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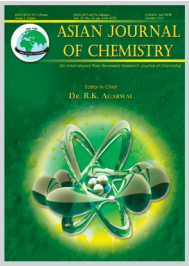

Prioritization of Tourism Destinations Through the South Coast Lines of the Caspian Sea from Sustainable Viewpoint

S.M. MONAVARI[1], P. FARSHCHI[1], A. KARBASSI[2], Z. ABEDI[1] and M. HAKIMI ABED[1,*]

[1]Department of Environment and Energy, Science and Research Branch, Islamic Azad University, Tehran, P.O. Box: 14155-4933, Iran
[2]Graduate Faculty of Environment, University of Tehran, Tehran, P.O. Box.14155-6135, Iran

*Corresponding author: E-mail: hakimimah@gmail.com

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Sustainable tourism aims at development of tourism in such a way that avoids damage to the environment, economy and culture of the indigenous people. It requires simultaneous considering lots of criteria including infrastructure, competitiveness and supply, socioeconomic, land use/tourist facilities and service to meet the concept of sustainable development. In the meanwhile, the southern coastal strip of the Caspian sear grabs the tourists' attention in such a volume that is considered as the main pole of tourism industry in Iran. The question now is that which areas are the best candidate destinations to establish sustainable coastal tourism. Accordingly, the current study focuses on determining and prioritizing potential destinations for sustainable coastal tourism. Thereby, site selection analysis was initially conducted using Boolean logic to find out the suitable areas. The results obtained from the research revealed that totally 15 destinations were suitable for sustainable tourism development. Afterwards, the considered destinations were separately prioritized from socio-economic, environmental, land use, tourist service and infrastructures points of view.

Key Words: Sustainable coastal tourism, Tourism destination, Site selection, Compensatory model.

INTRODUCTION

Nowadays tourism is a key element of development in the world[1]. Lots of planners and policy makers mention tourism as one of the factors affecting sustainable development[2]. The industry, besides the economic aspects, is considered an important factor in promoting social and cultural goals[3]. Various countries are attempting to develop tourism with a variety of purposes[4-7]. Currently, tourism industry has become more complex and diverse than in the past[8]. Tourists in tourist destinations enjoyed a short term accommodation rather than long staying instead, they have added the number of their trips. Tourists have a greater emphasis on environmental objectives and expect more values in exchange for their cost. For success in tourism, a region should enjoy sustainability in terms of economic, social and environmental aspects. Accordingly, in order to achieve sustainability, it must be carefully planned and managed[9]. Meanwhile decision makers must regard different factors in their considerations. Tourism destinations as the main focus of tourist attraction play a fundamental role in developing the tourism industry[7]. These destinations, by possessing the elements of tourism supply system provide an experience of tourism product for tourists. In other words, it is the main feature of a destination, which should represent a specific area or region integratedly. Development of tourism activities in coastal areas, in addition to impressibility of the features of the areas, will be followed by impacts on sensitive coastal environment[10]. Selection of areas compatible with the environmental features for coastal tourism development activities, on the one hand reduce the negative effects of these activities on the environment of coastal areas and on the other hand provides context for thriving coastal tourism activities[11]. Destinations can be considered as a focus center of the facilities and services that are designed to meet the needs of tourists. However, tourism destinations are defined as geographical areas where are the focus of tourist activities and its impacts. Destinations can be regarded one of the main sectors of the tourism system, whereas, their notion on people's mind attract tourisms and motivate them for visiting[12]. Destination is where that contains a lot of attractions and facilitations required for tourists. Tourism destinations do not offer a specific industry but they are a focus centre of activities in different sectors of the tourism industry. Such areas are the external aspects of the tourism industry benefited from positive economic and social impacts. At the same time, these sites will not be deprived of the negative environmental and social and cultural impacts of tourism industry[12]. Thereby, selection of suitable areas for establishment or development of tourism destinations regarding effective criteria including economic, environmental and social enjoys a great importance. In the meanwhile the methods of

the compensatory model can be an appropriate tool to handle simultaneously the noted above criteria. In this model, inefficiency of a factor is offset by strength of others therewith, there is not an optimal point in the output of the model but it offers a satisfactory condition[13].

