

Full Length Research Paper

Marine recreational activity impact on Kengting National Park, Taiwan

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This study applies an analytical hierarchy process (AHP) to evaluate 3 indices (real circumstances, economic development, and socioculture) and 18 factors relating to the impact of marine recreational activities on Kengting National Park, Taiwan. The 22 experts (civil servants, scholars, and local practitioners) who participated in this study expressed identical opinions on the index priorities (real circumstances is ranked first, followed by economic development and socioculture), but the ordering of factors differs because of participants' various roles and perspectives. Consequently, it is necessary of establishing an objective recreational impact index and developing a long-term monitoring program. Because the impact of marine recreational activities is a complex issue, future research should acquire a broader range of research participants and analyze the relationships among additional impact factors to obtain results that are more comprehensive and representative, and to ensure that the development of conservation and recreation is sustainable.

Key words: Recreational impact, sustainable tourism indicator, analytical hierarchy process.

INTRODUCTION

The benefits from tourism development include increased employment opportunities and local revenue, improved resident living standards, and the promotion of culture. However, tourism development also has many negative influences, such as environmental pollution, tourist crowds, landscape damage, resource exhaustion, cultural change, price inflation, and violent crimes (Andriotis and Vaughan, 2003; Freitag, 1994; Haralambopoulos and Pizam, 1996; King et al., 1993; Liu and Var, 1986; Mason and Cheyne, 2000). Therefore, it is crucial to investigate the impact of recreational activities on tourism development.

The purpose of national parks is not only to protect natural landscapes, wildlife, and historic ruins, but also to provide recreational space. Therefore, reaching the goals of preservation and recreation, it is important to understand the environmental impacts of recreational activities. Kengting National Park is Taiwan's first national park and is the only one that covers land and sea areas in the Island. The park is located in the tropics and is almost

completely surrounded by the sea. It is a famous international tourist attraction visited by more than 4 million tourists each year. At the same time of tourism promotion and development, investigating the impacts of the recreational environment of Kengting National Park is essential for maintaining a balance between environmental preservation and recreational development.

In order to inquire the marine recreational activity impact, this study is based on the Nanwan aquatic sports area of Kengting National Park, Taiwan, and employs the AHP to conclude the professional suggestions from specialists' investigation. The results of this study could serve as a reference for sustainable ecotourism promotion and policy development.

RECREATIONAL IMPACTS ON KENGTING NATIONAL PARK

Recreational impacts are caused by complex interactions

among tourists, residents, government, and the tourism industry (Chen and Chen, 2007). Previous recreational impact research has evaluated social-cultural, economic, and environmental impacts using impact scales (Mason and Cheyne, 2000). Other studies have discussed the positive and negative influences of tourism from the various political, economic, social, and environmental perspectives and developed an integrated management evaluation index (Andriotis, 2002; Choi and Sirakaya, 2006). Many reviews have shown that sustainable tourism development is founded on environmental conservation, economic investment, and social justice; hence, these three critical factors are formed as an integrative and reciprocal relationship (Giddings et al., 2002; Ko and Stewart, 2002; Pipinos and Fokiali, 2009; Spangenberg, 2004).

Taiwan is located in the Pacific region and the government is enthusiastic at promoting marine recreation in recent years; consequently, Kengting National Park is one of the marine scenic areas in Taiwan. The positive and negative impact factors of recreational activities on the Kengting area that have been discussed from the perspectives of socioculture, real circumstances, and economic development, and have got some specific outcomes (Table 1). The factors presented by previous studies provide theoretical research dimensions for evaluating how the impact of recreational activities corresponds to actual circumstances (Wang et al., 2007; Wu, 2003).

METHODOLOGY

Study area

Kengting National Park is surrounded by the Pacific Ocean, the Taiwan Strait, and the Bashi Channel. It covers approximately 18,083.5 ha of land, and 15,185.15 ha of sea. The environment is composed of coral cliffs, mountains, lakes, grasslands, sand dunes, tropical forests, and so on. Nanwan (South Bay) is located in Kengting National Park and is highly suitable for water-based recreational activities. It has a beautiful coastline, and a soft white sand beach stretches 600 m. Therefore, this study selected this area as the research location (Figure 1).

Data collection

AHP can be applied to evaluate various elements contrasting each other at a time to assist in policy decision making (Levary and Wan, 1998). A complex decision problem is decomposed into a hierarchy of more easily comprehended and analyzed sub-problems to achieve a proper result, so it is used in a wide variety of fields (Teng and Tzeng, 1989a; Vaidya and Kumar, 2006).

