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Original Research

Land Use Changes in Relation to Coastal Tourism Developments in Turkish Mediterranean

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Abstract

Tourism is one of the major driving forces behind land use and landscape changes in the coastal Mediterranean. The aim of this study is to analyze the land use changes in relation to coastal tourism developments in the Turkish Mediterranean. Spatial and quantitative inventory of land use changes was delineated by interpreting physical land use data for 1974, 1988, 1990 and 1996 in GIS systems. Study results showed that 816 hectares of agricultural land and 457 hectares of natural coastal forest are converted to tourism-based establishments such as hotels, service buildings and settlements. Degradation of the coastal forests was higher in the beginning of tourism developments, but this trend has become static while constant change on agricultural lands was expected to continue in the coming years. Therefore, it is crucial that tourism development plans be accompanied with a set of ecological, social and economic system for the livelihood of tourism and the operated area.

Keywords: tourism impact, environment, land use change, South Antalya Region

Introduction

Because tourism occurs in environmentally fragile areas with high landscape quality, its impact on the environment is significant on ecological, visual and socio-cultural terms. Tzatzanis et al. [1] stated that landscapes in the Mediterranean have evolved under constant, intensive, human impact. This has resulted in a highly differentiated mosaic of landscape types, ranking from semi-natural to highly artificial ones.

Demand for tourism exaggerates the pressure on coastal areas of high natural and visual value, and is becoming a major concern in the Mediterranean [2, 3]. However, although tourism-related environmental issues have been empirically studied, the number of spatial examples is limited. On the other hand Sun and Walsh [4] emphasized that before setting up tourism and recreation-based environmental management plans that have extensive impact on natural ecosystems, their descriptive and spatial relationship must be examined.

Tourism is receiving close scrutiny in environmental terms because of its actual and potential impacts in land use, energy consumption, biodiversity loss, climate change and water consumption [5]. However, despite the rising importance for recreation and tourism development in the Mediterranean, the amount of research on their environmental effects is still scarce [6, 7]. Hall [8] emphasized that in the majority of coastal regions of the world, basic data on tourism and its associated impacts is extremely poor.

The aim of this study is to analyze land-use changes in relation to coastal tourism developments in the Turkish Mediterranean. As the change can be documented by means of different data sources, basic land use plans were used to document land use changes in different time series.

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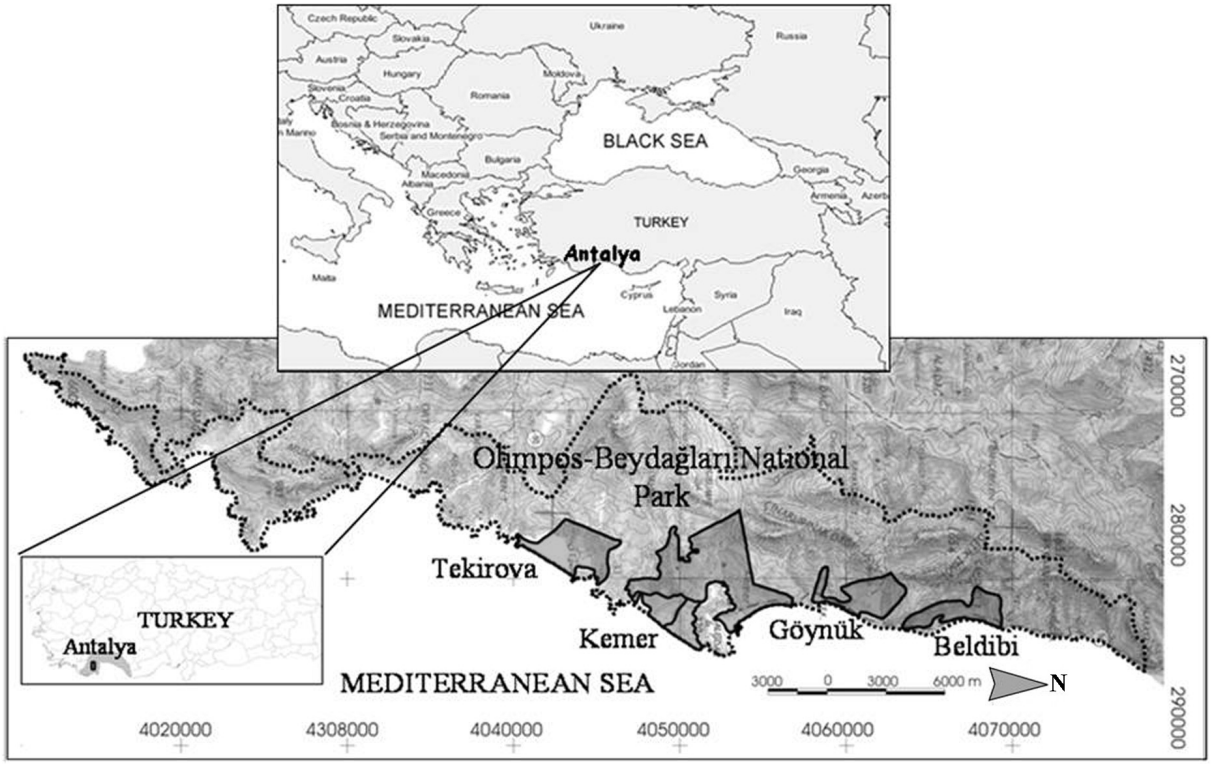

Fig. 1. Location of the study area.

The South Antalya region was chosen as a study area due to its dedication as the first integrated tourism development plan, and being the most attractive coastal tourism destination in the Turkish Mediterranean. The methodological outreach of this study is to bring out an inventory of land use changes by interpreting spatial data from basic land use plans.

Combined in Geographical Information Systems (GIS), quantitative inventories of land use changes for the periods 1974, 1988, 1990 and 1996 were derived from Environmental Order Plans and completed by comparisons in order to understand the nature of change. Correlation analysis provided further insights about the trends in land use changes and their consequences, not in terms of the environment but also management of coastal areas in the region.

