STATISTICAL AND SPATIAL APPROACHES TO MARINA MASTER PLAN FOR TURKEY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

AYŞE KARANCI

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
CIVIL ENGINEERING

FEBRUARY 2011

Approval of the thesis:

CAPACITY DETERMINATION OF COASTAL TRANSPORTATION STRUCTURES

submitted by **AYŞE KARANCI** in partial fulfillment of the requirements for the degree of **Master of Science in Civil Engineering Department, Middle East Technical University** by,

Prof. Dr. Canan Özgen ______________________
Dean, Graduate School of **Natural and Applied Sciences**

Prof. Dr. Güney Özcebe ______________________
Head of Department, **Civil Engineering**

Prof. Dr. Ayşen Ergin ______________________
Supervisor, **Civil Engineering Dept., METU**

Dr. Işıkhan Güler ______________________
Co-Supervisor, **Civil Engineering Dept., METU**

Examining Committee Members:

Prof. Dr. Ahmet Cevdet Yalçıner ________
Civil Engineering Dept., METU

Prof. Dr. Ayşen Ergin ________
Civil Engineering Dept., METU

Dr. Engin Karaesmen ________
Civil Engineering Dept., METU

Dr. Işıkhan Güler ________
Civil Engineering Dept., METU

Ülker Yetgin, M.Sc. ________
General Directorate of State Railroads, Ports and Airports Construction, DLH

Date: 11.02.2011

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last name : Ayşe Karancı

Signature :

ABSTRACT

STATISTICAL AND SPATIAL APPROACHES TO MARINA MASTER PLAN FOR TURKEY

Karancı, Ayşe
M.S., Department of Civil Engineering
Supervisor: Prof. Dr. Ayşen Ergin

February 2011, 92 pages

Turkey, with its climate, protected bays, cultural and environmental resources is an ideal place for yacht tourism. Subsequently, yacht tourism is increasing consistently. Yacht tourism can cause unmitigated development and environmental concerns when aiming to achieve tourist satisfaction. As the demand for yacht tourism intensifies, sustainable development strategies are needed to maximize natural, cultural and economic benefits.

Integration of forecasts to the strategic planning is necessary for sustainable and use of the coastal resources. In this study two different quantitative forecasting techniques - Exponential smoothing and Auto-Regressive Integrated Moving Average (ARIMA) methods were used to estimate the demand for yacht berthing capacity demand till 2030 in Turkey.

Based on environmental, socio-economic and geographic data and the opinions gathered from stakeholders such as marina operators, local communities and government officials an allocation model was developed for the successful allocation of the predicted demand seeking social and economical growth while preserving the coastal environment. AHP was used to identify and evaluate the development, social and environmental and geographic priorities. Aiming a dynamic plan which is responsive to both national and international developments in yacht tourism, potential investment areas were determined for the investments required to accommodate the future demand. This study provides a multi dimensioned point of view to planning problem and highlights the need for sustainable and dynamic planning at delicate and high demand areas such as coasts.

Keywords: Coastal Management, Tourism Demand Forecasting, Multi-Criteria Decision Making, Scenario Building, Master Plan Studies, Analytic Hierarchy Process, Time Series Forecasting

ÖZ

ULAŞTIRMA KIYI YAPILARININ KAPASİTELERİNİN BELİRLENMESİ

Karancı, Ayşe
Yüksek Lisans, İnşaat Mühendisliği Bölümü
Tez Yöneticisi: Prof. Dr. Ayşen Ergin

Şubat 2011, 92 Sayfa

Türkiye uygun iklimi, korunaklı koyları, kültür ve çevre kaynakları ile yat turizmi için çok elverişli bir bölgedir. Bu avantajları sayesinde bölgedeki yat turizmi sürekli artmaktadır. Yat turizminin kıyılar üzerindeki baskısı arttıkça, sosyal gelişimin desteklenmesi ve çevrenin korunması için sürdürülebilir gelişim stratejilerine ihtiyaç duyulmaktadır.

Yat turizmi için gelişim planları ancak planlanacak yıldaki yat turizm eğilimlerinin saptanmasından sonra yapılabilir. Bu çalışmada zaman serisi tahmin yöntemleri kullanılarak 2030 yılı için yat turizmi tahminlemesi yapılmıştır.

Gelecek yat turizmi altyapı ihtiyacının bölgelere dağılımı için, uzmanlardan alınan görüşler, sosyo-ekonomik veriler ve çevresel koşullar kullanılarak bir model oluşturulmuştur. Coğrafi Bilgi Sistemleri ve çok kriterli karar verme yöntemi olan Analitik Hiyerarşi yöntemi kullanılarak yeni yatırım önerileri 5 yıl aralıklar ile zamansal ve mekansal olarak belirlenmiştir. Bu çalışma ile kıyı planlanmasına çok kriterli bir bakış açısı sunulmuş, kıyılarda sürdürülebilir gelişim planlarının önemi vurgulanmıştır..

Anahtar Kelimeler: Kıyı Yönetimi, Turizm Talep Tahmini, Master Plan Çalışması, Senaryo Çalışmaları, Analitik Hiyerarşi Yöntemi, Zaman Serisi Tahmin Yöntemleri

“The Road goes ever on and on down from the door where it began. Now far ahead the Road has gone, and I must follow, if I can, pursuing it with eager feet, until it joins some larger way where many paths and errands meet. And whither then? I cannot say.”

J.R.R. Tolkien

Dedicated to my brilliant family

ACKNOWLEDGEMENTS

Foremost, I would like to thank my supervisor, Prof. Dr. Ayşen Ergin, for her enthusiasm, motivation, patience and immense knowledge. Her warm encouragement and thoughtful guidance has immensely helped me through my thesis studies. I also like to express my gratitude to Dr. Işıkhan Güler, who aside from being a great mentor, has also been a cornerstone in my professional development. It is difficult to express the depth my appreciation to Prof. Dr. Ahmet Cevdet Yalciner, who brought me into the world of research.

I remain indebted to Coastal Engineering Laboratory family for their kindness, support and constant merriment. I will always miss the people who have made K5 walls home. I want to express my thanks to Pelin Özturk and Işıl İnsel not only for their constant support and friendship but for always being there whenever I need someone to listen to me rant. I would especially like to thank “alt kat” crew for the much needed diversions they provided during my thesis work and keeping me sane. These include delicious coffee breaks, hours of tv-series and the sounds of FIFA. Thank you for all the fun.

I individually thank all of my friends which, from my childhood until graduate school, have joined me in the discovery of what is life about and how to make the best of it.

I cannot finish without saying how grateful I am with my family who always provided me with a loving environment to grow. I thank my brother for his constant love and guidance. Lastly, and most importantly, I wish to thank my parents, Nuray and Egemen Karancı. Thank you for encouraging me to pursue what I want and always encouraging me to achieve my best. The confidence you endowed upon me that you will always be there to pick up the pieces is what allows me to repeatedly risk getting shattered.

And a brief thanks to the white bright apple which never let me down and almost always recovered my studies from the trenches of power shortages and program fails.

TABLE OF CONTENTS

ABSTRACT iv
ÖZ...vi
ACKNOWLEDGEMENTS...viii
TABLE OF CONTENTS..ix
CHAPTER 1.. 1
INTRODUCTION... 1
CHAPTER 2.. 3
YACHT TOURISM 3
2.1 Yachting History... 3
2.2 Yacht Tourism in World.. 4
2.3 Yachting in Turkey 6
2.3.1 Mega Yacht Tourism in World and in Turkey 11
2.3.2 The Use of Fisheries in Yacht Tourism..12
2.4 Berthing Space Capacity Evaluation 13
CHAPTER 3...15
DEMAND FORECASTING METHODS..15
3.1 Demand Forecasting Methods 15
3.1.1 Time Series Models...16
3.1.2 Causal Methods 20
3.2 Measure of Accuracy 21
3.2.1 Measure of Accuracy for Extrapolative Methods......................................22
3.2.2 Measure of Accuracy for Regression Analysis..23
3.3. Preliminary Selection of Forecasting Methods 23
CHAPTER 4...25
YACHT TOURISM DEMAND FORECAST for TURKEY 25

4.1 Design phase....25

4.2 Specification Phase....29

4.3. Selection of the Forecast Method....33

CHAPTER 5....35

BERTHING SPACE DEMAND DISTRIBUTION for TURKEY (2010 - 2030)....35

5.1 Development Scenarios....35

5.1.1 Scenario 1: Very weak sustainability....36

5.1.2 Scenario 2: Social Growth Scenario....37

5.1.3 Scenario 3: Environmental Conservation Scenario....37

5.1.4 Scenario 4: Strong Sustainability Scenario....37

5.2 Spatial Distribution of New Investments In Coastal Regions....38

5.2.1 Analytic Hierarchy Process....39

5.1.5 Step 2: Pair-wise Comparisons....50

5.1.6 Calculation of Relative Weights....52

5.1.7 Presentation of Results....54

CHAPTER 6....69

DEVELOPMENT of NEW INVESTMENTS OVER TIME....69

6.1 Planning New Investments for the Regions....71

6.2 Time-dependent Development Scenarios for Yacht Tourism....73

6.2.2 Scenario 2: Socio-Economic Growth....76

6.2.4 Scenario 4 Sustainable Development....81

6.3 Discussion of Results....83

CHAPTER 7....87

CONCLUSIONS....87

REFERENCES....90

LIST of TABLES

Table 2.1. Total Mooring Capacities and Recreational Sea Craft (ICOMIA, 2005)........ 5

Table 2.2: Capacities of Operated Marinas and Berthing Facilities in Turkey (DLHI, 2010)... 7

Table 2.3: Capacities of Marinas in Turkey that are in Construction, Tender and Planning Phases (DLHI, 2010).. 9

Table 2.4: Distribution of Domestic and Foreign Yachts Arrived all Marinas by Nature and By Years (Ministry of Culture and Tourism, 2007) 10

Table 2.5: Yacht Berthing Capacities in Fisheries 12

Table 4.1 Historical Trends for Turkey Yacht Demand 28

Table 4.2 Turkey Overall Berthing Space Demand Estimations with Holt's Exponential Smoothing Method..31

Table 4.3 Yacht Demand Estimations with ARIMA Method 32

Table 4.4 Summary of Forecasts for Berthing Capacity Demand for Turkey (2010 - 2030)..33

Table 5.1 Socio-Economic Ratings of the Coastal Provinces (SPO, 2003)..................49

Table 5.2 Pairwise Comparision Measures (Saaty, 1980) 51

Table 5.3 Random Consistency Index (RI)..53

Table 5.4 Comparison of Coastal Regions with Respect to Climate 55

Table 5.5 Comparison of Coastal Regions with Respect to Protected Bays 55

Table 5.6 Comparison of Coastal Regions with Respect to Environmental Scenery....56

Table 5.7 Comparison of Coastal Regions with Respect to Touristic Benchmarks 56

Table 5.8 Comparison of Coastal Regions with Respect to Accessibility in Turkey Marina Network 57

Table 5.9 Comparison of Coastal Regions with Respect to Accessibility in Mediterranean Marina Network 57

Table 5.10 Comparison of Coastal Regions with Respect to Accessibility in Black Sea Marina Network 58

Table 5.11 Comparison of Coastal Regions with Respect to Population 58

Table 5.12 Comparison of Coastal Regions with Respect to Tourism Income 59

Table 5.13 Comparison of Coastal Regions with Respect to Socio Economic Index ...59

Table 5.14 Comparison of Coastal Regions with Respect to Pollution 60

Table 5.15 Comparison of Coastal Regions with Respect to Yacht/km 60

Table 5.16 Comparison of Coastal Regions with Respect to Marina/km 61

Table 5.17 Comparison of Criterion with Respect to Coastal Tourism Resources 61

Table 5.18 Comparison of Criterion with Respect to Accessibility to Marina Networks 62

Table 5.19 Comparison of Criterion with Respect to Physical and Geographical Attractiveness of the Region 62

Table 5.20 Comparison of Criterion with Respect to Demographic Properties of the Region 63

Table 5.21 Comparison of Criterion with Respect to Environmental Properties of the Region 63

Table 5.22 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 1 (Very Weak Sustainability) 64

Table 5.23 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 2 (Social Growth) 65

Table 5.24 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 3 (Environmental Conservation) 65

Table 5.25 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 4 (Strong Sustainability) 66

Table 5.26 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 4 (Very Strong Sustainability) 66

Table 5.27 Overall Priority Weights for Regions 67

Table 5.28 Regional Distributions of Future Investments Corresponding to 2030 Berthing Space Demand for the Proposed Scenarios 68

Table 6.1 Development of Berthing Space Capacity in Scenario 1: Very Weak Sustainability (2010-2030)..74

Table 6.2 Development of Berthing Space Capacity in Scenario 2: Social Growth (2010-2030) 76

Table 6.3 Development of Berthing Space Capacity in Scenario 3: Environmental Conservation (2010-2030)..79

Table 6.4 Development of Berthing Space Capacity in Scenario 4: Sustainable Development (2010-2030)..81

Table 6.5 New Marina Investments Proposed in Scenario 4: Sustainable Development (2010-2030) 86

LIST of FIGURES

Figure 2.1 Marinas and Yacht Berthing Facilities in Turkey 8

Figure 3.1 Guide to preliminary selection of the most appropriate forecasting method (Frechtling, 2001) 24

Figure 4.1 Yacht Densities at Turkey Shores 27

Figure 4.2 Berthing Space Demand Trends in Turkey 28

Figure 4.3 Berthing Space Demand Trends in Turkey Estimated by Holt's Exponential Smoothing (2010 – 2030) 31

Figure 4.4 Berthing Space Demand Trends in Turkey Estimated by Holt's Exponential Smoothing (2010 – 2030) 33

Figure 5.1 Analytic Hierarchy Process Framework (Saaty, 1994) 40

Figure 5.2 Coastal Regions of Turkey 42

Figure 5.3 A simple AHP model 44

Figure 5.4 Decision Hierarchy for Analytic Hierarchy Process 45

Figure 6.1 Development Stages of the Regions According to Yacht Tourism Development (Diedrich Amy, 2009) 70

Figure 6.2 Development of Berthing Space Capacities of the Regions 71

Figure 6.3 Regional Distribution of New Berthing Space Investments for Scenario 1: Very Weak Sustainability, (2010 -2030) 74

Figure 6.4 TALC of Coastal Regions According to Scenario 1: Weak Sustainability (1998 – 2030) 75

Figure 6.5 Regional Distribution of New Berthing Space Investments for Scenario 2 (Social Growth), 2010 – 2030..........77

Figure 6.6 TALC of Coastal Regions According to Scenario 2: Social Growth (1998 – 2030)..........78

Figure 6.7 Regional Distribution of New Berthing Space Investments for Scenario 3: Environmental Conservation, (2010 -2030)..........79

Figure 6.8 TALC of Coastal Regions According to Scenario 3: Environmental Conservation (1998 – 2030)..........80

Figure 6.9 Regional Distribution of New Berthing Space Investments for Scenario 4: Sustainable Development, (2010 -2030)..........82

Figure 6.10 TALC of Coastal Region According to Scenario 3: Environmental Conservation (1998 – 2030)..........82

CHAPTER 1

INTRODUCTION

Man has been traveling for recreational purposes for centuries even before biblical times (Adler, 1989). However, tourism has not gained significant attention until the end of the Second World War. Over the last half century, tourism has shown a remarkable growth, working as an amplifying factor of social and economic development. In 1950, worldwide international tourist arrivals were estimated approximately over 25 million; by 2000, that figure had increased to 687 million and since then international tourism has continued its remarkable growth. In 2009, over 935 million international arrivals were recorded (UNWTO, 2011).

