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Climatic Changes on the Island of Rhodes

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IMPLICATIONS OF EXPECTED CLIMATIC CHANGES ON THE ISLAND OF RHODES

SOCIO ECONOMIC ASPECTS OF THE ISLAND OF RHODES

by

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FIRST DRAFT

NOT TO BE CITED

2.4. SOCIO ECONOMIC ASPECTS OF THE ISLAND OF RHODES

4.1. Demographics

The population of Rhodes is spread over forty-two scattered villages and the town of Rhodes. According to the 1991 census, the population of the town of Rhodes and some villages in the Northern part (Ialysos-, Kalithies, Faliraki and Afandou) has increased since the previous ten years. The islands total population reached 109.532 in 1991, which is 67.4% of the population of the Dodecanese, as opposed to 62.7%(90963) in 1981 (see table 1,2).

This is due to tourism which has encouraged people to remain on the island and has also attracted employees from other areas of Greece. Also around the town of Rhodes in many suburbs and villages are present (Ixia, Asgourou, Kremasti, Paradisi, Pastida, Maritsa, Damatria and Tholos) where, complete urbanisation has taken place and the secondary and tertiary production sectors are dominant, mainly in the form of tourism services in the form of the hotels along the Rhodes- Paradisi axis. Thus these areas have been transformed from rural to 'dormitory' villages. In Paradisi in particular the construction of Rhodes International Airport on the most fertile plain of the island has played a major role in this transformation.

In the villages of Kalithies and Afandou the same phenomenon is observed, with Kalithies in particular providing an extreme example, where employment in tourism and commercial activities connected with it has reached high levels. In Afandou village, where the island's second most fertile plain exist after that of Paradisi this has been transformed into a golf course. The same is observed, albeit on a smaller scale.

In villages there is an increase in the land prices and a frenzy of construction work. In the rest of the island, the central, mountainous and the southern parts, the primary production sector predominates, with cultivation and animal breeding. Here too it is not unusual for a farmer to be seasonally employed in tourism resulting in local labour force shortage during the summer. In the largest section of the island, the population seems to have undergone a slight increase or to have remained constant according to the statistics (see table 2) but in reality it is decreased.

The reason for this is that since the census operates on Sundays, it is easy for a large number of the island's inhabitants to go from the city of Rhodes to their villages, and register there, since greater village populations would require more state funds.

The decrease of the population in mountain villages is again due to the development of tourism at the coastal areas where the large hotel units are located.

Concluding we can say that there is a population shift towards the urban centres. Also part of the island's habitants are coming from the surrounding islands and the rest of Greece. In addition, in recent years, there has been a population movement from the countries of the European Community toward the city.

4.1.1. Economically Active Population

According to tables 3 and 3A which apply for the Prefecture of the Dodecanese as a whole, but are particularly applicable to the island of Rhodes, the active population by sector of employment has increased by 0,7%. In 1981 this constituted 32,3% of the total population. The only exception which can be observed since then is the decrease in the primary sector in the order of 0,8% but this is not shown by the statistics as many people who are registered as farmers actually work in other sectors (construction, services, etc.).

The greatest increase was in the Trade and Tourism sectors, where the number of employed people more than doubled, and which was mainly derived from the primary sector.

In the secondary sector we observe a significant increase in employment in the Construction and Public Works (0,3%), while the Mining/Quarrying and Manufacturing showed a small increase (0,4%). It is worth mentioning that in 1986 29,2% of the labour force was employed in trade and tourism, 17,6% in other services, 14,7% in Construction, 12,0% in Agriculture-Animal breeding etc and 10,4% in mining/quarrying and manufacturing.

Unemployment is seasonal and high during the winter months, when the tourist season ends. During the summer months unemployment is as low as 1-2%.

4.2. Tourism

Tourism first started in Rhodes Island during the Italian occupation. The Italians constructed a solid road network, airport, port, developed existing natural beauty spots, such as the Valley of the Butterflies and Kallithea and ,they built the first hotels in 1926. In 1930 Rhodes had 574 beds in 8 hotels. Shortly before the war the level of 10,000 arrivals was reached. Up until 1967 the development of tourism took place along moderate lines. From 1963 to 1977 hotels were constructed at the rate of 650 beds per year, most of them in the town of Rhodes only. Parallel to this development, a considerable number of tourist units were built in Ixia in the greater area of Trianda, in the Reni-Koskinou area and Faliraki(Table 4, 5, Map 1).

The majority of tourist units are located along the roads of Rhodes - Faliraki and Rhodes - Airport and are almost all next to the sea (map 2).

From the above data it can be concluded that tourism is the most important factor in the economic life of the island, since it employs directly and indirectly a great amount of the labour. In fact tourism in the Dodecanese is of national importance because it is in second place with regard to tourist beds (after Attica), and a considerable amount of foreign currency is earned in the region.

