MEASURING THE ATTRACTIVENESS OF SMALL ISLANDS. A TOOL FOR SUSTAINABILITY*

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Abstract

Islands exhibit specific and unique problems, which ought to be studied in a special and separate way from the territories of the mainland. These problems and characteristics are more intense in small islands. Furthermore, islands comprise unique entities with specific natural, anthropologic and historical characteristics, which subsequently necessitate their examination as units of analysis.

The problems that islands, and especially small ones, face impose an impediment to their sustainable development process. In order to blossom, islands must at the same time cope with the improvement of their residents' living conditions. This can be accomplished through the elaboration of the notion of 'attractiveness', as an operational definition of sustainable development.

This paper argues that in order to rejuvenate, islands need to ameliorate their attractiveness. By this way they will sustain their residents and in time will attract new ones. Physical isolation is a factor that cannot be changed but only accounted for. Yet, other factors, such as population potential, existence of employment opportunities, quantity of infrastructure and quality of services offered, environmental quality and safety, can, if addressed properly, constitute the cornerstone of islands' sustainable development. Taking into account the above-mentioned factors, an attractiveness index (AI) is created and used for the classification of islands. This index is applied to the small islands of the exclusive Greek insular prefecture of Cyclades, as a tool for sustainability.

Introduction

The failure of existing theories and concepts (growth, development) to capture the dynamics of regional structures and transitions led to the emergence of the notion of 'sustainable development'. The emphasis was given in the coexistence and interrelation of economic, social and environmental factors, shifting the focus of the analysis from 'hard' (economic) to more 'soft' factors regarding people and the satisfaction of their needs. In 1987 the WCED defined sustainability as the «development that meets the need of the present without compromising the ability of future generations to meet their own needs» (WCED 1987).

Although the WCED suggested a general interpretation of sustainability, there are different opinions regarding its explanation. The variety of existing interpretations reflects the lack of a commonly accepted operational definition. The differences are so substantive, that there is no general agreement on what must be sustained, what it means to 'sustain' and little agreement on what it can or must be measured (Industry Canada 1997; Mikolajuk & Yeh 2000).

However, there seems to be an increasing consent that, in order to achieve sustainability universally, it must firstly be accomplished at a regional level (Schleicher-Tappeser et al. 1999; PACTE 2000; Mikolajuk & Yeh 2000), in spite of the existence of global problems. Conceptualising sustainability at a regional level makes the notion less abstract. After all, sustainability is context-specific and, as such, must be designated on the basis of a specific regional area.

The question then is how the general notion of sustainable development can be put in practice and become useful at a regional level. Thus, 'sustainable regional development' must be defined. This implies a combination of 'regional development' and 'sustainable development'. Both notions refer to a process, as 'development' indicates. Still, the first notion stresses matters of *space*, while the latter focuses on *time*. Sustainable regional development refers, therefore, to a process (development) at a specific spatial level (regional), which can be maintained (sustainable).

In the case of islands, sustainable development denotes the maintenance of the islands' character, as the cultures, geographical isolation, natural characteristics, space and resource limitations, and the residents' identity shape it. What islands, especially small ones, need in order to be reinforced is the amelioration of their attractiveness. Thereby they will sustain their residents and in the long run will attract new ones (Spilanis 1998).

Islands face two kinds of problems. On the one hand there are islands that suffer from high concentrations of people and intensive use of their resources, due to their touristic development. On the other hand, there are islands that suffer from depopulation and the resulting decrease of economic activities. While, most surveys have concentrated on the fist case, in order to solve the problems that create unsustainable conditions for the islands, few essays have focused on the latter.

This paper concentrates on the depopulation problem and its implications to sustainability. Based on the hypothesis that people remain in islands because they are attractive, we investigate which factors influence the location decisions of islanders, in order to develop an attractiveness index. This index reflects the degree of the islands' attractiveness as places of residence. The first section addresses some theoretical notions related to islands and insularity. In the second section the notion of attractiveness is investigated through a literature review, while afterwards a more integrated definition of 'place attractiveness' is developed and analysed. Then, adequate indicators are created in order to measure the attractiveness of the Cyclades islands. Finally, conclusions are drawn about the attractiveness index created and its variations between island categories.

This survey presents a first attempt for the development of an index to measure place attractiveness, which is for the time being concentrated on the case of islands. Our final purpose is to develop a more integral methodology to measure attractiveness, which will allow comparisons to be made between island and mainland territories, in order to create a tool for sustainability.

Islands And Insularity

Although islands are detached, self-contained entities whose boundaries are obvious (King 1993), a commonly accepted definition of 'islands' appears to be quite problematic. The definitional problems exist due to the impermanent insular status of the islands (e.g. islands that exist only at high or low tide), due to problems of scale (e.g. continents viewed as islands) and due to their political and administrative context (e.g. independent microstates) (Morey 1993).

According to the International Convention of the Law of the Sea (UNCLOS 1982) an island is a naturally formed area of land, surrounded by water, which is above water at high tide. At a European level, Eurostat (Eurisles 1997) defines an island as a geographical unit which:

- has a surface of at least 1km^2,
- has a statistically significant permanent population (at least 50 habitants),
- is not connected to the mainland by permanent structures,
- is situated at least 1km from the European mainland,
- is not containing the capital of a Member State.