Tourism is an essential factor in economic development of several countries and is one of the fastest growing sectors in the world, providing employment to more than 220 million people and composes over 9.4% of world GDP (WTTC, 2009).

Tourism also plays a significant part in Turkey's economic and social development. International tourist arrivals in Turkey have shown a remarkable growth during the last two decades. World tourism statistics indicate in terms of tourist arrivals Turkey was the 19th most popular destination in 1997, up from its position as 52^{nd} in 1980. In 2009, Turkey was one of the top ten tourism earners accommodating over 25.5 million foreign tourists with approximately 21.3 billion tourism receipts (UNWTO, 2010). It is assumed that tourism will continue to be one of the leading industries in the Turkey's economic structure and a leading place among top tourist-receiving countries in the 21st century.

In the past, Turkey has focused on mass tourism, concentrating only on the destinations with sun-sea-sand resources. This trend has resulted on increasingly low prices and a move to all-inclusive systems, in an effort to remain competitive versus other similar sun-sea-sand (3S) tourism destinations. Consequently, increasingly low quality products, at low prices have been offered to low income tourists, in order to fill up the capacity in these destinations. Turkey's tourism sector has been facing problems because of the high dependence on only one single tourism product (3S), unsuccessful marketing, pollution, uncontrolled exhaustion of tourism resources and a lack of educated staff (Tosun, Okumus, & Fyall, 2008).

To solve this problem and take precaution the domination of 3S tourism has to be decreased by introducing alternative tourism sectors. The indented 8,333 km long coastline of Turkey combined with favorable climatic and scenic coasts provides remarkable resources for yacht tourism. To maximize the opportunity for yacht tourism in Turkey careful planning which integrates sustainable tourism principles in to planning process is necessary.

This study aims to produce a sustainable development plan for yacht tourism infrastructure of Turkey. The main aim of this study is to:

- Evaluate the present condition,
- Estimate the future capacity demand,
- Produce sustainable yacht tourism development plans for coastal regions of Turkey for next 20 years (till 2030).

Within this context, in Chapter 2 present conditions of yacht tourism in the world and Turkey were evaluated and yacht tourism definitions were explained.

In Chapter 3, tourism demand forecasting was described. Forecasting methods and forecasting period were given in detail.

In Chapter 4, historical yacht tourism data collection was presented. Forecasting studies for the estimation of future demand were carried out.

In Chapter 5, spatial distribution with analytical hierarchy process procedure integrating scenario studies were presented.

At the next section, Chapter 6 yacht tourism development of regions over time was planned and discussed according to different scenarios.

In the last chapter, Chapter 7 conclusions and discussion of the planning studies were presented and recommendations were given for future studies.

CHAPTER 2

YACHT TOURISM

Yacht tourism is an adventure tourism based on sea and freedom. It is an expensive leisure activity but with the increasing welfare standards it is gaining more popularity.

Yachting offers historical, cultural and environmental resources of the coasts to yachtsmen along with a sense of freedom. Yachtsmen exploring the unspoilt coasts, interact with locals and by word of mouth advertise the country.

2.1 Yachting History

Almost two thirds of the World consists of water. From the pre-biblical times the man, seeking adventure and freedom have been attracted by the unpredictable waters of the sea. Man used sea for various purposes such as transportation, fishing and pleasure.

The earliest vessels – dugout canoes - were mainly used by fisherman for fishing. With time these primitive forms of sea transportation developed into the earliest seaworthy boats.

Boating for recreational purposes started almost as early as boating. Egyptians are the first recorded civilization to sail for pleasure. But since ship building needed incredible workmanship and wood resources were scarce, pleasure boating was limited to the members of royal family. Till the 16th century, the pleasure boating remained limited to a small scale of people from high society.

Yachts which were light and fast and easy to navigate, was originally used by the Dutch navy to pursue pirates and other transgressors. As the wealth of the

Dutch merchants increased, their strong orientation towards maritime activities caused them to use yachts for pleasure.

The first yacht club "The Water Club of Cork" was founded in Ireland around 1720 whereas the first marina was built in USA around 1928. By year 1960 USA built approximately 350 marinas (Herreshoff & Spectre, 2007).

In the 20th century the naturally sheltered bays of Mediterranean coasts attracted yachters attention to this area. The first place, preferred in the Mediterranean, was the French Riviera followed by the Italian and the Spanish coasts. Europe did not have sufficient background and required information for yacht tourism development, so most countries used the French model. Greece started the yacht tourism in 1963, where the first sail boat in Turkish waters was seen in 1965. Establishment of the first yachting club in Turkey 'İstanbul Sailing Club' took about 3 centuries (1965) after the first yachting club established in England in 1639 'Seamarc Club' (Ministry of Tourism, 1992).

2.2 Yacht Tourism in World

The Caribbean Sea and the Mediterranean Sea are the two key yachting destinations in the world. Their suitable climates combined with favorable wind conditions, beautiful natural settings and historical places inviting cruising grounds make them a magnet for yachting activities. There is no rivalry between these two destinations because of the difference in their season orders and the long distance between them.

Mediterranean coasts stands witness to over 600,000 visiting yachts while in winter over 650,000 yachters tends to prefer Caribbean shores for yachting. 718 marinas residing in Mediterranean has roughly 315,000 berthing spaces. Great majority of these marinas resides in France, Italy and Spain. Total mooring capacities and number of recreational sea crafts of noteworthy countries for yacht tourism is shown in Table 2.1. (ICOMIA, 2005).

Table 2.1. Total Mooring Capacities and Recreational Sea Craft (ICOMIA, 2005)

	Yacht Berthing Spaces	Recreational Sea Craft
Australia	43,800	-
Crotia	13,878	-
Finland	80,900	110,700
France	227,700	240,113
Germany	-	209,407
Greece	7,000	19,620
Ireland	3,300	19,600
Italy	128,042	846,720
Japan		268,000
Hollanda	177,000	219,474
New Zealand	21,000	55,500
Norway	-	362,000
Poland	-	32,520
Portugal	10,516	-
S.Africa	2,500	-
Spain	106,795	47,318
Sweden	200,000	170,000
Turkey	19,301	13,670
England	225,000	160,742
USA	874,100	5,190,000

Yacht tourism development plans and projects belonging to popular yachting countries are as follows:

Italy: Plans to increase its mooring capacity by 200,000 with the addition of 60 new yacht harbours. Majority of these marinas are planned to be built in south coasts of Italy.

Crotia: Crotia which has advantages of tax-free yachting and desirable coastline for yatching activities has implemented a development project which aims to increase the mooring capacity of the country from 16,000 to 31,000 by 2017.

Bulgaria: Because of its geographic location, Bulgaria to increase its share in Black Sea yacht tourism. Recently Marina Dinevi which has 300 mooring capacity has started to serve Black Sea yachtmen.

Russia: Yachting started to gain popularity in Russia since 2004 by attracting the interest of the people in the high income level. Although more and more yachts are being purchased in Russia, the development of the appropriate infrastructure is lacking.

<u>Ukraine:</u> Ukraine's southern borders are washed by the Black Sea and Sea of Azov; the Dnepr River and other big rivers offer good opportunities for establishing yachting. Still, the supporting infrastructure and industry, while undeniably improving, is still very under-developed when compared to other European and emerging European markets.

France: 72 projects concerning yacht tourism is in the planning and implementation stages.

There exist approximately 2,500,000 private and commercial yachts and 718 marinas serving 315,000 yachts in the Mediterranean. France, Italy and the Spain have 88% of the mooring capacity in the Mediterranean. Turkey has only 0.3% of the total capacity (Kara and Emecen, 2001). This is a disadvantage but this could be an advantage to Turkey if used effectively.

Turkey attracts most of the yachters from the west and middle Mediterranean because of its magnificent natural scenery and better naturally sheltered bays.

Approximately 40% of the tourism income of Turkey is maintained by the yacht tourism (CBMCT, 2007). In Turkey, this sector is the fastest growing sector in the last 15 years of the Turkish national economy

2.3 Yachting in Turkey

With the visits of boats transporting tourists that are started in 1960's, a requirement for facilities that would meet the needs of visitors coming from Europe and America such as harboring, repair, wintering, shopping etc. has been arisen. By the end of 1970's, several marinas have been determined by the Ministry of Tourism and development plans for these facilities have been prepared by DPT (State Planning Organization). After the Tourism Promoting Law, in 1980's, marinas in several quality and statute has been established in regions between Çeşme and Antalya where yacht tourism is predominant, in mostly natural bays.

Yacht Tourism in Turkey has come up with the revival of domestic and especially foreign demand in the second half of 1980's. The first motion of yachting in Turkey has been provided by appropriate foundation of Aegean and Mediterranean coasts for yacht tourism and in addition by being estranged of world yachters from other yachting regions in terms of hygiene, intensity and habits.

Capacities of marinas and yacht berthing facilities that are in operation in Turkey are given in Table 2.2. Although capacities of marinas vary in different sources, these references provide approximate values. Locations of marinas are given in Figure 2.1.

Table 2.2: Capacities of Operated Marinas and Berthing Facilities in Turkey (DLHI, 2010)

Province	No	Marina	Capacity Sea	Capacity Land
Antalya	1	Kaleiçi Marina	65	0
	2	Çelebi Marina	235	300
	3	Setur Finike Marina	300	150
	4	Kemer Türkiz Marina	240	140
	5	Kaş Marina	450	150
Aydın	6	D-Marin Didim	580	600
	7	Setur Kuşadası Marina	350	175
Muğla	8	Ece Saray Marina	400	0
	9	Fethiye Municipality Marina	120	0
	10	Letoonia Jetty	30	0
	11	My Marina Berthing Place	68	0
	12	Göcek Municipality Marina	150	0
	13	Port Göcek	385	150
	14	Skopea Marina	48	0
	15	Göcek Club Marina	205	0
	16	Marina Turk Göcek Village Port	185	240
	17	Marina Turk Exclusive	96	0
	18	Bodrum Milta Marina	425	50
	19	Bodrum Belediye Marina	300	0
	20	D-Marin Turgutreis	550	100
	21	Port Atami	30	0
	22	Port Bodrum Yalıkavak	336	100
	23	Yat Lift	0	100
	24	Ağanlar	0	200
	25	Pupa Marina	30	0
	26	Albatros Marina	150	240
	27	Netsel Marmaris Marina	676	120
	28	Martı Marina	350	100
	29	Marmaris Yacht Marin	460	575
	30	Kumlubükü Yacht Club	35	0
İzmir	31	Levent İzmir Marina	70	60
	32	Setur Altınyunus Çeşme Marina	180	60
	33	Alaçatı Marina	250	70
	34	Dalyanköy Berthing Place	100	0
	35	IC Çeşme Marina	400	100
	36	Sığacık Marina	400	200
	37	Eski Foça Berthıng Place	75	0
İstanbul	38	Kumburgaz Güzelce Marina	250	100
	39	B. Çekmece Marina	150	0
	40	Ataköy Marina	700	100
	41	Setur Kalamış ve Fenerbahçe Marina	1,010	220
	42	Atabay Marina	0	100
Balıkesir	43	Ayvalık Setur Marina	200	150
Çanakkale	44	Çanakkale Marina	65	0
TOTAL			**11,099**	**4,650**

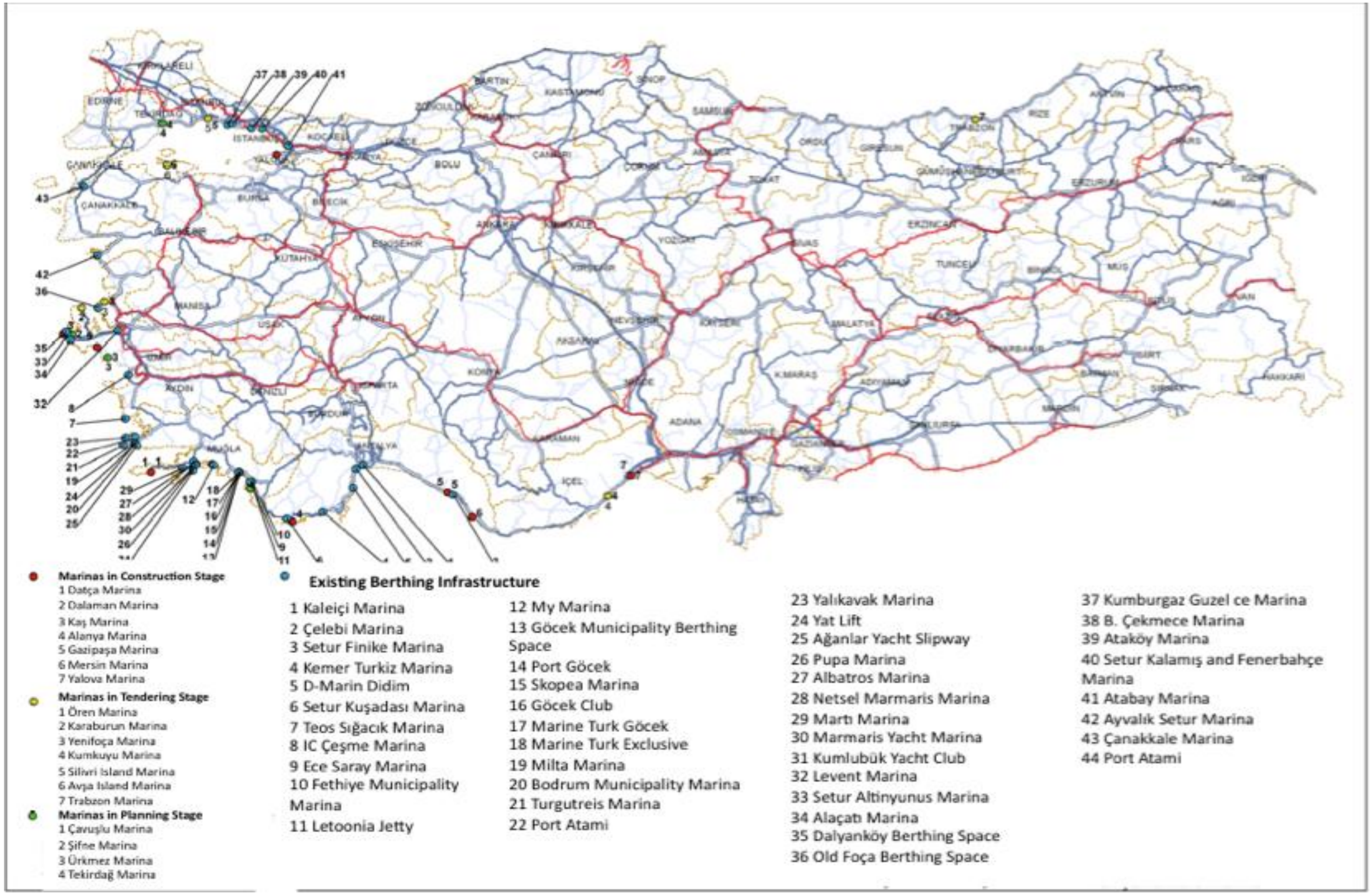

Figure 2.1: Marinas and Yacht Berthing Facilities in Turkey

As seen in Table 2.2 and Figure 2.1, marinas and berthing facilities in Turkey are mostly located at Aegean and Mediterranean Regions (especially in Muğla province). There are no marinas or related facilities that are in operation in Eastern Mediterranean and Black Sea Coasts. However, there are several facilities that are in construction phase and facilities whose constructions have been completed and in tender phase. The properties of marinas in operation are given at Appendix 1. Capacities of marinas that are present and in the phase of construction, tender and planning are shown in Table 2.3.