The island of Rhodes is over developed with plentiful accommodation of all categories. The number of arrivals to the island of Rhodes alone reached 844.477 in 1990. In respect to the areal distribution, mainly tourism has developed in the town of Rhodes and in the northern triangle. However as time passes, new tourist places are also being created in the south of the island.

Despite the high level of touristic development which has taken place, the island is still in need of higher profile marketing and improved air links. We can also say that the integration of hotels into the natural environment has been negative.

4.3. Infrastructure

The Dodecanese islands have a higher road density than the rest of Greece (table below).

1984	Total Road length km	Road Length/Area (km/ooo Ha)
Greece	40.199	3.064
Dodecanese	2.354	3.588

Source: CEDRE, 1989

However, the road network is not considered adequate. Within the framework of the Structural Funds of the European Community, a programme of widening of rural roads has begun. Most of them

run through the sparse forested areas which remained after the catastrophic forest fire of 1987 when almost 50% of Rhodes forests were destroyed, in which the trees cut for the road must be added. This denudation has resulted in increased erosion, especially in the case of sudden heavy rainfalls, a phenomenon which has been occurring with greater frequency the last few years. The communication of Rhodes with the mainland is more than adequately served by the ferries. The inter-island services, however are inadequate and have to be made via Pireus. The problem here seems to be acute because the ships which serve these so-called "non profit" lines are often lacking adequate insurance, speed and comforts.

Port facilities are satisfactory and serve commercial ships. There is no marina for yachts and pleasure craft. One is planned for the town of Rhodes.

There are direct regular airlinks from and to Athens, Thessaloniki, Crete and the other islands of the Dodecanese exist from the Rhodes airport, which is also used for summer charter flights. Services are run by the National Airline Olympic Airways. Lack of adequate air service in the winter has led tourism to be only summer oriented.

The island suffers from deficient telecommunication connections to the mainland and there is no electronic data transfer system (EDT) which would make possible the relocation of some business activities on the island.

The water supply does not fully satisfy domestic and industrial demands. There is a variety of reasons for this, including sparse rainfall, insufficient reservoir capacity and old and inefficient water distribution system.

Sanitation and sewage systems on the island are frequently unable to cope with the demands. The problems are exaggerated during the tourist season when demands are much greater.

In general the island has an infrastructure which is insufficient to satisfy existing tourism requirements.

4.3.1. Power Generation

There is no local fuel production in Rhodes. Thus it has to rely on imported fuel for its electrical power production. The power generating station is situated at Soroni village near the shore and this results in very high cost of energy. Only very few private companies have explored the possibilities of alternative energy sources such as wind power. Solar power is used only in water heating.

4.4. Industry

The secondary sector in the Dodecanese represents a small proportion of the gross local product - (10,5% see table 3A) and it employs a small percentage of the work power. It is marginal to the whole economic activity and survives by satisfying the needs of the tourism industry and tourist infrastructure. It mainly includes ceramic factories, popular art workshops, factories producing refreshments, cakes and pastries, clothing, furs etc. Also due to the high increase in the construction sector, many factories produce ready-made cement, bricks, marbles, tiles, paints, aluminium constructions, and carpets. The shift of investment toward tourist enterprises, the high labour cost and other reasons have been responsible for the closing-down of the factories producing tobacco, pasta, concentrated tomato and others.

The distribution of the secondary sector activities is of interest. They are concentrated along the first five kilometres of the Rhodes-Lindos and Rhodes-Kallithea roads, in the already saturated area of the disused slaughter house, and in the Asgourou area. The latter was developed without

being incorporated into any integrated development or town planning programme. Certain initial procedures concerning the demarcation and topographical survey of an industrial zone were carried out, but no infrastructure work has been undertaken in the area. Also the existing quarry at the area of Kallithea will be transferred to a new site in a 150 Hectare forested area of pine trees. The first stage of infrastructure work (widening of forest roads) has already taken place.

4.5. Primary Sector

The primary sector (agriculture, animal breeding, forestry and fishing) in the Dodecanese and in particular in Rhodes has shrunk, a phenomenon which can be pictured by the fact that in 1986 the primary sector activity as a percentage of the gross local product was a mere 7,6% (for today values see table 3A).

The cultivated areas on the island, including fallow land cover a surface area of 272.925 Ar and constitute 64% of the cultivated area of the Prefecture (see table below), while that the percentage of the irrigated land is low. This percentage declined up until 1987. During the period 1987-1990 it remained steady.

Total cultivation including fallow land in the Island of Rhodes (1985-1990)

	Total cult. land (Ar)	Irrigation land (Ar)
1985	273.463	27.259
1986	191.805	24.610
1987	269.054	22.533
1988	267.169	25.592
1989	268.549	25.334
1990	272.925	24.597

Source: Unofficial figures, Agricultural Dept of the Prefecture of Dodecanese

There is also a considerable decrease in agricultural, animal production, and poultry production. The fishing activities are negligible.

