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Tourism development of Anzali lagoon with emphasis on the estimation of physical carrying capacity

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ABSTRACT

Today stability is known as of the most elemental parts of the world. In recent years' the idea of sustainable development have been considered seriously by experts and authorities. The development of "tourism industry" and its application as a major economic activity in developed and developing countries has caused the planners to pay more attention to two important points: first 'the improvement of the practical experience of tourism and second the attempt to increase the benefit and in tracts of the host countries. The aim of this research id is to assess and plan the tourism carrying capacity in Anzali lagoon. Also, It try to minimize the biological damage of Anzali lagoon in order to support the entertaining quality of the lagoon. This research uses a range of indicators at three levels of physical, realistic & effective carrying capacity, using TCC model. According to this research the number of tourists who enter the lagoon are less. The result shows that the lagoon attracts less number of tourists than its potentials. So, this should be encouraged through proper planning and creating more appropriate infrastructures to make it a more beautiful place for tourists without harming the ecosystem.

Key word: Carrying capacity (physical, real and effective), Anzali lagoon

INTRODUCTION

Today tourism is known as one of the most important sources of income, at the same time one of the most significant factors in the cultural exchange within the countries and the world's largest service industry. Therefore, many countries are trying to increase their international activities. Anzali lagoon is also one of the most beautiful places in Guilan. The word lagoon is defined differently in Persian Encyclopedia &other scientific articles. Dehkhoda 1990, has defined the world "Tal"-standing for the first part of the word lagoon in Farsi-as akind of forest tree&rock candy.Lagoon is specific area of water that is separated from the sea by a reef and is suitable for birds and fish.Normally lagoons contain more than 100 types of birds and 50 types of fish and other kind of halophile and this makes it one of the rarest place. Hopefully, Anzali lagoon has been of one the protected international lagoons since 1975 and consequent one of the Most important places to producebeluga in Caspian sea with the advent of tourism in the world, many environment of problems and hardships are witnessed and many tourists are dissatisfied with the quality of tourism industry. Negative consequences are naturally inherent in the tourism industry. This has caused countries to find ways to stabilize these places. In the last decades, the flaws and strength of this hung in dusty has been examined as an example we could name the "stable tourism" in 1990 affected by itstheory in 1970. In this theory different techniques such as " carrying capacity or tolerance capacity " are utilized . The important point is to make a balance between maximization & optimism of this process in order to reach ideal & acceptable features and effects. The need for this agreement is rooted from the natural and human capacities.[1]. This research hot only examinant the potentials of eco touristic tourism of Anzali lagoon but also examinant the" carrying capacity " in order to put forward the way it, s applied specifically regarding Anzali lagoon. The main reason is the point that this area considering its potentials can be one of the most important tourist attractions for foreign and native tourists.

Ingeneral no specific research has been done and in its generalsense, tourism has recently become a matter of importance and tourism planning and manage meant have been paid attention. Although some research has been done regarding Anzali lagoon that are mentioned in the following.

Used the Baker approach(method) to recognize the potential of ecotourism and environmental climate comfort in Anzali lagoon .This method showed that &months of the year ecotourism is capable to be use by tourists. [2].

Economic valuation of entertaining service of environmental resources inAnzalilagoon,Valuing of environmental resources considering their non-marketing aspect is a complicated process. [3].

The entertaining value of the Anzali lagoon-as one of its most concrete value -is evaluated through traveling expenses.

Geographical analysis of second Houses in rural areas of Anzali after revolution showed that the development of the second houses in Anzali is due to the geographical condition of this area(which is considered as free zone). [4].

Most of these "second houses" are erected recently and their owners are mostly people from Tehran and they nor ally and stay at these houses for about 3weeks to 1month ayear.

The recognition of bioclimatic zones of comfort in the Anzali coast considering the suitable spatial morphology of the beaches in Guilan, in springs and summers the maximum comfort condition is available at Anzali beach. [5].