Table 2.3: Capacities of Marinas in Turkey that are in Construction, Tender and Planning Phases (DLHI, 2010)

	No	Name	Capacity Sea	Dry-Dock Capacity	Total Capacity	Province
Marinas in Construction	1	Kaş Marina	400	100	500	Antalya
	2	Alanya Marina	290	160	450	Antalya
	3	Mersin Marina	500	300	800	Mersin
	4	Kumkuyu Marina	200	100	300	Mersin
	5	Yalova Marina	240	100	340	Yalova
	6	Gazipaşa Marina	250	100	350	Antalya
	7	Datça Marina	250	100	350	Muğla
	8	Muğla Ören Marina	250	100	350	Muğla
	9	Dalaman Marina	650	300	950	Muğla
	TOTAL		3,030	1,360	4,390	
Marinas in Tendering Stage	1	Karaburun Marina	200	100	300	İzmir
	2	Yenifoça Marina	225	100	325	İzmir
	3	Trabzon Marina	175	50	225	Trabzon
	4	Silivri Marina	450	200	650	İstanbul
	5	Avşa Island Türkeli Marina	175	150	325	Balıkesir
	TOTAL		1,225	600	1,825	
Marinas in Planning Stages	1	Fethiye Çavuşlu Marina	1,000	200	1,200	Muğla
	2	Çeşme Şifne Marina	700	100	800	İzmir
	3	Seferihisar Ürkmez Marina	475	150	625	İzmir
	4	Tekirdağ Marina	200	50	250	Tekirdağ
	TOTAL		2,375	500	2,875	
OVERALL TOTALS			7,430	2,760	10,190	

Marina capacity of Turkey will reach up to 25,000 with these facilities that will be started to be operated within short and medium term.

In Table 2.4, distribution of numbers of domestic and foreign yachts that came to Turkey between 2000 and 2007 is given. Briefly evaluating, yellow flag yacht expresses number of yachts that enters to Turkish territorial waters from foreign waters regardless of being domestic or foreign. Transitlog expresses activity and density of yachts in Turkish territorial waters. A steady growth is observed in number of yachts came to Turkish coasts and in yachting activities in Turkish coasts especially in last 5 years.

Table 2.4: Distribution of Domestic and Foreign Yachts Arrived all Marinas by Nature and By Years (Ministry of Culture and Tourism, 2007)

	Number of Yachts						
	Foreign		**Domestic**		**Total**		
	Transitlog (Commercial + Private) number of Yachts	Yellow Flag (Commercial + Private) number of Yachts	Transitlog (Commercial + Private) number of Yachts	Yellow Flag (Commercial + Private) number of Yachts	Transitlog (Commercial + Private) number of Yachts	Yellow Flag (Commercial +Private) number of Yachts	Total
2000	5,924	1,203	11,361	664	17,285	1,867	19,152
2001	6,114	2,398	11,818	803	17,932	3,201	21,133
2002	4,230	2,284	9,092	1,035	13,322	3,319	16,641
2003	4,213	3,994	8,136	1,083	12,349	5,077	17,426
2004	5,800	3,642	8,823	1,549	14,623	5,191	19,814
2005	7,422	4,231	9,608	1,979	17,030	6,210	23,240
2006	11,023	6,101	10,718	2,404	21,741	8,505	30,246
2007	13,309	7,718	11,736	2,815	25,045	10,533	35,578

As per 2007, yacht mooring capacity of Turkey is about 16,000, 9,000 of which are in marinas while those numbers for France, Spain and Italy are approximately 227 thousand, 107 thousand and 128 thousand, respectively. Total yacht mooring capacity of marinas and yacht mooring facilities in Mediterranean Basin is about 500 thousand

and the capacity of Turkey constitutes approximately 4% of total capacity in Mediterranean Basin.

In recent years due to sea pollution occurred in Western Mediterranean Sea and increases in prices, Eastern Mediterranean Sea has become an indispensable place for yachters. Taxes imposed for yachts in European Union countries caused yachters to visit Eastern Mediterranean Sea; and this has constituted a good opportunity for Turkey for yacht tourism. Yachters' demand for discovering new places result in new yachting places in Eastern Mediterranean Sea. In addition, especially Mediterranean, Aegean Sea and Marmara Sea have a great economic potential with their natural and historical wealth, geographical properties and mild climate conditions.

There are lots of bays and gulf in Black Sea that yachters can take shelter. This texture can provide a new yachting route that expands from west to east in Mediterranean Sea and for Turkey from all along Aegean Sea to İstanbul and then to Black Sea.

2.3.1 Mega Yacht Tourism in World and in Turkey

Mega yachts are yachts with a length of 25-30 meters or more. These yachts are generally preferred by people in upper income level.

In the last decade an increase in mega-yachts numbers was observed all over the world. 777 yachts were launched in 2007 while an increase of 18.7 % in mega yacht orders occurred in the year 2009. With this increase in numbers, in 2009 the mega-yachts orders are increased by approximately 4 times, compared to year 1997 in which 241 mega yachts were ordered (http://www.superyachttimes.com/).

Turkey provides an important international market opportunity for mega yachts with its coasts, yacht tourism facilities, cultural and historical wealth. Berthing opportunities in new facilities and ports for mega-yachts planned to be built in Istanbul and Gocek. Developments in Mega –yacht sector should be monitored closely in order to gain maximum benefit from this market.

2.3.2 The Use of Fisheries in Yacht Tourism

Since Turkey marina network is still in developing stages the existing marinas cannot provide cover for all the yacht destinations at the coasts of Turkey. Therefore, fisheries provide shelter and the bare minimum services for the yachts if required. Especially in Eastern Mediterranean and Black Sea coasts the exploring yachtsmen take shelter in fisheries. The fisheries available to offer shelter in Eastern Mediterranean and Black Sea coasts of Turkey are given at Table 2.5.

Table 2.5: Yacht Berthing Capacities in Fisheries

Province	Fisheries	Capacity
Mugla	Mesudiye (Hayıtbükü) Muğla Fishery	2
Aydin	Akköy Fishery	59
İzmir	Balıklıova Fishery	9
	Mordoğan Fishery	79
Edirne	Enez Fishery	94
Çanakkale	Küçükuyu Fishery	40
	Gülpınar Fishery	25
	Bozcaada Fishery	28
	Kabatepe Fishery	67
	Lapseki Fishery	51
Hatay	Samandağ Fishery	43
	Konacık Fishery	32
	Dörtyol Fishery	101
Mersin	Aydıncık Fishery	16
	Taşucu Fishery	64
Tekirdağ	Şarköy Fishery	85
	Hoşköy Fishery	9
	Mürefte Fishery	-
Yalova	Armutlu Fishery	105
Bursa	Babakale Fishery	38
	Yeniköy Fishery	27
	Kurşunlu Fishery	12
	Zeytinbağı Fishery	20
Balıkesir	Alibey Island Fishery	84
	Şahinburgaz Fishery	29
	Avşa Fishery	75
Kocaeli	Kefken Fishery	25
Zonguldak	Alaplı Fishery	41
	Kilimli Fishery	112
Kırklareli	Kıyıköy Fishery	67
	İğneada Fishery	175

Table 2.5 (continued)

Province	Fisheries	Capacity
Rize	Rize Fishery	0
	Vakfıkebir Fishery	55
	Bulancak Fishery	50
Samsun	Samsun Fishery	136
	Yakakent Fishery	141
Bartın	Amasra Tarlaağzı Fishery	50
	Amasra Fishery	37
Kastamonu	Doğanyurt Fishery	22
	Gemiciler Fishery	28
	Cide Fishery	162
	İnebolu Özlüce Fishery	37
	Çatalzeytin Fishery	88
Sinop	Gerze Fishery	124
	Türkeli Fishery	42
	Ustaburnu Fishery	90
Duzce	Akçakoca Fishery	21
Sinop	Sinop Fishery	57
Ordu	Yalıköy Fishery	34
	Fatsa Fishery	162
	Efirli Fishery	188
Giresun	Giresun Fishery	22
	Görele Fishery	86
Trabzon	Of Fishery	84
	Fındıklı Fishery	50
İstanbul	Poyrazköy Fishery	81
	Rumeli Fishery	43
	Tuzla Fishery	0
	Şile Fishery	215
	Bağırganlı (İstanbul) Fishery	26
Total		**3,747**

2.4 Berthing Space Capacity Evaluation

Turkey is facing a supply problem when it comes to available berthing spaces. It can't expect to be more competitive in yacht tourism as long as berthing and dockage capacity is not enough for the cruising yachtsmen who wish to come but are dissuaded by the scarcity of economic and convenient yachting facilities. Especially the yachting facilities in Bodrum, Fethiye, Göcek and Marmaris coasts are filled to the brim. While the popularity and the number of visiting yachts of these coastlines will continue to increase, the Black Sea coast is also open for development. Black Sea has numerous natural protected bays yachts can take shelter. The development of yacht tourism facilities at Black Sea shores will add a yachting route starting from Mediterranean, passing from Aegean Sea into the Black Sea to Turkey nautical tourism. Also advancements in yacht building industry enable the yachts to travel from Europe to Black Sea, through Danube River. Sailing competitions are organized at the Black Sea aiming to promote the yachting tourism in the area.

The yachts and other recreational crafts owned by country is also an important indicator of yacht tourism in the country. In Turkey there is approximately one yacht per 2000 people whereas in European countries such as Norway, Finland and Sweden this ratio shifts as 0,5 yachts per capita.

CHAPTER 3

DEMAND FORECASTING METHODS

Demand forecast of any economic activity will be the fundamental input for national regional and local development plans to reduce the risk of decisions regarding the future. Accordingly, all tourism-related planning decisions must be founded on tourism demand. For a successful tourism sector, tourism industries (such as yachting) need to reduce the risks. One of the most effective ways of reducing the risk is to determine and understand the future events or environments.

In case of yacht tourism demand forecasts are used to (Frechtling, 2001):

- predict the economic, social and environmental consequences of yacht tourism developments,
- constitute environmental quality controls,
- estimate public revenues from yacht tourism for the budgeting process,
- ensure adequate capacity and infrastructure of marinas, including airports and airways, highways, and energy and water treatment utilities.

3.1 Demand Forecasting Methods

In general tourism demand forecasting is generally categorized into two-categories: quantitative and qualitative. Qualitative methods use expert judgments to organize the past information of the variable. Qualitative forecasts are used when historical information about the variable is unavailable.

Quantitative methods employ mathematical rules to identify the patterns and relationships of the phenemonon to predict future patterns. Quantitative methods can be used when the past information of variable exists and can be quantified. These methods also assume past patterns will continue into the future.(Makridakis, Wheelwright, & Hyndman, 1998)

The quantitative forecasting literature is divided into two sub-categories of methods: time series models and the causal methods. (Song & Li, 2008)

3.1.1 Time Series Models

Time series methods use the historical trends of the variable being forecasted to extrapolate future values. These methods only use past data of the variable in computations. A drawback of time series methods is their inability to portray the cause-effect relationships between other variables which is integral for policy evaluations.
Time series models can be divided into six as;

- Moving Average Method
- Exponential Smoothing
- Simple Exponential Smoothing
- Browns Exponential Smoothing Method
- Holt’s Exponential Smoothing Method
- Autoregressive Integrated Moving Average Method (ARIMA)

3.1.1.1 Moving Average Method

Moving average method determine forecast values by calculating the average of the most recent *n* data values in the time series. Moving average generally used to smooth out the short-term fluctuations in the time series.

The general equation for moving average method is :

$$F_t = \frac{\sum A_{t-1}+A_{t-2}+\cdots+A_{t-n}}{n} \quad (1)$$

where:

F= forecast value

A=Actual demand value

t= time period

n= number of past periods

3.1.1.2 Exponential Smoothing

Exponential smoothing method produces smoothed time series by assigning exponentially decreasing weights to older observations. In this method as the weight of the data will decrease exponentially as data get older (Touran and Lopez, 2006). Most commonly used types of exponential smoothing are described below.

3.1.1.3 Simple Exponential Smoothing

The simple exponential smoothing method has a single level parameter to adjust the weight of recent values to forecasting. The logic of the simple exponential smoothing can be described by the following equations:

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1}) \quad (2)$$

where:

F = forecast value

α = smoothing constant

A=Actual demand value

t= time period

The term (A_{t-1}-F_{t-1}) represents the forecast error since it computes the difference between the forecasted and actual data.

3.1.1.4 Brown's Exponential Smoothing Method

The trend in a time series is the rate which observations changes over time periods. Second order exponential smoothing was developed to handle time series with linear trend. One of the simplest one of these models is Brown's exponential smoothing method (Frechtling, 2001). Brown's exponential smoothing method can be formulized as:

$$\begin{aligned} &\text{Level:} && L_t = \alpha A_t + (1 - A)(L_{t-1} + b_{t-1}) \\ &\text{Trend:} && b_t = \alpha(L_t - L_{t-1}) + (1 - \alpha)b_{t-1} \\ &\text{Forecast:} && F_{t-n} = L_t + n \times b_t \end{aligned} \tag{3}$$

where :

L = level of the series

α= level and trend smoothing constant between 0 and 1

A = actual value

b = trend of the series

t = time period

n = number of time periods ahead to be forecast.