4.5.1. Fish Farming

A large fish farming unit has been constructed in the area of Kattavia, using tanks on dry land for fish and prawns, in addition to a fish-spawning station. Opinions on the potential for the development of fish farming differ, although the island has natural bays.

The Fishing Department of the Prefecture has the opinion that the island's coastal waters are not suitable for the installation of fish farming units because the sea is very deep. The writer, without being an expert in the subject, feels that this is probably an excuse so that hotels may be built in these regions, especially since the development of Southern Rhodes is a matter of capital and nothing else. Noticeable is that an area of publicly-owned coastal land is currently being auctioned off by the state.

4.6. Discussion of the Climate Changes Implications

The implications of the climate changes which are expected to occur due to the greenhouse effect will have financial consequences to the degree to which they will qualitatively affect the holiday market by changing the natural environment and climatic conditions.

The quality of the climate is one of the most important factors in choosing Rhodes as a holiday resort and in the successful promotion of this resort in the tourist market.

Climatic conditions for example determine the duration of the holiday season while the natural environment is the greatest assets including both the lowland and the mountain areas. These include a diverse and variable flora and fauna, a clean and transparent sea, a combination of calm sea for the swimmers and areas with waves suitable for water sports. Also the variety and cleanliness of the coastline sand the beaches and the quality and variety of underwater life are a real magnet for tourists.

As has already been mentioned in this chapter, numerous hotels are situated very close to the beaches (see map 2) They will certainly face problems in the event of flooding due to eventual sea-level rise. Especially in the enclosed bays this regime could be manifested during seasurges, reinforced by strong south winds where waves will be prolonged, washing away the exposed seawall surfaces. These impacts are not expected to be noticeable during the initial stages of 10-20 cm sea level rise, but they could become significant later when the sea level is believed to rise to 1m. high, with important economical repercussions on land and property. Seawater will also cover broad coastal areas, including economically important areas like Faliraki.

Beaches as well as other recreational coastal constructions might be destroyed under prolonged wave action. At the area of Paradisi airport, seasurges could seriously damage the low-lying airport area, with serious economical impact.

Finally some roads are expected to be affected because they are situated within the sensitive lowlying plain areas.

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TABLE 1
 GREECE AND THE DODECANESE
 POPULATION 1961-1991

Area	Population				Area (sq.km.)	Populat. Density 1991
	1961	1971	1981	1991		
Greece	18,725,553	19,748,641	19,730,417	110,255,444	131,957	79
Pref. of Dodecanese	127,021	121,817	145,071	152,108	2,714	50
County of Rhodes		70,110	90,247	109,532	1,551	70

1961, 1971, 1981 = Censuses
 1991 = Greece and Prefecture of Dodecanese: Census
 County of Rhodes
 Consultant's estimates

2

Sources: 1971 and 1981 = Censuses
1991 = Greece and Prefecture of Dodecanese = Censuses
County of Rhodes, Municipalities and
Communities: Consultants' estimates

