Multicriteria Evaluation and Local Environmental Planning for Sustainable Tourism

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1 Introduction: Evaluation and Construction of a New Development Framework for Tourism

During the last 30 years, the successful development of a variety of regions has been paralleled by growing confidence in tourism as a catalyst for economic and cultural development. In a classical perspective, economists in developing countries have been supporting policies for a higher level of tourist activities and revenues in the hope of obtaining overall higher performances in the whole economic system.

However, there have been many changes in this paradigm. Recent advanced studies on the concept of integrated tourist development (Pearce, 1989; Wall, 1997) reveal how tourism per se can not be indicated as a factor of development, as it has to be linked to the other sectors of the economy. On the other hand, research findings (APDR, 2000) also indicate that integrated tourist development involves many stakes and interests that most of the time are conflicting. Butler (2000) notes that integration in tourism is often regarded as a common purpose in many research studies on environmental policy and planning.

Indeed, integration is frequently associated with sustainability. In the light of many institutional reports, as long as theobjectives of the

development are generally linked to the human and material resources embedded in the local context, sustainable development can then be guaranteed by the positive attitude of local communities towards social learning and self-organizing.

In the perspective of policy makers and planners, addressing local societies to sustainability calls for the adoption of methodologies and indicators able to capture hardly measurable properties conveyed in the issues at hand, such as tourism integration, community empowerment, and self-reliance. In this realm, multicriteria analysis represents a suitable methodology to tackle complexity, as it provides a framework for constructing, aggregating, and managing complex indicators.

On the basis of this background, the aim of this chapter is the construction of a multicriteria methodology suited for measuring the level of achievement of the integration of tourism within the whole economic system. The methodology, based on a combination of two multicriteria tools, the Regime method and the analytic hierarchy process (AHP), is then tested on the assessment of the attitude to sustain policies towards tourist integrated development demonstrated by seven municipalities along the southern coast of Sardinia, Italy.

This chapter is structured as follows. The remainder of this section deals with innovative approaches to tourist policies for coastal environments as a catalyst for development in the context of sustainability and with the assessment of composite indicators able to analyze complexity. In Sect. 2, the parts of the methodology adopted are described. Then, in Sect. 3 the results are discussed and screened by means of sensitivity analysis. In Sect. 4, the conclusions of the chapter are proposed and confronted with new research directions.

1.1 New Developments of Coastal Planning: Pushing Economic Activities by Environmental Protection

According to classical economic approaches, tourism per se is able to bring advantage to the economies of developing countries. The main assumption of these theories is that especially international tourism is able to generate a higher level of consumption, thus leading to an overall higher level of disposable income (Krapf, 1961). As a consequence, since the end of the 1960's many developing countries have been introducing international tourism into their economic system. Examples are the Caribbean Islands, Mexico, Thailand, Indonesia, the Maldives, and Spain. In summary, the following characteristics can be attributed

to the traditional approach to tourist policies: autarchy of tourist entrepreneurship; internationalization; and lack of perception of the local culture. One of the main results of these practices is the perception of an initial lack of concern of tourist ventures for local environments and ecosystems.

On the other side, Coccossis and Nijkamp (1996), reflecting on the interaction between tourism and environment, emphasize that tourist activities, if correctly conceived, might actually contribute to the protection of the natural environment. They point out that classical economic frameworks, such as the internalization of the externalities, do not seem to solve the dilemma of tourist impacts.

In the same perspective, Briassoulis (1996, p. 33) claims that mainstream economic analysis is not adequate to support tourism policy decisions because tourism is not a typical economic sector or activity as is assumed by this kind of analysis. When tourism is conceptualized as a complex and multifaceted socio-economic activity, more integrated analytical approaches are required to represent the interrelatedness among the tourism-related economic sectors and environment. A new paradigm in tourism economics is required, because today tourism is recognized worldwide as a strategic sector of the economy.

The tourist experience is indeed a multifaceted phenomenon. Many research studies (Ryan, 1998) have identified the main characteristics of leisure traveling. In the last few years, the technological change, the widening of leisure time and the specialization of tourism demand have introduced new elements into the classical patterns of tourist sector planning. The idea is that mono-cultural tourism based on the exploitation of singular beauties of a country is no longer considered sustainable. It seems that an innovative development model should involve diversifying activities and smoothing out seasonal fluctuations in demand.

Butler (2000, p. 50) proposes the term "complementarity", which is similar to sustainable tourism, in that it is an integrative concept. Complementarity is the optimal level of the relationship between tourism and other resource activities. This term implies that tourism and other activities are not only in relative harmony with each other in the destination region, but in fact enhance each other by their mutual presence. Accordingly, as many research studies point out (Law, 1993; Shaw and Williams, 1994; Harvey, 1989; Ashworth and Voogd, 1990;

Urry, 1990; Poon, 1989), there has been an increase of tourism initiatives based on local urban and rural entrepreneurship. Usually these processes are managed along three main strategies: tourism promotion; image restructuring; and place marketing. Many times, integration of tourism activities with the local *milieu* is based on diversification of local economies, de-industrialization, and fragmentation of ownership.

1.2 Towards Tourist Complementarity in the Framework of Sustainability

In the perspective of policy makers and planners, understanding the level of achievement of tourist integration with respect to the remaining economic sectors and readdressing local strategies and operative actions accordingly represent major issues. Planning and managing new sustainable tourist destinations imply a conspicuous demand of contextual knowledge and information retrieval. The assessment of the characteristics of tourist entrepreneurship and its relations with local economies, environment and societies is a primary yet complex activity focused on benchmarking actual and potential performance improvements, recommending policy actions, and suggesting financing strategies.

This is why evaluation plays a central role in the identification of suitable conditions for tourist development for contemporary societies. In many countries, increasing concerns for environmental protection and sustainable development have recently led to the inclusion in central policy programs of procedures for evaluating the compatibility between projected activities and the environment.

According to recent studies, relating soundly productive tourist ventures and their economic activities with local environmental systems as well as developing efficacious communication strategies proved to become success factors for tourist destinations. Mihalic (2000) stresses that environmental management of a destination, when correctly conceived, constitutes a determinant factor for its success and attractiveness. In the same direction, Lee (2001) stresses the potential comparative advantage of sustainable tourism destinations. Crucial components of a path toward sustainability for tourism destinations are actions for implementing environmental management systems (EMS), ecolabelling, local agenda 21 (LA21), and cleaner production (Lee, 2001, p. 316).