3.1.1.5 Holt's Exponential Smoothing Method

Another simple second order exponential smoothing method which can deal with both the trend and linear components of a time series is Holt's exponential smoothing method. This method is very similar to Brown's exponential smoothing method but Holt's Method utilizes different parameters to smooth the trend value. This method can be described by following equations (Makridakis, et al., 1998):

$$\begin{aligned} &\text{Level:} && L_t = \alpha A_t + (1 - \alpha)(L_{t-1} + b_{t-1}) \\ &\text{Trend:} && b_t = \alpha(L_t - L_{t-1}) + (1 - \alpha)b_{t-1} \\ &\text{Forecast:} && F_{t-n} = L_t + n \times b_t \end{aligned} \tag{4}$$

where;

L = level of the series

α= level and trend smoothing constant between 0 and 1

A = actual value

b = trend of the series

t = time period

n = number of time periods ahead to be forecast.

3.1.1.6 ARIMA

The abbreviation ARIMA stands for "autoregressive integrated moving average." ARIMA approach is designated to design the simplest model for describing the past patterns of observed data forecasting that are based on linear functions of observations. Forecasts produced by ARIMA models are based on linear functions of the sample data.

ARIMA processes which are sometimes called as Box-Jenkins models consists of three parts. The model is often denoted as ARIMA(p,d,q) where p is the order of autoregressive component, d describes the order of differencing needed in order to achieve stationary time series and q describes the order of moving average component. The three components of the ARIMA method are described below.

Autoregression (AR): Autoregression part of the ARIMA model describes the degree to each observation is a function of the previous *n* observations.

$$A_t = a + b_1 A_{t-1} + b_2 A_{t-2} + \cdots + b_n A_{t-n} \quad (5)$$

where;

A= Actual demand value

a = constant determined by iteration

b= coefficient determined by iteration

t = time period

n = number of past periods

Integration (I): The ARIMA models only use time series with stationary means. If the past observations are not stationary, differencing is used to achieve stationarity. The number of times a series must be differenced to achieve stationarity is indicated by its 'integration index'.

Moving average (MA): This part of the model refers to the relationship between actual values in our time series and successive error terms. Moving average can be formulized as:

$$A_t = a + e_t - b_1 e_{t-1} - b e_{t-2} - \cdots - b_n e_{t-m} \quad (6)$$

where;

A= Actual demand value

a = constant determined by iteration

b = coefficient determined by iteration

e = error term

t = time period

n = number of past periods

3.1.2 Causal Methods

The other sub-category of quantitative methods is causal (econometric) methods. Causal methods explore the cause-effect relationships between the variable being forecasted and influencing (explanatory) variables. Causal models allow interpretation of influencing variables but they are more costly and time-consuming to construct than time series models, and are often considerably less accurate. (Frechtling, 2001)

There are two major approaches to causal modeling popular in tourism forecasting. One is the *linear regression method*, where the forecast variable is explained by, one or more independent variables (Frechtling, 2001).

The other approach is to develop a set of regression equations linked together by certain variables that are both dependent and independent variables. These are often called *structural models*. Although structural models reveals more detail about the relationships between the dependent and independent variables they are time-consuming and costly.

3.1.2.1 Linear Regression Method

Regression analysis is a forecasting tool in which the dependent variable is expressed in terms of the independent variables. The accuracy of a regression method depends upon the consistency of the relationship between the independent variables. (Touran & Lopez, 2006)

Linear regression models are the most common regression models. They attempt to understand the relationship between two variables by developing the best fitting linear equation to observed data. The general form of a *linear regression model* is:

$$F = a + b_1x_1 + b_2x_2 + \cdots + b_nx_n + e \qquad (7)$$

where

F = forecast, dependent, variable
a = intercept
b = slope coefficients
x = independent, or explanatory variables
n = number of independent variables
e = residual

3.2 Measure of Accuracy

The accuracy of a forecasting method can be measured by the difference between the forecasted value (F) and actual demand (A). The difference called forecast error is defined by:

$$e_t = A_t - F_t \qquad (8)$$

If the forecasting method is correctly structured, forecasting errors should form a random series with a mean of zero. The sum of the forecasting errors is most likely to be zero. Therefore, a model with very poor forecast results may generate very small forecasting errors because the positive and negative forecasting errors cancel out. This problem can be solved by using $|e_t|$ or e_t^2. The smaller the $|e_t|$ or e_t^2, the accurate the forecasts.

3.2.1 Measure of Accuracy for Extrapolative Methods

Mean absolute percentage error (MAPE) is a sum of the absolute errors for each time period divided by the actual value for the period, divided by the number of periods. Then, by convention, this value is multiplied by 100. This is a simple measure allowing the comparison of different forecasting models with different time periods and numbers of observations, and weighting all percentage error magnitudes the same. Lower MAPE values are preferred to higher ones since they indicate a forecasting model with smaller percentage errors (Frechtling, 2001). MAPE can be denoted as:

$$MAPE = \frac{1}{n} \times \left(\frac{|e_t|}{D_t}\right) \times 100 \qquad (9)$$

where:

n = number of periods

e = forecast error

D= actual demand value

t = time period

The MAPE indicates, on the average, the percentage error a given forecasting model produces for a specified period. Lewis (1982) has suggested the following interpretation of MAPE values:

- less than 10% is highly accurate forecasting,
- between 10 and 20% is good forecasting,
- between 20 and 50% is reasonable forecasting,
- greater than 50 per cent is inaccurate forecasting .

3.2.2 Measure of Accuracy for Regression Analysis

The two important indicators of accuracy of a regression model are the R^2 and the P-Value. R^2 measures the percent of the variation of the dependent variable that is explained by our explanatory variables. The value of R^2 close to 1 indicates a good model with R^2 ranging from 0 to 1.

Significance level, P-value is a test statistic designating the significance of the independent variables. Usually a P-value less than 0.1 designate a significant independent variable.

3.3. Preliminary Selection of Forecasting Methods

One of the fundamental issues in demand forecasting is the selection of the forecasting method. Within the two main classes of demand forecasting – extrapolative and causal- there are a number of viable alternatives the forecaster can use. Research has indicated that no single tourism demand forecasting method can outperform the others on all occasions (Frechtling, 2001; Song & Li, 2008).

Figure 3.1 provides advice on choosing between forecasting methods. It should be noted that the figure allows only for a preliminary selection since it only shows the ability of the methods to forecast accurately within your historical data series. The accuracy of the model will ultimately determine which method to utilize in forecasting.

The criterion in preliminary selection process can be defined as (Armstrong, 2002; Frechtling, 2001):

Objective data: are numerical measures of the past activity of variable to be forecasted.

Forecast horizon: refers to the most distant time period you are trying to forecast.

Large changes in the environment: denotes future forces likely to change relationships among the forecast variables and the factors that influence them.

Good information on relationships: refers to the information available about how variables affect the variable you are trying to forecast.

Many data on causal variables: refers to how long the time series are on the factors that influence your forecast variable. A rule of thumb often proposed for causal methods such as regression analysis and structural models is that you need at least five historical data points for every period ahead you plan to forecast.

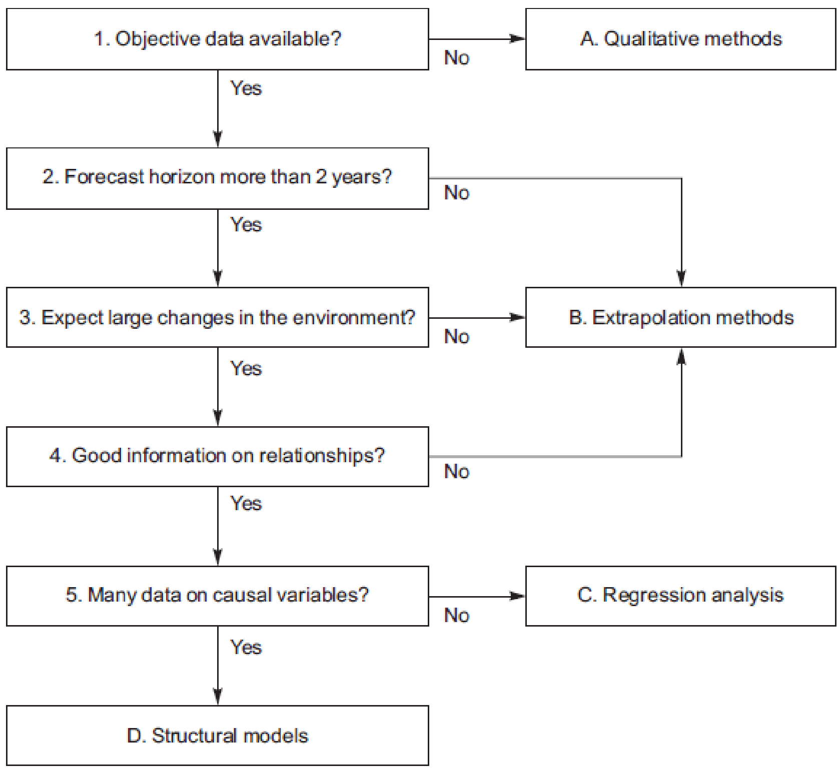

Figure 3.1 Guide to preliminary selection of the most appropriate forecasting method (Frechtling, 2001)

Yacht tourism demand for Turkey will be carried out under the light of the methods discussions given in this chapter.

CHAPTER 4

YACHT TOURISM DEMAND FORECAST for TURKEY

Any tourism forecasting procedure can be broken into four phases.(Frechtling, 2001)

Design Phase: In this step problem is defined (variable to forecast, forecast period), data availability is determined. Appropriate forecasting model(s) are chosen according to the problem and available data.

Specification Phase: Relationships between variables are estimated and verified for causal methods. Model(s) accuracy in the past is determined. Then accuracies of the models are compared to choose the best fitted model.

Implementation Phase: Forecasts are developed with the chosen model.

Evaluation Phase: Forecasts are monitored over time and adjustments are made if required.

In this study, yacht tourism demand forecast studies will be carried out within the four phases as presented above.

4.1 Design phase

Future demand for berthing spaces should be determined in order to develop the coasts, by ensuring adequate the required berthing space capacity. Future demand will be estimated in terms of berthing space for yachts.

Design Period

In this study future demand study for berthing spaces is carried out for the next 20 years. Thus, historical data is needed to extrapolate up to 2030 within the scope of the design phase.

Available Yacht Tourism Data

In Turkey, the most difficult challenge for forecasting is inadequacy of the available yacht tourism data. Data presented in Yacht Statistics Yearbooks (Ministry of Culture and Tourism, 1992 - 2009) only relays yacht movements in Turkey, not berthing space demand.

In order to acquire the lacking historical data for yacht berthing space demand, surveys have been performed in Coastal Tourism Structures Master Plan Studies (DLHI, 2010). In scope of the Master Plan Studies, a questionnaire inquiring information about capacity, infrastructure, yacht berthing trends, environment protection measures and demographic information about the employees of the yacht harbor was prepared and sent to 35 yacht harbors located at Turkey shores. The response rate was %63; 22 of the questionnaires were returned. The berthing capacity provided by the marinas which responded to questionnaires corresponded to %81 of the capacity of Turkey.

The yacht berthing historical data gathered from the questionnaires had not accounted for the yachts moored freely at the protected bays. These yachts over-crowd the bays and cause environmental threats to the marine environment due to anchoring and waste disposal. In order to prevent these social an environmental problems, yachts mooring freely at the protected bays should be encouraged to use organized berthing spaces by creating adequate capacity and enforcing legal obstacles. In order to create adequate capacity these yachts should also be accounted for in future demand. An index which calculates the free yacht/mooring space density is produced in order to include these yachts into the forecasts. For the calculations, data was taken from;

- Göcek capacity assessment study (METU,2007)
- Bay Assessment Study (Chamber of Shipping Bodrum Branch, 2006)
- Bodrum Bay Assessment Study (Chamber of Shipping Bodrum Branch, 2006)
- Google Earth images

Mentioned studies (Göcek Capacity assessment study and bay assessment studies) all provide number of yachts moored freely at Aegean Sea Bays. Incorporating these data with the yacht numbers found from Google Earth images yacht numbers moored freely at protected bays were found. The free yacht/mooring space proportion of the regions was then calculated to attain a connection between the existing infrastructure and free yachts.

The free yacht/mooring space proportion defined as densities are given in Figure 4.1 where four different areas were categorized. The least dense area is Marmara Region with a density of 0.17. The most crowded area is the coastline between Bodrum and Göcek. Density for this area is calculated as 0.34. The density of the coastal waters between Bodrum to Çanakkale and Kaş to Anamur are found as 0.25 and 0.22 respectively.

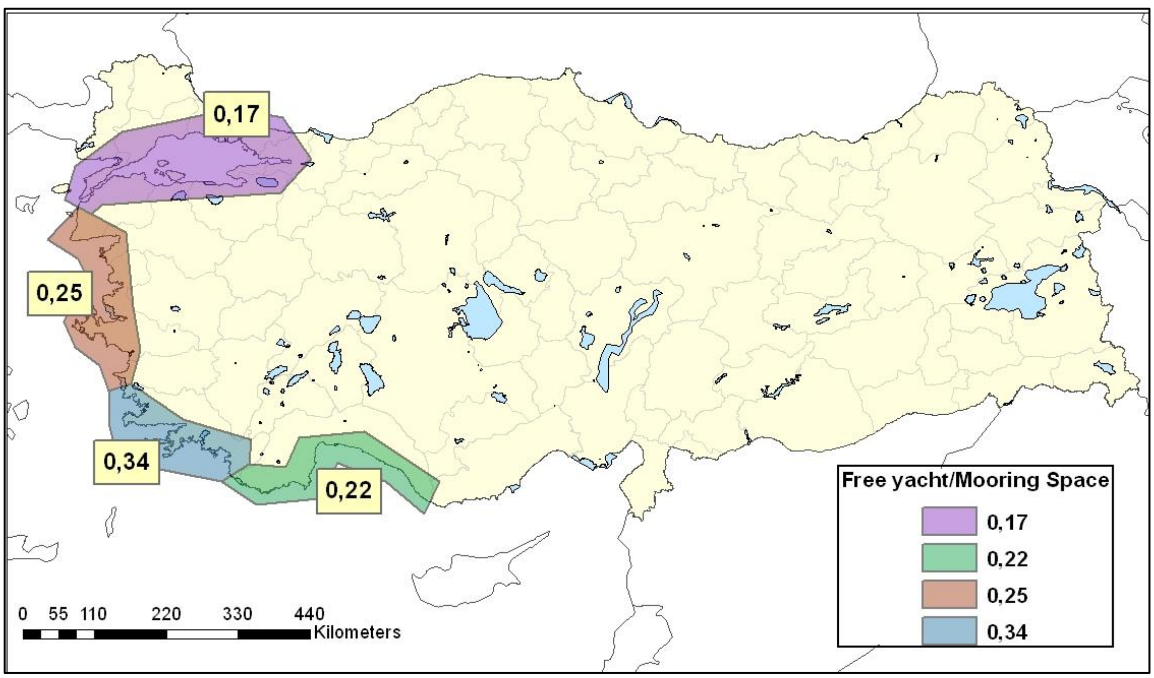

Figure 4.1 Yacht Densities at Turkey Shores

Combining the data from Coastal Tourism Structures Master Plan Study (DLHI, 2010), with the calculated index values historical yacht berthing space demand from 1998 to 2008 for Turkey is gathered. Demand for berthing space is given at Table 4.1 and Figure 4.2.