Iran with respect to the variety of natural destinations, such as mountains, marine and coastal areas has a suitable context for tourism development. In the meanwhile, Caspian coastlines is the well-known natural tourist destination in Iran[14,15]. The current research applies on widely used methods of compensatory model called analytical Hierarchy method to determine tourism destinations within the south west coastline of the caspian sea in order to establish sustainable coastal tourism.

EXPERIMENTAL

Guilan province with an area of 13,952 km^2 is located in the north of Iran between latitude 48º 53' 56' N and longitude 37º 47' 51'E. The province is stretching between the Alborz and Talesh mountain ranges. It enjoys a climate known as 'moderate Caspian'; the humid climate that emerges due to the simultaneous influences of Alborz mountains and the Caspian sea currents. The mountains serve as a barrier against the humid Caspian winds and withhold the penetration of wind bearing vapours towards Iran's mainland. The noted circumstance causes heavy rainfalls in the northern provinces of Iran. Due to the high rate of humidity, freezing temperatures are occasionally reported in the coastal areas. It is worth noting that the amount of rainfall in Guilan depends on the winds bearing vapour.

The Caspian coastline is one of the most popular destinations for domestic tourists in Iran. Sandy beaches, thickly forested foothills and the bare peaks of Alborz mountain range all make the area attractive for the tourists. For lots of Iranians particularly the ones who com from big cities like Tehran, the lush vegetation and spectacular natural scenery, along with the tropical summers and mild winters, offer an outstanding contrast from the routine urban life. The unique scenery, mild climate and natural environment provide a convenient tourism destination for outdoor recreation activities. As a result, the province of Guilan, which fronts the Caspian sea as the world's biggest lake has resort complexes, leisure facilities and holiday homes. Fig. 1 demonstrates the situation of the study area in Iran. It is worth noting that 100 m contours were applied to determine the scope of the research. In other word, all zones owing an altitude below 100 m through the coastal strip of Guilan include the scope of the study area highlighted with light green in Fig. 1.

Research workflow: In order to select destinations for establishment of sustainable coastal tourism using AHP method, three distinct procedures were exercized in GIS environment as follows: 1) Preparing required map layers using GIS software: the first step in the methodology consists of development of a digital GIS database in which spatial information is prepared; 2) Analyzing the map layers by means of Boolean logic as well as environmental criteria in order to determine the best areas suited for establishment of sustainable tourism.

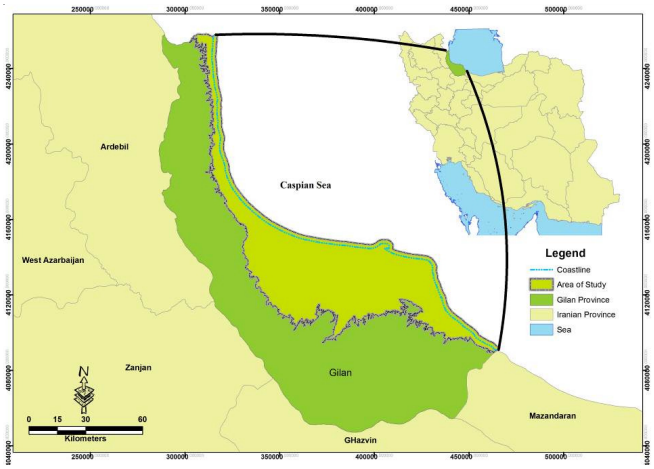

Fig. 1. Specification of study area location in Iran

3) Prioritizing the selected tourism destinations using analytical Hierarchy process (other criteria).