Eco-touristic development in Anzali through emphasis the output of the lagoon)showed the importance of Guilan province Anzali lagoon and the river at the outlet. [6].

The ecological analysis of Anzalilagoon, the aim is to gain information about the spatial and temporal changes and variables such as physical /chemical and biological to optimize and manage the lagoon quality. [7].

The study investigates the factors affecting the lagoon pollution such as population, the size of area, population density. In this study, the statistical relationship between the polluting indicators regarding size population density isdetermined. [8].

United settlement and villages around Anzali lagoon, the main aim is to increase the people's awareness of the international Anzali lagoon and neighboring villages. [9].

Evaluation of Tourism climate Index in Anzali lagoon and its calendar). The aim was to identify and provide the most comfortable month regarding the favorable climate index of Anzalilagoon. [10].

The development of coastal tourism has had many environmental impacts.

The most important of which is the pollution of coastal waters and coastal landscape. [11].

States those natural tourist attractions near Caspian Sea, creating sceniclandscapes, usingwater resources, fishing, and boating, commercial and other major factors are. [12].

The study examines the concept of integrating the carrying capacity in the process of planning and city management in Tehran city. This way he wanted to examine the carrying capacity of the environment intern of urbanecosystem health in cities in the process of mega city planning and management. [13].

Examined and introduced the recreational carrying capacity in this research the carrying capacity was examined based on the recreational activities and also the type and the capability of the resorts. [14].

In his thesis came to the point that the green nature&the sea are of those effective factors in attracting tourists in Guilan province ,and lack of appropriate ways to meet the needs of tourists in terms of car rides or other vehicles especially in peak holiday time for tourists face problems such as tourism expenses. [15].

In their research under the title of "The analysis of carrying capacity in KalarDasht" used a descriptive – analysis and evaluate the ideas and vie points of both inhabitants and tourists regarding the tourism development, they used subjective indicators and three methods as their frame work which are as following.

Social Exchange theory
 Cycle of tourism development
 Socreation method. [16]

3)Segmentation method. [16].

Did a research under the title of "Environment of the national beach park in Boushehr" This research used systemic analysis and applied the national and international criteria for assessment and GIS to recognize the suitable resorts. Then necessary classification was done based on the growing economic development in the region and the neighbor areas& also the conservation and sensitive locations. [17].

In an article entitled "Assessment of the environmental effects of assessing the environmental impact of human activities on the island.

According to the researches done, Hormoz island is already suitable for fishing, sailing, mineral usages , their fore the unplanned tourism and the existing problems are recognized and necessary measures are taken. Also, this research has calculated the physical range of 1.5 persons in each hectare. [18].

Having published article entitled "The estimation of the recreational carrying capacity for management support on the faro bank parade in Portugal" they have used the carrying capacity of people and tourism at the same time to assess both the tourism carrying capacity and its management tools in that the beach the authors of this paper, by estimating the physical capacity of this beach and also consideration of relevant infrastructural &managerial factors ,came to the point that besides the physical carrying capacity, the cultural-social carrying is of high importance. [19]

Geographical scope

Azali lagoon is one of the largest lagoons in Guilan province.Based on the latest survey conducted through geographical mapping it is located between latitude of 37°32' 45" and 37°21' 45" from east 49° 34' 45" and 49° 14' 15". This lagoon is connected to Azali city from north-west.

Maps number 1 and 2 show the lagoon's location.



Figure1-1-Map Aerial photos of Anzali Source: "The organization of Housing & urban development" of Guilan province

MATERIALS AND METHODS

Anzali lagoon is one of the biggest lagoons in Guilan. This area due to a unique &natural eco system has become of a suitable place for tourism.

In this paper to evaluate the tourism carrying capacity, the physical actual and effective carrying methods are used .First, the map position of the city of Anzali regarding the administrative-political divisions was provided by

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planning department of the province. Also, theinformation and tables related to the population of Anzali was gathered from the SCI(or census organization). The climatic information and data including rainfall, temperature, relative, humidity and wind within the period a 50 year period (1955-2005) was gained from meteorological synoptic center (station) of Anzali. Also, related maps of location were received from the free zone and other organizations. To understand the point, some articles related to physical carrying capacity and books on this topic were used that are mentioned in the reference section photos are provided by some websites and the researcher herself.