Turkey has greatly depended on the tourism sector for its economy since the 1970s and further initiatives are under way for new drastic tourism establishments as in many Mediterranean countries. Besides, tourism developments rely heavily on the quality of natural and cultural environments. Learning from the past thereby enables us to understand the nature of the change and to prevent exploitation of coastal areas.

Study Area and Method

South Antalya is situated between 36º55'/36º12' north latitude and 30º20'/30º40' east longitude in the western part of Antalya, which is the most popular tourism site in Turkey. The diverse landscape in the area is characterized by evergreen Mediterranean forest and macchia covering a total area of 7.085 hectares. Olimpos-Beydağları National Park surrounds the sub-tourism quarters of Beldibi, Göynük, Kemer and Tekirova within the study area (Fig. 1).

The study combines the examination of land use changes within South Antalya tourism development by using environment order plans that define basic physical land use decisions in Turkey. The method of the study comprises two main steps as following the diagram in Fig. 2.

Land use changes were indicated with the comparison of 1/25,000 scale plans provided by the Ministry of Tourism, in which revisions within the South Antalya Tourism Development Plan in 1974, 1988, 1990 and 1996 took place [9-12]. Plan revisions were interpreted by using ArcView 3.2. The program and changes were quantified in GIS systems. To create a standard map, 1/25,000 scale topographical maps was integrated in a UTM projection

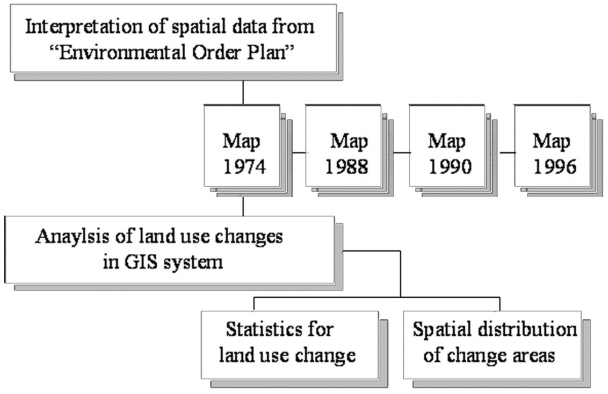

Fig. 2. Flow diagram indicating land use change.

Table 1. Land use changes in South Antalya (hectare).

Land use classes	1974	1988	1990	1996
Urban Settlement	-	144	110	313
Rural Settlement, Medium Density	30	124	344	283
Rural Settlement, Low Density	218	37	203	251
Low Density Tourism Development Area	306	385	145	78
Organized Tourism Development Area	-	132	471	510
Tourist Accommodation Service Area	-	-	13	106
Entertainment Area	-	-	60	72
Golf Area	-	-	150	150
Daily-used Area	41	60	50	60
Market and Small Arts Area	-	14	-	-
Camping Area	39	100	92	160
Archaeological Site in Forest	131	130	7	4
Forest Area	3,765	3,425	3,243	3,308
Recreation Area	-	240	290	268
Tree Plantation Area	210	22	0	-
Agricultural Land	2,338	2,241	1,807	1,522
Historical Site in Agricultural Land	-	31	-	-

system and spatial pattern of changes were put into a database. Land use categories that provided a clear view of land use changes were given 9 classes in the 1974 plan, and 14 classes in 1988, 1991 and 1996.

For a better understanding of land use changes, a reciprocal approach for spatial and temporal relationship is necessary [13]. In order to analyze tendencies in land use changes, the Pearson correlation was estimated for each tourism sub-quarter in an SPSS 9.0 program. Changes in each land use classes were used as variables to test linear relationship between classes.

Land-use changes were correlated with socio-economic forces in order to demonstrate how these changes affect the basic resources of the area and to provide a clearer understanding of possible future trends. The impact on forests and agricultural lands was further examined by analyzing their relationships with the organised tourism development area and the number of accommodations.

Land Use Changes

Tourist areas have been considered under large tourism projects that often take place in such fragile areas as coasts and forests. In fact, large-scale mass tourism is one of the main forces, particularly in coastal areas in the Mediterranean basin.

The tourism sector first officially took part in Turkey in the 1960s "Five-Year Development Plan" [14], and a great number of tourism centers were established along the Turkish Mediterranean coast. The "South Antalya Tourism Development Project" was set up after the 1970s with tourism capitals and state incentives to meet mass tourism demands in the region [15]. A legal standpoint of the project, "1/25,000-scale Southwest Antalya Environmental Order Plan," aimed at the protection of natural environment for the favour of local people and local economy [16]. However, revisions in 1988, 1990 and 1996 took place in South Antalya Project with low taxes, free land assignments and credits brought by the Tourism Incentive Act in 1982, which led to greater demands in coastal areas.

Table 1 shows the land use changes within plan revisions in South Antalya Region. Accordingly, 847 hectare of land opened for urban and rural settlement, 588 hectares for low and organized tourism development (in other words directly for hotel construction) and 1,136 hectares for tourism building and services. The adverse impact of this development resulted in a 816-hectare decrease in agricultural lands and 457 hectares in forest areas. Kızılöz [17] indicated that the reflection of these revisions into the planning procedure ended up with excessive exploitation of new areas for speculative land use and heavy tourism construction rather than protecting natural resources.

Table 2. Correlation relation between land use changes in Beldibi.

	RSLD	LDTDA	OTDA	EC	DUA	CA	RA	TPA	FA	ASF	AL
RSMD	0.760	-0.370	0.511	0.503	-0.436	0.184	0.636	-0.406	-0.421	-0.406	-0.959
RSLD		-0.872	0.902	0.913	-0.916	0.170	0.653	-0.400	-0.412	-0.400	-0.832
LDTDA			-0.842	-0.872	**0.980***	0.079	-0.333	0.105	0.113	0.105	0.545
OTDA				**0.998****	-0.932	0.464	0.777	-0.625	-0.632	-0.625	-0.536
EC					**-0.952***	0.411	0.741	-0.577	-0.584	-0.577	-0.545
DUA						-0.116	-0.508	0.299	0.307	0.299	0.562
CA							0.842	-0.968	-0.964	-0.968	0.047
RA								**-0.951***	**-0.955***	**-0.951***	-0.481
TPA									**1.000****	**1.000****	0.199
FA										**1.000****	0.216
ASF											0.199

RSMD – Rural Settlement, Medium Density; RSLD – Rural Settlement, Low Density; LDTDA – Low Density Tourism Development Area; OTDA – Organised Tourism Development Area; EC – Entertainment Center; DUA – Daily-used Area; CA – Camping Area; RA – Recreation Area; TPA – Tree Plantation Area; FA – Forest Area; ASF – Archaeological Site in Forest; AL – Agricultural Land.
* ; ** Correlation is significant at the 0.01 level; at the 0.05 level (2-tailed).