Table 4.1 Historical Trends for Turkey Yacht Demand

	Yachts Moored Freely at Protected Bays	Yachts in Marinas	Demand for Berthing Space
1998	1,228	5,962	7,190
1999	1,502	5,759	7,261
2000	1,626	6,689	8,315
2001	1,722	7,208	8,930
2002	1,833	7,252	9,085
2003	1,937	7,332	9,269
2004	2,318	7,813	10,131
2005	2,809	9,460	12,269
2006	2,843	10,153	12,996
2007	3,054	10,890	13,944
2008	3,172	11,813	14,985

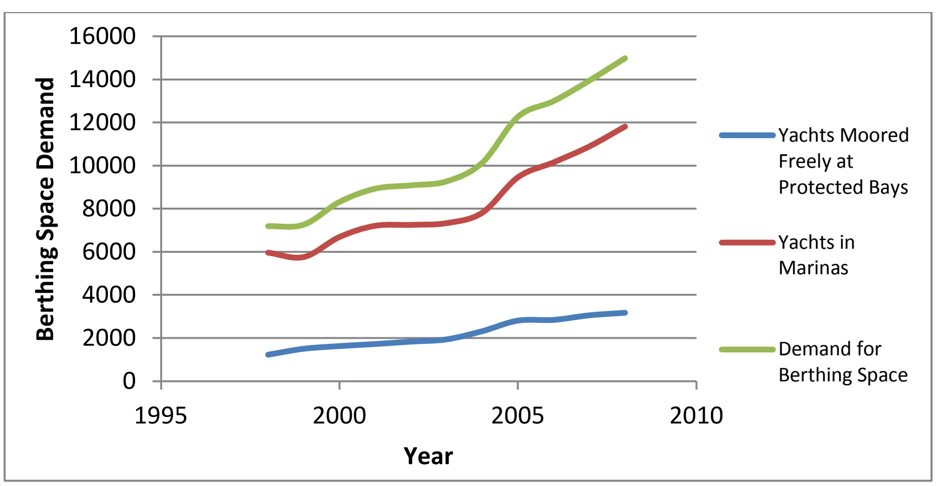

Figure 4.2 Berthing Space Demand Trends in Turkey

Socio-Economic Parameters: Population and gross domestic product (GDP) were selected as socio economic variables. Data were gathered from International Economic Indicators and Statistical Indicators Yearbooks of the State Planning Organization (SPO).

Tourism Parameters: World tourist arrival, world tourism income, Turkey tourist arrival, Turkey tourism income were selected as variables that represent the tourism trends. Data for world tourism trends were taken from UNWTO Tourism Barometer (UNWTO, 2000-2009) while data for Turkey tourist arrival, Turkey tourism income were collected from Turkey Statistics Institute (TUİK).

4.2 Specification Phase

Literature survey was conducted in order to determine the forecasting methods that are suitable for the forecasting model.

Historical yacht tourism data is lacking and the available data covers only 10 years (1998-2008). As stated in section 3.3 for every single period to be forecasted five historical data points are required for regression analysis. Since in this study next 20 years are to be forecasted, 100 historical data points are needed. Therefore, the available data is not adequate for regression analysis. Moreover the causal relationships between yacht tourism the variables are not clearly known.

(Song & Witt, 2000) and (Armstrong, 2002) suggested that simple models gives more accurate results when the data is limited. Therefore assessing the data and utilizing Figure 3.1, exponential smoothing and ARIMA models were chosen for forecasting the future berthing space demand.

In this study, the forecasts developed will be compared according to their MAPE values in order to choose the most suitable method.

The analysis results of selected forecasting methods are given in the following sections.

4.2.1 Exponential Smoothing

Exponential smoothing analysis is done using the SPSS software. SPSS performs analysis to determine the best fitting exponential smoothing model to the available time series data according to the chosen measure of accurracy. The non-seasonal exponential smoothing methods analyzed by SPSS software are:

- Simple exponential smoothing,
- Holt's exponential smoothing,
- Brown's exponential smoothing,
- Damped trend,
- Simple seasonal exponential smoothing,
- Winters additive exponential smoothing and
- Winters multiplicative exponential smoothing.

The data used in exponential smoothing analysis is annual berthing space data from 1998 to 2008. Confidence limit in the analysis is chosen as %95. MAPE is used as measure of accuracy in the analysis. As a result of processing; Holt's linear trend model yielded the smallest MAPE value among the exponential smoothing methods. MAPE for berthing space demand is found as 4.254. This value indicates that Holt's linear trend model is suitable for the available time series data (Section 3.2).

The predicted berthing space demand data and the upper/lower confidence intervals for Holt's exponential smoothing method are given in Table 4.2 and Figure 4.3.

Table 4.2 Turkey Overall Berthing Space Demand Estimations with Holt's Exponential Smoothing Method

Year	Lower %95	Predicted Overall Demand	Upper %95
2011	14,994	17,369	19,744
2012	15,421	18,164	20,907
2013	15,892	18,959	22,026
2014	16,393	19,754	23,115
2015	**16,918**	**20,549**	**24,179**
2016	17,461	21,343	25,226
2017	18,020	22,138	26,257
2018	18,591	22,933	27,275
2019	19,173	23,728	28,283
2020	**19,764**	**24,522**	**29,281**
2021	20,363	25,317	30,271
2022	20,970	26,112	31,254
2023	21,584	26,907	32,230
2024	22,203	27,702	33,201
2025	**22,827**	**28,496**	**34,166**
2026	23,456	29,291	35,126
2027	24,090	30,086	36,082
2028	24,728	30,881	37,034
2029	25,370	31,676	37,981
2030	**26,015**	**32,470**	**38,926**

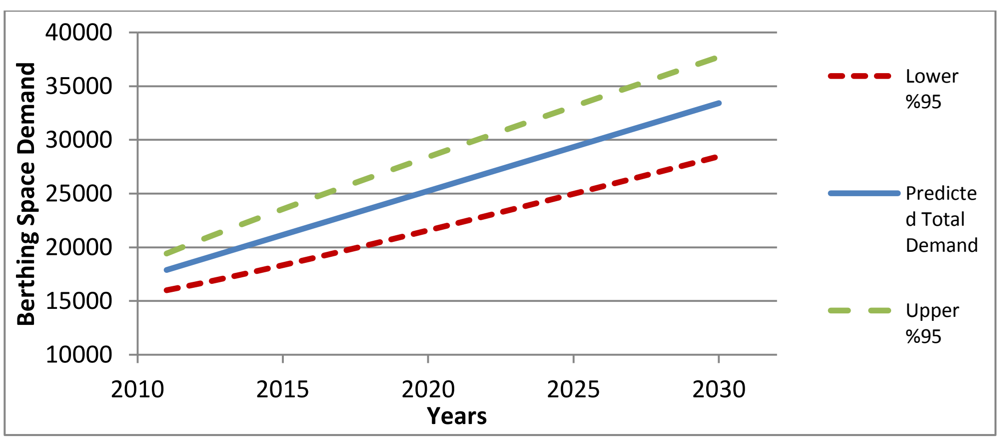

Figure 4.3 Berthing Space Demand Trends in Turkey Estimated by Holt's Exponential Smoothing (2010 – 2030)

4.2.2 Autoregressive integrated moving average (ARIMA)

Using SPSS software seasonal ARIMA models were analyzed using 95% confidence interval. Annual berthing space data from 1998 to 2008 was entered in to the model. The best fitting forecasting model was chosen according to MAPE values.

SPSS analysis estimated that ARIMA (0,1,0) model gives the best fit when MAPE is used as the measure of accuracy. MAPE for ARIMA (0,1,0) model is calculated as 3.143 which indicates a suitable fit (Section 3.3). The predicted berthing space demand data and the upper/lower confidence intervals for ARIMA (0,1,0) is given in Table 4.3 and Figure 4.4.

Table 4.3 Yacht Demand Estimations with ARIMA Method

Year	Lower %95	Predicted Overall Demand	Upper %95
2011	16,004	17,891	19,423
2012	16,549	18,708	20,497
2013	17,126	19,526	21,539
2014	17,725	20,343	22,559
2015	**18,341**	**21,162**	**23,562**
2016	18,970	21,979	24,552
2017	19,610	22,797	25,531
2018	20,259	23,614	26,501
2019	20,917	24,432	27,462
2020	**21,581**	**25,249**	**28,417**
2021	22,250	26,067	29,367
2022	22,926	26,884	30,310
2023	23,606	27,702	31,249
2024	24,290	28,519	32,184
2025	**24,978**	**29,337**	**33,115**
2026	25,669	30,155	34,043
2027	26,364	30,973	34,967
2028	27,062	31,790	35,888
2029	27,762	32,608	36,807
2030	**28,465**	**33,425**	**37,723**

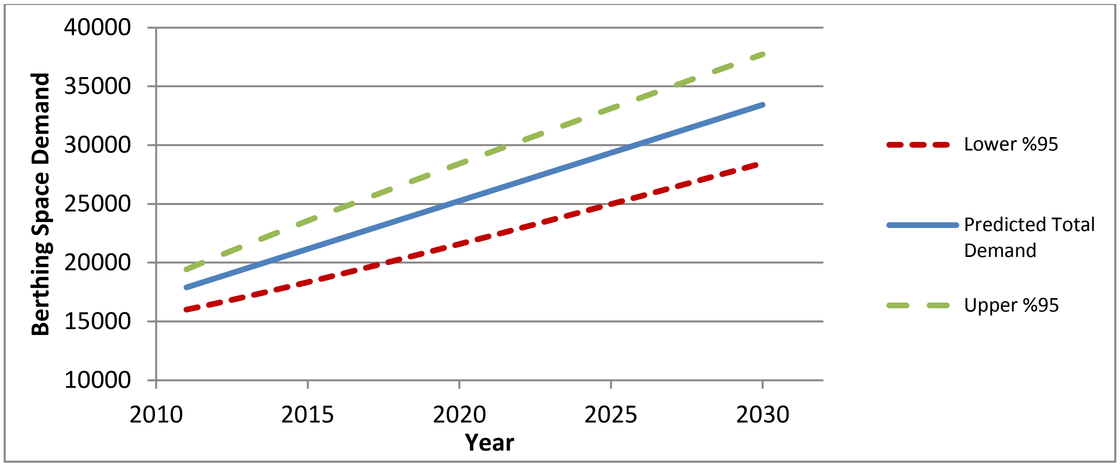

Figure 4.4 Berthing Space Demand Trends in Turkey Estimated by Holt's Exponential Smoothing (2010 – 2030)

4.3. Selection of the Forecast Method

Results of the time series estimations done are summarized below at Table 4.4.

Table 4.4 Summary of Forecasts for Berthing Capacity Demand for Turkey (2010 - 2030)

	Holt's Exponential Smoothing		ARIMA (0,1,0)	
	Berthing Capacity Demand	MAPE	Berthing Capacity Demand	MAPE
2015	20,549	4.254	21,162	3.143
2020	24,522		25,249	
2025	28,496		29,337	
2030	32,470		33,425	

From Table 4.4, it can be seen that both forecasting methods produced similar results. Since there is limited data and the models used are extrapolative models this result is expected.

In this study MAPE is proposed as a measure of accuracy which will be used in selection of the forecasting method. Since it has a smaller MAPE value, ARIMA was chosen as the forecasting method for this study.

Distribution of the berthing capacity will be done using the estimations (Table 4.3) produced by ARIMA forecasting method, in the next chapter.

CHAPTER 5

BERTHING SPACE DEMAND DISTRIBUTION for TURKEY (2010 - 2030)

In Turkey, existing marinas are mostly located in the most attractive and often the most fragile environments. However because of the highly fragile nature of coastal environments over exploitation of these areas may have severe consequences on the environment. The uneven utilization of Turkey coasts also causes unequal distribution of investments and tourism expenditures. While popular areas benefit significantly from tourism, remaining areas are mostly neglected. In order to overcome the regional disparities and protect the ecological integrity of the coasts when planning for spatial development of marinas social, economic and ecological development effects should be considered. Given the uncertain nature of the future, one way of analyzing and determining the possible effects of various development approaches on social growth, economic development and ecological integrity, is to develop scenarios.

5.1 Development Scenarios

“A scenario is a narrative description of a possible state of affairs or development over time. It can be very useful to communicate speculative thoughts about future developments to elicit discussion and feedback, and to stimulate the imagination” (Warfield, 1996).

Scenario based planning is an effective tool for analyzing possible futures for the considered alternative decisions. It is a comprehensive tool for exploring the alternatives to realize the consequences of possible decisions (Schoemaker, 1995).

In this context, it has been suggested (Fahey & Randall, 1998) (Ratcliffe, 2000) that the aim of scenario analysis is to:

- Assist understanding by exploring the alternative possible futures and determining how and why possible futures come about.
- Produce new decisions by forcing fresh considerations to surface.
- Re-evaluate existing decisions by providing a new context.
- Identify contingent decisions by exploring what an organization might do if certain circumstances arise.

Four scenarios were proposed in this study seeking to understand the possible effects of different social and economic development decisions on the future state of yacht tourism. Development scenarios can be considered through four basic forms (Kovačić & Luković, 2007):

- Very weak sustainability
- Social growth
- Environmental conservation
- Sustainability

These scenarios narrate four alternative futures resulting from different policy choices considering socio-economic growth and ecological integrity. All scenarios are logical but not equally probable. They have been considered because they congregate alternative social and political visions, objectives and values.

5.1.1 Scenario 1: Very weak sustainability

Very weak sustainability is based on the criteria of economic effectiveness by economic theory. In this scenario, development has no constraints. Thus, government provides a fostering environment for private sector. In turn, private sector produces economic growth. Consequently, development is directed towards valued and allocated resources based on market mechanisms. This scenario may yield high profits for a marina in short-term, but it will have irreparable effects on ecological integrity of the area due to the lack of planning and absence of preservative measures. This scenario only becomes acceptable in situations where the only goal is economic gain (Kovačić & Luković, 2007).

5.1.2 Scenario 2: Social Growth Scenario

Social growth scenario emphasizes the criteria of socio-economic growth, it respects environmental protection but gives more importance to psychosocial, human based values and cultural factors. It aims to achieve economic gain through socio-economic development. Environment is not an identifier factor. Because of the nature of humans to mitigate to socially developed areas, the scenario runs the risk of damaging the fragile nature of coasts by overcrowding.

5.1.3 Scenario 3: Environmental Conservation Scenario

Preserving the highly fragile and valuable natural resources at the coasts is the first priority of the environmental conservation scenario. Preservation measures in this scenario by far exceed those that are required by sustainable development and nature is preserved at any cost. Market trends are mostly dismissed. Socio-economic growth is desired at a level which it will support the ecological integrity through increase in awareness and resources to be used for the conservation of environment.