Physical carrying capacity (pcc)

Physical carrying capacity refers to the maximum number of tourists in on area that is accepted and if the number of actual tourists exceeds this number there will be some losses to the environment. According to Matyson (1982) physical carrying capacity is the " maximum number of people who can use the space in a way that no significant change occur on the natural environment and the quality of visitors enjoy visiting nature does not decrease.

The aim is to have the maximum use of the recreational center in the form of the number and the activities that can be tolerated before an unacceptable decline in the value of ecological tolerance.

The carrying capacity in an area means the number of the tourists who are accepted by that area in a particular point of time (day, month or year). This capacity depends on the topography of the area soil type animal behavior , quality &quantity of the tourism facilities in the area.[20]. Also, It refers to the number of people use the area & the amount of time that the recreational can provide annually wit out physical or environmental destruction in a way that does not reduce the quality of tourists experience.[21].

Physical carrying capacity is defined based on the formula (1) which A is the area under study that is suitable for tourism.

(V/a) is the ratio of the number of allowed tourists per unit area consider per unit area of tourism that every visitor needs to be transported easily in the lagoon without being disturbed with other physical factors. Rf^2 is the ratio of time tourists presence & their risit in a particular point of time that is defined through $Rf = \frac{s}{T}$, in which S refers to the time at presence and visiting and T stands for the length of time of usability a day

1)Pcc= $A \times \frac{v}{a} \times Rf$

Real carrying capacity (RCC)

Real carrying capacity refers to the maximum hum bar at visitors from a recreational place who are allowed to visit a place based an some controlling factors due on the pcc. These controlling factors are gained by considering biological, ecological, social & managerial considering conditions and factors [1]. This capacity is calculated by formula number 210. In this formula Σ pcc Is total area and routes suitable for tourism and each of cf refers to coefficient restrictions that act like reducer and are relatively gained through total favorability. It should be noted that the control factors in each area are specific to that regain & there may not exist in other areas.

The control factor (Cf) are pressed in percentage and are gained by formula .no (3) in which ML^4 is the controlling scope of the variable & the Mt^5 is total amount of the variable

2)Rcc= $\sum pcc \times (Cf1 \times cf2 \times ... \times cfm)$

3)
$$cf = \frac{Ml}{Mt} \times 100$$

1-Physical carrying capacity 2- Rotation Factor

Effective carrying capacity (ECC)

ECC refers to the maximum number of visitors in a place where the existing management is able to manage and control it sustainably. Mc^7 Consist of all his aims & goals in a place. The effective carrying capacity never exceed the real carrying capacity and the managerial skills can lead to the use of a place up to its carrying capacity and more.[1].

The effective carrying capacity is calculated by formula (4)

4)
$$Ecc = Rcc \times \frac{100 - FM}{IMC} \times 100$$

5)
$$FM = \frac{IMC - AMC}{IMC} \times 100$$

3- Real carrying capacity
Correction Factor Variable 45- Limiting magnitude of Variable
6- Totalmagnitude of Variables

DISCUSSION

Temperature

According to the survey done, the average monthly temperature fluctuates from 7/1 to maximum 25/7 in February & August respectively (Figure 2-4). The result shows that Anzali has a unique temperature that special to coastal area of Caspian Sea& its main feature is its balanced and uniform temperature change. The important point is the average minimum temperature of Anzali which has never reached less than 4/4 c (Celsius) and never fell below zero. The analysis of the data regarding the minimum temperature shows that extreme cold weather is very probable in the area but of low depth and durability. Ice parameter which is cons develops as an unfavorable factor in tourism industry is around less than 80 days a year and this is not a really limiting. The average annual temperature in Anzali is 16/2 degree Celsius, and the mean annual maximum temperature is 19/2 and its minimum is 13/2. The difference between max and min annually is 5/1 degree. The mean temperature in the coldest mount of the year – February is 7 and in the hottest mount -July – is 26 c .The average temperature in spring is 18/5 c and in summer is 24/7 c, in autumn 13/8 c and winder 7/7 c minimum temperature was 11c in February and the maximum temperature was 37 c in July in 1971 & 2 October in 1989 (figure 1-3).