TABLE 2
COUNTY OF RHODES
POPULATION 1971-1981-1991 BY MUNICIPALITY OR COMMUNITY

Municipality - Community	Population			Rate of Growth		Percent Composition (%)		
	1971	1981	1991	1971-1981	1971-1991	1971	1981	1991
Greece - Total	8,748,511	9,780,417	110,033,484	1.0%	0.5%	100.0%	100.0%	100.0%
Prefecture of Dodecanese	121,017	143,071	162,459	1.83%	1.14%	1.4%	1.5%	1.5%
County of Rhodes - Total	70,110	90,963	109,832	2.64%	1.97%	57.9%	62.7%	67.4%
Municipalities - Total	36,427	44,443	55,724	2.01%	1.73%	52.0%	48.9%	48.1%
Megalo Chorio (Tilos Island)	175	189	183	0.77%	-0.30%	0.2%	0.2%	0.2%
Magisto (Magisto Island)	359	322	328	-1.27%	0.72%	0.4%	0.2%	0.2%
Rhodes	33,100	41,425	49,327	2.27%	1.87%	47.0%	45.5%	45.3%
Syros (Syros Island)	2,497	2,273	2,344	-0.94%	0.31%	3.6%	2.5%	2.1%
Chalki (Chalki Island)	787	554	512	-1.46%	-0.83%	0.6%	0.4%	0.3%
Communities - Total	35,683	46,820	56,777	3.08%	2.02%	48.0%	51.4%	51.9%
Aghios Isidoros	701	774	852	1.00%	0.73%	1.0%	0.9%	0.8%
Asolakkia	528	574	607	0.85%	0.57%	0.8%	0.6%	0.6%
Apollonia	678	839	881	2.15%	0.49%	1.0%	0.9%	0.8%
Arathia	239	260	278	0.85%	0.65%	0.3%	0.3%	0.3%
Archangelos	3,023	4,171	4,963	3.87%	1.73%	4.3%	4.6%	4.5%
Archontika	334	528	716	4.89%	3.10%	0.5%	0.6%	0.7%
Asvlissero	378	363	366	-0.40%	0.06%	0.5%	0.4%	0.3%
Afanou	2,489	3,925	4,368	4.66%	2.13%	7.4%	4.3%	4.4%
Vatso	285	288	313	1.22%	0.84%	0.4%	0.3%	0.3%
Serravalle	428	371	398	-0.34%	-0.32%	0.5%	0.4%	0.3%
Dassaria	387	370	386	0.34%	0.47%	0.5%	0.4%	0.4%
Diazia	387	422	446	1.09%	0.56%	0.5%	0.5%	0.4%
Enonias	1,306	1,377	1,363	0.53%	-0.10%	1.9%	1.5%	1.3%
Thalagios	342	351	406	0.26%	1.60%	0.3%	0.3%	0.3%
Ialysos (Triantia)	2,485	7,212	11,008	7.84%	4.33%	5.3%	7.9%	10.1%
Ierissos	168	269	382	4.32%	2.72%	0.2%	0.3%	0.3%
Kalavarda	382	449	480	2.15%	0.63%	0.5%	0.5%	0.4%
Kalatona	419	317	284	-2.78%	-1.10%	0.6%	0.3%	0.3%
Kalythies	1,778	2,738	3,294	4.60%	1.63%	2.5%	3.1%	3.0%
Kattavia	341	618	576	1.34%	0.90%	0.3%	0.7%	0.6%
Koskiriou	1,200	2,370	3,581	7.17%	4.07%	1.7%	2.8%	3.3%
Krasati	2,412	3,143	3,732	3.75%	1.45%	3.4%	3.2%	3.4%
Kronosia	267	338	338	1.23%	0.17%	1.0%	0.3%	0.3%
Lafra	491	477	487	-0.29%	0.17%	0.7%	0.5%	0.4%
Lafra	471	510	720	2.55%	1.57%	0.7%	1.7%	2.7%
Lafra	171	370	330	4.67%	2.54%	0.2%	0.4%	0.3%
Livadia (Tilos Island)	174	112	94	-1.27%	-1.87%	0.2%	0.1%	0.1%
Lindos	787	807	850	1.77%	0.54%	1.0%	0.9%	0.9%
Mastou	322	1,049	1,181	1.87%	1.07%	0.4%	0.8%	0.9%
Maroussi	1,110	1,732	1,817	1.97%	1.75%	1.5%	1.5%	1.5%
Mastou	628	752	809	2.14%	1.74%	0.8%	1.0%	1.0%
Messagros	227	239	209	0.53%	0.35%	0.3%	0.3%	0.3%
Mondithos	247	394	514	4.73%	2.77%	0.4%	0.6%	0.6%
Parosagios	1,734	2,327	2,507	3.47%	1.23%	2.5%	2.4%	2.3%
Parosia	549	1,021	1,707	4.54%	2.50%	0.9%	1.1%	1.2%
Platania	174	223	244	2.63%	0.51%	0.2%	0.2%	0.2%
Profilia	171	213	234	2.34%	1.48%	0.2%	0.3%	0.3%
Pylos	176	379	597	7.97%	4.33%	0.2%	0.4%	0.6%
Salaniki	330	330	364	0.10%	0.37%	0.3%	0.3%	0.3%
Siana	250	294	319	1.56%	0.51%	0.4%	0.5%	0.5%
Sofroni	834	925	988	1.11%	0.67%	1.2%	1.3%	1.3%
Sofroni	487	607	688	2.46%	1.60%	1.0%	1.1%	1.0%
Sofroni	459	520	515	1.52%	1.11%	0.7%	0.7%	0.7%

1) Dodecanese % of Greece, Rhodes County % of Dodecanese
Municipalities and Communities % of Rhodes County