The frame of questionnaire was designed referring to AHP and related researches (Bodin and Gass, 2003; Levary and Wan, 1998; Saaty, 1990a; Teng and Tzeng, 1989b; Vargas, 1990). All questions were based on Table 1 and the circumstance of the study area, Kengting National Park. The content validity was confirmed by professionals and researchers (Table 2).

Local recreation-related practitioners, government officers of Kengting National Park, and the professors or academicians who are studying in related issues or teaching in the departments of

recreation or tourism, were selected as study participants by using purposive sampling method for data collection, in a face-to-face interview during March of 2012. After rejecting invalid questionnaires and testing the consistency and reliability one by one (Lin et al., 2011), 22 effective questionnaires remained, including 13 from practitioners, 3 from officers, and 6 from scholars.

Data analysis

To successfully apply the AHP, the hypothetical assumptions should accord with the following four general principles of hierarchy structure: expectation/completeness, homogeneity, reciprocity, and independence (Vargas, 1990). There are two steps in the AHP: (a) hierarchy development and (b) evaluation. This study proceeded as follows (Subramanian and Ramanathan, 2012):

Problem definition

Comprehending the impact of marine recreational activities according to the extant literature and defining the problem. The identified impacts are environmental, sociocultural, and economic development.

Model the problem as a hierarchy

In accordance with Saaty’s suggestion (Saaty, 1990b) and for reasonable and consistent comparison, the comprehension of problem structures and alternatives is necessary, and no more than 7 factors must be in each hierarchy. This study built 3 levers based on the literature review and study area circumstances (Table 2).

Questionnaire design and survey

Table 2 shows the foundational hierarchy structure for designing the AHP questionnaire and forming the criteria, including 3 primary indices and 18 factors. After questionnaires were designed and surveyed, the data were converted into 9-point scale numerical values suggested by Bodin and Gass (2003); Saaty (1990c). Then the alternative cases were evaluated, and the factor priority is determined by pairwise comparison against the goal for relative importance.

Pairwise comparison matrix conduction

In a hierarchy diagram, there are n factors (A1, A2....., An) for each hierarchy, and the priority is obtained according to the upper hierarchy indices. “*a_{ij}*” is the reciprocal value of *A_i* and *A_j*, and the formula is applied to obtain the relative importance of factor *i* to factor *j*.

If all priorities are obtained, the pairwise comparison matrix can be shown as

$$A = [a_{ij}] = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{bmatrix} \tag{1}$$

Table 1. Recreational impacts on Kengting area (Wang et al., 2007; Wu, 2003).

Impact factor	Positive	Negative
Social and cultural impact	<ul style="list-style-type: none"> - The increasing of human interaction - The reducing of out-migration rate 	<ul style="list-style-type: none"> - The tense relationship from commercial competition - The change of original livelihood activity - The increasing of disorder and illegal manner
Environmental impact	<ul style="list-style-type: none"> - The improvement of public facilities - The improvement of local activities - The preservation of community environment 	<ul style="list-style-type: none"> - The improper behaviors from tourists - The destroy of environment - The stealing of natural resource - Overdevelopment
Economic impact	<ul style="list-style-type: none"> - The increasing of local revenue - The promotion of incoming investment - The development of related industry 	<ul style="list-style-type: none"> - The inflated price - Peccant buildings - Mobile vendors - Unapproved hotels - Illegal plucking and hunting

Table 2. Questionnaire contents.

Level I	Level II	Level III
	Main-items	Sub-items
Recreational impacts	Environmental impact	The original landscape is destroyed after the development of marine recreation
		The waste in the ocean has increased after the development of marine recreation
		The water pollution has increased after the development of marine recreation
		The noise pollution getting worse after the development of marine recreation
		The ocean ecology is destroyed after the development of marine recreation
	The beach trash has increased after the development of marine recreation	
Social and cultural impact	The community development getting better after the development of marine recreation	
	The values of residents is changing after the development of marine recreation	
	The interaction between residents and tourists is increasing after the development of marine recreation	
	The life's pace of residents is changing after the development of marine recreation	
	The life's style of residents is changing after the development of marine recreation	
Economic impact	The out-migration is reducing after the development of marine recreation	
	The job opportunity is increasing after the development of marine recreation	
	The economic development is promoting after the development of marine recreation	
	The living price is raising after the development of marine recreation	
	The season revenue is unequal after the development of marine recreation	
		The type of local industry is changing after the development of marine recreation
		The incoming investment is increasing after the development of marine recreation