Even though an exact or generally agreed distinction doesn't exist, islands can be classified according to their size as small and big. In the framework of the MAB (Man and the Biosphere) Programme, 'small islands' were defined as those with a surface of less than 10.000 km^2 and a population of less than 500.000 inhabitants (Hess 1990).

Although various definitions have been proposed for them, 'islands', as Hache (1987) remarks, resist the simple classification of definition and statistics. It seems more meaningful to focus on the more holistic notion of 'insularity' rather on the geographical one of the 'island'. The concept of insularity goes beyond simple geographical boundaries and includes sociological, economic and bio-geographical concepts. Insularity is the quality or state of being an island or consisting of islands. The characteristics of insularity are: small surface and population size, peripherality and isolation, diversified and fragile physical and cultural environment, and the particular islanders' 'identities' (Spilanis 1998; Doussis 1998). Insularity is the result of a conjunction between a geographical condition and the reactions to a process of political, social, economic and cultural peripheralisation. This peripheralisation results in the islands' decreased competitiveness, in relation to continental territories (Spilanis 1996), deterring their sustainable development.

The EU (1999) acknowledged the special character of its island territories with the Amsterdam Treaty. Article 158 emphasised the necessity to reduce the backwardness of the least favoured regions or islands. Along with Declaration No 30 which stated that «the island regions suffer from structural handicaps linked to their island status, the permanence of which impairs their economic and social development», the EU recognised the need to apply special measures in favour of its island territories.

Attractiveness

Literature Review

According to the Oxford Dictionary (1995) an attraction is the action or power of attracting sb/sth, while attractive is sb/sth having the power to attract. Attractiveness can then be defined as the attribute of sb/sth that is attractive. Although difficult to define, people make up their minds about what 'attractiveness' is, every day.

Place attractiveness is a complex combination of physical and man-made factors. Throughout literature the notion of place attractiveness is related to different social groups (residents, migrants, entrepreneurs, investors, tourists). When people choose their place of residence they take into account factors concerning accessibility, physical and natural characteristics and quality, existence of social facilities and businesses, services' supply, available infrastructure, population size and local ties, property prices, land use and zoning regulations etc (Loibl et al. 2002; Portnov 1998; Portnov et al. 2000; Engelen et al. 2002; Waddington 2000; Joseph & Chalmers 1995; Fotheringham et al. 2000).

Tourists assess place attractiveness by taking into account features that can be summarised into three main categories: built, natural and living heritage attractions (Gibson 1993; Huan & O'Leary 1999; Lim & McAleer 2002; Rátz & Puczkó 1998).

With regard to enterprises, attractiveness as a location factor is affected by the geographical position of the region, accessibility, quality of the labour market, population size, availability of natural resources, availability and quality of infrastructure, cost of running a business, incentives provided by local governments, clients' purchasing power, social climate, recreation opportunities etc (Engelen et al. 2002; Portnov 1998; Gong & Wheeler 2002; Polizos & Petrakos 2001; Swianiewicz 2002; Mazzarol & Choo 2003; Johnson & Raymond 1995; Dziembowska-Kowalska & Funck 2000).

In these surveys attractiveness was investigated or measured in relation to different social groups in different places (regions, city centres, suburbs countries etc) located in the continental territory. Relevant surveys are very limited in the case of islands. The findings that emerged from a survey conducted by Kizos (2003), at the Greek island of Lesvos, indicate that the existence of employment opportunities, infrastructure and services (public and health services), isolation and cultural opportunities, are the major attractiveness factors for the heads of the agricultural holdings. Another survey concluded that the attractiveness of the small islands of Scotland is dependent on accessibility and availability of infrastructure-services (Cross & Nutley 1999).

Cross (1996) investigated the issue of service provision on nine Irish islands. A major issue of the research was the perception of the islanders about the services' level. The services, which were investigated in terms of their attractiveness for the island residents, were transport, medical, educational, social and entertainment facilities, retail facilities, postal service, telecommunications, water and electricity facilities. The results showed that four of the most significant developments affecting the standard of living of island residents were changes to transport, telephone, and water and electricity services.

Royle (1995), in a discussion on the effects of aid-dependency in the mid-oceanic islands of the South Atlantic, argued that the main factors that constrain life on a small island are the scale, isolation, and access to finance and development. The main finding for small islands was that the operational problems of providing health care systems could be alleviated, if not overcome, by ensuring that islands have adequate medical staff-expatriates and by setting up medical evacuation procedures. However, such health care provision for small and isolated populations is very expensive, as economies of scale are few.

In an attempt to particularise the concept of sustainability, Copus and Crabtree (1996) assessed Scotland's rural socio-economic development in terms of population density and change, migration, age structure, activity rates and unemployment, industrial structure, expanding and declining industries, levels of entrepreneurial activity, structure and performance of community and culture, and the dependency dimension. The results placed islands among the most peripheral rural areas, and indicated that they exhibit very low performances in all indicators, reflecting their unsustainable course of development.

Although conducted at different scales and for different social groups, these surveys point out certain common attractiveness' characteristics for all places. These factors constitute the basis of our analysis and are related to infrastructure and quality of services offered population, accessibility, economic base, and natural characteristics and quality.

The Notion Of Attractiveness

Place attractiveness is defined as the image of a specific place, in a specific temporal framework by a specific social group. This definition sets three distinct questions: attractiveness where? when? and for whom? The first thing to consider when talking about attractiveness is 'scale'. A place can vary in size from a very small spatial unit to the entire earth. Thus, the first question clarifies the place to be assessed in terms of its attractiveness. The second question reflects the time period during which attractiveness is to be determined. Time must be taken into consideration given that place attractiveness comprises a time varying concept. The third question deals with the social group for which place attractiveness is being assessed.