Boolean logics: Based on literature reviews, information availability and priorities of factors, six criteria consisting of topography (slope and aspect), water resource, distance from fault, flora, fauna (protected areas) and soil were selected and structured in the form of a hierarchy. Map layers were weighted based on Boolean logic (one and zero). In other word the logic determines a specific area is good or bad to establish regarded land use. It is not considered the middle range for suitability degrees. AND, OR and NOT are three operators of Boolean logic. Accordingly and extracted commons indicates the areas that contain both conditions, OR which deals with subsets presented places that contain either of the conditions. Meanwhile, NOT operator nullifies the conditions[16].

Analytical Hierarchy process: At this stage, all considered criteria were structured in the form of a hierarchy consisted of four criteria and thirty sub-criteria. The main and sub-criteria applied to run AHP analysis are given in Table-1. As regards the criteria maps have different measurement scales in order to being compared and overplayed with each other, they are to be standardized *i.e.* convert into the same scale. In this study all criteria maps were divided into two main categories; the criteria that their incensement will be followed by prosperity augmentation and the ones whose raise will lead to drop in prosperity. In current research a linear scaling method was applied to make criteria dimensionless. Eqns. 1 and 2 demonstrate the standardization formula for both noted above categories.

$$Y_{ij} = (X_{ij}-X_{j\ min})/(X_{j\ max}- X_{j\ min}) \quad (1)$$

$$Y_{ij} = (X_{j\ max} - X_{ij})/(X_{j\ max}- X_{j\ min}) \quad (2)$$

where, Y_{ij} = standardized value for i^{th} criterion and j^{th} option; X_{ij} = raw score for i^{th} criterion and j^{th} option; $X_{j\ min}$ = minimum score for i^{th} criterion and j^{th} option; $X_{j\ max}$ = maximum score for i^{th} criterion and j^{th} option.

The output of the AHP analysis will classify the study area in two classes; unsuitable (value 0) and suitable (1). WLC (weighted linear combination) method was used to overly the criteria[17-19].

$$S = S\ Wi\ Xi \quad (3)$$

where, S = suitability; Wi = weight of factor i; Xi = criterion score of factor i.

TABLE-1
MAIN AND SUB CRITERIA USED IN SITE SELECTION OF SUSTAINABLE COASTAL TOURISM DESTINATION

Main criteria	Sub criteria
Infrastructure	Road accessibility
	Having electricity power
	Having water supply
	Having telephone mobile service
	Accessibility to medical center
	Accessibility to airport
	Accessibility to harbor
	Having dominant energy of region
	Having sanitary sewage and waste disposal system
Competitiveness and supply	Beach length
	Beach width
	Protection of the coastal landscape beauty
	Construction areas
	Importance of the coastal destination (local, provincial, regional, national and international)
	Spatial development possibility of coastal destination
	Usage possibility of the coastal destination during the year
	Demand volume for the coastal destination in the current situation
	Plan for development of the coastal destination
Socioeconomic	Crowd in coastal destination
	Security
	Population
	Accessibility to restaurant
	Ratio of increasing in the land price
	Ratio of increasing in the inflation
Land use /tourist facilities and service	Accessibility to tourist accommodations
	Accessibility to financial services
	Accessibility to tourist information centers
	Settlement
	Closeness to industrial area
	Closeness to tourist area

There are a wide variety of techniques to weight the criteria[20]. The technique applied in research ahead, is pair wise comparisons presented by Saaty[21] called analytical Hierarchy process. Through weighted linear combination process weights are to be sum to one while in AHP methods weights are calculated using an eigenvector of a square reciprocal matrix based on pair wise comparisons between the criteria. Accordingly, the relative importance of criteria is determined regarding the main goal of decision making. A 9-piont preferences scale demonstrated in Table-2 is applied to rate the criteria. Afterwards, the principal eigenvector of the pair wise comparison matrix was calculated to derive the best set of weights. The final weights were sum to one and the results were applied as an input for WLC equation.

To ensure the consistency of judgments in the pair-wise comparison the consistency index (CI) was applied (Eqn. 4). Considering CI and random index (RI), the consistency ratio (CR) was computed, using Eqn. 5[13,22-24].

$$C.I. = \frac{\lambda_{max} - n}{n - 1} \quad (4)$$

$$C.R. = \frac{C.I.}{R.I.} \quad (5)$$

where, n is the number of items being compared in the matrix; λ_{max}, is the largest Eigen value and RI is a random consistency index derived from a large number of simulation runs and varies upon the order of matrix (Table-2)[13,22,25,26].