According to De Montis and De Montis (2004), two families of environmental evaluation procedures characterize the set of tools able to support decision making: mandatory procedures such as environmental impact assessment (EIA) and strategic environmental assessment (SEA), and voluntary ones, such as environmental quality certification. Rao (2000) points out that many small and medium tourist ventures, as well as international organizations, show an interest in environmental certification. The International Standard Organization (ISO) in 1996 developed the 14.000 series of regulations dedicated to the environmental area. The main concerns of these directives are: specifications for pollution prevention and environmental management; environmental auditing; environmental performance evaluation; life-cycle assessment; the environmental aspects of product standards; and environmental labeling (Rao, 2000). The diffusion of tourism ecolabels has affected at the first stage developed countries, while recently also in developing countries a number of small size tourism entrepreneurs display a positive tendency to acquire those voluntary certifications (Sasidharan et al. 2002).

Many institutions stress that evaluation of the environmental impacts has to become a requirement for the acceptability of territorial projects. As the UNI ISO 14000 regulations and many other homologous documents also associated with LA21 suggest, each territory can be assigned a certain level of quality and can thus more easily access the network European funding for tourism. The UNI ISO 14001 regulation, in particular, refers to activities carried out by an organization, with the aim to receive the Certificate of Environmental Quality about its environmental management system (EMS). According to a recent handbook (RINA, 1999), in Italy this Certificate is issued after the evaluation of the environmental policy program of the candidate organization. The aim of this international standard regulation is to contribute to environmental protection and to pollution prevention, in line with the needs of the local socio-economic context (UNI, 1996). According to the Introductory Guide to the application of UNI EN ISO 14001 to the environment management system of a municipality (RINA, 1999), the Italian Communes may tailor their policies according to the series UNI EN ISO 14001 and then become eligible for the Certificate of Environmental Management System (EMS). These remarks suggest that, in their policies for tourism development, municipalities should aim to manage their natural resources in such a way so as to achieve a high

level of quality. In this way, protection of the environment and integration of tourism with the other local economic sectors can be interpreted as coordinated strategies of development.

This approach is confirmed by the principle of integration between tourism and a healthy environment, embedded in Local Agenda 21, the document that proposes a translation of the principle of sustainable development into policy practice.

Turning to coastal management, according to recent research studies (Vallega, 1996), the principles inspiring the Rio Conference apply in operative planning in the case of coastal sites and cities, as they are part of a complex regional ecosystem. Three particular ecosystems need to be examined: the land ecosystem affected by coastal facilities and resource uses; the fresh-salt water ecosystem; and the marine ecosystem. Respect for the main idea of sustainable development leads to acting according to three paradigms: integrity of the ecosystem; economic efficiency; and social equity. In the tourist-development perspective of city port management, Vallega argues that the more the city port stimulates sustainable-development-based functions, the more it is able to serve as a main reference basis for regional policy, and the more it is able to attract attention from the international market for clean technology and emerging tertiary activities (Vallega, 1996).

Coastal sustainable planning is related to three main geo-political scales: the intra-urban scale; the urban scale; and the regional scale. It should lead to the implementation of the still abstract advice included in LA21 stemming from the warning concerning the limits to growth and natural resources.

1.3 Measuring the Immeasurable: Towards Composite Indicators for Tourism Policy Making and Planning

In general terms, the need to understand and address progress toward tourist sustainability recalls the broader issue of assessing a system of measures able to face complexity. It is very difficult to conceive a unique yardstick able to yield a reliable assessment of, for instance, the degree of environmental performance. Under an analytic perspective, it is easier to rephrase the question by referring to a number of simple components and by adopting a coordinated set of parallel composite indicators. Usually, these indices are meant as complex measurement instruments and

> "are based on sub-indicators that have no common meaningful unit of measurement and there is no obvious way of weighting these sub-indicators" (Saisana and Tarantola, 2002, p. 5).

According to Saisana and Tarantola (2002), composite indicators, while presenting a bundle of shortcomings,

> "are useful to provide experts, stakeholders and decision-makers with: the direction of developments, comparison across places, situations, and countries, assessment of state and trend in relation to goals and targets, early warning, identification of areas for action, anticipation of future conditions and trends, and communication channel for general public and decision-makers." (Saisana and Tarantola, 2002, p. 6)

Many methods are suitable for constructing and aggregating composite indicators, such as principal component analysis, factor analysis, aggregation techniques, multicriteria analysis, but they obey to a general scheme. This is articulated in the following steps:

> "deciding on the phenomenon to be measured, selecting sub-indicators, assessing the quality of the data, analyzing the relationships between the sub-indicators, normalizing and weighting the indicators, and testing for robustness and sensitivity." (Saisana and Tarantola, 2002, p. 8)

It is possible to observe an explosion in the number of composite indicators and related methods assessed or proposed by a series of international bodies. Saisana and Tarantola (2002) select 24 composite indicators, analyzing their scope, related sub-indicators, and aggregation method. Bandura (2005) lists 135 indices, reporting issuer organization, methodology, country coverage, year of creation, update frequency, publication, and source website. Nardo et al. (2005) present a broad and updated review of methodologies able to support each step needed for constructing composite indicators.

Environmental policy makers and planners are daily confronted with a wide range of questions, such as pollution control and natural resources depletion, and face continuously a lack of precise and timely information. Thus their activities require suitable support tools and methods. The Environmental Performance Index (EPI) is a composite indicator specifically built to support decision makers facing uncertain or fuzzy environmental phenomena (Esty et al. 2006). It is based on the aggregation of 19 indicators grouped in six policy categories pointing at two broad objectives: environmental health and ecosystem vitality.

This indicator measures the performance of world countries: top scorers are New Zealand, Sweden, and Finland while lowest ones Ethiopia, Mali, and Mauritania.

As many scholars point out (Reed et al. 2005 and in press; Dougill et al. 2006), indicators are adopted within actual decisional processes according to two main broad methodological paradigms -the first expert-led and top-down, the second one society-driven and bottom-up- that need to be integrated in order to stimulate community learning, understanding and empowerment. In this panorama, multicriteria analysis stands as a methodology suitable to guide the construction of composite indicators, and to support interactive and mutual learning-based policy making and planning. With this respect, many examples can be quoted (Ferrarini et al. 2001; Sheppard and Meitner, 2003; Doumpos and Zopounidis, 2003; Kangas et al. 2001; Rauschmayer, 2001; Rotmans and Van Asselt, 2000; Hostmann et al. 2005).