Having defined these three factors the issue of how attractiveness is going to be measured remains. Place attractiveness can be realised in two different ways. The first takes into account perceptions, beliefs and attitudes of various social groups living in a specific place. The other investigates 'concrete' place characteristics that determine its attractiveness. These two representations can be expressed through the notions of 'soft' and 'hard' attractiveness respectively (Kizos & Spilanis 2002; Spilanis et al. 2003).

'Soft' attractiveness assesses the place's perceived image, taking into account the viewpoints and perceptions of various social groups. A humanistic emphasis on place is especially relevant to 'soft' attractiveness. Humanists stress that place is space filled with people acting out their lives. Therefore, «place must be studied with an eye to its meaning for people and be analysed in terms of its quantifiable attributes and patterns» (Gesler 1991). Residents of particular places may, as 'insiders', have subjective views of their places. As Buttimer (1980) notes «There is a fundamental contrast between the *insider's* way of experiencing place and the *outsider's* conventional ways of describing it…Choices people make span the divide between the objective characteristics of places as seen by *outsiders* and their (perceived) subjective status in the eyes of the *insiders*». Thus, the indicators used to assess 'soft' attractiveness, reflect the indirect influence of beliefs and feelings in the attractiveness of places. 'Soft' indicators are related to qualitative values (e.g. image of the place, quality of life, services provision satisfaction) as reflected in the specific groups' mind.

On the other hand, 'hard' attractiveness refers to place characteristics and is assessed with the use of specialised indicators. These indicators reflect the objective place characteristics, which exhibit the actual status of the place concerned. 'Hard' indicators can be directly measured (e.g. distances, travel time) or be measured in physical or performance related terms (e.g. number of jobs, hospitals).

To summarise, in order to assess attractiveness three factors must be clarified: the scale, the social group, and the time period of interest. On the basis of these clarifications, the method of analysis chosen determines the assessment criteria and indicators used in the measurement of attractiveness.

Defining attractiveness in this unified manner accomplishes a more complete approach on the subject. The coupling of theoretical and operational notions makes the method of analysis more integrated and valid.

The Attractiveness Of The Cyclades Prefecture Islands

The Greek Islands Of The Aegean Archipelago

Greece, according to Eurostat's definition, has 112 inhabited islands that cover 19% (24.739 Km^2) of its territory. The Aegean Archipelago comprises a space with a variety of islands. In the south, Crete is one island among the very big ones of the EU. In the west, close to the mainland, there are many islands that are administratively part of continental regions. The remaining area of the Aegean Archipelago (almost 480.000 km^2) is comprised of lots of medium and small sized islands, which make up almost 50% of the total island area and its respective population. Administratively these islands constitute 5 prefectures and 2 regions exclusively insular.

A historically essential characteristic of the Aegean islands is the instability of their populations. In the middle of the 19th century, the islands concentrated 20% of Greece's population, reaching at the end of the century a percentage of 30%. During the first half of the 20th century, the population stabilised, while small increases took place, mainly due to emigration. After the II World War, and in a 30-year period (1945-1975), the islands experienced a 13,4% loss of their population. Only a few touristic islands experienced growth rates, succeeding to attract new residents, and thus to partly counterbalance the internal migration rates. Since the '80s the Aegean islands exhibit, either a trend for further population shrinkage (due mainly to changes in the cultural standards and reduction of employment opportunities), or growth rates mainly due to tourism.

This paper focuses on the islands of the exclusive insular prefecture of Cyclades. The prefecture comprises an area of 2.714 km^2. There are 24 islands, according to Eurostat's definition, which represent 4% of the country's area. The prefecture's population in 2001 was 111.181 inhabitants, while in 1991 it was 94.005 inhabitants. Its economic development was based in 2001 on the tertiary sector (mainly on tourism), as 66,6% (45,59% in 1991) of the prefecture's population was employed there, while only 11,7% (25,99% in 1991) and 21,6% (28,42% in 1991) was employed in the primary and secondary sector respectively.

Measuring The Attractiveness Of The Cyclades Prefecture Islands

In this paper the scale of analysis is that of an island. Islands are approached as *points* in space, in order to spotlight the inter-islands' diversification. In other words attractiveness is not measured within the boundaries of each island, but between islands. This approach is in line with the Eurisles peripherality index (1997), designed for comparisons between the European islands and the national capital of each country.

