities, and that the profit is the result from the costs and returns whereby the value of the land is calculated based on its ability to generate income that exceeds the current inflation rate, it becomes clear that eco-friendly economic alternative is valid in case of capitalising income over 32 years. In other words, it is the most suitable alternative for the state.

5. Recmmendations

Studying the land evaluation, at present, is considered an important tool for strategic planning. It is also an effective method for the strategic management of projects. Therefore, it is necessary to use land evaluation for the lands of natural reserves to achieve sustainable development that can assist in prospective aid using strategic thinking. It is safe to say that land evaluation is model for the most suitable use for such land as it is envisioned prior to implementation to ensure that preserve of rare resources. Thus, land evaluation becomes a cautionary tool that prevents governments and investors from entering into fruitless projects. It also provides a certain level of knowledge and suitable use of resources.

And because the main objective of studing the evaluation of land of a Petrified Forest Reserve is achieving a public benefit whether by achieving profit or not in the framework of a sustainable environment, and because people still suffer from positive effects resulting from limited capabilities and weak policies that deal with these environmentally-sensitive areas in Egypt's natural reserves, evaluation, therefore, leads to the real reasons behind not using this land. Despite, the fact that natural reserves in the Arab Republic of Egypt cover around 8%, while the total inhabited area covers around 5% of the land.

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