2 Description of the Methodology

In this specific application, the multicriteria method adopted is the qualitative choice method known as "Regime" (Hinloopen and Nijkamp, 1990), combined with the analytical hierarchy process (AHP), assessed by Saaty (1988). The first of these methods belongs to the broader family of concordance methods developed by Roy (1985). Even though a description of the mathematics, already well known in the literature, is not the aim of this paper, a brief note has to be added about the usability of the Regime method. It has a number of important advantages with respect to the classical outranking methods (belonging to the family of Electre tools), since it makes it possible to process mixed data in an intuitive way and provides the user wih a complete final ranking of the alternatives. On the other hand, concordance analysis, allowing for incomparability and incomplete ranking of the alternatives, may lead to misunderstanding of the final output.

This combined multicriteria method has been tested, as a social learning instrument, to the evaluation of the environmental and tourist performance displayed by seven municipalities in Sardinia, Italy. Testing is meant in this chapter as a crucial step to understand the usability of the specific tool, to highlight possible pitfalls, and to stress eventual advantages. Moreover,the exposition of the whole process developed

proves to be useful for adopting this procedure in institutional decisional settings.

The exposition of the application to the case study is divided into three different steps: the identification of the alternatives; the list of criteria; and the assessment of the weights.

2.1 The Set of Alternatives

Since the main objective of the method is to help an institutional body to evaluate the territorial quality with reference to tourism, this analysis considers a set of seven alternatives, which correspond to particular territories that could host tourist activities. A review of the current state of European funding programs and of regional special programs reveals that these territories are accorded many possibilities of receiving support. The alternatives consist of the following municipalities located in Southern Sardinia: Arbus, Pula, Carloforte and Iglesias in the western part of the province of Cagliari, the main urban center Cagliari, Muravera and Villasimius in the eastern part of the province of Cagliari. The restriction of the whole range of Sardinian coastal municipalities to seven allows a better understanding of the model. Eventually, this procedure could be extended to the whole set of coastal communes. It should be noted that the alternatives do not consist of different project options. Rather they refer to different potential characteristics for the seven alternative municipalities, treated as complex values.

2.2 The Set of Criteria and Their Proxies

In order to assess a proper list of criteria, a decision-making process has been simulated, as it allows the definition of the main concerns involved in the general issue of integration. In particular, concerns have been identified, by means of the generation of social scenarios. The main assumption implies that a reasonable scheme for the development of local communities can be deduced from the comparison of a number of best practices that have been successful in the Mediterranean Area (De Montis, 2002). Therefore, the list of criteria has been derived via a meta-analysis of the characteristics of those case studies.

Criteria are clustered according to a hierarchy: the general goal, i.e. the development of integrated and sustainable tourism, which is articulated as 7 complex criteria that are themselvesdecomposed into

26 simple criteria. Table 1 shows the list of simple criteria, with respect to their policy concern, unit of measurement, direction of preference[4], modality and source.

2.3 The Score Table

The score table adopted consists of a 7 by 26 matrix (Tables 2 and 3), which shows the values criteria functions assume for each alternative. In the case of cardinal mode, figures have been normalized according to linear min/max formulas, described as follows: $f_1(X) = (X - Xmin)/(Xmax - Xmin)$, for positive criteria, $f_2(X) = (Xmin - X)/(Xmax - Xmin)$, for negative criteria. For the ordinal mode, a discontinuous five-step scale has been utilized. In this way, data can be processed by means of the experimental software "Samisoft", tested at the Department of Spatial Economics, Free University Amsterdam. The requirement of the framework is the following: the higher the score the better the alternative. The choice of a linear normalizing curve is due to the assumption of a neutral attitude of decision-makers towards risk.

2.4 The Weights: Politics and Subjectivity in Decision-making

According to the general multicriteria theory, the weights can be considered as reflecting the importance of the criteria. In this case, they have been assessed by means of the analytical hierarchy process (AHP). Criteria were subjected to pairwise comparisons, based on the judgment expressed by a variety of stakeholders. In other words, as far as the importance of the criteria can be considered as being free from subjective

[4] The readers may note that criteria sometimes show a negative direction of preference, i.e. "Human capital" and "Accessibility". This unexpected feature is due to the need to manage a general framework able to support hypothetical institutional bodies, i.e. belonging to the Autonomous Region of Sardinia, interested into developing the economic activities of specified regions by balancing the growth of their tourist settlements. In this approach, negative criteria should be regarded as strategic functional parts of the model and, thus, means for encourage financial paths towards a "convergence" in tourism-based activities over the spatial dimension. Within this perspective of economic redistribution, the adoption of this support system seems to boost a wider diffusion of the benefits connected to integrated tourism. Hence, new investments are likely to be allowed by this multicriteria decisional device not only for already tourist-facilities- well-equipped regions, but also, and especially, for relatively lagging-behind environments.

Table 1. Policy concerns and units of measurement associated with the simple criteria

Complex criteria	Simple criteria						
	Code	Generic name	Policy concern	Unit of measurement	Direction of preference[5]	Mode	Source
DEMOGRAPHIC DEVELOPMENT (C_{DD})	C_{DD1}	Population	Stable settlement	Number of residents in 1991	Negative	Cardinal	Census 1991, Istat
	C_{DD2}	Population growth	Re-equilibrium of population	Population rate of growth between 1991 and 1996	Negative	Cardinal	Census 1991, Istat; Municipal Registry Office
	C_{DD3}	Human capital	Educating to a highly qualified and diffused culture of tourism	Aggregated percentage of graduates (University and High-School) over total population in 1991	Negative	Cardinal	Census 1991, Istat
ECONOMIC DEVELOPMENT (C_{ED})	C_{ED1}	Employment	Reducing unemployment starting from critical areas	Unemployment rate in 1991	Positive	Cardinal	Census 1991, Istat
	C_{ED2}	Income per capita	Income distribution	Average monthly income per capita in 1991	Negative	Cardinal	Estimation by Mura (1996)
	C_{ED3}	Productivity	Balancing the productivity of the areas	Average yearly value added per worker in 1991	Negative	Cardinal	Estimation by Usai (1998)
	C_{ED4}	Coherence with EU	Linking operational tourist projects to EU programs of financial support	Qualitative attribute	Positive	Ordinal	Regional Centre for Programming, Autonomous Region of Sardinia

[5]In the case of positive criteria, the level of performances corresponds directly with the score; in the case of negative ones, inversely. Therefore, the highest value is given to the highest score for positive criteria, and to the lowest for negative criteria

Table 1. (Cont.)