Having defined the spatial scale, the social group and the time period that the islands' attractiveness is going to be assessed must be determined. The focus of this study is on the social group with day-to-day life activities: the residents. Which are these island characteristics that formulate attractive conditions for its residents to remain there? The focus on residents is necessary in order to understand the real nature of the conditions experienced in these remote and insular areas by those who are indeed affected by them. Furthermore, in certain surveys it has been suggested that the reasons that make people remain in a place are not necessarily the same with those that make them choose to move elsewhere (Fischer et al. 2000; Fischer & Malmberg 2001; Wikhall 2002; Tassinopoulos & Werner 1999; Jones 1999). The social group selected determines indirectly the time period of analysis. Winter is chosen as the appropriate period of analysis because it is the time when islands face most problems due to windy conditions, and affects only the residents since tourist demand is limited. Thus, the analysis in this time period can provide insight to policy makers, in order to encounter the unfavourable islands' conditions. Finally, regarding the method of analysis, while both 'hard' and 'soft' attractiveness must be investigated in order to shape a more complete image of the islands, this is not possible for the time being. In order to have some indication of the islanders' perception some indicators are created, using hard information to reflect these views. Considering the above and based on the analysis and clarifications made on the notion of attractiveness and on the attractiveness factors examined in existing surveys, seven criteria are chosen as the influential factors that make people remain in the islands. In order to make these criteria quantifiable indicators are used. The selected indicators are based on available information, the results of existing surveys, and the authors' expert knowledge. The data used comprise secondary data (1991 and 2001 census) from the National Statistical Service of Greece (NSSG) and the Chamber of Commerce and Industry in Syros, as well as primary data provided by the hospital administration and the local associations of municipalities and communities. The indicators used are analysed below for each axe of attractiveness (Gryllaki 2003):

• The first axe of islands' attractiveness is related to *access difficulties*. Islands differentiate from other peripheral mainland territories due to the extra disadvantage posed by sea. Accessibility to the mainland and to other islands is restricted to the use of ships or aeroplanes, compelling people to adjust their schedules to timetables. As costs of air transport are high, efficient sea transport is a requirement for the social and economic development of islands. The barrier formed by the sea prevents the mobility possibilities by private vehicles, except via ships. Bad weather and heavy sea conditions -especially in the winter- make the accessibility problem worse.

To measure the problem of remoteness an Accessibility Index (AcI) is used, which is based on the isolation index created by Spilanis et al. (2002) in proportion to the Eurisles (1997) peripherality index. This index measures in kilometres the virtual/real distance ratio. Real distance is calculated in kilometres, based on the Euclidean distance between two points, in our case between each island and Athens. Virtual distance is the real time that a conventional ship makes to travel from Piraeus harbour (Athens) with an average speed of 18 nautical miles. This measure of accessibility denotes greater values to the less accessible islands. In this form the index measures the negative contribution to islands' attractiveness. Thus, the index is transformed so as the less accessible islands to have the smaller values. This adjustment is necessary so that the index to be in accordance with all other indicators, which assess the positive contribution to the attractiveness of the islands.

• The second axe of attractiveness is related to the islands' *population size*. It is widely accepted that large populations make a place more and more attractive. Humans are social beings, which need to interact with one another and with their environment in the process of establishing social structures. Population size is a prerequisite for the existence of adequate social life activities, infrastructure and services, which in the case of small islands are of primary importance for the islanders' welfare. Furthermore, population size determines the market's economic character and dynamism.

The Population Index (PI) used in this paper represents each island's (i) population transformed in such a way that the island with the smaller population has a zero value and all other islands' populations relatively bigger values.

• The third axe of attractiveness refers to the islands' *growth pattern*. This issue is widely considered a major attractiveness factor, as it has multiplying effects, shaping each time a positive or a negative island image. A strong local economic profile is important in order to promote the competitiveness of the existing companies, motivate start-ups and eventually attract investors. At the same time a strong local economic base creates employment opportunities, necessary for the residents to support their activities and needs and especially for the young people when they choose their place of work.

Two indicators measure the islands' growth. The first calculates the number of enterprises per resident (X_1), and the second the number of employees per resident (X_2). The final Growth Pattern Index (GPI_i) is given by the following equation:

$$GPI_i = (0,5*X_{1i}) + (0,5*X_{2i})$$

These indicators have certain disadvantages. As far as the first indicator is concerned, the number of enterprises refers to both seasonal and non-seasonal enterprises. This lack of appropriate data creates problems in the reflection of the real seasonal situation of the islands. This is because in some cases the firms' headquarters are located on the islands, while the owners' residence is located elsewhere (mainly in the metropolitan centres). This is particularly true for touristic enterprises, which operate only during summer. The negative result is twofold. On the one hand, the earnings do not remain within the boundaries of the islands and thus do not contribute to their further development. On the other hand, these enterprises do not create employment opportunities because either they are self-employed enterprises, or they employ temporary[1] -usually foreign- personnel.

As far as the second indicator is concerned, another problem is encountered due to lack of data about the employment in the private and public sector. Employment in the islands' public sector is proportionally larger to their size and population. This is not a result of their attractiveness features, but is actually a necessity posed by the dispersion of island space, which entails the existence of at least a minimum of infrastructure and services on each island. Thus, this indicator measures the total employment at each island, although data concerning the employment in the private sector would be more adequate.

• The fourth and fifth axe of attractiveness is related to the *quantity of the infrastructure and the quality of the services offered*. Infrastructure quantity and quality are issues closely related, as the existence of infrastructure is not of importance on its own, but in relation to the services offered to the users. Thus, both the quantity and the quality of the infrastructure considered must be accounted.

The lack of infrastructure and services, as well as their inadequacy, decreases the islands' attractiveness as a location place of new economic activities, while simultaneously reduces the competitiveness of the existing enterprises. This ultimately reinforces the isolation factor, leading the islanders either to emigration or to conciliation with an inferior quality of life (Spilanis 1998). On the one hand the dispersion and accessibility problems of insular space necessitate the existence of at least a minimum of basic infrastructure and services. Islands' population size does not always justify such an existence. On the other hand, at the islands economies of scale are few or non-existent. Thus, it is very expensive for the state to provide at each island all infrastructure and services (especially high order services e.g. hospital) that are essential. Thus, the quality of the existent services is of major importance for the islanders.