Table 3. Correlation relation between land use changes in Göynük.

	RSMD	RSLD	LDTDA	OTDA	EC	DUA	CA	RA	TPA	FA	AL
US	**1.000****	0.536	-0.688	0.818	0.577	0.198	0.925	0.488	-0.333	-0.333	-0.752
RSMD		0.536	-0.688	0.818	0.577	0.198	0.925	0.488	-0.333	-0.333	-0.752
RSLD			-0.397	0.838	0.743	0.626	0.698	**0.988***	**-0.965***	**-0.954***	-0.732
LDTDA				-0.815	-0.875	-0.710	-0.859	-0.260	0.154	0.107	0.916
OTDA					0.923	0.703	**0.966***	0.760	-0.666	-0.639	**-0.973***
EC						0.915	0.845	0.632	-0.577	-0.530	**-0.972***
DUA							0.556	0.517	-0.528	-0.472	-0.794
CA								0.614	-0.488	-0.465	-0.946
RA									**-0.986***	**-0.984***	-0.626
TPA										**0.998****	0.536
FA											0.497

US – Urban Settlement; RSMD – Rural Settlement, Medium Density; RSLD – Rural Settlement, Low Density; LDTDA – Low Density Tourism development Area; OTDA – Organised Tourism Development Area EC – Entertainment Area; DUA – Daily-used Area; CA – Camping Area; RA – Recreation Area; TPA – Tree Plantation Area; FA – Forest Area; AL – Agricultural Land.
* ; ** Correlation is significant at the 0.01 level; at the 0.05 level (2-tailed).

Beldibi

According to provisions in environmental order plans, an important part of forests converted to daily-used areas, in 1988 some part of daily-used camping areas were relocated by tourism base uses and in 1996 a great majority of agricultural lands were transferred to dense urban development (Fig. 3).

There is a constant increase in recreation areas as well as in tourism development, and recreation areas in the Beldibi tourism sub-quarter. The correlation relation between land use changes in Beldibi shows that (Table 2) there is a decreasing correlation (-) at the 0.01 level between archaeological sites in forest and recreation areas that can be explained by the transformation of archaeological sites first to camping and consequently to recreation areas.

Göynük

While a limited number of tourist accommodations were planned along the coastal parts of the region in 1974, a conflicting development appeared in the following revi-

sions (Fig. 4). Particularly in 1990, urban settlements proposed in Göynük were enlarged to cover huge agricultural lands.

The correlation (+) at 0.01 level between urban settlement and rural development is due to the increase in both land use types (Table 3). Decreasing correlation (-) at 0.05 level between tree plantation and forest area shows that the low density urbanization is obviously growing on forest and green areas and is a greater fact in exploitation of natural areas in Göynük. Similarly, recreation areas enlarge toward forest and tree plantation areas with decreasing correlation (-) at 0.05 level.