5.1.4 Scenario 4: Strong Sustainability Scenario

Strong sustainability supports the ecosystem of health, nature and profit in a unique entity. It aims for the values of total economic value and represents the theory of psychosocial as well as cultural factors, meeting consumers' preferences, profit transfer, risk analysis and multi-criteria analysis. It also implements the concept of product span, standards and regulations, and respects natural capital, principles of nature preservation with less cost and comprehensive politics.

"In development plans, space serves a dual role as an irreplaceable factor of socio-economic development and as the object of development processes. Development systems evolve and are inter-coordinated in space. This implies that neither can space be considered separately from development processes, nor can development scenarios can be completely understood without the participation of space" (Kovačić, Dundović, & Bošković, 2007)". Therefore, for an effective coastal management strategy, spatial use must be carefully planned and consistently monitored.

5.2 Spatial Distribution of New Investments In Coastal Regions

Coastal planning is a very complex and multivariate decision making process because of the increasing demand on coastal resources and conflicting economic interests (Coastal tourism, yacht tourism industry, fishing etc.) Effective decision making tools are necessary to integrate and analyze socio-economic, physical and environmental variables. Moreover, a balance between the conflicting objectives needs to be attained by the decision model through a highly subjective process. (Curry & Moutinho, 1992) "Since we are concerned with real-life problems we must recognize the necessity for trade-offs to best serve the common interest. Therefore, this process should also allow for consensus building and compromise". (Saaty, 1994) Thus multi-criteria decision making approach (MCA) is necessary in order to achieve a balanced solution between the conflicting economic interests to the planning problem considering political, social, economic, physical and environmental perspectives.

The MCA contains three elements:

- a set of decision options which need to be ranked or scored by the decision maker;
- a set of criteria, typically measured in different units; and
- a set of performance measures, which are the raw scores for each decision option against each criterion (Higgins, Hajkowicz, & Bui, 2008).

MCA is a decision-making tool which is developed for solving complex problems. When dealing with multi-disciplinary decisions, it is difficult to reach a general agreement. Utilizing MCA methods enables every member of the multi-disciplinary team to contribute to the final decision.

MCA has been applied in many fields from economic analysis to environmental impact evaluation (Villa, Tunesi, & Agardy, 2001), such as water management, climate change, natural attraction evaluation, and tourism destination evaluation.

AHP is one of the MCA methods, which approaches decision making by arranging the important components of a problem into a hierarchical structure similar to a family tree. The theory of AHP will be adopted in this study to create a hierarchy structure for distribution of berthing space demand based on regional development of Turkey.

5.2.1 Analytic Hierarchy Process

The Analytic Hierarchy Process (AHP), developed by Saaty, is a structured decision making tool which can cope with the intuitive, the rational, and the irrational when we make multiobjective, multicriterion and multi stakeholder decisions with and without certainty for any number of alternatives (Harker & Vargas, 1987). “It facilitates decision making by organizing perceptions, feelings, judgments, and memories into a framework that exhibits the forces that influence a decision.” (Saaty, 1994). AHP has been used in many multi-criteria decision making problems such as resource allocation, planning and development, site selection and evaluation, logistics, and medicine. It provides simplicity, ease of use and great and can be integrated with other techniques thus has a wide range of applicability. (Vaidya & Kumar, 2006) Two features of the AHP differentiate it from other decision-making approaches. One is its ability to handle both tangible and intangible attributes. The other is its ability to monitor the consistency with which a decision-maker makes his judgments. (Wind & Saaty, 1980)

AHP provides decision maker means to establish measures for the both the physical (objective) and social (subjective ideas) variables. “The AHP is used to derive relative priorities on absolute scales (invariant under the identity transformation) from both discrete and continuous paired comparisons in multilevel hierarchic structures. These comparisons may be taken from actual measurements or from a fundamental scale that reflects the relative strength of preferences and feelings.” (Cheng & Li, 2001a).

It first decomposes a multi-criteria decision making problem into a multi-level hierarchic structure, in which each level consists of objectives, criteria, subcriteria and alternatives. Then it employs pair wise comparisons to determine and assign relative weights to the tested parameters. The overall procedure of the AHP is shown in Figure 5.1.

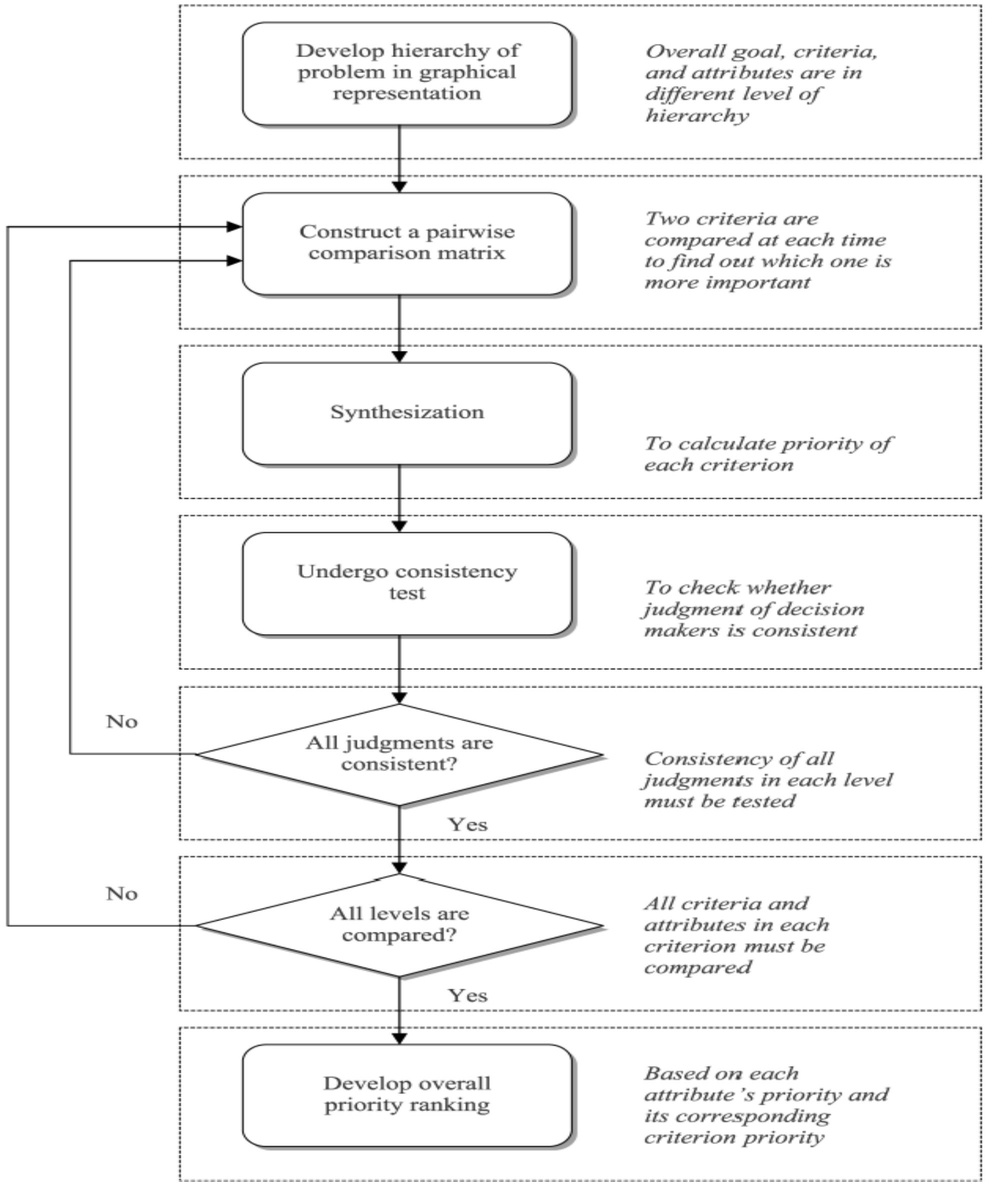

Figure 5.1 Analytic Hierarchy Process Framework (Saaty, 1994)

"The AHP has a special concern with departure from consistency and the measurement of this departure."(Saaty, 2006) It uses the consistency test to validate the consistency of the judgments. Inconsistency of the responses indicates a lack of transivity of the judgments (Saaty, 1980). Knowledge of inconsistency enables one to determine those judgments that need reassessment.

In this study “Expert Choice 11” software was used to structure and solve the decision problem. Expert Choice software structures decisions using the AHP and facilitates group decisions that are more efficient, analytical, and justifiable (www.expertchoice.com).

The use of AHP for distribution of berthing space demand based on regional development of Turkey is explained in this section.

5.2.1.1 Determination of the Goal and Alternatives

Goal

In order to start a decision making problem, first, the problem should be stated clearly. The main objective of the spatial berthing space demand distribution model is the successful distribution of the predicted demand among coastal regions according to the goals and properties of the marina development scenarios explained at Section 5.1 Utilization of the AHP method in such a complex system will allow evaluation of various alternatives with respect to many different attributes while introducing opinions of different solutions to the model.

8 Coastal Regions of Turkey

For the distribution model, alternative coastal regions were determined according to their socio-economic, physical and geographic properties. According to these properties, at this stage, 8 different regions were formed (Figure 5.2). These regions are determined according to existing yacht tourism, ecology and socio-economic conditions and should be re-evaluated periodically since new developments may change conditions of the regions and may produce new regions.

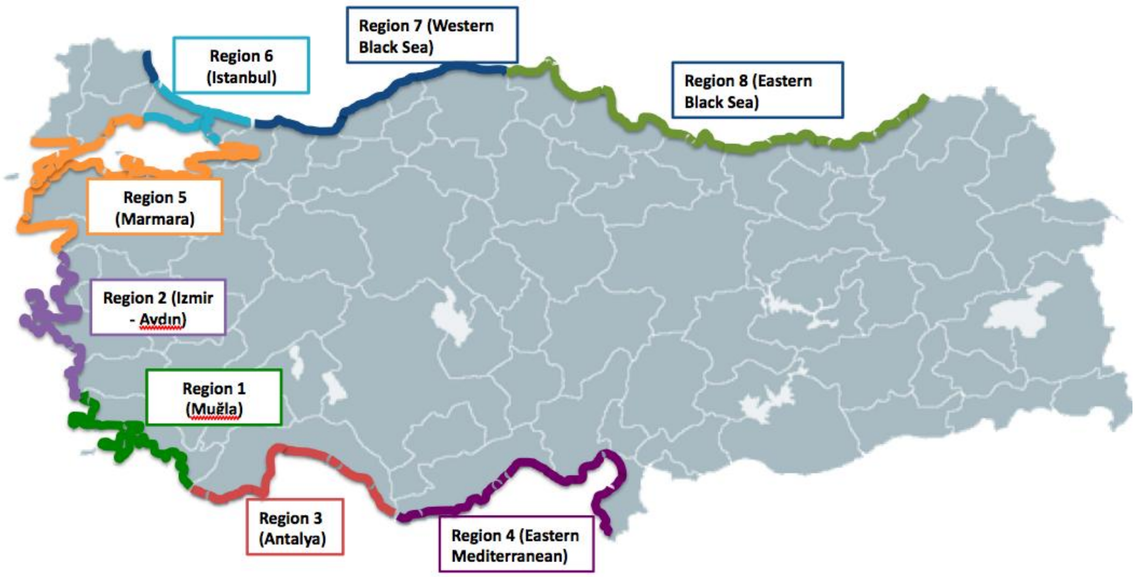

Figure 5.2 Coastal Regions of Turkey

<u>Region 1 (Muğla):</u> The limits of this region consist of Muğla city. Muğla is the most exploited and developed region in terms of yacht tourism. Currently 49.6% percent of the yacht berthing capacity is located at Muğla (DLHI, 2010). The growing popularity of yachting due to the favorable climatic and geographic condition of the area has resulted in a large recreational pressure.

<u>Region 2 (İzmir – Aydın):</u> Region 2 consists of the coastal area between Muğla-Aydın border to İzmir- Balikesir border. This region is highly developed from the socio-economic point of view but still has not fulfilled its yacht tourism potential.

<u>Region 3 (Antalya):</u> The limits of this region consist of Antalya province. Antalya is the most exploited and developed region in terms of coastal mass tourism. Tourism developments and investments in the area have transformed the city into an international resort.

<u>Region 4 (Eastern Mediterranean):</u> This region lies between Antalya-Mersin border and Syria Border. Although having favorable climatic conditions, yacht tourism is very little

in this region. The region faces security problem and extra precautions need to be taken to reduce the threats. This region should be investigated carefully since it has a very favorable location in the eastern Mediterranean marina network.

Region 5 (Marmara Region): This region consists of the coast between Balikesir -İzmir border and Kocaeli - İstanbul in Anatolia combined with the coastal area between Bulgaria to İstanbul. Although yacht tourism sector is not very developed, industrial sectors are very developed in this region. Marmara Sea has been considerably polluted because of the industrial facilities and large commercial ports and area that encircle the sea such as İzmit Bay.

Region 6 (İstanbul): İstanbul province sets the limits of Region 6. İstanbul is the most populated city in Turkey and is ranked 5^{th} in the world with a population of 12.8 million. Extending both on the European and on the Asian sides of the Bosporus, İstanbul is also the cultural, economic, and industrial centre of Turkey.

Region 7 (Western Black Sea): The coastline from the Bulgaria border to Sinop-Samsun border constitutes Region 7. To distinguish Black Sea Region such as Eastern and Western Black Sea Regions may be useful in terms of investment priority. Yacht tourism infrastructure is almost non-existent in this region. Yacht tourism in this region at preliminary stages of development and fisheries are used as yacht shelters.

Region 8 (Eastern Black Sea): This region consists of the coastal area between Sinop-Samsun border and Georgia Border. Region 8 is the most undeveloped region in terms of socio-economic development amongst the other coastal regions. It has the lowest tourism income and has a very low accessibility to/from marina networks. As Western Black Sea yachts take shelter in fisheries.

5.2.1.2 Decision Hierarchy

AHP, first, decomposes a complex problem into a hierarchy. In the hierarchy each level consists of a few manageable elements which are also decomposed into another set of elements. A simple AHP model (Figure 5.3) has three levels (goal, criteria and alternatives). The decomposing procedure continues down to the lowest level of the hierarchy which generally consists of decision alternatives.