TABLE 3
PREFECTURE OF DODECANESE
ACTIVE POPULATION BY SECTOR OF EMPLOYMENT 1991-1994

	Number		Percent Distribution				Location	
			Dodecanese		Dodecanese		Quotient	
			Greece	Rate	Greece	Dodecanese	for	
	1991	1994	1991	1991-1994	1991	1994	1991	1994
Primary	5,450	4,000	972,391	0,0%	12,8%	12,0%	27,4%	17%
Mining-Quarr.	87	210	23,957	29,4%	0,2%	0,4%	0,5%	27%
Manufacturing	4,727	5,300	454,322	1,9%	10,1%	10,4%	18,7%	54%
Electricity etc.	412	530	25,425	2,9%	0,9%	1,0%	0,7%	127%
Construction	6,740	7,400	325,390	1,9%	14,4%	14,7%	9,2%	154%
Trade & Tourism	11,787	14,620	433,944	4,4%	25,1%	29,1%	12,2%	205%
Transport etc.	4,730	3,050	211,517	2,1%	19,1%	10,8%	7,5%	124%
Financial	1,188	1,350	126,703	2,6%	2,5%	2,7%	3,6%	71%
Other Services	7,966	8,640	531,869	2,2%	17,0%	17,6%	15,0%	113%
Young	739	810	89,026	1,2%	1,6%	1,5%	2,5%	53%
Not reported	2,539	0	84,343	-100,0%	5,4%	0,0%	2,4%	224%
Total	46,870	50,200	3,843,777	1,4%	100,0%	100,0%	100,0%	100%

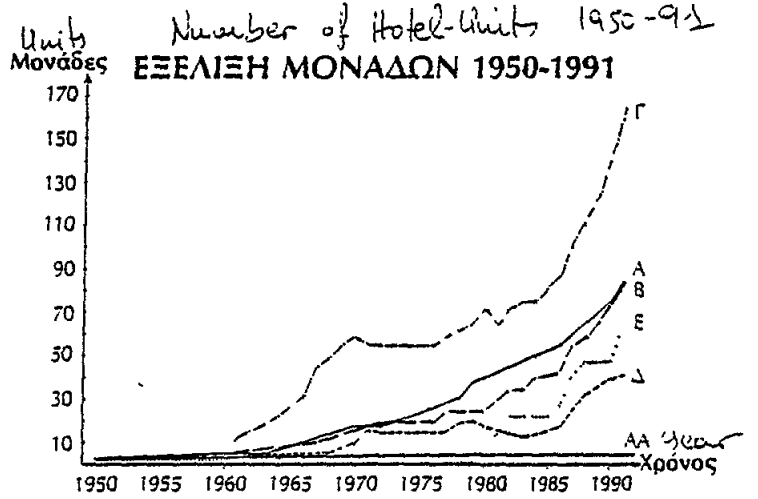
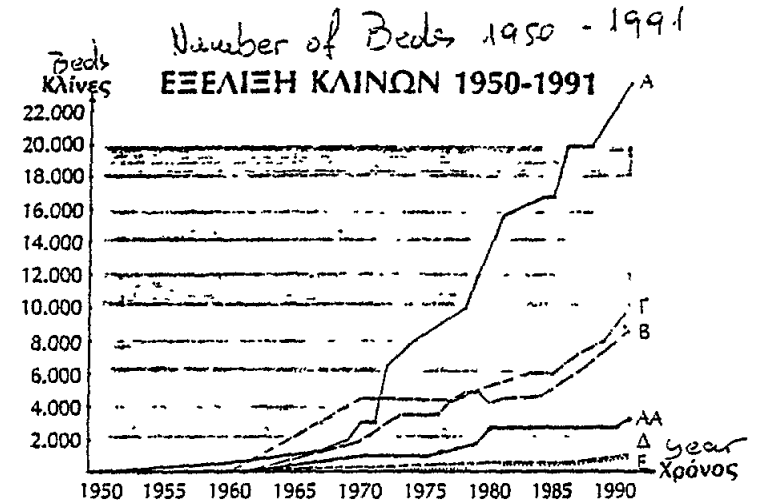
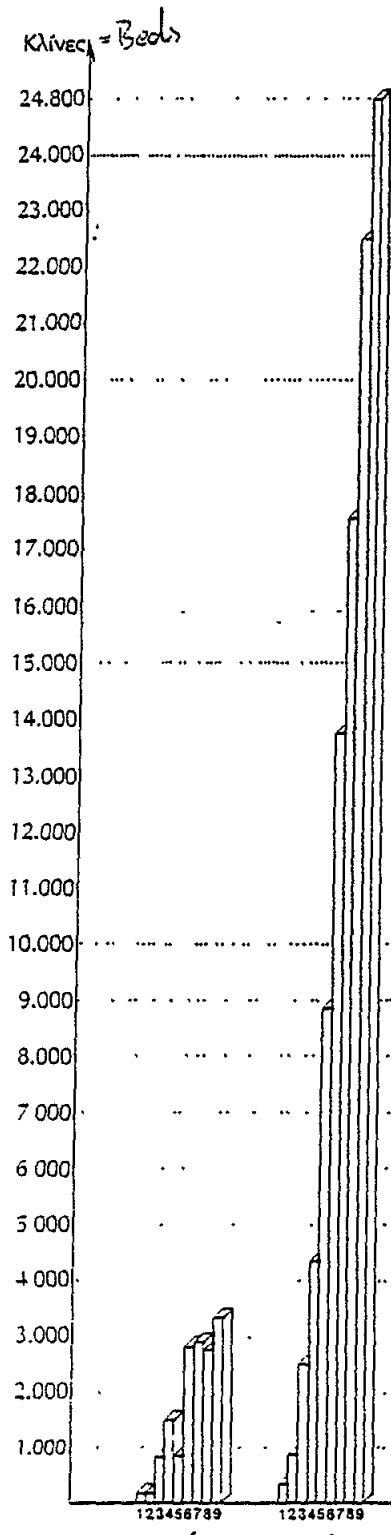
Notes: Electricity etc. also includes gas, steam and water
 Transport etc. also includes storage and communications
 Financial includes banking, insurance, real estate etc.
 'Young' includes those that enter the labour force for the first time
 Sources: 1991 Census
 1994 estimates of the Administration of the Prefecture of Dodecanese