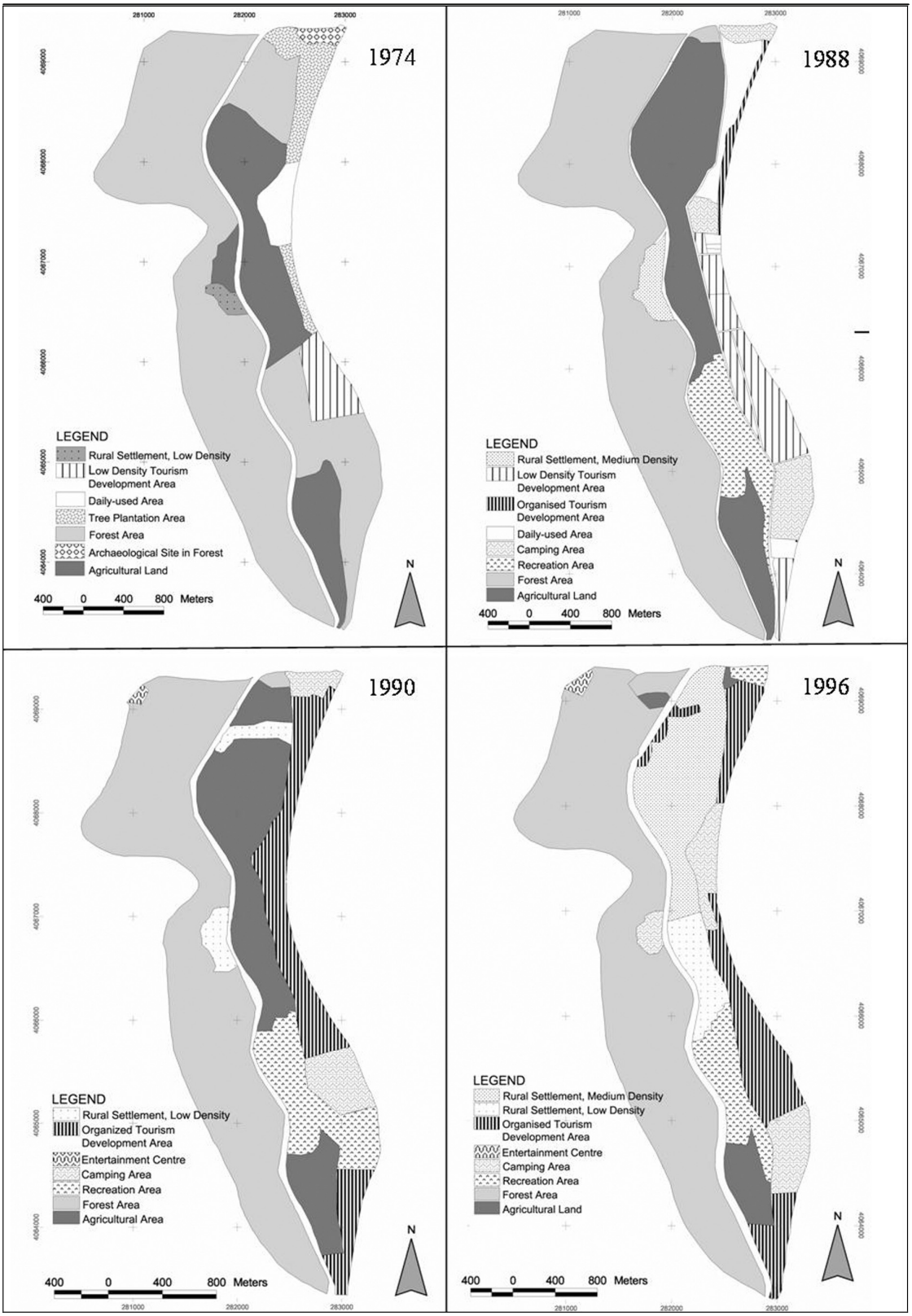

Fig. 3. Land use changes in Beldibi sub-quarter.

This is more peculiar for Agricultural Lands with a decreasing correlation (-) 0.05 level with the Organised Tourism Development Area and the Entertainment Center. This proves that tourism developments have a strong impact on agricultural land. The greater the size of the tourism development areas and services the more agricultural lands decrease.

Kemer

Being a small village with a population of 1,500 people in the 1950's [18], Kemer has been a resort scale tourism center. After the first revision in 1988 in which urban settlements were limited, the 1990 revision enlarged new urban settlement areas in agricultural lands (Fig. 5).

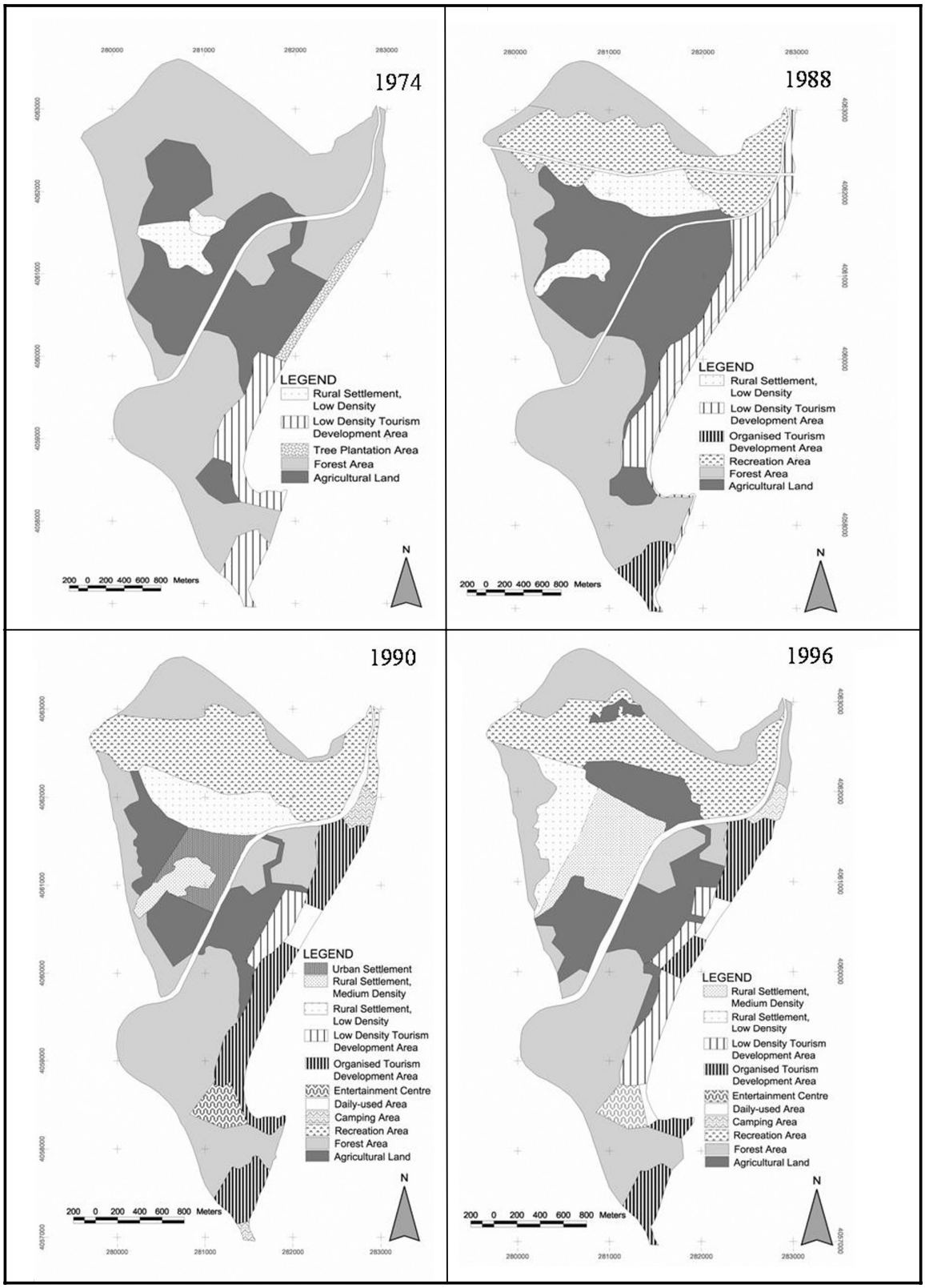

Fig. 4. Land use changes in Göynük sub-quarter.

Areas of low density tourism development in 1974 and 1988 became highly constructed by the Organised Tourism Development Area following revisions in 1990 and 1996.

Land use changes in Kemer (Table 4) show that tourism developments were more demanding on agricultural lands. Decreasing correlation (-) at 0.05 level between Organised Tourism Development Area and agricultural land clearly explains this negative interaction.