Complex criteria	Simple criteria						
	Code	Generic name	Policy concern	Unit of measurement	Direction of preference[2]	Mode	Source
TOURISM DEMAND (C_{TD})	C_{TD1}	Bed-nights	Balancing tourist bed-nights	Total yearly bed-nights in 1996	Negative	Cardinal	ESIT (Sardinian Boureau of Tourit Industries), Cagliari
	C_{TD2}	Length of stay	Balancing tourist length of stay	Average length of stay in 1996	Negative	Cardinal	ESIT (Sardinian Boureau of Tourit Industries), Cagliari
	C_{TD3}	Accessibility	Balancing the quality of infrastructures for transportation	Complex index	Negative	Cardinal	Master Plan the Coastline, Cagliari, Technical Report
	C_{TD4}	Tourist consumption	Balance of the tourist revenues among the areas	Qualitative attribute	Positive	Ordinal	Department of Tourism, Council of the Ministries, Italy
TOURISM SUPPLY (C_{TS})	C_{TS1}	System capacity	Sustain a balanced increase of hotels and residences	Total spare beds in 1996	Negative	Cardinal	ESIT (Sardinian Boureau of Tourit Industries), Cagliari
	C_{TS2}	Specialized employment	Balancing attitudes to specialization of tourist services	Average length of stay in 1996	Negative	Cardinal	Census 1991, Istat
	C_{TS3}	"Second houses"	Recover fiscal benefits	Total non-utilized houses, 1991	Negative	Cardinal	Census 1991, Istat
	C_{TS4}	Output in services	Sustaining autonomous development of integrated tourist services	Percentage share of output produced in services over total output	Positive	Cardinal	Banco di Sardegna, 1998
	C_{TS5}	"Tertiary" employment	Encourage tourism within economies of services	Percentage share of employee in the "tertiary" sector over total employment	Positive	Cardinal	Census 1991, Istat

OPERATIVE TOURISM PLANNING (C_{TP})	C_{TP1}	"F"[6] zones	Emphasis of tourist policies within urban and environmental planning	Percentage share of area classified as "F" zone over total area of the Municipality	Positive	Cardinal	Master Plan the Coastline, Cagliari, Technical Report
	C_{TP2}	Built "F" zones	Assign tourist settlements to suitable zones	Percentage share of built area within the "F" zones over total area of the "F" zones	Positive	Cardinal	Master Plan the Coastline, Cagliari, Technical Report
	C_{TP3}	Carrying capacity	Respecting the equilibrium of local natural resources	Forecasted number of inhabitants (Rule D.D.A.A./u/83 2266)	Positive	Cardinal	Master Plan the Coastline, Cagliari, Technical Report
PROTECTION MANAGEMENT (C_{PM})	C_{PM1}	Diversification	Emphasis of tourist policies in non-coastal domains	Percentage ratio between length of the coast line and length of the whole municipal boundary	Negative	Cardinal	IGM Cartography
	C_{PM2}	Park Integration	Linking tourist activities to natural parks	Percentage share of municipal area within natural parks over total municipal area	Positive	Cardinal	IGM Cartography
	C_{PM3}	Reserve Integration	Linking tourist activities to nature reserves	Percentage share of municipal area within natural reserves over total municipal area	Positive	Cardinal	IGM Cartography

[6]Homogeneous functional zones dedicated to the development of tourist settlements, according to the local master plan

Table 1. (Cont.)

Complex criteria	Simple criteria						
	Code	Generic name	Policy concern	Unit of measurement	Direction of preference[2]	Mode	Source
ENVIRONMENTAL IMPACT (C_{EI})	C_{EI1}	Bathing	Better use of coastlines	Percentage ratio between length of bathing coast and total length of the coast	Negative	Cardinal	Master Plan the Coastline, Cagliari, Technical Report
	C_{EI2}	Water	Continuous water delivery	Water flow	Positive	Cardinal	Master Plan the Coastline, Cagliari, Technical Report
	C_{EI3}	Forest	Integrated tourist use of forests	Percentage share of municipal area covered by forests over total municipal area	Positive	Cardinal	Census Istat, 1990
	C_{EI4}	Naturalness	Environmental compatibility	Qualitative attribute	Negative	Ordinal	Naturalness Chart, Cagliari[7]

[7]Synthetic chart obtained by overlaying geo-referred information from different sources about land cover and uses. The criterion "Naturalness" measures the level of absence of human settlements. The highest value corresponds to the lowest score.

Table 2. Score table, Part 1

Alternatives	Scores												
	C_{DD1}	C_{DD2}	C_{DD3}	C_{ED1}	C_{ED2}	C_{ED3}	C_{ED4}	C_{TD1}	C_{TD2}	C_{TD3}	C_{TD4}	C_{TS1}	C_{TS2}
Arbus	0.97	0.42	0.86	0.78	1.00	1.00	1.00	1.00	0.90	0.88	1.00	0.87	1.00
Cagliari	0.00	1.00	0.00	0.00	0.00	0.29	3.00	0.33	1.00	0.00	3.00	0.63	0.00
Carloforte	0.98	0.30	0.44	0.42	0.72	0.85	1.00	0.98	0.76	1.00	2.00	0.99	1.00
Iglesias	0.84	0.42	0.49	0.44	0.70	0.84	3.00	1.00	0.92	1.00	1.00	1.00	0.99
Muravera	0.99	0.03	0.66	0.15	0.66	0.49	2.00	0.03	0.00	0.49	3.00	0.40	0.96
Pula	0.98	0.07	1.00	0.26	0.68	0.64	2.00	0.27	0.50	0.41	4.00	0.21	0.93
Villasimius	1.00	0.00	0.95	1.00	0.70	0.00	2.00	0.00	0.04	0.71	4.00	0.00	0.95