Figure 1-3 the seasonal mean temperature in Anzali (1955- 2005) Source: Meteorological organize ticn

Precipitation (rainfall)

The average annual rainfall in Anzali is move them 1853.5 mm that is the highest amount of annual rain fall in the whole country. The number of rainy days reaches 148 days a year that March & October have the maximum rainy days, with 2/15 and 15/4 a month respectively.(Figure 4-3)And July and June with 6/1 & 7/1 days a month respectively have the least rainy days with 2/46 mm. Summer rains could be useful in refreshing and reducing the temperature . Also, as the summer rain is accompanied by appropriate temperature could be a kind of attraction, in a way that many tourists prefer to experience summer rain during their trip to the region (graph no 5-4).

The lowest amount of rainfall during the last 50 years is 1971 with 1156/2 mm & the high amount took place in 1957 with 3020/2 mm. The average seasonal rainfall in Anzali in spring is 160/9, in summer 433/3, in autumn 852/6 & in winter 405/7 mm. There fore, autumn has the maximum amount of rainfall and spring has the minimum amount. The ranis mount of the minimum amount. The rainy months of the year in Anzali is October with 332 mm monthly & the driest mount is July with 46/2 mm,monthly. (Figure 2-3), the maximum amount of rainfall in 24 hours in Anzali is 353 mm, in 27 September 1962.



Figure 2-3 seasonal mean of precipitation in Anzali (1955- 2005) Source : meteor logical organization

Number of frost days

As Anzali is directly affected by Caspian sea, the number of frost days per year is less them that of Rasht city. The average number of frost days is 7 days a year which happen in January, February, March & late December and the most freezing days occur in February (3 days) and then in January (figure 3-3).



The graph of the average frost days monthly in Anzali (1995- 2005) Source: Metero logical organization

Physical carrying capacity

Physical carrying capacity refers to the maximum number of tourists in an area that are possible to be present and is assessed based on formula (1) in which A is the area number study that is suitable for tourism.(v/a) is the ratio of the number of allowed tourism per unit area considering per unit area of tourism that every visitor needs to be transported easily the lagoon whit out being disturbed with other physical factor Rf^2 is the ratio of time tourists presence and their visit in a particular point of time that is defined through $Rf = \frac{s}{T}$, in which "s" refers to the time of presence and visiting & "T" stand for the length of time of usability a day.

A= tourism area,374000 hectar equals 3740000000 square meter

Rf= number of visits based on interviewers, inter views with people in the area. The length of the study is 12 hours considering the point that an average takes a visitor 3 hours to visit the lagoon. Pf=12/2-4

Rf=12/3=4

As the area is a natural recreational center, v/a is move sensitive and for each heactar 60 people are estimated

X=v/a=60/10000=0.006

1)Pcc=A*V/a*Rf

4Pcc=3740000000 ×0/006 ×4= 832800

visitor a days 832800 × 365 = 3039720visitor a years

Considering the limited there, the physical carrying capacity of the lagoon is 832800 tourists a day &309720 tourists a year. Hence the lagoon does not have the capacity to accept this number of tourist a day or a year the effective and real carrying capacity should be evaluated.

Real carrying capacity (RCC)

Real carrying capacity refers to the maximum number of visitors from a recreational place who some are all over to visit a place based on some control factors ,due to the condition of the target place and their effects on the PCC .This capacity is calculated by formula number(2).