While fast growing urban and rural settlements are affected both on agricultural land and forest area, decreas-

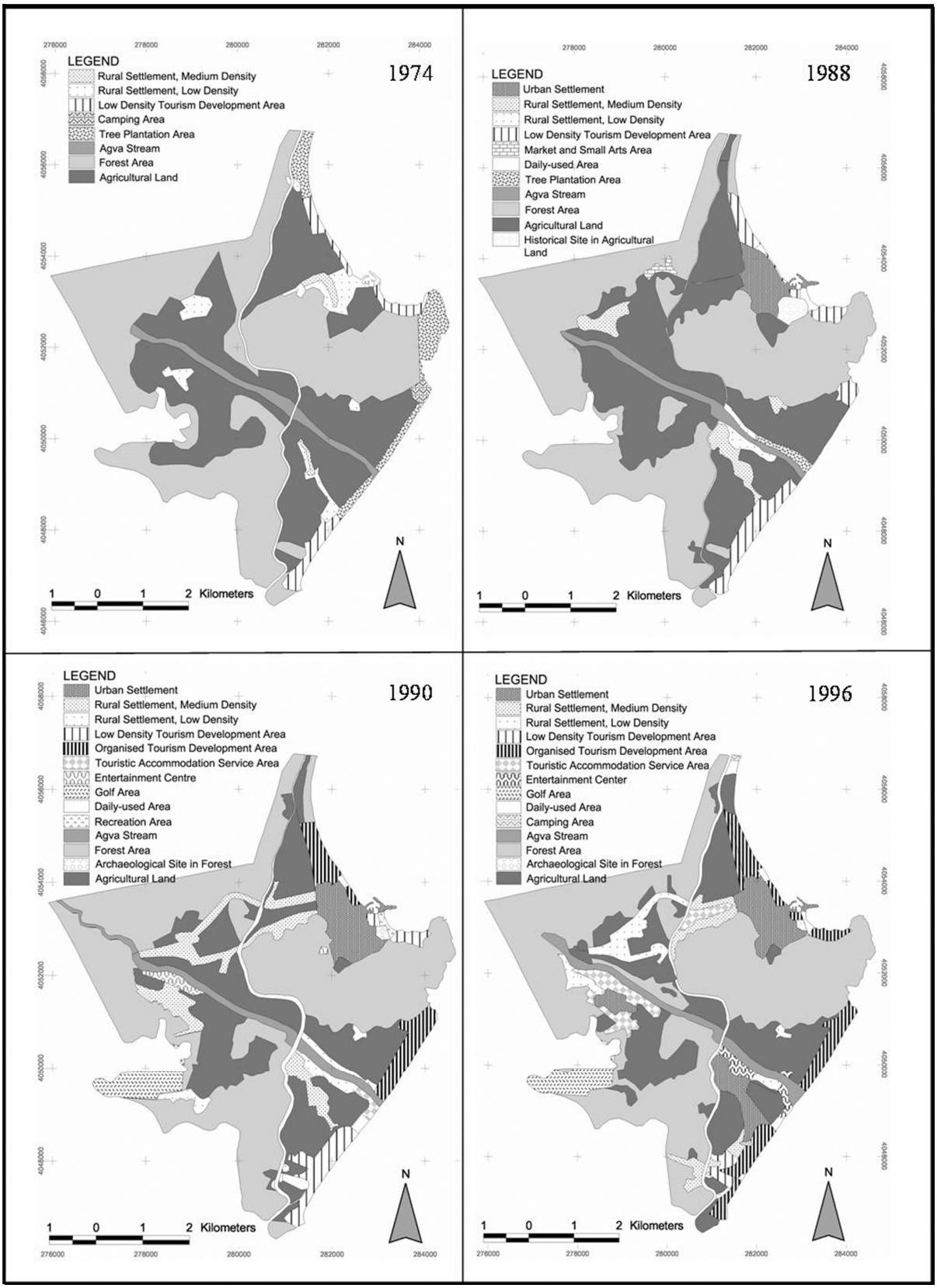

Fig. 5. Land use changes in Kemer sub-quarter.

Table 4. Correlation relation between land use changes in Kemer.

	RSMD	RSLD	LDTDA	OTDA	TASA	MSAA	EC	GA	DUA	CA	RA	TPA	FA	ASF	AL	HSAL
US	0.325	0.065	-0.656	0.923	0.887	-0.184	0.907	0.732	0.888	-0.445	0.097	-0.815	-0.673	0.597	-0.928	-0.184
RSMD		-0.445	0.155	0.377	-0.080	-0.105	0.446	0.748	0.723	-0.758	0.936	-0.680	-0.499	0.850	-0.536	-0.105
RSLD			-0.796	0.347	0.464	-0.840	0.319	0.143	-0.179	0.827	-0.227	0.492	-0.485	0.046	-0.178	-0.840
LDTDA				-0.817	-0.893	0.738	-0.785	-0.540	-0.397	-0.360	0.130	0.119	0.764	-0.382	0.691	0.738
OTDA					0.880	-0.544	**0.997****	0.876	0.853	-0.230	0.271	-0.645	-0.900	0.759	**-0.981***	-0.544
TASA						-0.387	0.839	0.542	0.607	0.010	-0.218	-0.459	-0.649	0.359	-0.796	-0.387
MSAA							-0.558	-0.570	-0.174	-0.494	-0.333	-0.201	0.803	-0.539	0.454	**1.000****
EC								0.912	0.874	-0.266	0.349	-0.661	-0.922	0.810	**-0.989***	-0.558
GA									0.893	-0.418	0.702	-0.675	-0.935	**0.979***	-0.928	-0.570
DUA										-0.700	0.522	-0.93	-0.726	0.844	-0.935	-0.174
CA											-0.494	0.881	0.073	-0.466	0.403	-0.494
RA												-0.395	-0.536	0.832	-0.404	-0.333
TPA													0.422	-0.638	0.761	-0.201
FA														-0.881	0.886	0.803
ASF															-0.838	-0.539
AL																0.454

US – Urban Settlement; RSMD – Rural Settlement, Medium Density; RSLD – Rural Settlement, Low Density; LDTDA – Low Density Tourism Development Area; OTDA – Organised Tourism Development Area; TASA – Tourist Accommodation Service Area; MSAA – Market and Small Arts Area; EC – Entertainment Area; GA – Golf Area; DUA – Daily-used Area; CA; Camping Area; RA – Recreation Area; TPA – Tree Plantation Area; FA – Forest Area; ASF – Archaeological Site in Forest; AL – Agricultural Land; HSAL – Historical Site in Agricultural Land.
* ; ** Correlation is significant at the 0.01 level; at the 0.05 level (2-tailed).