The consistency ratio (CR) represents the probability that the matrix ratings were produced randomly. It should be mentioned that the matrices with CR ratings higher than 0.1 must be re-scored[27]. Table-3 gives the preferences matrix to determine the criteria weights.

TABLE- 3
A NINE POINT SCALE PREFERENCES MATRIX[22,23]

Priority	Score
Equally preferred	1
Moderately preferred	3
Strongly preferred	5
Very strongly preferred	7
Extremely preferred	9

*Even numbers presents between-category priorities

The output of the mentioned above procedure will be a map in which sustainable coastal destinations are specified. Finally the coastal destination will be ranked and classified in descending order to indicate the priority of different options ahead of decision makers.

RESULTS AND DISCUSSION

Primary sites for sustainable coastal tourism: Environmental criteria are regarded as an essential parameter affecting the destination selection of sustainable coastal tourism. Accordingly, in the current research the topographic layers including slope and aspect were derived from DEM (digital elevation model) in the environment of GIS software. Water resource is considered an inevitable criterion for being determined a site as coastal tourism destination. In other words, whatever a land is adjacent to a coastline will enjoy more preferences for being selected. Thereby, the areas situated within 2 km buffer zone from the water resource (Caspian sea) gets a weight equal to one while the others are scored zero. Destinations must be farther from the faults in order to reduce hazard. In the current research, a 2 km buffer zone was regarded as fault buffer based on Iran regulations for buffer zones. Accordingly, three zones with different levels of suitability were determined through further analysis including 1 km buffer zone as very dangerous area, 2 km buffer zone as fairly dangerous area and other places as safe zone. Furthermore, the areas situated inside the protected area were scored zero.

Finally, according to the soil characteristics of the region, the entire area was divided into three distinct classifications. unsuitable areas refer the soils having high rate of permeability. Among the unsuitable soils in this category can be pointed to cambisols, haplic and gleyic solonchalks, cambic podzols with karst formations and so on. Fairly suitable areas concern the soils with medium and relatively low rate of permeability

TABLE-2
RANDOM INDEX BASED ON THE NUMBER OF ITEMS BEING COMPARED IN THE MATRIX

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R.I.	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.58

TABLE-4
RESULTS OF PAIR WISE COMPARISONS AND RELATIVE WEIGHTS OF MAJOR AND MINOR CRITERIA

Main criteria	Sub criteria	Weight	Consistency ratio
Infrastructure	Road Accessibility	0.0094	0.07
	Having electricity power	0.0049	
	Having water supply	0.0138	
	Having telephone mobile service	0.0048	
	Accessibility to medical center	0.0169	
	Accessibility to airport	0.0021	
	Accessibility to harbor	0.0015	
	Having dominant energy of region	0.0036	
	Having sanitary sewage and waste disposal system	0.0295	
	Total	0.0865	
Competitiveness and Supply	Beach length	0.0180	0.06
	Beach width	0.0175	
	Protection of the coastal landscape beauty	0.1284	
	Construction areas	0.0475	
	Importance of the coastal destination (local, provincial, regional, national and international)	0.1253	
	Spatial development possibility of coastal destination	0.0392	
	Usage possibility of the coastal destination during the year	0.0802	
	Demand volume for the coastal destination in the current situation	0.0746	
	Plan for development of the coastal destination	0.0237	
	Total	0.5544	
Socioeconomic	Crowd in coastal destination	0.0206	0.04
	Security	0.0892	
	Population	0.0115	
	Ratio of increasing in the land price	0.0571	
	Ratio of increasing in the inflation	0.0591	
	Total	0.2375	
Land use / Tourist facilities and service	Accessibility to tourist accommodations	0.0157	0.06
	Accessibility to restaurant	0.0094	
	Accessibility to financial services	0.0033	
	Accessibility to tourist information centers	0.0060	
	Settlement	0.0035	
	Closeness to industrial area	0.0483	
	Closeness to tourist area	0.0354	
	Total	0.1216	
	Total	1	0.08

consisting of mollic gleysols, calcaric and eutric cambisols, *etc*. the last category is suitable areas wherein soil has very low permeability including clayey soils, shale, calcaric fluvisols. Superposing all of the raster-type layers, the primary sites for sustainable coastal tourism were identified.