$$a_{ij} = \frac{w_i}{w_j} \quad (i, j=1,2,3,\dots,n)$$

$$a_{ji} = \frac{1}{a_{ij}} = \frac{w_j}{w_i} \quad (i, j=1,2,3,\dots,n)$$

$$w_i = \frac{1}{n} \sum_{j=1}^n \frac{a_{ij}}{\sum_{i=1}^n a_{ij}} \quad (i, j=1,2,3,\dots,n)$$

$$\bar{w} = (w_1, w_2, \dots, w_n)^T$$

Calculate eigenvectors and eigenvalues

To get a ranking of priorities from the pairwise matrix comparison, the eigenvectors were computed. If A is a n×n consistent matrix, according to the theory of numerical analysis, Equation (2) shows the relationship between matrix A, eigenvector and eigenvalues λ

$$A \bar{w} = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \dots & \dots & \dots & \dots \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{bmatrix} \begin{bmatrix} w_1 \\ w_2 \\ \dots \\ w_n \end{bmatrix} = \lambda \begin{bmatrix} w_1 \\ w_2 \\ \dots \\ w_n \end{bmatrix} \quad (2)$$

Equation (3) is obtained after transposing Equation (2).

$$(A - \lambda I) \bar{w} = 0 \quad (3)$$

If $\bar{w} \neq 0$, the eigenvector \bar{w} is also called a priority vector. The maximum eigenvalue is λmax. Comparing matrix A and priority vector, Equation 4 is obtained.

$$A \bar{w} = \lambda_{max} \bar{w} \quad (4)$$

Due to $\bar{w} \neq 0$ and $1 \bar{w}_1 + 2 \bar{w}_2 + \dots + n \bar{w}_n = 1$, the λmax can be obtained by numerical analysis theory.

Consistency check

The reciprocal of a matrix can be verified using the consistent index (CI).

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (5)$$

If CI=0, the judgment is consistent. If CI>0.1, the judgment is deviated and inconsecutive. If CI≤0.1, the judgment is deviated but acceptable. When the situation became too complex to determine directly, Saaty (1990c) proposed the appropriate consistency index called the random index (RI) (Table 3). The consistency ratio (CR) is a comparison between the CI and RI, and is expressed as

$$CR = \frac{CI}{RI} \quad (6)$$

If CR≤0.1, the consistency is acceptable.

Correction for consistency

If CR>0.1, the matrix is inconsistent; therefore, it should be revised to be acceptable or rejected. Because the cost of re-conducting the survey is too high and the results may be inconsistent, we can

change the primary indices and repeat the computation until the consistency is acceptable by using

$$\sum_{i=1}^n |a_{ij} - w_i / w_j| \quad (7)$$

Consistency check for overall hierarchy

The discussed consistency check is evaluated in one level. If the problem is with multi-hierarchy, we must check the overall consistency by applying the CR of the hierarchy (CRH) (Teng and Tzeng, 1989a).

Consistency index of hierarchy (CIH) = Σ(priority vectors of each level) × (CI of each level)
 Random index of hierarchy (RIH) = Σ(priority vectors of each level) × (RI of each level)
 Consistency ratio of the hierarchy (CRH) = CIH/RIH

Compute the composite priority

Finally, the overall priority is calculated in the entire hierarchy using the geometric mean.

RESULTS

22 effective questionnaires were obtained from 13 practitioners, 3 officers, and 6 scholars by using purposive sampling method. After checking for consistency, the CRH was <0.1, and the result shows that the factors are correlated (Table 4).

This study divided participants into two groups to appropriately distinguish between them. One group comprised officers and scholars to represent the professional opinions from outsiders, and the other was composed of related practitioners to represent the local standpoints. The comprehensive evaluation is ranked by the weight ratio of overall indicators. Table 5 shows the results. The weight ratio ranked priorities of scholars and officers differed from those of related practitioners; however, the ranking is consistent. Environment is ranked as the highest priority, followed by economic development and socioculture.

This result shows that the most critical impact from marine recreational activity development is the environment. Therefore, long-term monitoring of the environment is essential. Although the local economy is visibly affected by the millions of tourists that visit Kengting National Park every year, but the sociocultural change is long term and invisible; therefore, its priority is relatively low (Schluter and Var, 1988).