Table 5. Correlation between land use changes in Tekirova.

	RSMD	RSMD	LDTDA	OTDA	EC	GA	DUA	CA	FA	ASF	AL
US	-0.608	-0.574	-0.333	0.464	-0.577	-0.577	-0.889	0.101	-0.067	0.716	-0.697
RSMD		-0.164	-0.520	0.363	**0.977***	**0.977***	0.190	-0.534	0.097	**-0.971***	0.667
RSLD			0.658	-0.616	-0.073	-0.073	0.737	-0.072	-0.507	-0.065	0.527
LDTDA				-0.981	-0.577	-0.577	0.728	0.704	0.200	0.420	-0.205
OTDA					0.448	0.448	-0.813	-0.718	-0.324	-0.280	0.154
EC						**1.000****	0.140	-0.696	-0.115	**-0.983***	0.781
GA							0.140	-0.696	-0.115	**-0.983***	0.781
DUA								0.268	0.146	-0.317	0.407
CA									0.744	0.618	-0.769
FA										0.084	-0.577
ASF											-0.822

US – Urban Settlement; RDMD – Rural Settlement, Medium Density; RSLD – Rural Settlement, Low Density; LDTDA – Low Density Tourism Development Area; OTDA – Organised Tourism Development Area; EM – Entertainment Center; GA – Golf Area; DUA – Daily-used Area; CA – Camping Area; FA – Forest Area; ASF – Archaeological Site in Forest; AL – Agricultural Land.
* ; ** Correlation is significant at the 0.01 level; at the 0.05 level (2-tailed).

ing correlation (-) at 0.05 level between agricultural land and entertainment center and golf area shows that both are threatening the agricultural lands.

Tekirova

Located in the southern part of the research area, the border of Phaselis archaeological site in Tekirova was reduced in 1990, and in 1996 the golf area was introduced on the coastal part (Fig. 6). Increasing correlation (+) at 0.01 level between entertainment center and golf area in Tekirova emphasizes the increase in both uses. Correlation (+) at 0.05 level between rural settlement and entertainment center-golf area gives some clues about likely future land-use tendency (Table 5).

Results

On the coastal plains of the Mediterranean, the homogeneity and degradation of landscapes, especially after the expansion of built environment characteristic of mass tourism, has reduced natural and cultural biodiversity [19].

South Antalya is situated within the Mediterranean Phytogeographic Region [20-22]. Dominated by red pine (*Pinus brutia*) forests, the region is characterized by xerophilous vegetation. Peşmen [20] described 865 plant species for the region and considered the fact that with 154 species are native to Turkey, protection of diversity in forest landscapes becomes a fundamental concern for sustainable tourism.

With the revised environment order plan in 1988, there was a transition from low-density tourism into organised tourism development, particularly in the coastal forests. This was due to the 'Tourism Incentive Act' passed in 1982. Arslan [23] stated that such legislation is in opposition to preserving the natural environment, especially the long term negative impact of the Tourism Incentive Act.

There is a similar trend between forest areas and organised tourism development areas and current hotel capacity (Fig. 7), in which tourism development areas and the number of accommodations increases and the size of forest area decreases.

Excessive demands for tourism-based land uses after the 1970's brought speculations in land prices and subsequently forest areas registered to private ownership first opened up to agriculture and finally to tourism. Here the indicating factor was Forestry Act No. 6831 [24] that allowed the reduction of forests. Kızılöz [17] indicated that with the application of the Forestry Act, forests were taken over from the national parks, describing that these area lost their priority of being forest when they were transferred into agricultural lands by the land acquisitions.

Hayırsever [25] confirmed that according to landownership records in Beldibi, the majority of tourism-based land assignments cover forests and a large amount of land that was handed over to tourism developments since the enactment of the Tourism Incentive Act in the 1980s displayed an increase up to 10 times. Particularly in 1985, a high amount of assignments to private ownership took place in Kemer. The 88% of the state-owned land in Beldibi covered by natural forest was transferred to private ownership.

According to Uyar [26], during the planning process (by 1974 and particularly in 1985 and 1988) it became possible for small villages to become municipal settlements. This led to increasing urban expansion in the entire region.

Tourism developments and heavy building construction in costal regions generated an abundance of traditional economic activities. Exploitation of agricultural lands was another critical consequence of use land changes in the South Antalya region.

Agriculture was the main livelihood activity in the region. Particularly citrus was the most important agricultural product [27]. Kızılöz [17] confirmed that high demands for tourism induced land use, increasing land prices (particularly after 1970s) led to pressure on the citrus