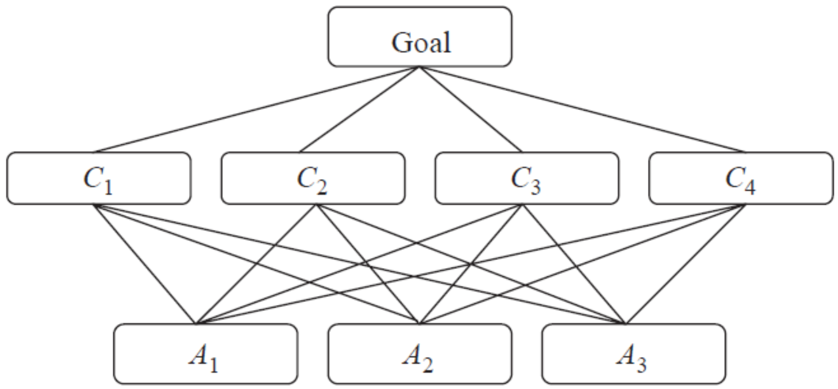

Figure 5.3 A simple AHP model

The formation of the hierarchy is based upon two assumptions, without which a problem cannot be dealt with using AHP (Cheng & Li, 2001b):

1. "It is expected that each element of a level in the hierarchy would be related to the elements at the adjacent levels. AHP recognizes the interaction between elements of two adjacent levels.

2. There is no hypothesized relationship between the elements of different groups at the same level. "

Using these assumptions a hierarchy model was built for the distribution of berthing space demand among the 8 coastal regions of Turkey. Sustainable tourism elements (economic gain, environmental protection and social growth) were combined with spatial parameters (accessibility) to produce the hierarchy framework. A schematic representation of the decision hierarchy is shown in Figure 5.4.

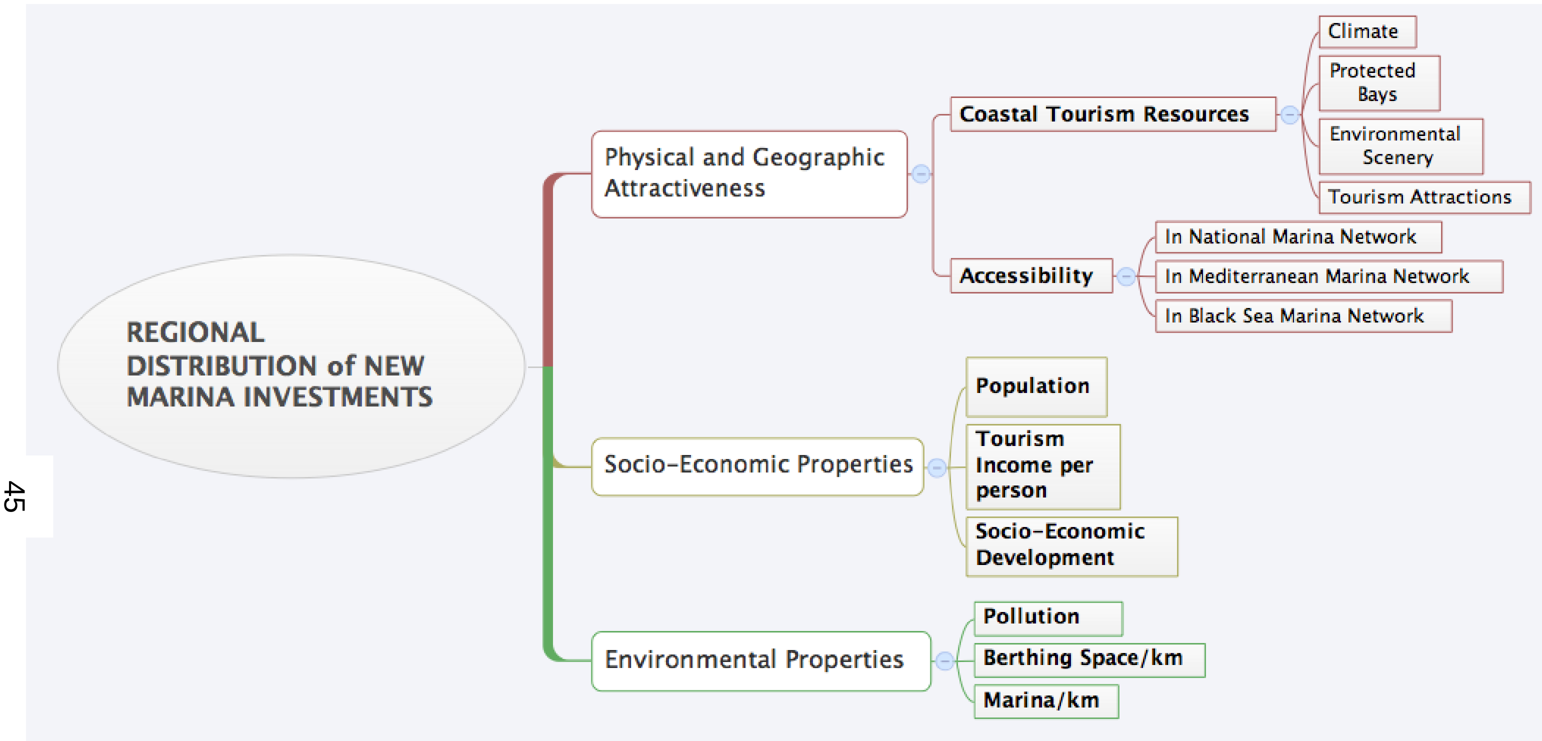

Figure 5.4 Decision Hierarchy for Analytic Hierarchy Process

Definitions of the selected criterion for the distribution of berthing space demand among the 8 coastal regions of Turkey are given below.

Physical Properties of the Region

Natural environment of the coasts combined with historical and cultural heritages of the region present remarkable tourism resources. Climate, location, cultural heritages etc. of a region all present the region opportunities and advantages. Thus, physical and geographic properties of a region have an important role in determining its share in the yacht tourism sector. These resources are investigated in two different criterion; geographic (accessibility) and coastal tourism attractiveness.

i) Coastal Tourism Attractiveness: The unbalanced distribution of tourism expenditures and investments through the coastal regions indicates very high attraction diversity at the coasts of Turkey. To establish relative levels of attraction of the coastal regions, resources for development of coastal tourism industry were identified and assessed.

- Climate: Since yacht tourism is a climate dependent type of recreation, climate can be regarded as one of the most important natural resource of yacht tourism attraction. Moreover, climate determines the length of yacht tourism. Favorable climatic conditions provide a significant advantage for yacht tourism. Climate of the regions were evaluated according to yacht tourism using Turkish State Meteorological database (http://www.dmi.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx).
- Protected Bays: Relief formations along the coasts such as bays, islands and islets provide yachtsmen natural shelters from the dangers of the sea. A favorable yacht route should be near to protected bays which yachts can take shelter and visit. Especially the indented western coast of Turkey offers the yachtsmen with scenic natural shelters. Geographical Information Systems (GIS) were used to assess the bays in the regions.
- Environmental Scenery: Yacht tourism is a nature based tourism. Yachtsmen seek aesthetic beauty during their travels. The coasts are outstanding areas that enhance visual quality due to their dynamic and variant nature. Opinions of

marina operators and experts involved with coastal tourism were used in evaluation of environmental scenery for the regions.

- Touristic Attractions: Attractions are the main reason for tourism; they generate visits, give rise to excursion circuits and create an industry of their own. Beyond sun, sea and freedom yacht tourism also offers cultural, historical and natural attractions to yachtsmen. Attractions located in a region especially effects the time which a yacht stays at the region. Tourism attractions of the regions were determined using Cultural Heritage database of Ministry of Culture and Tourism.

ii) Accessibility of the Region from Marina Networks: “Tourism and transport are inseparable. Tourism is about being elsewhere and transport bridges the gap between origin and destination.”(Boniface & Cooper, 2005) So without an access to a transportation network, new investments are pointless. The planned marina investments should be within a reasonable distance from the other marinas since yacht travel distance is dependent on fuel it can store (In general this distance is measured as 20 nautical miles). Moreover, development of a successful marina chain enables less sea traffic and reduces the negative environmental impacts by eliminating the extra load caused by indirect routes. Accessibilities of the regions were determined by the utilization of GIS software.

- Accessibility in the National Marina Network: To evenly distribute yacht tourism throughout Turkey coasts, connectivity should be established among national marina network.

- Accessibility in the Mediterranean Marina Network: Accessibility of the region from/to the Mediterranean marina network is a very important element of attractiveness. Mediterranean Sea has a very important place in yacht tourism sector. Accessibility is necessary in order to benefit from the bustling yacht traffic at the Mediterranean.

- Accessibility in the Black Sea Marina Network: Black Sea marina network has not been developed completely. Currently the network has a very low accessibility within itself. It is expected that by 2020, marina developments planned by the countries in the Black Sea Region will increase the accessibility in the region. Also the technological advancements will enable the accessibility to Black Sea Region from Danube River.

Socio-economic Properties of the Region

Sustainable development affirms the need to improve the socio-economic conditions of the poor whilst protecting the physical resources (Dodds, 1997). Sustainable development on a national scale is a holistic approach and must improve the well-being of the whole nation. For socio-economic growth on a national scale the wide differences in the socio-economic fabric of Turkey should be reduced. Socio-economic properties of the coastal regions in Turkey were investigated in 3 sub-categories.

i) Population: Population can be regarded either as a resource encouraging the development of yacht tourism or as a constraint reducing the appeal of a destination. Increasing population at the coasts cause great pressure and environmental risks for the coastal areas. In opposition, from a socio-economic perspective it can be argued that new investments should be encouraged at highly populated areas since more people will benefit from it. Moreover new marina investments at the more populated areas will increase the human-sea interactions by providing more opportunities for the local communities. In this study since the goal is to achieve social growth in this level of the hierarchy population, not population density, is regarded as a promoting attribute. Population data in this study was taken from TUIK database.

ii) Tourism income per person of the region: One of the main strategies of sustainable development is to achieve a balanced development in national scale. Therefore new investments should be encouraged in the areas which suffer from low tourism income. Tourism income data in this study was taken from TUIK database.

iii) Socio-economic index: Tourism when managed carefully is an agent which can simulate socio-economic growth through investments, tourism expenditures, employment opportunities, cultural exchanges and education. The latest socio-economic index study, carried out by SPO in 2003 was used in this study. 81 provinces of Turkey were assessed according to their socio-economic development. 5 different development category ratings from 1-5, 1 indicating the highest development level, was assigned to the provinces by SPO. 17 of 27 coastal provinces (Table 5.1) were categorized into first and second development categories. The 10 remaining provinces which were placed into third and fourth levels of are located in the Black Sea Region.

Table 5.1 Socio-Economic Ratings of the Coastal Provinces (SPO, 2003)

Socio-economic Development Index Rating	1	2	3	4	5
Provinces	İstanbul İzmir Bursa Kocaeli	Adana Mersin Antalya Muğla Aydın Balıkesir Çanakkale Edirne Tekirdağ Kırklareli Yalova Sakarya Zonguldak	Hatay Samsun Trabzon Rize Artvin	Bartın Kastamonu Sinop Ordu Giresun	-

In this study, concentration of development efforts to areas with low socio-economic development levels was considered to achieve a socio-economic balance within Turkey.

Environmental Properties of the Region

"Clean water, healthy coastal habitats, and a safe, secure, and enjoyable environment are clearly fundamental to successful coastal tourism. Similarly, bountiful living marine resources (fish, shellfish, wetlands, coral reefs, etc.) are of critical importance to most recreational experiences."(NOAA, 1997) Thus, environment is an important resource for tourism and its protection is necessary for the future development of tourism.

i) Sea Pollution: Coastal areas are fragile regions. Coastal water pollution may result in the destruction of marine habitat, species of flora and fauna and feeding grounds for fish. Pressures on coasts should be managed carefully in order to prevent negative impacts of yacht tourism. Sea pollution of the regions was assessed using Sea Pollution Database of the Ministry of Environment and Forestry (http://www.deniz.cevreorman.gov.tr/deniz/istatistik.htm). Pollution was measured by O_2, NO_3 concentrations and bacteria amounts.

ii) Yacht density of the coasts: Although it is a type of eco-tourism, increase in yacht traffic can endanger the fragile nature of the sea due to the waste discharge and oil pollution. Moreover, anchorages may destroy the marine habitat at the sea bed. It also increases the risk of accidents. Yacht densities of the regions were calculated by yacht/coastline (km) proportion of the region.

iii) Marina density of the coasts: Construction of marinas can damage marine resources of the area, cause degradation of water quality and disturb the shoreline. Carrying capacities of the bays have to be considered in development plans. Marina densities of the regions were calculated by marina/coastline (km) proportion of the region.

5.1.5 Step 2: Pair-wise Comparisons

The next step is establishing pair-wise comparisons of all levels. "A judgment or comparison is the numerical representation of a relationship between two elements that share a common parent. The set of all such judgments can be represented in a square matrix in which the set of elements is compared with itself. The judgments matrix (square matrix) reflects the answers to two questions: which of the two elements is more important with respect to a higher level criterion, and how strongly".(Saaty, 1994) Importance is measured using the Saaty's (1980) 1-9 scale shown in Table 5.2

Table 5.2 Pairwise Comparision Measures (Saaty, 1980)

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Weak importance of one over other	Experience and judgment slightly favor one activity over another
5	Essential or strong importance	Experience and judgment strongly favor one activity over another
7	Demonstrated importance	An activity is strongly favored and its dominance is demonstrated in practice
9	Absolute importance	The evidence favoring one activity over the other is of the highest possible order of affirmation
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed
Reciprocals above nonzero	If activity *i* has one of the above nonzero numbers assigned to it when compared to activity *j*, then *j* has the reciprocal value when compared with *i*.	

The judgment matrix can be represented as;

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \tag{10}$$

where aij is the pair-wise comparison rating between element i and element j. (Saaty, 1986) and (Duke & Aull-Hyde, 2002) highlights four axioms for the theoretical validity of pair-wise comparisons:

1- The reciprocal property : If $a_{ij} = x$, then $a_{ji} = \frac{1}{x}$ where $x \neq 0$

2- Homogeneity: If characteristics i and j are judged to be of equal relative importance, then $a_{ij} = a_{ji} = 1$ for all *i*.

3- Independence: When expressing preference under each criterion, each criterion is assumed to be independent of the properties of the decision alternatives.

4- Expectations: When proposing a hierarchical structure for a decision problem, the structure is assumed to be complete.

Given the reciprocal property, of AHP only n(n−1)/2 actual pairwise comparisons are needed for an n×n comparison matrix.

5.1.6 Calculation of Relative Weights

After forming the comparison matrices, the process moves to the phase of deriving relative weights for the various criterion and alternatives. To obtain the set of overall priorities of criterion and alternatives in the decision hierarchy, judgments made in pair-wise comparisons have to be synthesized. Relative weights should be determined in order to derive a single number measure to indicate the priority of each element.(Cheng & Li, 2001a)

The normalized eigenvector corresponding to the principal eigenvalue of the judgment matrix provides the relative weights of the corresponding criterion and alternatives. The weight vector can be computed as (Cheng & Li, 2001b):

- Compute if a_{ij} denotes the relative importance of criterion i to criterion j, Divide the elements of each column of the matrix by the sum of that column (normalizing the column to sum to 1.0 or 100%);
- Obtain the eigen vector by adding the elements in each resulting row
- Divide this sum by the number of elements in the row (to obtain priority or relative weight):

Relative weights are computed for each of the judgment matrices using eigenvalue method and checked for consistency.