The further discussion on environment priority, Table 6 shows that the point of view is different from subjects. The overall influence on marine ecology and original landscape is the highest priority for scholars and officers, and related practitioners ranked the issue of beach

Table 3. The lookup table of RI (Saaty, 1990c).

n	1	2	3	4	5	6	7	8	9	10	11
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

Table 4. Consistency test of overall AHP levels.

Indexes	Level I		Level II	
	Recreational impact	Environmental impact	Social and cultural impact	Economic impact
λ_{\max}	3.0700	6.3500	6.3600	6.3600
CI	0.0400	0.0700	0.0700	0.0700
CR	0.0600	0.0600	0.0600	0.0600
CIH	0.0100	0.0150	0.0120	0.0010
RIH	0.5800	1.2400	1.2400	1.2400
CRH	0.0200	0.0121	0.0096	0.0006

Table 5. The weight ratio of overall indicators on level II.

Impact factor	Weight		Standard weight		Ranking	
	Scholar and official	Related profession	Scholar and official	Related profession	Scholar and official	Related profession
Environmental impact	0.55	0.34	0.55	0.46	1	1
Social and cultural impact	0.10	0.16	0.10	0.21	3	3
Economic impact	0.35	0.25	0.35	0.33	2	2

Table 6. The weight ratio of environmental impact indicators.

Impact indicator	Weight		Standard weight		Ranking	
	Scholar and official	Related practitioners	Scholar and official	Related practitioners	Scholar and official	Related practitioners
The original landscape is destroyed	0.15	0.10	0.19	0.13	2	4
The waste in the ocean has increased	0.13	0.18	0.16	0.24	4	2
The water pollution has increased	0.10	0.13	0.13	0.17	5	3
The noise pollution getting worse	0.06	0.05	0.07	0.07	6	6
The ocean ecology is destroyed	0.23	0.09	0.28	0.11	1	5
The beach trash has increased	0.14	0.22	0.17	0.28	3	1

pollution caused by marine recreation activity as the highest priority.

This result shows that the macroscopic viewpoints of outsiders consider the damage of marine ecology and original landscape mainly, but local practitioners concern the problems of the increasing beach trash and the waste in the ocean. The correlation between pollution and ecological destruction has been identified by previous research (Korca, 1996). Therefore, we may consider reducing the pollution from number of activity participants,

area, time, types, or equipment for sustainable development of local recreational environment. Moreover, the results also show that the environment is less affected by noise pollution; therefore, it is not regarded as a current issue.

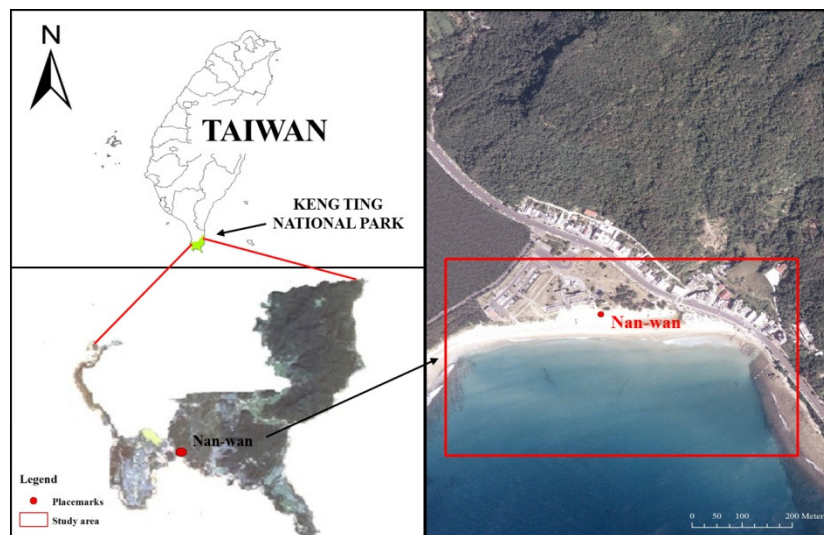
Regarding the sociocultural impacts (Table 7), all participants highlighted the change of a view of value of residents. In fact, it is obvious when the recreational activities were promoted, the first influence is perception of values, followed by behavior, which causes

Table 7. The weight ratio of social and cultural impact indicators.