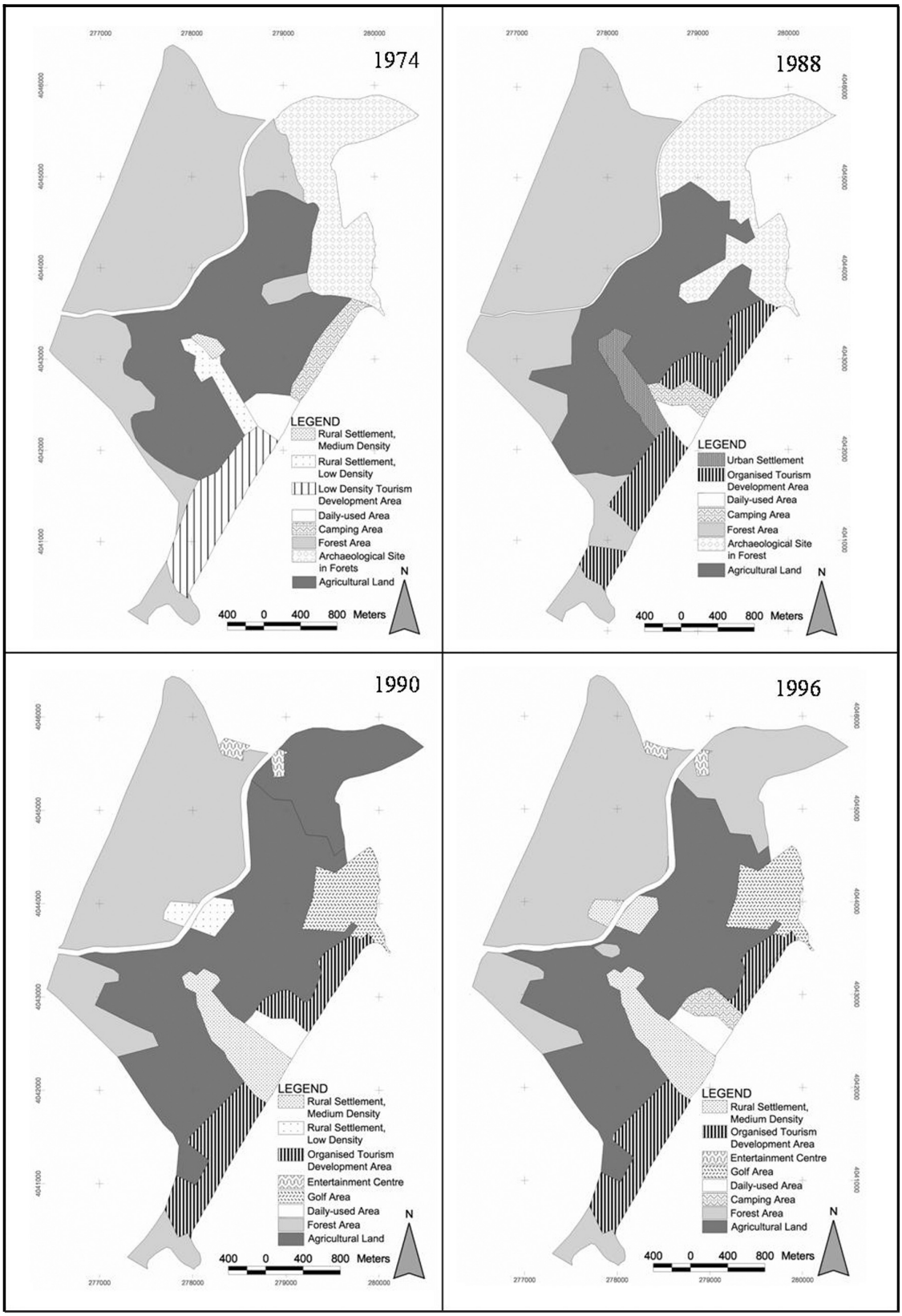

Fig. 6. Land use changes in Tekirova sub-quarter.

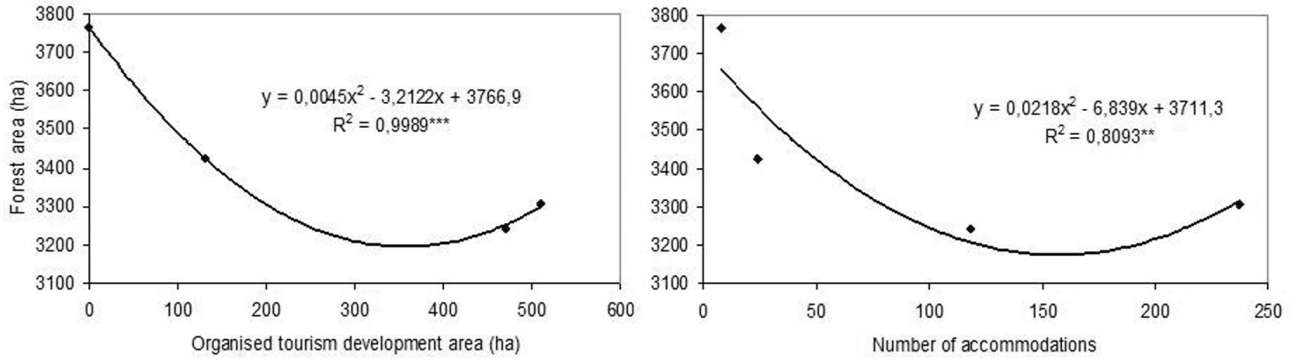

Fig. 7. Relation between forest areas and organized tourism development areas and the number of accommodations in South Antalya (**: P≤0.01, ***: P≤0.001).

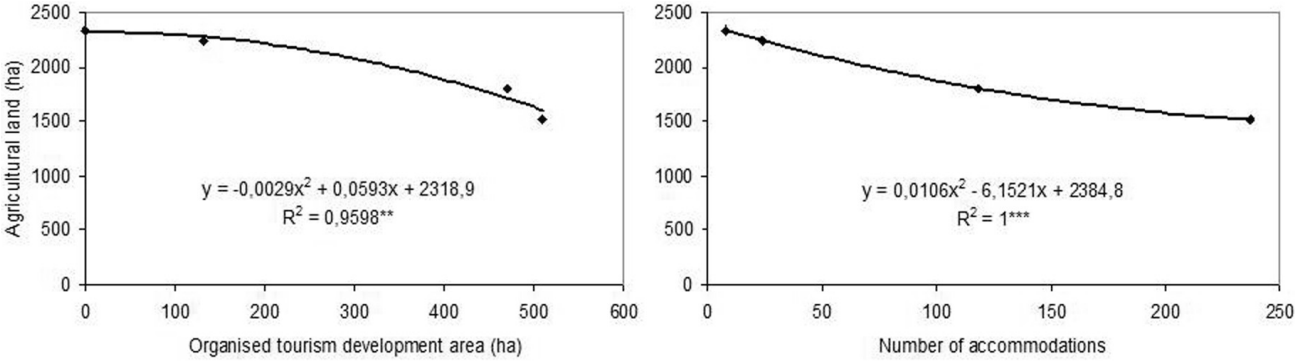

Fig. 8. Relation between agricultural land and organized tourism development areas and the number of accommodations in South Antalya (**: P≤0.01, ***: P≤0.001).

groves that were opened up to hotel buildings without taking into consideration the area size or productivity of these groves.