The results obtained from the research suggested that of whole study area 15 destinations are suitable to establish sustainable coastal tourism (Fig. 2).

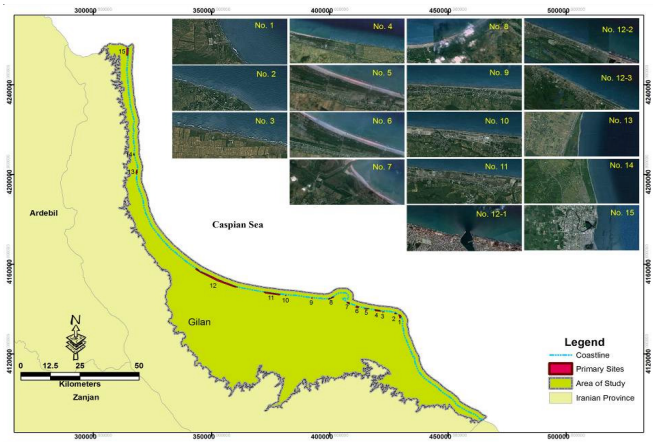

Fig. 2. Primary sites for sustainable coastal tourism

Prioritizing sustainable coastal tourism destination: At this stage all destinations specified in previous stage were re-evaluated using AHP method to determine their priority from different viewpoints. Consequently, some other new criteria were defined which are given in Table-4. Considering relative priority of criteria determined by conducting pair-wise comparisons, a specific weight was designated to each criterion according to their total influence on the whole process of decision making. According to the final weight of each criterion, candidate areas are finally categorized in a final-weight decreasing order.

Prioritizing of sustainable coastal tourism destination regarding infrastructure criteria: The infrastructure in a tourism destination is an essential criterion that cannot be denied. Such basic facilities like roads, sewage systems, communication networks and lots of commercial facilities have been put in place to meet the needs of local residents. In the meanwhile, the components of the infrastructure can be important to visitors as well. Their primary functions are associated with the ongoing daily needs of residents. The results indicated that destinations including coastal park of Anzali (No. 12-1), Sahel recreational complex in astara (No. 15) and the east coast of Kiashahr (No. 7) are the first three priorities of the candidate areas while the other areas have the next priorities (Fig. 3).

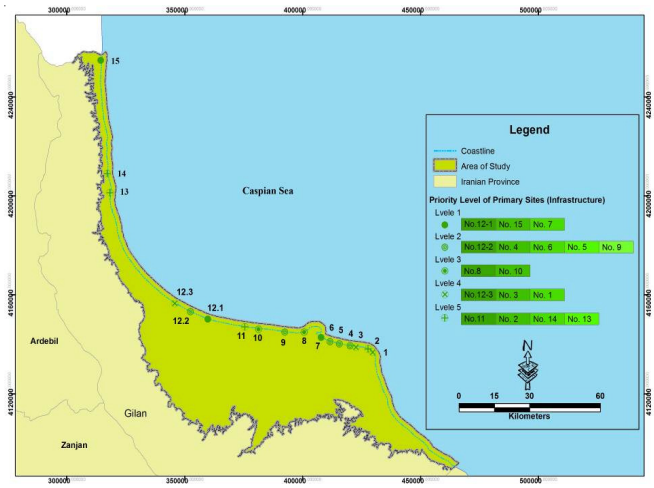

Fig. 3. Priority of sustainable coastal tourism destination regarding infrastructure criteria

Prioritizing of sustainable coastal tourism destination regarding competitiveness and supply criteria: The competitiveness of a destination is defined as the ability to compete in the tourism marketplace efficiently. Sustainability deepens on the ability of a destination in keeping the physical, social, cultural and environmental resources during competence in the marketplace. Results indicated that the areas including coast of Amir Kiasar (No. 6), coast of Labeh Daria (No. 5), coast of Anbarsar (No. 4) and east coast of Kiashahr (No. 8) are the first four priorities of the candidate areas and the other areas enjoy the next priorities (Fig. 4).