Impact indicator	Weights		Standard weights		Ranking	
	Scholar and official	Related practitioners	Scholar and official	Related practitioners	Scholar and official	Related practitioners
The community development getting better	0.16	0.20	0.20	0.21	3	2
The values of residents is changing	0.18	0.23	0.23	0.29	2	1
The interaction between residents and tourists is increasing	0.04	0.05	0.05	0.15	6	4
The life's pace of residents is changing	0.09	0.11	0.11	0.09	5	6
The life's style of residents is changing	0.19	0.24	0.24	0.15	1	3
The out-migration is reducing	0.13	0.16	0.16	0.11	4	5

Table 8. The weight ratio of economic impact indicators.

Impact indicator	Weight		Standard weight		Ranking	
	Scholar and official	Related practitioners	Scholar and official	Related practitioners	Scholar and official	Related practitioners
The job opportunity is increasing	0.24	0.19	0.29	0.25	1	2
The economic development is promoting	0.23	0.23	0.28	0.30	2	1
The living price is raising	0.08	0.10	0.10	0.13	5	4
The season revenue is unequal	0.07	0.07	0.08	0.08	6	6
The type of local industry is changing	0.10	0.11	0.13	0.14	3	3
The incoming investment is increasing	0.09	0.08	0.12	0.10	4	5

**Figure 1.** The study area.

organization to become well-developed, community study and life's pace changes. Pipinos and Fokiali (2009) indicated that the multi-effects on economic, psychology and social aspects are reached easily if local residents participate and conduct the tourism activities and share the benefits from these activities. Therefore, it is important for local residents to build a positive and proper

recreation attitude and behavior. Meanwhile, the communication between tourists and residents is no help to enrich the experience mutually. This may be because of the prosperous information technology and rapid mass media; people can communicate without direct contact.

Economic development is known to create employment opportunities (Table 8); however, marine recreational

activity also changes the type of local industry. Local industry shifts from primary production (agriculture and fishing industries) to services (tourism). Furthermore, recreational activities do not increase the number of investments from outside of the area (ranking no. 4 and 5), but in fact, the National Museum of Marine Biology and Aquarium and numerous hotels in Kengting National Park are invested by outsiders. This circumstance is not addressed by the results, therefore, further discussion is required.

Besides, according to the government's population employment investigation, the ratio of residents' employment on agricultural and fishing industries is greater than on other industries. Only the employment of the service industry are increasing at some tourist attractions. The result shows that the real situation is not revealed by the interviewers and corroborates the study which indicated the economic prosperity and employment increasing from the development of tourism and recreation are not full-scale (Freitag, 1994). This result may be a factor of outflow of the local labor force, and also is an issue worth for further study.

Conclusion

Taiwan, although is an island, the water-based recreational activities is just prosperously growing. The type, intensity, and influence of impacts of marine recreational activity require effective control and regulation. This study applied judgmental sampling to data obtained from 22 participants (scholars, officers, and related practitioners). The results indicate that the most significant is environmental, followed by economic, and then sociocultural. Because roles and perspectives of participants differ, the priorities of sub-factors differ among scholars, officers, and related practitioners. Therefore, building the impact index for the long-term quantitative monitoring of Kengting National Park is currently a critical issue.

The causes of marine recreational impacts are complex. This study has considered the views of scholars, officers, and related practitioners; however, no tourists or residents were included. Moreover, the judgmental sampling is the sampling method in this study. Thus, the samples may be insufficient which may lead to the inconsistency of the overall results of the national park. Furthermore, the sequence of these impact factors have been sorted and ranked, but the correlation among them still requires further study and discussion. To obtain a more comprehensive and representative finding, it is crucial that residents and tourists should be included in interviews, and combine other analysis methods in study (García-Melón et al., 2012).

Kengting National Park is a precious recreational site in Taiwan that attracts millions of tourists to visit every year. Despite the different considerations of local related practitioners, officers, and scholars on the impact of marine recreational activities, their goal of sustainable

development is shared. How to develop the marine recreational activities in constructive and sustainable is a significant issue that requires further research and discussion (Reza and Abdullah, 2011).