In this formula $\sum pcc$ is the total area and the routes suitable for tourism and each of CF3 refers to coefficient restrictions that act like a reducer and relatively gained through total favorability. It should be said that the controlling factors in each area are specific to that origin & there may not exist in other areas .the controlling factors (cf) are expressed in percentage and are gained by formula no(3) in which Mt4 is the controlling scope of the variable Mt5 is the total amount of the variable.

2)RCC= \sum PCC*(cf1*cf2*....*cfm) RCC=PCC*110-cf1/100*100-cf2/100*.....*100-cfm/100 3)cf=m1/mt*100 The controlling factors are gained by considering the environmental, ecological/ society and physical. In this study three factors are considered which are as following: percipience, frost days and protected area.

1-Area

1-A part of limited area of Azali lagoon is the wild life shelter or sactuary and is forbidden to be visited by tourists. Those are as following:

1209 acre (hectare):wildlife actuary of Sarkhangal

360 acre (hectare): wildlife Sactuary of Seikeh 444 acre (hectare): wildlife Sactuary of Chookam 4500 acre (hectare): wildlife Sactuary of SiyahKisham 1209+360+444+4500=6513 That according to the formula M=The total amount of one variable m=The control amount of one variable cf=controlling factor cf=m/M*100 CF=6513/374000*100=1.74 NO application for tourism 2-Also the limitations of the area for the cold ,rainy and frost days of December ,January ,February ,calculated and the rainy day when tourists can come to the area were 73 days. CF=m/M*100 CF=73/365*100=20 3-Another controlling factor was the frost day is calculated and showed to be 7 days a year. CF=m/M*100 CF=7/365*100 CF=0.01*100=1.9 frost days 4-dusty days were reparted to be 1/4a years that is too low as a controlling factor. CF=1.4/365*100=0.38 RCC=PCC*100-cf1/100*100-cf2/100*100-cf3/100 RCC=PCC*100-1.74/100*100-20/100*100-1.9/100*100-0.38/100=

RCC=832800*0.983*0.8*0.98*0.99=635397 person a day

ECC: Effective carrying capacity

Man factory are involved in the estimation of these capabilities, some them can be the policy or policies, rules and regulation, infrustules & equipment, required human force, financial resources lack of these managerial capabilities is

one of the most serious problems in the tourism management in developing countries Generally, we should be aware of the exceeds the real carrying capacity never skills can lead to the use of a please up to its carrying capacity and not more.

The effective carrying capacity is calculated byformula (4): 4)ECC=RCC*100-FM/IMC 5)FM=IMC-AMC/IMC*100

In formula (5) management adjustment factor,IMC is the idealmanagement capacity(2) for a sustainable management &AMC is the actual management capacity(3).

According to an interview with one of the leading forces in tourism in Anzali port, the number of work force is reported tobe 300 people while the ideal number of human resource for management & environmental protection is 500 people.

To calculate the effective carrying capacity of tourism Anzalilagoon, first formula (5) is used and the gained value is put is formula (4).

FM=500-300/500*100=40 ECC=635397*100-40/100=381238 person a day 381238*365=1391518 person a years

2-Ideal management ecapacity

3-Actual management capacity

CONCLUSION

In tourism industry one of the most important issues it the development of the coastal areas and its unfavorable effect on coastal environment. With the rapid growth of tourism industry, the coastal area and environment is put under more pressure. Therefore effective planning &the completion of areal strategy to avoid pressure on the environment is mostly done through carryingcapacity in recreational or touristy places. This research tried to analyze and defined the touristic carrying capacity of Anzalilagoon.

Anzali lagoon due to its scarce and scenic ecosystem, rare sea animal or birds and its suitable condition for migrating birds and its special plants such as water lily/tulip is a suitable place for tourists and scientific research.

A cording to the research done & the physical carrying capacity of Anzali lagoon, the number of tourists in this resort is less them its potential capacity, Therefore a careful planning & proper management is needed to have the ideal number of tourists without hurting the lagoon ecosystem.

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