Infrastructure

The notion of infrastructure comprises many elements e.g. transportation networks, water supply, sanitation, health, education etc. A thorough presentation of the entire existing infrastructure is not just an impossible task but also a meaningless one. Only these infrastructure, which are considered to be of most importance for a satisfactory standard of living, are taken into account. Thus, the infrastructure elements selected are limited to two categories. The first category comprises of those elements, which ensure a satisfactory standard of living and economic activity for the islanders. This category includes the basic infrastructure: health, education, banks and Internal Revenue Service (IRS). The latter

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[1] According to Act 1359 of 1945, as amended by Act 1346 of 1983, and Act 2081 of 1952, seasonal workers are employed by seasonal enterprises. Seasonal enterprises are defined as operating for more than two months but less than 12 months a year (http://www.eu-employment-observatory.net/ersep/imi47_uk/01400002.asp)

category includes the supplementary infrastructure. Culture, sports and social welfare, although important, they do not play a determinative role for the survival of the residents.

This distinction of the infrastructure into two different categories serves another reason as well. The non-existence of basic infrastructure compels people to travel to places where these are located. On the contrary, this doesn't apply for supplementary infrastructure. As a consequence both the existence and accessibility is measured for basic infrastructure, whereas the indicators used to measure supplementary infrastructure refer only to their existence or not.

Other forms of infrastructure, such as transportation networks, are not taken into consideration, as the study is focused on islands as units in space and does not take into account the inter-islands' diversification.

a) Basic infrastructure

In the case of basic infrastructure two things must be examined. First, whether all levels of health and education infrastructure, as well as bank and IRS branches exist on each island. These services are selected because of their public character (with the exception of banks), and because they are among those most absent from the islands. Banks are chosen because they provide a wide range of services facilitating the daily transactions. The existence of IRS is important because it facilitates transactions with the state. Educational and health infrastructure is of major importance, as they supply fundamental services for peoples' welfare.

Second, the accessibility to those services must be measured. The indicators referring to services' accessibility are calculated in the same manner as the already described accessibility index, using the virtual/real distance rate. Especially in the case of health, access by aeroplane and helicopter is measured as well, as these means constitute the only transfer mode in case of emergencies. The indicators of education and health infrastructure measure also the distance from the higher order services (Senior High School and Hospital), as these infrastructure are absent from the majority of the islands. The existence of senior high school infrastructure is very important, because its absence requires the relocation of people elsewhere, which is not necessary in the absence of health infrastructure.

As already explained, because this measure of accessibility denotes greater values to the less accessible islands, it is transformed so as the less accessible islands to have the smaller values. The Basic Infrastructure Index then is given by the following equation:

$$BII_i = 0,3*Z_{1i} + 0,3* Z_{2i} + 0,2* Z_{3i} + 0,2* Z_{4i}$$

where Z_i (for i=1-4) refer to accessibility to senior high school, hospital, bank, and IRS respectively. More weight is appointed to education and health indicators because they are considered to be of top priority for the welfare of a society. The index is then transformed to denote positive values, as in the case of accessibility.

b) Supplementary infrastructure

As already mentioned, in the case of supplementary infrastructure the analysis will be restricted to their existence or non-existence. Thus, for each of the three variables, tables are constructed indicating, for each island, their existence or non-existence, by appointing the value of '1' and '0' accordingly. The factors taken into consideration and the different weights appointed are based on their importance in the relevant literature (Portnov 1998; Waddington 2000;). The indexes comprising the supplementary infrastructure are:

$$Cultural\ Index\ (CI_i) = (0,2*L_{1i} + 0,3*L_{2i} + 0,5*L_{3i})/3$$

$$Sports\ Index\ (SI_i) = (0,2*L_{4i} + 0,3*L_{5i} + 0,5*L_{6i})/3$$

$$Social\ Welfare\ Index\ (SWI_i) = (0,2*L_{7i} + 0,3*L_{8i} + 0,5*L_{9i})/3$$

where L_1 = archaeological museums, L_2 = public libraries, L_3 = cinemas, L_4 = open sport facilities, L_5 = swimming pools, L_6 = stadiums, L_7 = 'help at home' programmes[2], L_8 = nursing homes, L_9 = centres for the creative activity of children[3].

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[2] The 'help at home' programme is a state programme for the provision of organised and systematic care for the elderly and for persons with disabilities at their homes.
[3] The centres for the creative activity of children are centres for children with disabilities and adolescents with intellectual problems and movement disabilities.

The final Supplementary Infrastructure Index (SII_i) is given by the sum of the weighted supplementary cultural, sports and welfare indexes:

$$SII_i = 0,4*CI_i + 0,3*SI_i + 0,3*SWI_i$$

which is then transformed so as each SII value expresses the relative SII of each island compared to the island with the smallest SII value (equal to 0).

Finally, the Quantity Infrastructure Index (QII_i) is calculated by combining the Basic and Supplementary Infrastructure Index in the following manner:

$$QII_i = 0,7*BII_i + 0,3*SII_i$$

The variant importance of basic and supplementary infrastructure, as analysed above, is indicated by the different weights appointed to their respective indexes. A higher weight is given to basic infrastructure to point out its significance in relation to the lower importance of supplementary infrastructure. The values of the indexes sum up to 1.