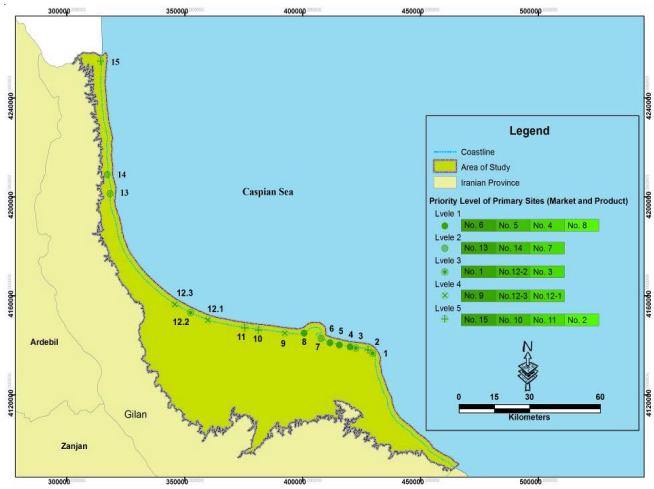

Fig. 4. Priority of sustainable coastal tourism destination regarding competitiveness and supply criteria

Prioritizing of sustainable coastal tourism destination regarding socio-economic criteria: The success of a destination depends on its ability to give enough attention to socio-economic features including crowd in coastal destination, security, population, ratio of increasing in the land price and ratio of increasing in the inflation. The obtained results indicated that areas; coast of Amirabad town (No. 1), east coast of Dastak (No. 2), north coast of Dastak (No. 3), coast between Khotbehsara and Sost (No. 14) and coast of Asalem (No. 13) are the first five priorities of candidate areas and the other areas are placed at the next priorities (Fig. 5).

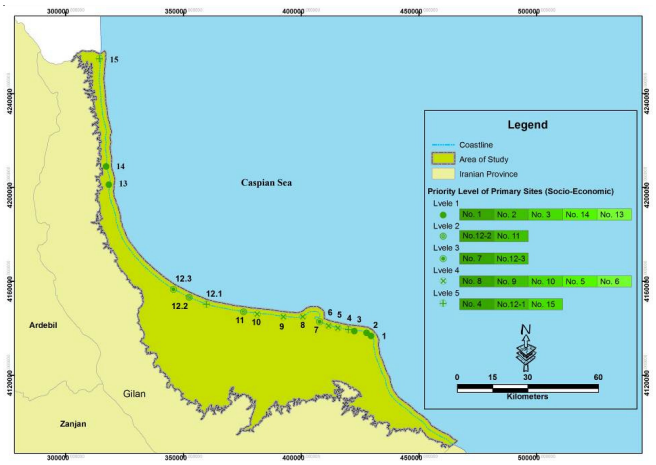

Fig. 5. Priority of sustainable coastal tourism destination regarding socio-economic criteria

Prioritizing of sustainable coastal tourism destination according to land use and tourist service criteria: As far as tourism industry involves a combination of activities, services and industries within a travel experience, it is necessary to identify and categorize the required tourist services in a destination. The offering manner of such services determines the success rate of each destination. The obtained results suggested that areas including Sahel recreational complex of Astara (No. 15), east coast of Kiashahr (No. 7), coastal park of Anzali (No. 12-1) and coast of Amir Kiasar (No. 6) are the first four priorities of candidate areas and the other areas are placed at the next priorities (Fig. 6).