TABLE 3.A
PREFECTURE OF DODECANESE
PERIOD INCOME
Multiple Decades

	1991		1994		Average Annual Rate of Growth
	Amount	%	Amount	%	
	1991-1994				
Primary	1,320	7,2%	1,380	7,5%	12,1%
Mining & Quarrying	30	1,4%	45	1,1%	21,2%
Manufacturing	2,790	13,1%	3,720	13,5%	14,1%
Electricity-Gas-water	310	2,2%	1,290	2,8%	16,5%
Construction	2,970	12,0%	4,224	12,7%	14,1%
Trade-Restaurants-hotels	7,420	15,8%	10,350	17,1%	14,2%
Transport-Storage-Commun.	2,510	10,7%	3,647	11,1%	14,1%
Bank-insurance etc.	450	2,2%	1,221	2,7%	12,9%
Other Services	3,020	22,4%	3,720	19,1%	10,7%
Total	18,400	100,0%	20,320	100,0%	12,6%

Sources: Administration of Prefecture of Dodecanese

Table 4



Hotels Activity 50-91 by Category
2. ΕΞΕΛΙΞΗ ΞΕΝΟΔΟΧΕΙΑΚΟΥ ΔΥΝΑΜΙΚΟΥ ΡΟΔΟΥ ΚΑΤΑ ΚΑΤΗΓΟΡΙΑ

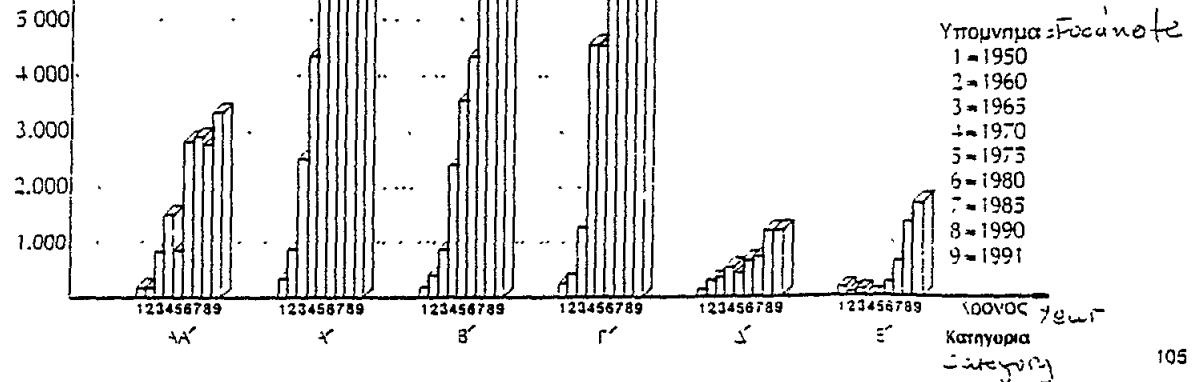
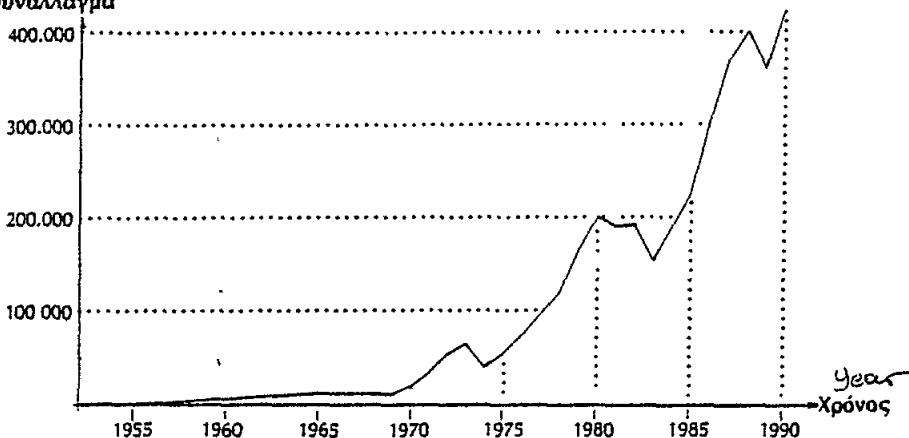


Table 5.