Services' quality

Services' quality is difficult to measure. As the NSSG doesn't collect data for this kind of information, and no other relevant survey has been conducted, indicators are created to reflect the condition of the services' quality. This is not, though, possible in the case of banks and IRS branches. Thus, those factors are not measured.

The number of senior high school students who go to the University[4] per senior high school graduate measures the quality of the services offered by the educational sector. Bad quality of educational services makes people leave their place of residence in order to provide to their children a good education and an opportunity to go to the University. In relation to health services two indicators are used in order to examine their quality. The first indicator measures the number of patients' transports per resident. This indicator shows the adequacy of the available medical equipment and the capability of the staff to handle emergencies, in which case the patients are being transported to hospitals in Athens. The second indicator measures the number of in-island births per total births. This indicator reflects the residents' belief for the quality status of the islands' health services, as mainly the lack of confidence to adequate services make women go to another place (mainly to Athens hospitals) to give birth.

In the first case it is the health system that reflects its disabilities, while in the second it is the people that declare their non-confidence in the health system. In the first case patients don't choose where they are hospitalised. It must be, though, pointed out that this refers only to emergency cases and not to all other less severe cases, where people choose the location of medical examination or treatment.

Due to unavailability of patients' transport data from the lower order health services, the indicator measures patient transports only from hospitals. The major problem encountered in the formation of the services' quality index is the unavailability of education services' data at the time of the research. Thus, the educational indicator is impossible to form, and it is left out of our analysis for the time being and not substituted by another, as it is believed that no other indicator would serve in the same manner.

Finally, the Services' Quality Index (SQI_i) is given by the following equation:

$$SQI_i = 0,5*M_{1i} + 0,5*M_{2i}$$

where M_{1i} = in-island births/total births and M_{2i} = patients' transports/resident, transformed to denote positive values. The index is then transformed so as each SQI value expresses the relative SQI of each island, compared to the island with the smallest SQI equal to zero.

• The sixth axe of attractiveness refers to the islands' *environmental quality*. The environment is considered to be one of the major factors that affect the quality of life (Halfacree 1995; Haarsten et al. 2003; Portnov 1998; Wikhall 2002). Although geographical isolation has contributed negatively to the population and economic development of the islands, it had positive effects on the maintenance of their ecosystems and natural amenities. Small societies live in largely unspoilt and unpolluted conditions (Royle 1995). Environmental problems on islands are limited to point sources of pollution, which would be meaningful to be analysed only in an intra-island survey. This is due to small population densities and minor industrial activity. Furthermore, in the winter period these problems are negligible, since even the touristic demand is quite inexistent. Nevertheless the environmental factor is taken into

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[4] In the Greek educational system students have to pass exams in order to go to the university

consideration, as it comprises a sustainability factor, and basically as a means to ensure its safeguarding within good quality levels.

Since all the islands have a good environmental quality, the Environmental Index (EI_i) has for all the islands the maximum value (1), on a scale from 0 to 1.

- The seventh axe of attractiveness is related to matters of *safety*. More and more, issues of safety are considered important for providing a good quality of life (Campbell 2001; Halfacree 1995; Wikhall 2002). Improving safety is about creating safer places for people to live and work, without fear or risks of harm (Accounts Commission 2000). It is well known that in the case of islands the small scale and the sea barrier constitute the causes of a climate of security. Islands benefit from a life virtually crime-free (Royle1995).

As a result the Safety Index (SI_i) appoints to each island the highest value (1), on a scale from 0 to 1.

Attractiveness Index.
In order to compare and sum up the indexes, they are normalised on a scale from 0 to 1. Some indexes are already normalised by the necessary transformations made above, so for them no further normalisation is being done. The Attractiveness Index (AI) for each island (i) is expressed as the sum of the normalised indexes analysed above:

$$AI_i = a_1 * GPI_i + a_2 * PI_i + a_3 * AcI_i + a_4 * QII_i + a_5 * SQI_i + a_6 * EI_i + a_7 * SI_i$$

The coefficients a_j (for j=1…7) for the islands of the Cyclades prefecture, although subjectively attached, are considered adequate taking into consideration the importance given to them throughout literature. Thus, the coefficients are given the following values, so as to sum up to 1: $a_1 = 0,25$; $a_2 = 0,2$; $a_3 = 0,2$; $a_4 = 0,15$; $a_5 = 0,1$; $a_6 = 0,05$; $a_7 = 0,05$. The AI values are presented at the table below (Table 1).