Table 3. Score table, Part 2

Alternatives	Scores												
	C_{TS3}	C_{TS4}	C_{TS5}	C_{TP1}	C_{TP2}	C_{TP3}	C_{PM1}	C_{PM2}	C_{PM3}	C_{EI1}	C_{EI2}	C_{EI3}	C_{EI4}
Arbus	0.98	0.59	0.35	1.00	0.07	1.00	0.66	0.40	0.40	0.00	0.00	0.49	3.00
Cagliari	0.00	1.00	1.00	0.00	0.00	0.71	0.66	0.12	0.00	0.36	1.00	0.00	5.00
Carloforte	0.88	0.21	0.58	1.00	0.43	0.04	0.00	1.00	1.00	0.93	0.00	0.04	2.00
Iglesias	0.86	0.41	0.42	0.56	0.00	0.00	1.00	0.30	0.30	1.00	0.10	0.66	4.00
Muravera	0.98	0.54	0.61	0.95	0.21	0.41	0.63	0.16	0.15	0.63	0.04	0.59	5.00
Pula	0.95	0.99	0.00	0.89	1.00	0.39	0.79	0.00	0.00	0.58	0.05	1.00	3.00
Villasimius	1.00	0.00	0.59	0.94	0.21	0.47	0.50	1.00	0.17	0.55	0.04	0.13	2.00

feelings and experiences, the set of weights has been calculated according to a survey of a variety of stakeholders. Thus 26 actors were selected, on the basis that they were concerned with tourism policy and planning. These professionals represent the following categories: professionals working for bodies responsible for planning (BP); officials of environmental and cultural organizations (EN); freelance professional urban planners (LP); public administrators (PA); managers of institutional bodies or of private companies (MG); and researchers (RE). Each stakeholder was presented with the list, and asked to compare criteria pairwise. In this experiment, no substitution of the original tentative criteria list was allowed: each interviewee expressed his judgments on the same list.

Tables 4 and 5 show the 7 by 26 matrix of weights calculated for the 7 complex criteria. The complete review of the weights should have required also showing the table of the 26 by 26 matrix of the weights of the simple criteria. However, for ease of reading, and to avoid cumbersome notation, these figures have been omitted.

The algorithm has a computational framework that allows processing a maximum of ten criteria. Thus two cycles of calculations have been applied: first for simple criteria, then for complex ones.

Table 4. Weights of the complex criteria, by professional categories, Part 1

Complex criteria	Weights												
	BP1	BP2	BP3	BP4	BP5	BP6	EN1	EN2	EN3	LP1	LP2	LP3	LP4
C_{DD}	0.052	0.031	0.030	0.023	0.126	0.180	0.139	0.018	0.024	0.031	0.174	0.176	0.022
C_{ED}	0.052	0.076	0.095	0.059	0.126	0.069	0.205	0.064	0.065	0.263	0.277	0.266	0.210
C_{TD}	0.087	0.243	0.050	0.059	0.060	0.047	0.093	0.025	0.075	0.109	0.066	0.094	0.083
C_{TP}	0.146	0.136	0.154	0.021	0.083	0.041	0.093	0.050	0.075	0.182	0.069	0.266	0.075
C_{TS}	0.230	0.136	0.136	0.088	0.117	0.253	0.139	0.136	0.293	0.115	0.044	0.098	0.158
C_{PM}	0.347	0.243	0.255	0.375	0.229	0.413	0.166	0.353	0.234	0.106	0.261	0.060	0.145
C_{EI}	0.087	0.136	0.279	0.375	0.258	0.158	0.166	0.353	0.234	0.195	0.109	0.040	0.308

Table 5. Weights of the complex criteria, by professional categories, Part 2

Complex criteria	Weights												
	MG1	MG2	MG3	MG4	MG5	MG6	PA1	PA2	PA3	PA4	PA5	RE1	RE2
C_{DD}	0.082	0.019	0.034	0.023	0.026	0.029	0.034	0.031	0.021	0.029	0.091	0.214	0.027
C_{ED}	0.106	0.052	0.139	0.172	0.095	0.142	0.054	0.456	0.051	0.142	0.151	0.065	0.027
C_{TD}	0.078	0.061	0.089	0.272	0.164	0.091	0.242	0.055	0.044	0.091	0.034	0.032	0.322
C_{TP}	0.093	0.089	0.046	0.272	0.164	0.083	0.370	0.211	0.093	0.083	0.035	0.033	0.322
C_{TS}	0.317	0.192	0.061	0.053	0.340	0.239	0.122	0.033	0.221	0.239	0.067	0.094	0.160
C_{PM}	0.163	0.293	0.270	0.080	0.100	0.208	0.122	0.107	0.285	0.208	0.244	0.319	0.044
C_{EI}	0.161	0.293	0.362	0.127	0.112	0.208	0.056	0.107	0.285	0.208	0.379	0.242	0.099

It should be noted that during the interviews, the analyst presented the criteria list to each interviewee, discussing their concern and meaning. The interviewee was asked to express judgments in dedicated talks consisting of a one-to-one communication between the analyst and the interviewee. The main consequence of this procedure was that the analyst elaborated 26 different judgment systems and obtained 26 different

Table 6. Final rankings, by professional categories, Part 1

Alternatives	Final scores												
	BP1	BP2	BP3	BP4	BP5	BP6	EN1	EN2	EN3	LP1	LP2	LP3	LP4
Arbus	0.82	0.77	0.65	0.80	0.64	1.00	0.93	0.87	0.75	0.80	0.83	0.47	0.91
Cagliari	0.02	0.35	0.14	0.14	0.39	0.40	0.04	0.19	0.49	0.25	0.23	0.12	0.03
Carloforte	0.50	0.71	0.35	0.35	0.32	0.08	0.32	0.16	0.08	0.27	0.78	0.52	0.44
Iglesias	0.56	0.72	0.93	0.93	0.70	0.29	0.79	0.63	0.52	0.66	0.89	0.81	0.54
Muravera	0.90	0.39	0.89	0.53	0.49	0.42	0.49	0.77	0.66	0.57	0.46	0.61	0.66
Pula	0.42	0.14	0.29	0.25	0.43	0.73	0.31	0.40	0.60	0.80	0.17	0.90	0.60
Villasimius	0.28	0.43	0.25	0.50	0.53	0.58	0.63	0.49	0.33	0.15	0.15	0.06	0.32

Table 7. Final rankings, by professional categories, Part 2

Alternatives	Final scores												
	MG1	MG2	MG3	MG4	MG5	MG6	PA1	PA2	PA3	PA4	PA5	RE1	RE2
Arbus	0.43	0.90	0.81	0.79	0.99	0.36	0.52	0.71	0.71	0.66	0.80	0.97	0.41
Cagliari	0.42	0.15	0.03	0.01	0.05	0.20	0.28	0.56	0.46	0.05	0.28	0.01	0.46
Carloforte	0.02	0.36	0.47	0.67	0.73	0.49	0.84	0.29	0.04	0.44	0.22	0.22	0.08
Iglesias	0.67	0.73	0.90	0.45	0.60	0.37	0.36	0.99	0.77	0.53	0.97	0.65	0.14
Muravera	0.81	0.68	0.37	0.54	0.54	0.76	0.79	0.44	0.88	0.65	0.67	0.58	0.81
Pula	0.54	0.15	0.32	0.26	0.40	0.55	0.04	0.29	0.25	0.35	0.40	0.39	0.89
Villasimius	0.61	0.54	0.59	0.78	0.20	0.77	0.67	0.22	0.39	0.83	0.17	0.69	0.70

and independent sets of weights. Again, this event depends on the evidence that none of the actors have met each other.