REFERENCES

- Andriotis K (2002). Local authorities in Crete and the development of tourism. *J. Tourism Stud.* 13(2):53-62.
- Andriotis K, Vaughan DR (2003). Urban residents' attitudes towards tourism development: the case of Crete. *J. Travel Res.* 42(2):172-185.
- Bodin L, Gass SI (2003). On teaching the analytic hierarchy process. *Comput. Operat. Res.* 30:1487-1497.
- Chen FD, Chen PT (2007). Tourism impacts as perceived by its residents. *Tourism Manag. Res.* 6(2):83-97.
- Choi HC, Sirakaya E (2006). Sustainability indicators for managing community tourism. *Tourism Manag.* 27(6):1274-1289.
- Freitag TG (1994). Enclave tourism development: for whom the benefits roll? *Ann. Tour. Res.* 21(3):538-554.
- García-Melón M, Gómez-Navarro T, Acuña-Dutra S (2012). A combined ANP-delphi approach to evaluate sustainable tourism. *Environ. Impact. Assess. Rev.* 34:41-50.
- Giddings B, Hopwood B, O'Brien G (2002). Environment, economy and society: fitting them together into sustainable development. *Sustain. Dev.* 10:187-196.
- Haralambopoulos N, Pizam A (1996). Perceived impacts of tourism: the case of Samos. *Ann. Tourism Res.* 23(3):503-526.
- King B, Pizam A, Milman A (1993). Social impacts of tourism: host perceptions. *Annals Tourism Res.* 20(4):650-665.
- Ko DW, Stewart WP (2002). A structural equation model of residents' attitudes for tourism development. *Tourism Manag.* 23(5):512-530.
- Korca P (1996). Resident attitudes toward tourism impacts in Antalya, Turkey. *Annals Tourism Res.* 23(3):695-697.
- Levary RR, Wan K (1998). A simulation approach for handling uncertainty in the analytic hierarchy process. *Eur. J. Operat. Res.* 106(1):116-122.
- Lin HL, Wu ST, Chen CT, Wu CY (2011). A value assessment of sustainable indicators for aboriginal community developing ecotourism. *J. Leisure, Tourism Sport Health* 2(1):52-74.
- Liu JC, Var T (1986). Residents attitudes toward tourism impacts in Hawaii. *Ann. Tourism Res.* 13:193-214.
- Mason P, Cheyne J (2000). Residents' attitudes to proposed tourism development. *Ann. Tourism Res.* 27(2):391-411.
- Pipinos G, Fokiali P (2009). An assessment of the attitudes of the inhabitants of Northern Karpathos, Greece: towards a framework for ecotourism development in environmentally sensitive areas. *Environ. Dev. Sustain.* 11:655-675.
- Reza MIH, Abdullah SA (2011). Regional index of ecological integrity: A need for sustainable management of natural resources. *Ecol. Indic.* 11:220-229.
- Saaty TL (1990a). *The analytic hierarchy process: planning, priority setting, resource allocation* (2nd ed.). Pittsburgh: RWS Publications (1st ed. in 1980).
- Saaty TL (1990b). *Decision making for leaders-the analytic hierarchy process for decisions in a complex world.* Pittsburgh: RWS Publications.
- Saaty TL (1990c). *Fundamentals of decision making with the analytic hierarchy process.* Pittsburgh: RWS Publications.
- Schluter R, Var T (1988). Resident attitudes toward tourism in Argentina. *Ann. Tourism Res.* 15:442-445.
- Spangenberg JH (2004). Reconciling sustainability and growth: factors, indicators, policies. *Sustain. Dev.* 12:74-86.
- Subramanian N, Ramanathan R (2012). A review of applications of analytic hierarchy process in operations management. *Int. J. Prod. Econ.* 138:215-241.
- Teng JY, Tzeng GH (1989a). The theory and application of analytic hierarchy process (I). *J. Chin. Stat. Assoc.* 27(6):13707-13724.
- Teng JY, Tzeng GH (1989b). The theory and application of analytic hierarchy process (II). *J. Chin. Stat. Assoc.* 27(7):13767-13786.

Vaidya OS, Kumar S (2006). Analytic hierarchy process: an overview of applications. *Eur. J. Operat. Res.* 169(1):1-29.
Vargas LG (1990). An overview of the analytic hierarchy process and its applications. *Eur. J. Operat. Res.* 48(1):2-8.
Wang WC, Wu CC, Wu CY (2007). A Study of water-based recreation conflicts in Kengting National Park. *Ann. Leis. Recreat. Res.* 2(1):103-131.

Wu CY (2003). An investigation of recreational conflicts among participants in coastal recreational activities. *Sports Exerc. Res.* 5(2):51-63.