Table 1: Attractiveness Index of the Cyclades Islands

Islands	AI	GPI	PI	AcI	QII	SQI	EI	SI
Thirasia	0,29	0	0,01	0,71	0	0,44	1	1
Donoussa	0,39	0,71	0	0	0,51	0,33	1	1
Kimolos	0,44	0,16	0,03	0,75	0,63	0,47	1	1
Schinoussa	0,47	0,80	0	0,51	0,46	0	1	1
Kythnos	0,48	0,46	0,07	0,61	0,61	0,37	1	1
Iraklia	0,49	0,80	0	0,50	0,44	0,20	1	1
Sikinos	0,50	0,50	0	0,76	0,55	0,35	1	1
Koufonisi	0,51	0,82	0,01	0,51	0,54	0,19	1	1
Serifos	0,53	0,51	0,06	0,72	0,75	0,34	1	1
Folegandros	0,54	0,53	0,03	0,81	0,66	0,40	1	1
Kea	0,57	0,60	0,12	0,69	0,71	0,47	1	1
Amorgos	0,57	0,56	0,09	0,81	0,74	0,42	1	1
Anafi	0,58	0,74	0,01	0,77	0,67	0,36	1	1
Sifnos	0,61	0,71	0,12	0,77	0,72	0,50	1	1
Antiparos	0,62	0,90	0,05	0,95	0,62	0	1	1
Milos	0,63	0,54	0,24	0,84	0,87	0,45	1	1
Tinos	0,63	0,38	0,43	0,90	0,82	0,41	1	1
Andros	0,63	0,30	0,50	0,86	0,90	0,47	1	1
Ios	0,70	0,97	0,09	0,97	0,74	0,40	1	1
Mykonos	0,75	0,81	0,47	0,93	0,84	0,45	1	1
Naxos	0,76	0,40	0,92	0,99	0,86	0,45	1	1
Paros	0,77	0,68	0,65	0,99	0,81	0,47	1	1
Syros	0,81	0,31	1	0,94	1	1	1	1
Thira	0,86	1	0,68	1	0,85	0,44	1	1

Results

Based on the Attractiveness Index, islands can be clustered into five groups. This categorisation indicates that the majority of the islands are not particularly attractive (Map 1). In order to clarify whether this taxonomy relates in the same way to the size of the islands or to their remoteness, a correlation analysis is conducted.
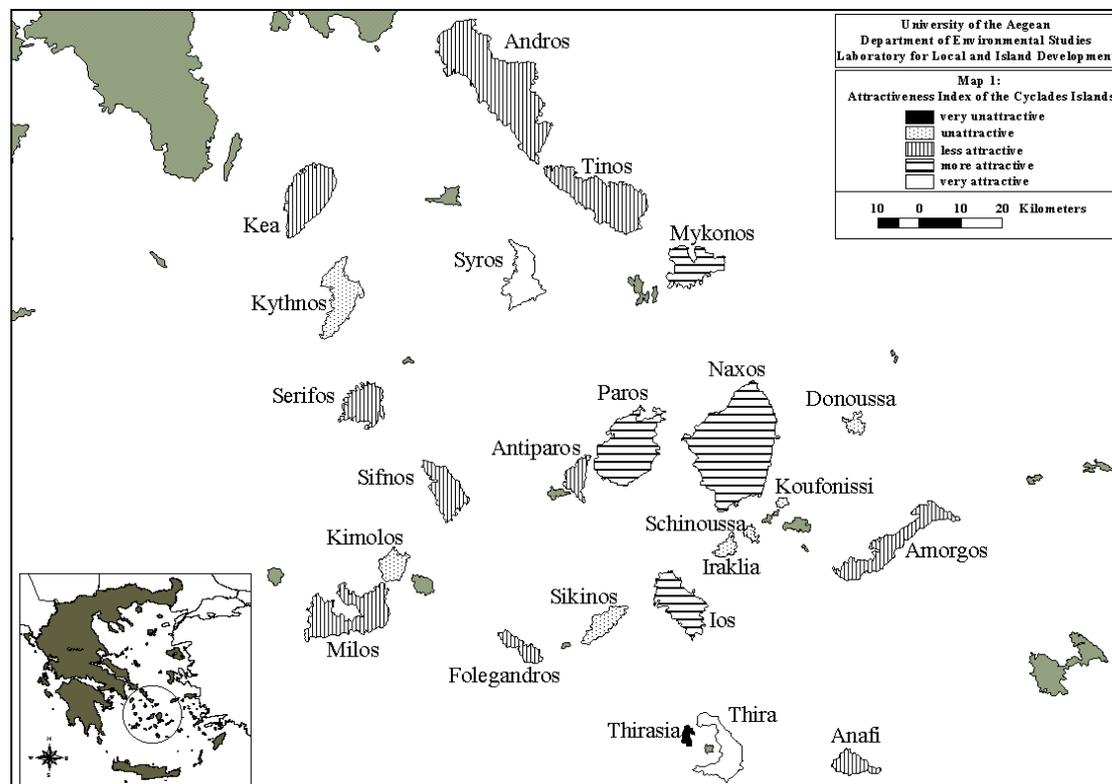
The small sample size (N = 24) indicates that only non-parametric tests are appropriate for the statistical analysis. Accordingly, relationships tested are based on Spearman's rank correlation coefficients using the SPSS software. The correlation results show that the AI has a significantly positive correlation with the size of the islands (r=0,691 p<0,001), while no correlation appears to exist between the AI and the real distance (Km) of the islands from the mainland.

These results lead to the conclusion that proximity to the mainland doesn't explain the islands' attractiveness on its own. There seems to exist a more complex relation where the character of the population and economic base, the distance from the mainland (real distance in km), the size of the island and the proximity to other bigger islands, determine the islands' attractiveness (Map 1; Table 2).

This is easily seen in the case of Kea and Kythnos, which are the two islands closer to the mainland. While the first has a medium, the latter has a small, AI value, reflecting the effects of small local economies and not very large populations. On the other hand Thira, one of the most remote islands, has the highest AI value.