The output of the combination of the weights with the scores yields a 7 by 26 matrix, as Tables 6 and 7 show. This matrix represents the resulting final rankings of the alternatives for each interviewee selected.

3 Discussion of the Results

This section is mainly concerned with the interpretation of the resulting output, as shown in Tables 6 and 7 above. Two ways of doing this are discussed, and they can be considered, respectively, a synthetic and analytic scheme for analysis. First, unique indexes will be assessed for final ranking and weight vectors. Second, frequency analysis will be applied to explain the relationship between group composition, final rankings and weight vectors.

3.1 The Synthesis of Unique Indexes

This synthesis is based on the assumption that the ranking, which symbolizes the aggregated preference of the group of interviewees, can be calculated as a vector function of the rankings expressed by each stakeholder. In this case, this function has been adopted as the linear unweighted mean of the final scores expressed by each stakeholder. In such a pattern, the resulting ranking (see Table 8) consists of the outcome of voting, provided that each elector has the same political weight.

The group puts the Commune of Arbus in first place, Iglesias in second place and Muravera in third place; the main town of the Island, Cagliari, comes last in this ranking. According to its output, the

Table 8. Aggregate final ranking of the alternatives

Alternatives	Aggregate scores
Arbus	0.74
Iglesias	0.66
Muravera	0.63
Villasimius	0.46
Pula	0.42
Carloforte	0.37
Cagliari	0.22

multicriteria system suggests scenarios where territories with underdeveloped social and economic and sometimes also tourist systems need to be promoted, especially if they are well endowed with natural resources.

For the aggregation, the same assumption has been adopted for the weights attached to the complex criteria (Table 9), i.e. the vector of the weights has been calculated as the unweighted mean of the weights expressed by each interviewee.

In the light of these results, some remarks can be drawn on the computational behavior of the solution algorithm. First of all, those criteria that have been given the highest weight are connected to the environmental aspects of urban transformation and planning. Secondly, the comparison between the final average ranking in Table 8 and the complex criteria average weights vector in Table 9 reveals some kind of "environmental bias" of the multicriteria framework. The highest values of the environmentally-driven criteria linked to the mitigation of the environmental impact confirms that the group of actors interpret these criteria in the sense of the integration of tourist development.

Table 9. Aggregate weights of the complex criteria

Complex criteria	Aggregate weights
Protection Management(C_{PM})	0.217
Environmental Impact(C_{EI})	0.205
Operative Tourism Planning(C_{TP})	0.157
Economic Development (C_{ED})	0.134
Tourism Supply (C_{TS})	0.126
Tourism Demand (C_{TD})	0.103
Demographic Development (C_{DD})	0.065

Table 10. Variability of the positions in the final average ranking referred to each category of actors: professionals working for bodies responsible for planning (BP); officials of environmental and cultural organizations (EN); freelance professional urban planners (LP); public administrators (PA); managers of institutional bodies or of private companies (MG); and researchers (RE)

Alternatives	Aggregate scores					
	BP	EN	LP	MG	PA	RE
Arbus	1	1	1	1	3	3
Cagliari	7	6	7	7	6	6
Carloforte	5	7	5	5	5	7
Iglesias	2	2	2	2	2	5
Muravera	3	3	4	3	1	1
Pula	6	5	3	6	7	4
Villasimius	4	4	6	4	4	2

As an immediate consequence, territories richly endowed with natural resources receive a higher score than the others, because they are judged to be able to couple the resource stock with economic activities within a project of integrated tourist development.

The thesis of the environmental bias can be tested by means of a comparison of the final average rankings and weight vectors referring to each group of interviewees. The values of the scores and weights have been obtained to represent the aggregate expression of each group of professionals as unweighted means of the scores and weights of the interviewee belonging to the same group. For ease of understanding, scores and weights are expressed in ordinal values.

Table 10 shows in ordinal terms the different positions occupied in the final ranking by the alternatives, according to each group of stakeholders. The results confirm what Table 8 shows: those territories that received the highest scores still continue to occupy the highest positions also according to the different groups of professionals. Therefore the Municipality of Arbus occupies the first position, according to the judgment of four groups out of six and the Municipality of Iglesias occupies the second position, according to the judgment of five groups out of six.

It is useful to compare the ordinal values of the rankings in Table 10 with the ordinal values of the weights of the complex criteria for each group in Table 11.

Table 11. Mean of the weights of complex criteria expressed by the different categories of actors: professionals working for bodies responsible for planning (BP); officials of environmental and cultural organizations (EN); freelance professional urban planners (LP); public administrators (PA); managers of institutional bodies or of private companies (MG); and researchers (RE)

Complex criteria	Aggregate weights					
	BP	EN	LP	MG	PA	RE
Demographic Development (C_{DD})	5	6	7	4	6	3
Economic Development (C_{ED})	5	6	7	4	6	3
Tourism Demand (C_{TD})	5	6	7	4	6	3
Tourism Supply (C_{TS})	4	5	3	5	1	2
Operative Tourism Planning (C_{TP})	3	3	5	2	5	5
Protection Management (C_{PM})	1	1	4	3	2	1
Environmental Impact (C_{EI})	2	1	2	1	4	4

The results shown in this table display a high volatility. Yet still the environmental complex criteria occupy the highest positions: three groups out of six put in the first position the criterion "Protection management" in the first place and two groups out of six put the criterion "Environmental impact" first.

According to public administrators, the most important criterion is "Tourism supply", while for freelance professionals it is "Economic development". Professionals working for bodies responsible for planning and freelance professionals put the criterion "Environmental impact" in second place, while officials of environmental and cultural organizations put the criterion "Operative tourism planning" in third place. On the other hand, the criterion "Demographic development" is ranked last, according to four groups out of six. This robust result seems to be linked to the belief that demographic increase is more an effect than a cause of the other criteria, such as "Economic development" and "Protection management", which are more directly linked to the structure of society.

It is possible to derive some important conclusions from the sensitivity analysis of the mean of the values expressed by each group. The main conclusion is that the multicriteria procedure, which we constructed, seems to be strongly influenced by environmental factors.