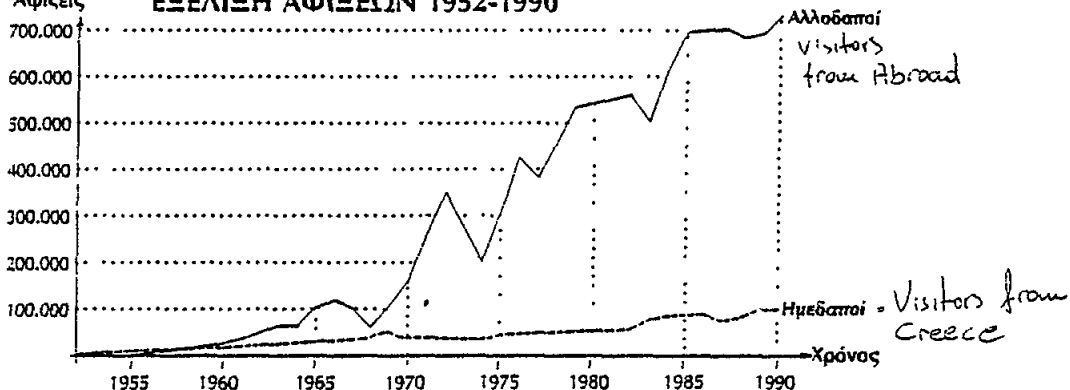
Foreign Exchange
Τουριστικό συναλλαγμα

FOREIGN EXCHANGE 1952-1990
ΕΞΕΛΙΞΗ ΤΟΥΡΙΣΤΙΚΟΥ ΣΥΝΑΛΛΑΓΜΑΤΟΣ 1952-1990



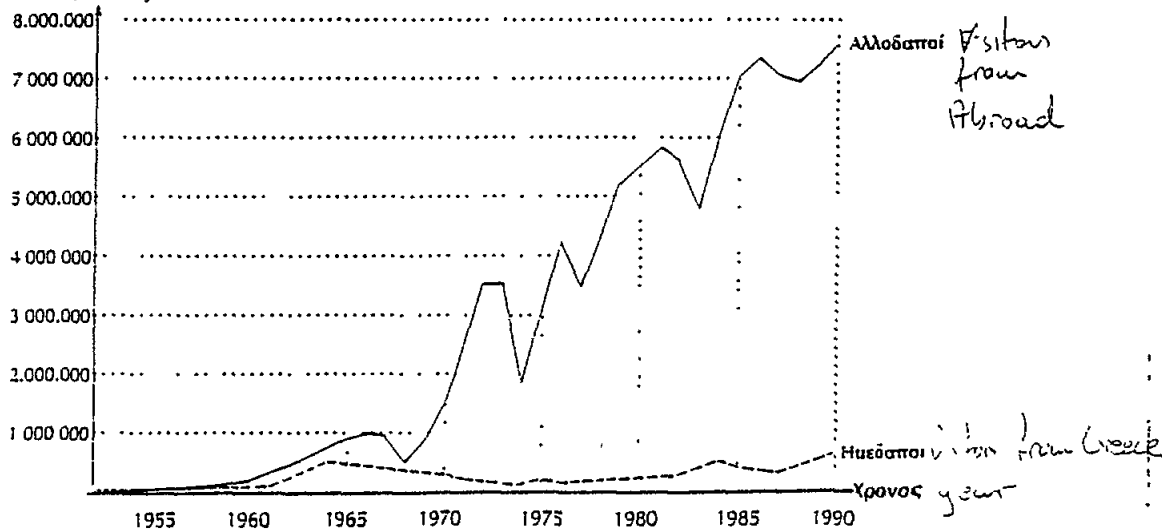
Arrivals
Αφίξεις

Arrivals 1952-1990
ΕΞΕΛΙΞΗ ΑΦΙΞΕΩΝ 1952-1990



Overnight Stays
Διανυκτερεύσεις

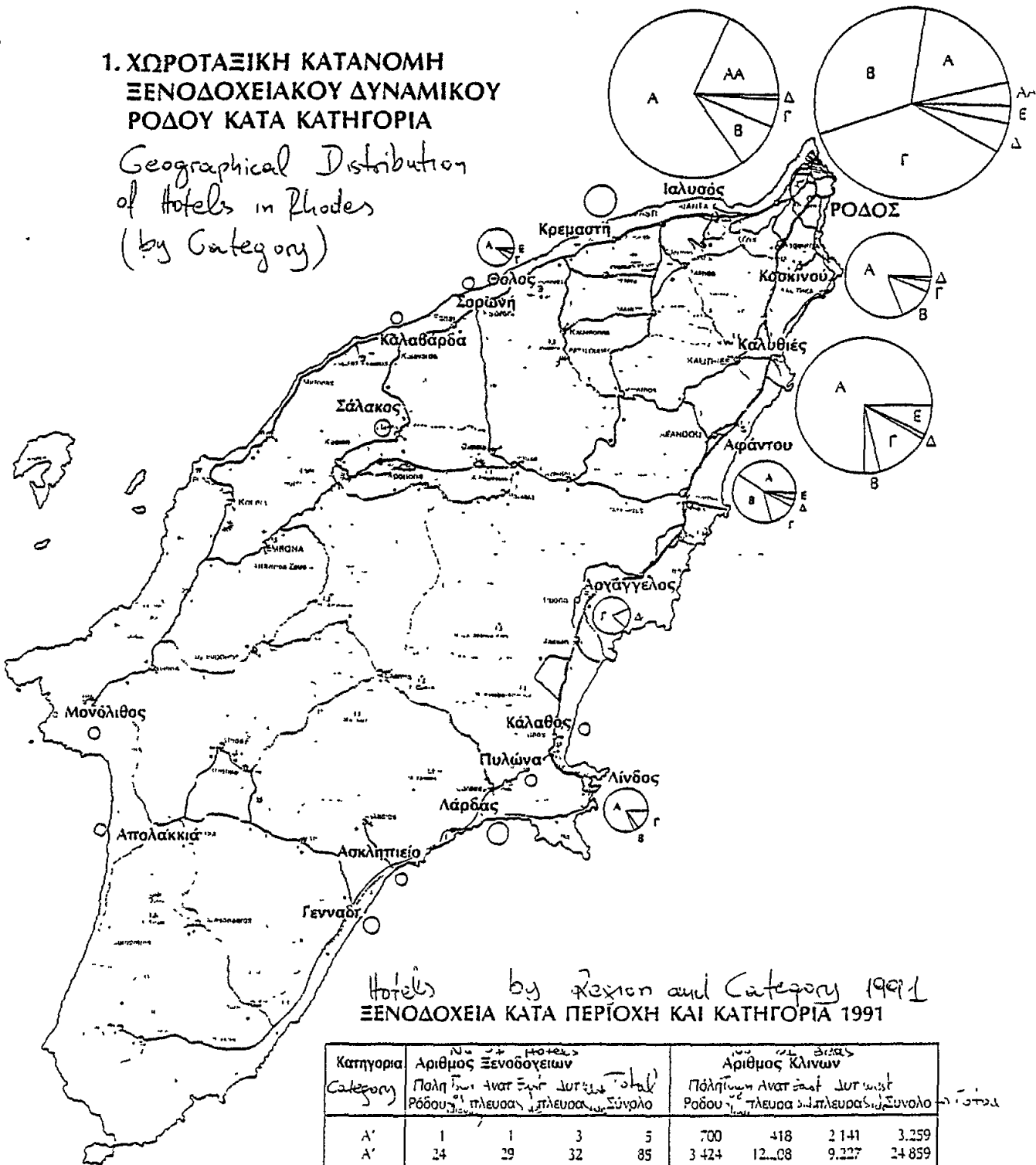
Overnight Stays 1952-1990
ΕΞΕΛΙΞΗ ΔΙΑΝΥΚΤΕΡΕΥΣΕΩΝ 1952-1990



Map 2

1. ΧΩΡΟΤΑΞΙΚΗ ΚΑΤΑΝΟΜΗ
ΞΕΝΟΔΟΧΕΙΑΚΟΥ ΔΥΝΑΜΙΚΟΥ
ΡΟΔΟΥ ΚΑΤΑ ΚΑΤΗΓΟΡΙΑ

Geographical Distribution
of Hotels in Rhodes
(by Category)



Hotels by Region and Category 1991
ΞΕΝΟΔΟΧΕΙΑ ΚΑΤΑ ΠΕΡΙΟΧΗ ΚΑΙ ΚΑΤΗΓΟΡΙΑ 1991

Κατηγορία Category	Αριθμός Ξενοδοχείων Number of Hotels				Αριθμός Κλινών Number of Beds			
	Πολύτιμη Ρόδου	Ανατολική Πλευρά	Δυτική Πλευρά	Σύνολο	Πολύτιμη Ρόδου	Ανατολική Πλευρά	Δυτική Πλευρά	Σύνολο
A'	1	1	3	5	700	418	2 141	3.259
A''	24	29	32	85	3 424	12 008	9 227	24 859
B'	34	28	23	85	5 150	2 277	1 586	9 013
Γ'	68	64	34	166	5 918	3 398	1 300	10.616
Δ'	23	13	5	41	711	383	166	1 260
Ε'	37	23	-	60	826	555	187	1 668
Γεν. σύνολο	187	158	104	449	16 729	19 339	14 607	50 675

Source = Association of Hotel Owners