The rest of the islands are either medium-size islands and exhibit average AI values due to a non-dynamic population and economic base (Anafi, Amorgos, Folegandros, Sikinos, Sikinos, Kythnos, Serifos, Sifnos), or very small ones close to bigger islands (Thirasia, Donoussa, Schinoussa, Iraklia, Koufonisi, Antiparos, Kimolos). The latter case reflects the dependence of smaller islands on the developmental capabilities and sea connection frequencies of the bigger islands, as smaller ones usually don't have direct connection to the mainland. This is well highlighted in the case of Thira and Thirasia, two islands very close to each other. The first, having the higher AI value, is almost three times more attractive than the latter, which has the lower AI value.

Another conclusion that can be drawn is that medium-size islands with an adequate population and economic activity, and with regular sea connections to the mainland, are quite attractive. These islands are particularly favoured either by a strong tourist oriented economy (Paros, Ios), or an economy based on mining and agriculture (Naxos, Milos).

Finally, it can de said that medium-size islands with a large population and high economic activity and very frequent sea connection to the mainland are very attractive, either due to their strong tourist sector (Thira, Mykonos) or in the case of Syros because it's the administrative centre of the prefecture. These islands, although not very close to the mainland, have the advantage of air connection to the mainland and to other islands. This is an advantage also in the case of the other four islands with the higher AI values.

Table 2: AI, Surface, Real Distance, Ship Frequencies and Connections for the Cyclades' Islands

Islands	AI	Surface (km²)	Real distance from Athens (Km)	Weekly sea connection frequencies with		Island of connection	Clusters*
				Athens	other islands		
Thirasia	0,29	9,30	233		3	Thira	1
Donoussa	0,39	13,48	213	1	3	Naxos	2
Kimolos	0,44	35,71	153	5			2
Schinoussa	0,47	7,78	206	2			2
Kythnos	0,48	99,26	92	6			2
Iraklia	0,49	17,60	203	2	3	Naxos	2
Sikinos	0,50	41,03	197	4			2
Koufonisi	0,51	5,70	208	2			2
Serifos	0,53	73,23	119	6			3
Folegandros	0,54	32,07	186	5			3
Kea	0,57	103,58	68	16			3
Amorgos	0,57	120,67	234	4			3
Anafi	0,58	38,35	260	3			3
Sifnos	0,61	73,18	140	6			3
Antiparos	0,62	34,83	163		24	Paros	3
Milos	0,63	150,60	157	7			3
Tinos	0,63	194,21	140	12			3
Andros	0,63	379,67	118	15			3
Ios	0,70	107,80	202	14			4
Mykonos	0,75	85,48	160	12			4
Naxos	0,76	428,13	181	24			4
Paros	0,77	194,52	165	24			4
Syros	0,81	83,63	129	18			5
Thira	0,86	75,79	237	18			5

* 1=very unattractive, 2=unattractive, 3=less attractive, 4=more attractive, 5=very attractive

Conclusions

The analysis of island territories is a complex task because they exhibit not just the characteristics of disadvantaged areas but the insular characteristics as well. This intensifies their problems and weaknesses, and acts as the main impediment to their sustainable development. In regard to sustainability the analysis of the islands must be made on the basis of those elements that shape them as attractive places for their residents to remain there. Place attractiveness has been defined as the image of a specific place, in a specific temporal framework by a specific social group. This definition specifies three questions that must be answered: attractiveness where? when? and for whom?

In this paper attractiveness was investigated for the small islands of the Cyclades prefecture during the winter and with regard to their residents. As the main interest of the survey was the differences among islands, these were considered for the purposes of the analysis as points in space. Furthermore, attractiveness was measured taking into consideration 'hard' and 'soft' indicators. The selected factors of analysis were based on findings of the existing relevant literature and the authors' expert knowledge, and were summarised into seven axes: a) accessibility, b) population, c) growth pattern, d) infrastructure e) services, f) environmental quality, and g) safety. Each contributed to a different degree to the islands' attractiveness.

The final Attractiveness Index measured for each island showed that isolation is not a determinant attractiveness factor for the islands on its own. Rather it can be said that:
- islands with minor population and economic base, very small in size, and close to a bigger island, experience the effects of insularity to a large degree. These islands are mainly dependent on the

developmental capabilities and inter-connections of the bigger islands, due to very sparse or non-existent direct sea connections to the mainland
- islands with a small population and economic base, and not frequent sea connections to the mainland seem to be affected by their degree of isolation (real distance from Athens)
- medium-size islands with a dynamic population and economic base, are quite attractive. These islands have regular sea connection to the mainland and are favoured by a strong tourist sector or in the case of Syros by being the administrative centre of the prefecture
- large population and high economic activity favour larger islands, and justify the existence of most basic infrastructure and frequent sea connections to the mainland. Most of these islands have also air linkages with the mainland and other islands with airports

These conditions are differentiated during summer for the majority of the islands. Yet these differences remain an issue for investigation in a following survey, along with the matter of the islanders' beliefs on the attractiveness features.

What can be concluded though is that if place attractiveness endures or increases in time then a measure of sustainability can be formulated. Whereas the characterisation of a place as sustainable may not be possible or meaningful in absolute terms, its description as more sustainable than another place makes sense and implies a positive developmental course between the places examined. The notion of 'attractiveness' can serve as such a measure of comparison, and thus as a tool for sustainability.

Last but not least it must be pointed out that indexes have no special meaning if they are to be considered outside the developmental framework of the broader system in which they are a part. Regional, national and international trends must be taken into consideration in order indexes to reflect the dynamic milieu each era has to meet.

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