3.2 The Frequency Analysis

Frequency analysis was applied to investigate the sensitivity of the final rankings with respect to the weights of the complex criteria.

As in Sect. 3.1 above, the scores and the weights, originally expressed in cardinal terms, have been converted into ordinal terms. These figures represent the relative rank of the alternatives and of the complex criteria for the whole set of interviewees. Thus, it is possible to calculate absolute frequency matrices showing the percentage number of times an alternative, or criteria, has been ranked in a certain position.

Following the structure of the previous Sect. 3.1, a test was conducted to verify the "environmental bias", i.e. the sensitivity of the multicriteria framework to the environmental concerns.

In Table 12, absolute frequency values refer to the relative number of times interviewees put the alternatives in the different ranks.

The Municipality of Arbus comes in first place, according to 42 % of the interviewees, and in second place, according to 30 %, while the territory of Iglesias is put in first place, according to 27 %, and in second position, according to 23 %. The Municipality of Muravera is put in the first place, according to 11 % of the interviewees, and in the second position, according to 27 %.

It is not surprising that these results confirm the picture that emerges from the ranking of the mean of the scores, as displayed in Table 8. This evidence again points out that territories with a rich natural endowment are placed in the highest position by quite a large proportion of the interviewees.

Table 12. Alternatives versus ranks: absolute frequencies

Alternatives	Absolute frequencies						
	1	2	3	4	5	6	7
Arbus	42.31	30.77	7.69	3.85	11.54	3.85	0.00
Cagliari	0.00	0.00	3.85	7.69	15.38	30.77	42.31
Carloforte	3.85	3.85	11.54	19.23	26.92	7.69	26.92
Iglesias	26.92	23.08	19.23	11.54	11.54	7.69	0.00
Muravera	11.54	26.92	19.23	34.62	7.69	0.00	0.00
Pula	11.54	3.85	11.54	7.69	26.92	30.77	7.69
Villasimius	7.69	7.69	26.92	15.38	3.85	19.23	19.23

Again, following the structure of Sect. 3.1 above, it was useful to compare the results portrayed in Table 12 above with the results of the frequency analysis of the weights of the complex criteria (Table 13).

The complex criterion "Environmental impact" was put in first place, according to 35 % of the interviewees, and in second, according to 23 %. The complex criterion "Protection management" was placed first, according to 30 % of the interviewees, and in second, according to 38 %. At the other extreme, the complex criterion "Demographic development" was placed seventh and last, according to 58 % of the interviewees, and sixth, according to 15 %. Also at the bottom of the rankings the complex criterion "Tourism demand", which was ranked seventh, according to 15 %, and sixth, according to 23 % of the interviewees. Other complex criteria present more volatile behaviour, e.g. "Economic development" and "Tourism supply", judged first, respectively, by 19 % and 11 % of the interviewees.

Again, it is possible to observe, as an overall output, that the environmentally-oriented criteria are ranked higher than the others.

In conclusion, the comparison between the last two tables confirms the preponderance of the environmental factors for the output of the whole multicriteria evaluation system.

Table 13. Complex criteria versus ranks: absolute frequencies

Complex criteria	Absolute frequencies						
	1	2	3	4	5	6	7
Demographic Development (C_{DD})	0.00	0.00	19.23	7.69	0.00	15.38	57.69
Economic Development (C_{ED})	19.23	3.85	15.38	19.23	15.38	26.92	0.00
Tourism Demand (C_{TD})	11.54	7.69	0.00	15.38	26.92	23.08	15.38
Tourism Supply (C_{TS})	15.38	7.69	15.38	11.54	11.54	30.77	7.69
Operative Tourism Planning (C_{TP})	19.23	7.69	30.77	19.23	11.54	7.69	3.85
Protection Management (C_{PM})	30.77	38.46	7.69	3.85	11.54	7.69	0.00
Environmental Impact (C_{EI})	34.62	23.08	11.54	23.08	3.85	0.00	3.85

4 Future Research Perspectives

This paper points out how evaluation might become a useful tool to develop suitable policies for integrated sustainable development. This concept is quite complex and requires analysis able to cope with conflicting multiple objectives. Notwithstanding these assumptions, the Regime method combined with the AHP approach has proved in this application to be a useful multicriteria procedure, since it yields very good and easy to handle results.

In a more general perspective, this paper sheds some light on the broad basis of decision-making processes.

One of the main findings is that the application of the Regime method framework has allowed the analyst to use both cardinal and ordinal criteria within the system of individual preference structure, mathematically described by means of the outranking analysis. In this case, there seems to be enough evidence to confirm that the outranking structure embedded in the Regime framework is able to cope much better with the complexity and uncertainty, which is often present in environmental tourist policies, than other multicriteria frameworks.

Nevertheless, the analysis of the results considered in this exercise demonstrates how subjective the advice for the final choice might become, especially when different stakeholders are involved at the same time in the same decisional arena. In this case, the degree of uncertainty of the system has been limited by fixing the list of criteria and by allowing variability only to the weight vector. However, the volatility of the final ranking may increase, if subjectivity is also allowed to creep in for the construction of the criteria system. In this case, the whole system of criteria and weights should be tuned every time according to each different stakeholder.

Starting from this lesson, further research has to be directed into studying the relationship between politics and evaluation procedure, with a particular focus on the meaning of delegation in decision-making. Future research should focus on the way systems of access for everybody could be put into practical application. This is one of the main reasons for developing research on the role that the World Wide Web could play in this perspective and on the distribution of information for decision-making (Carver, 1999; De Montis, 2002; De Montis and Nijkamp, 2006).

References

Ashworth B, Voogd H (1990) *Selling the city. Belhaven,* London.

Associação Portuguesa para o Desenvolvimento Regional APDR (2000) *Tourism Sustainability and Territorial Organisation. XII Summer Institute of the European Regional Science Association*, Grafica de Coimbra Lta, Coimbra, Portugal.

Bandura R (2005) Measuring Country Performance and State Behavior: A Survey of Composite Indices. UNDP/ODS Background paper. Office of Development Studies, United Nations Development Programme, New York, USA.

Briassoulis H (1996) The environmental internalities of tourism: theoretical analysis and policy implication. In: Coccossis H, Nijkamp P (eds.) *Sustainable Tourism Development*. Ashgate Publishing Company, Aldershot, UK.