Due to increasing tourism demands and exaggerated land prices, farmers with a limited income gave up agricultural activities by selling their lands and working in the tourism sector in great numbers.

The quadratic relation between agricultural lands and organized tourism development areas and the number of accommodations in Fig. 8 clearly displays that as far as the area devoted for tourism development and the number of accommodations rises, the size of the agricultural land will gradually decrease. For the time being this inclination seems to be slow, but the recent trends show signs that this trend will increasingly continue.

Discussion

Human activities have shaped the coastal environment of the Mediterranean basin for millennia. Factors causing a more severe impact on the coastal landscapes are the large-scale developments for tourism and the process of urbanization [1].

Cendrero [28] emphasized that existing trends in the occupation of coastal areas exaggerated mainly by tourism and rising problems of environmental degradation must be reviewed in respect to the realm of land use planning, legislative and administrative actions.

Large tourism projects based on initiative and integrated planning concepts where many tourism centres like Cancun (Mexico) and LaGrande Motte (France) built by the 1970s depend on high trans-national capitals [29]. The South Antalya Tourism Development Project has been regarded as the most integrated tourism project by the "selected accumulation policy" approach in the 1970s, maintaining effective environmental control and reducing infrastructure expenses [16]. Remarkably, with the original plan in 1974 gathering various disciplines as architects, urban planners, engineers, sociologists, economists and their experiments in the project was a far-reaching consideration.

But such proactive application was given up after 1988 because of the Tourism Incentive Act with its high increase in tourism capacities where coastline started to be blocked by hotels. Inskeep [30] informed that with the revision in 1988 in South Antalya Tourism Development Project, bed capacity rose from 52,000 to 65,000.

Undoubtedly, unplanned and poorly managed tourism development can damage the natural environment [8]. Planning for tourism must involve economic, social and environmental considerations [31]. Tourism in the South

Antalya Region occurred in regional, national, sectoral and even international scales with invested capitals and market targets. However, environmental considerations were neglected within the project and thus appeared to lack environmental management in the regional level.

Benthem [32] indicated that lack of environmental planning results in heavy urbanization of the Mediterranean coasts. Tourism developments based on large structures often compete with land available on coasts. According to Tzatzanis et al. [1], the transformation of traditional land use patterns into urban and tourism is nowhere more evident than in the Mediterranean basin.

Overall understanding of the interaction between tourism and the environment (particularly within coastal areas) is general rather than the outcome of scientific research [8]. Therefore, regional surveys are important for assessing had ecological impact of tourism.

In this paper it was understood that land use changes in South Antalya over the last 30 years have had compelling effects, particularly on traditional agricultural lands and natural forests. According to land use changes provided by physical land use plans, 816 hectares of agricultural land and 457 hectares of natural coastal forest are converted to tourism-based establishments such as hotels, service buildings and settlements.

Lambin et al. [33] underlined that past land use changes can act as descriptive models for future developments. The quadratic relation in Figs. 7 and 8 between *Agricultural Land, Forest Area* and *Organised Tourism Development Areas, Number of Tourist Accommodations* showed that tourism developments on the first hand creates great pressure on the forest areas but this pressure become static. On the other hand, the changing effect differed in agricultural lands. Although change on agricultural lands was constant, it has a tendency to increasingly continue. This trend clearly explains the character of the land use change dynamic in the region.

Degradation of the coastal forests was higher in the beginning of tourism developments, but this trend started to change as the forests in the region situated in a national park as well as public awareness advanced both on institutional and legal terms in the favour of nature conservation. However, in this respect land use demands have concentrated more on agricultural lands that have been expected to continue in the coming years.

Hayırsever [25] and Erdem [16] indicated that agricultural lands were opened for tourism, especially with the fast-growing construction work in the region where Ulubay et al. [34] emphasized that there was a 10% decrease in forest area in Kemer between 1963 and 1995, and built-up areas of holiday villages and hotels increased 30 times.

Tourism has been one of the major driving forces behind land use and landscape changes in South Antalya. Regarding density and complexity of land use change, tourist areas have become highly artificial land mosaics over agricultural and forest landscapes.

Social aspect of the land use changes was the abundance of traditional land use patterns. Despite the fact that 60% of the local population was living on agriculture in the 1960s [31], today this figure declined down to 22% [35]. Employment in the tourism sector was the reflection of a decreasing number of the population in agriculture as well as the decrease in agricultural land.

There has been similar evidence that tourism developments in the form of resorts and service buildings are replacing agricultural lands and natural areas of forest, wetland or scrublands in the Mediterranean [5, 36-39].

As a concrete statement, scientific studies are needed to achieve environmentally sound land use plans and sustainable development, particularly for a tourism sector in which almost all the services and activities depend on nature itself. In this respect the data presented in this paper can play a key role in defining priorities for long-term land use planning, particularly for sensitive coastal areas.

Different types of data including aerial photographs and official records were used as an approach for understanding our interaction with the environment [40]. The methodological outreach of this study brings out spatial and quantitative inventory of land use changes in South Antalya by interpreting spatial data from the "Environment Order Plan" and supporting numerical data with conventional statistical analysis. Comparably, Hens et al. [41], Zebisch et al. [42], and Petit and Lambin [43] used land use maps in assessing biodiversity at the ecosystem level. Therefore, this study can methodologically be used for other areas.

Tourism is now the largest single economic sector in the world and its impact on the coastal environment is considerable and is extremely difficult to manage or limit [7]. On the other hand, the coastal tourist industry, the environment, both natural and man made, plays a leading role in the sustainable development of this economic activity [44]. Therefore, tourism development plans should be accompanied by a set of ecological, social and economic system of the operated area.

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