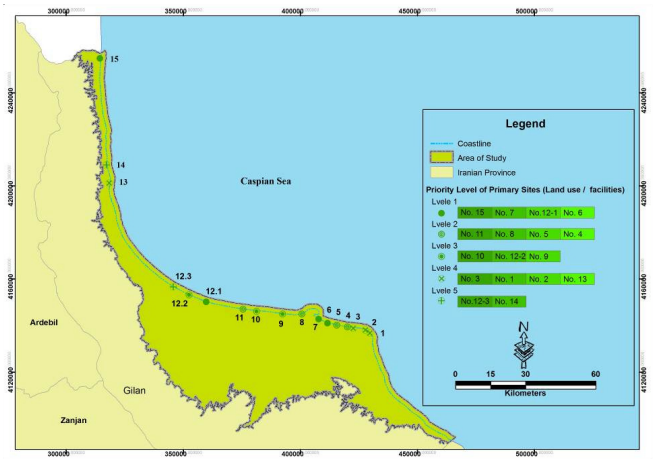

Fig. 6. Priority of sustainable coastal tourism destination regarding land use and tourist service criteria

Final prioritization of sustainable coastal tourism destination: According to the final weight of each criterion, the destinations were finally categorized in a final-weight decreasing order. The obtained results indicated that areas including coast of Amir Kiasar (No. 6), coast of Labeh Darya (No. 5) and east coast of Kiashahr (No. 7) are the first three priorities of the candidate areas and the other areas have the next priorities (Fig. 7).

Conclusion

Caspian sea with an area of approximately 371,000 km^2 is the greatest lake in the world. It is shared between the countries;

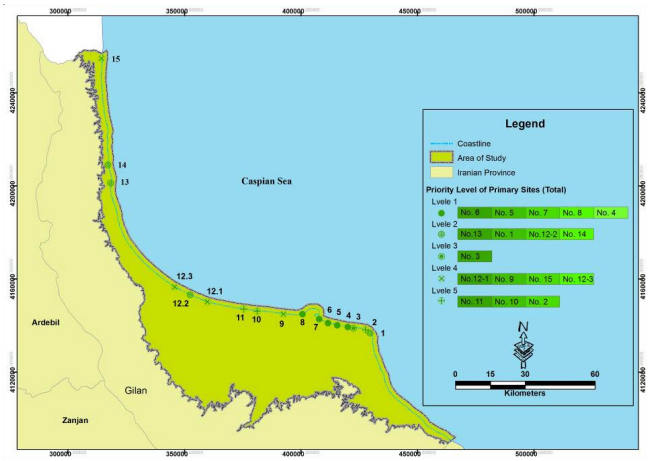

Fig. 7. Final priority of sustainable coastal tourism destination

Iran, Russia, Turkamenistan, Qazaqistan and Azarbayjan. In the meanwhile, its southern shores belong to Iran. The coastal strip of the Caspian sea with its high humidity and hot sunny weather offers tourists an outstanding resort. Such a unique feature of the area has led to excessive use regardless of carrying capacity. Therewith, there is an urgently need for site selection analysis to determine new destinations based on the sustainable development criteria. Study ahead presents a combined approach of GIS and multi criteria evaluation (MCE) through the site selection analysis. The workflow shows how effective multi criteria evaluation and Boolean logic are in determining sustainable coastal tourism development.

Amongst the main objectives of the research can be pointed to selecting suitable sites for sustainable coastal tourism destination using environmental criteria (Boolean logics) and determining priority of suitable sites for sustainable coastal tourism destination by means of the other secondary criteria (analytical Hierarchy process). Besides, the study shows practically differences between priorities of the considered destination from various viewpoints; economist and environmentalist. Due to the sensitivity of the sustainable coastal tourism affair as well as the fragile ecosystem of the Caspian sea it is highly recommended to be regarded enough research budget to form a work group consisted of scientists in the fields of economy, social science and environment to investigate the barriers ahead of achieving sustainable coastal tourism development. Sufficient financial and scientific supports are required to overcome the current challenges in the area.

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