Butler RW (2000) Tourism, natural resources and remote areas. In: *Associação Portuguesa para o Desenvolvimento Regional APDR, Tourism Sustainability and Territorial Organisation, XII Summer Institute of the European Regional Science Association*, Grafica de Coimbra Lta, Coimbra, Portugal: 47–60.

Carver S (1999) Developing Web-based GIS/MCE: improving Access to Data and Spatial Decision Support Tools. In: THILL JC (eds.) *Spatial Multicriteria Decision Making and Analysis. A geographic information sciences approach*, Aldershot, USA, pp 49–75.

Coccossis H, Nijkamp P (eds.) (1996) *Sustainable Tourism Development*. Ashgate Publishing Company, Aldershot, UK.

De Montis A (2002) *Il territorio, la misura, il piano. Valutazioni collaborative in una prospettiva digitale*. Gangemi Editore, Roma.

De Montis A. De Montis S. (2004) Mandatory and Spontaneous Processes of Impact Assessment: A Comparative Study Referred to Sardinia, Italy. *Agricultural Engineering International: the CIGR Journal of Scientific Research and Development*. Manuscript LW 04 011. Vol. VI. October, 2004.

De Montis A, Nijkamp P (2006) Environmental planning and multicriteria evaluation in a collaborative perspective. *International Journal of Environmental Technology and Management* 6(1/2), 40–64.

Dougill AJ, Fraser EDG, Holden J, Hubacek K, Prell C, Reed MS, Stagl S, Stringer LC (2006) Learning from Doing Participatory Rural Research: Lessons from the Peak District National Park, Journal of Agricultural Economics 57(2), 259–275.

Doumpos M, Zopounidis C. (2003) On the use of a multi-criteria hierarchical discrimination approach for country risk assessment. *Journal of Multi-Criteria Decision Analysis* 11(4-5), 279–289.

Esty DC, Levy MA, Srebotnjak T, de Sherbinin A, Kim CH, and Anderson B (2006). Pilot 2006 Environmental Performance Index. New Haven: Yale Center for Environmental Law & Policy.

Ferrarini A, Bodini A, Becchi M (2001) Environmental quality and sustainability in the province of Reggio Emilia (Italy): using multi-criteria analysis to assess and compare municipal performance. *Journal of Environmental Management* 63, 117–131.

Harvey D (1989) *The condition of postmodernity*. Blackwell, Oxford.

Hinloopen E, Nijkamp P (1990) Qualitative multiple criteria choice analysis. The dominant regime method. *Quality and Quantity* 24: 37–56.

Hostmann M, Bernauer T, Mosler HJ, Reichert P, Truffer B (2005) Multi-attribute value theory as a framework for conflict resolution in river rehabilitation. *Journal of Multi-Criteria Decision Analysis* 13(2-3), 91–102.

Kangas J, Kangas A, Leskinen P, Pykäläinen J (2001) MCDM methods in strategic planning of forestry on state-owned lands in Finland: applications and experiences. *Journal of Multi-Criteria Decision Analysis* 10(5), 257–271.

Krapf K (1961) Les pays en voie de développement face au tourisme: introdution méthodologique. Revue de Tourisme 16(3): 82–89.

Law CM (1993) *Urban tourism*. Mansell, London.

Lee KF (2001) Sustainable tourism destinations: the importance of cleaner production. *Journal of Cleaner Production* 9: 313–323.

Mihalic T (2000) Environmental management of a tourist destination. A factor of tourism competitiveness. *Tourism Management* 21: 65–78.

Nardo M, Saisana M, Saltelli A, Tarantola S, Hoffman A Giovannini E (2005) Handbook on constructing composite indicators: methodology and user guide. *OECD statistics working paper series*. OECD Statistics Directorate, Paris, France.

Pearce DG (1989) *Tourism development*. Longman, London.

Poon A (1989) Competitive strategies for a new tourism. In: Cooper C, Lockwood A (eds.) *Progress in tourism, recreation and hospitality management, I*, Belhaven, London, pp. 91–102.

Rao PK (2000) *Sustainable development*. Blackwell Publishers, Oxford, UK.

Rauschmayer F (2001) Reflections on ethics and MCA in environmental decisions. *Journal of Multi-Criteria Decision Analysis* 10(2), 65–74.

Reed MS, Fraser EDG, Dougill AJ (in press) An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics*.

Reed, M, Fraser EDG, Morse S, Dougill AJ. (2005) Integrating methods for developing sustainability indicators to facilitate learning and action. *Ecology and Society* 10(1): r3. [online] website: http://www.ecologyandsociety.org/vol10/ iss1/resp3/

RINA (1999) *Sistemi di gestione ambientale. Guida introduttiva all'applicazione della norma UNI EN ISO 14001 per un sistema di gestione ambientale di un territorio comunale*. Società del Gruppo Registro Italiano Navale, Genova.

Rotmans J, Van Asselt MBA (2000) Towards an integrated approach for sustainable city planning. *Journal of Multi-Criteria Decision Analysis* 9(1-3), 110–124.

Roy B (1985) *Méthodologie Multicritère d'Aide à la Décision*. Economica, Paris.

Ryan C (eds.) (1998) *The Tourist Experience*. Redwood Books, Trowbridge, Wiltshire, UK.

Saaty TL (1988) *Decision Making for Leaders. The Analytical Hierarchy Process for Decisions in a Complex World.* RWS Publications, Pittsburgh.

Saisana M and Tarantola S (2002) State-of-the-art Report on Current Methodologies and Practices for Composite Indicator Development. Joint Research Center of the European Commission, Ispra, Italy.

Sasidharan V, Sirakaya E, Kersetter D (2002) Developing countries and tourism ecolabels. *Tourism Management* 23: 161–174.

Shaw G, Williams AM (1994) *Critical issues in tourism: a geographical perspective*. Blackwell, Oxford.

Sheppard SRJ, Meitner M (2003) Using Multi-Criteria Analysis and Visualisation for Sustainable Forest Management Planning with Stakeholder Groups. University of British Columbia, Collaborative for Advance Landscape Planning, Vancouver, BC.

UNI (1996) *UNI EN ISO 14001*. UNI, Milano.

Urry J (1990) *The tourist gaze*. Sage, London.

Vallega R (1996) Cityports, Coastal Zones and Sustainable Development. In: Hoyle B (eds.) *Cityports, Coastal Zones and Regional Change*, John Wiley and Sons.

Wall G (1997) Sustainable Tourism-Unsustainable development. In: Wahab S, Pigram JJ (eds.) *Tourism Development and Growth: the challenge of sustainability*, Routledge, London, pp. 36–52.