Consistency Ratio

"Judgments in a matrix may not be consistent. In eliciting judgments, one makes redundant comparisons to improve the validity of the answer, given that respondents may be uncertain or may make poor judgments in comparing some of the elements. Redundancy gives rise to multiple comparisons of an element with other elements and hence to numerical inconsistencies" (Saaty, 1994)

Consistency index is dependent on maximum eigenvalue and the size of the comparison matrix. Saaty (1980) stated that the inconsistency of a reciprocal matrix can be measured by difference $\lambda_{max} - n$ divided by n-1 within a nxn matrix. Consistency index (CI) is shown by:

$$CI = \frac{\lambda_{max} - n}{n-1} \qquad (11)$$

Next, a random consistency index RI is calculated. Random Index (RI) is the consistency index of a pairwise comparison matrix which is generated randomly. Random index depends on the number of elements which are compared and as it is shown in Table 5.3; in each case for every n, the final RI. is the average of a large numbers of RI calculated for a randomly generated matrix.

Table 5.3 Random Consistency Index (RI)

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

The final consistency ratio is calculated by comparing the CI with the RI (Malczewski, 1999).

The consistency ratio (CR) is defined as (Saaty, 1980) :

CR = CI/RI

A consistency ratio of 0.1 is considered acceptable since human judgments are no always consistent and because of the nature of the measurement scale inconsistencies may occur. (Ramanathan, 2006)

On the other hand Saaty (1994) stated the acceptable consistency ratios, relative to the size of judgment matrices as:

The CR value

1. “0.05 for a 3 by 3 matrix;
2. 0.08 for a 4 by 4 matrix;
3. 0.1 for larger matrices.”

Judgments with higher inconsistencies than acceptable limits may cause problems in hierarchy and should be reconsidered.

5.1.7 Presentation of Results

Relative Weights of Alternatives

Using the pairwise comparisons relative weights of regions with respect criterion defined are determined. The judgment matrices and relative weights are given at Table 5.4 to Table 5.16. For all the pairwise comparisons consistencies were found to be in acceptable limits.

Table 5.4 Comparison of Coastal Regions with Respect to Climate

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	1	4	4	5	5	8	9	**0.29**
Region 2	1	1	4	4	5	5	8	9	**0.29**
Region 3	1/4	1/4	1	1	4	4	6	8	**0.131**
Region 4	1/4	1/4	1	1	4	4	6	8	**0.131**
Region 5	1/5	1/5	1/4	1/4	1	1	5	7	**0.06**
Region 6	1/5	1/5	1/4	1/4	1	1	5	7	**0.06**
Region 7	1/8	1/8	1/6	1/6	1/5	1/5	1	3	**0.024**
Region 8	1/9	1/9	1/8	1/8	1/7	1/7	1/3	1	**0.016**
Consistency Ratio =0.08									

Climate plays a very important role in the choice of yachting destination. Aegean and Mediterranean coasts of Turkey have very favorable climate conditions. Therefore, as it can be seen from Table 5.4 Regions 1(Muğla), 2(İzmir – Aydın), 3 (Antalya) and 4 (Eastern Mediterranean) are more preferable with respect to climatic conditions.

Table 5.5 Comparison of Coastal Regions with Respect to Protected Bays

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	5	6	8	5	3	7	9	**0.388**
Region 2	1/5	1	3	6	3	1/2	5	7	**0.158**
Region 3	1/6	1/3	1	3	1/2	1/4	3	6	**0.071**
Region 4	1/8	1/6	1/3	1	1/4	1/5	2	5	**0.041**
Region 5	1/5	1/3	2	4	1	1/3	4	6	**0.097**
Region 6	1/3	2	4	5	3	1	4	7	**0.192**
Region 7	1/7	1/5	1/3	1/2	1/4	1/4	1	4	**0.035**
Region 8	1/9	1/7	1/6	1/5	1/6	1/7	1/4	1	**0.018**
Consistency Ratio =0.08									

The coasts of Aegean Sea offer shelter to yachts with many protected bays. Therefore, Aegean coasts are most favorable coasts with respect to the ability to offer shelter whereas Eastern Black Sea is the least preferable region because of its unsheltered coasts.

Table 5.6 Comparison of Coastal Regions with Respect to Environmental Scenery

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	*Region 3 (Antalya)*	*Region 4 (Eastern Mediterranean)*	*Region 5 (Marmara Region)*	*Region 6 (İstanbul)*	*Region 7 (Western Black Sea)*	*Region 8 (Eastern Black Sea)*	***Relative Weights***
Region 1	1	5	5	7	5	3	6	9	**0.371**
Region 2	1/5	1	4	5	4	1/3	5	7	**0.166**
Region 3	1/5	1/4	1	3	3	1/3	4	6	**0.097**
Region 4	1/7	1/5	1/3	1	1	1/4	1/3	5	**0.041**
Region 5	1/5	1/4	1/3	1	1	1/4	1/2	4	**0.043**
Region 6	1/3	3	3	4	4	1	5	7	**0.209**
Region 7	1/6	1/5	1/4	3	2	1/5	1	4	**0.056**
Region 8	1/9	1/7	1/6	1/5	1/4	1/7	1/4	1	**0.018**
Consistency Ratio =0.07									

As can be seen from the Table 5.6, travelling along the coast, yachtsmen will have the opportunity to enjoy the environmental scenery mostly at the coasts of Region 1 (Muğla), Region 2 (İzmir-Aydın) and Region 6 (İstanbul).

Table 5.7 Comparison of Coastal Regions with Respect to Touristic Benchmarks

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara Region)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	1/3	1	3	1	1/5	5	5	**0.097**
Region 2	3	1	3	5	3	1/4	6	6	**0.202**
Region 3	1	1/3	1	3	1	1/5	5	5	**0.097**
Region 4	1/3	1/5	1/3	1	1/3	1/8	1	1	**0.033**
Region 5	1	1/3	1	1	1	1/5	6	6	**0.104**
Region 6	5	4	5	4	5	1	9	9	**0.414**
Region 7	1/5	1/6	1/5	3	1/6	1/9	1	1	**0.027**
Region 8	1/5	1/6	1/5	1/5	1/6	1/9	1	1	**0.027**
Consistency Ratio =0.04									

Due to the history, culture and diversity of the region, Region 6 (İstanbul) has the most significant weight amongst the alternatives. Region 2 (İzmir-Aydın) also provides various alternative for tourism attractions.

Table 5.8 Comparison of Coastal Regions with Respect to Accessibility in Turkey Marina Network

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	2	4	7	3	3	8	9	**0.320**
Region 2	1/2	1	3	6	1	2	7	9	**0.211**
Region 3	1/4	1/3	1	5	2	2	6	8	**0.151**
Region 4	1/7	1/6	1/5	1	1/3	1/4	3	3	**0.043**
Region 5	1/3	1	1/2	3	1	1/2	3	7	**0.106**
Region 6	1/3	1/2	1/2	4	2	1	4	7	**0.121**
Region 7	1/8	1/7	1/6	1/3	1/3	1/4	1	3	**0.030**
Region 8	1/9	1/9	1/8	1/3	1/7	1/7	1/3	1	**0.018**
Consistency Ratio =0.06									

Table 5.9 Comparison of Coastal Regions with Respect to Accessibility in Mediterranean Marina Network

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara Region)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	3	3	4	6	7	9	9	**0.354**
Region 2	1/3	1	1/2	1	4	5	7	8	**0.153**
Region 3	1/3	2	1	2	4	5	8	8	**0.201**
Region 4	1/4	1	1/2	1	3	4	7	7	**0.134**
Region 5	1/6	1/4	1/4	3	1	2	5	5	**0.065**
Region 6	1/7	1/5	1/5	1/4	1/2	1	5	5	**0.051**
Region 7	1/9	1/7	1/8	1/7	1/5	1/5	1	3	**0.024**
Region 8	1/9	1/8	1/8	1/7	1/5	1/5	1/3	1	**0.017**
Consistency Ratio =0.07									

Table 5.10 Comparison of Coastal Regions with Respect to Accessibility in Black Sea Marina Network

	Region 1 Muğla	Region 2 İzmir – Aydın	Region 3 Antalya	Region 4 Eastern Mediterranean	Region 5 Marmara	Region 6 İstanbul	Region 7 Western Black Sea	Region 8 Eastern Black Sea	**Relative Weights**
Region 1	1	1/2	3	5	1/5	1/6	1/6	1/8	**0.04**
Region 2	2	1	4	6	1/4	1/4	1/7	1/7	**0.056**
Region 3	1/3	1/4	1	3	1/6	1/6	1/8	1/8	**0.025**
Region 4	1/5	1/6	1/3	1	1/7	1/7	1/9	1/9	**0.017**
Region 5	5	4	6	7	1	1/2	1/3	1/5	**0.117**
Region 6	6	4	6	7	2	1	1/2	1/5	**0.148**
Region 7	6	7	8	9	3	2	1	1/2	**0.231**
Region 8	8	7	8	9	5	5	2	1	**0.366**
Consistency Ratio =0.06									

From Table 5.8 – Table 5.10, it can be gathered that while Region 1 (Muğla), Region 2 (İzmir-Aydın) and Region 3 (Antalya) have a strong accessibility in both Turkey Marina Network and Mediterranean marina network, Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) are seem to be isolated in Black Sea.

Table 5.11 Comparison of Coastal Regions with Respect to Population

	Region 1 Muğla	Region 2 İzmir – Aydın	Region 3 Antalya	Region 4 Eastern Mediterranean	Region 5 Marmara Region	Region 6 İstanbul	Region 7 Western Black Sea	Region 8 Eastern Black Sea	**Relative Weights**
Region 1	1	1/5	1/2	1/5	1/7	1/8	3	4	**0.039**
Region 2	5	1	4	3	1/2	1/3	7	8	**0.168**
Region 3	2	1/4	1	1/3	1/6	1/7	4	5	**0.056**
Region 4	5	1/3	3	1	1/3	1/5	7	8	**0.113**
Region 5	7	2	6	3	1	1/3	7	8	**0.222**
Region 6	8	3	7	5	3	1	8	9	**0.362**
Region 7	1/3	1/7	4	1/7	1/7	1/8	1	2	**0.023**
Region 8	1/4	1/8	5	1/8	1/8	1/9	1/2	1	**0.018**
Consistency Ratio =0.05									

İstanbul city is the most populated city in Turkey so as expected Region 6 (İstanbul) is the most consequential alternative among the regions whereas Region 7 and 8 (Western and Eastern Black Sea) are found to be the least populated regions.

Table 5.12 Comparison of Coastal Regions with Respect to Tourism Income

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara Region)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	1	3	1/3	1/2	3	1/6	1/5	**0.056**
Region 2	1	1	3	1/6	1/3	3	1/5	1/4	**0.054**
Region 3	1/3	1/3	1	1/3	1/4	2	1/8	1/4	**0.034**
Region 4	3	6	3	1	4	8	1/3	1/2	**0.174**
Region 5	2	3	4	1/4	1	3	1/6	1/5	**0.082**
Region 6	1/3	1/3	1/2	1/8	3	1	1/9	1/7	**0.023**
Region 7	6	5	8	3	6	9	1	3	**0.36**
Region 8	5	4	4	2	5	7	1/3	1	**0.218**
Consistency Ratio =0.06									

Comparisons are made favoring the regions suffering from the scarcity of tourism income. Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) was favored due to their lack of tourism income whereas Region 6 (İstanbul) and Region 3 (Antalya) preferred the least because of their ample tourism incomes.

Table 5.13 Comparison of Coastal Regions with Respect to Socio Economic Index

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara Region)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	3	1	1/3	2	4	1/3	1/5	**0.82**
Region 2	1/3	1	1/4	1/5	2	2	1/5	1/7	**0.045**
Region 3	1	4	1	1/3	1	3	1/3	1/4	**0.079**
Region 4	3	5	3	1	2	6	1	1/2	**0.176**
Region 5	1/2	1/2	1	1/2	1	3	1/4	1/3	**0.062**
Region 6	1/4	1/2	1/3	1/6	1/3	1	1/6	1/9	**0.025**
Region 7	3	5	3	1	4	6	1	1/5	**0.178**
Region 8	5	7	4	2	3	9	5	1	**0.354**
Consistency Ratio =0.06									

Again comparisons were made favoring the regions with low socio-economic properties. Therefore, Region 4 (Eastern Mediterranean), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) were the most preferred regions.

Table 5.14 Comparison of Coastal Regions with Respect to Pollution

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara Region)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	4	1/5	1/4	1/2	3	1/4	1/3	**0.053**
Region 2	1/4	1	1/8	1/7	1/3	1/2	4	6	**0.022**
Region 3	5	8	1	3	6	7	6	4	**0.37**
Region 4	4	7	1/3	1	4	5	3	1/3	**0.155**
Region 5	2	3	1/6	1/4	1	3	1/3	1/6	**0.055**
Region 6	1/3	2	1/7	1/5	1/3	1	1/3	1/6	**0.03**
Region 7	4	1/4	1/6	1/3	3	3	1	1/4	**0.093**
Region 8	3	1/6	1/4	3	6	6	4	1	**0.222**
Consistency Ratio =0.05									

Region 3 (Antalya) and Region 8 (Eastern Black Sea) were found to be the least polluted regions when compared with the other regions. Due to pollution in the regions, Region 2 (İzmir-Aydın) and Region 6 (İstanbul) were the least preferred regions.

Table 5.15 Comparison of Coastal Regions with Respect to Yacht/km

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara Region)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	1/4	1/5	1/6	1/6	1/5	1/9	1/9	**0.017**
Region 2	4	1	1/2	1/6	1/5	1/3	1/7	1/7	**0.031**
Region 3	5	2	1	1/5	2	1	1/6	1/6	**0.062**
Region 4	6	6	5	1	2	3	1/5	1/5	**0.134**
Region 5	6	5	1/2	1/2	1	2	1/5	1/5	**0.076**
Region 6	5	3	1	1/3	1/2	1	1/6	1/6	**0.55**
Region 7	9	7	6	5	5	6	1	1	**0.312**
Region 8	9	7	6	5	5	6	1	1	**0.312**
Consistency Ratio =0.03									

Table 5.16 Comparison of Coastal Regions with Respect to Marina/km

	Region 1 (Muğla)	Region 2 (İzmir – Aydın)	Region 3 (Antalya)	Region 4 (Eastern Mediterranean)	Region 5 (Marmara Region)	Region 6 (İstanbul)	Region 7 (Western Black Sea)	Region 8 (Eastern Black Sea)	**Relative Weights**
Region 1	1	1/2	1/5	1/6	1/3	1/4	1/9	1/9	**0.022**
Region 2	2	1	1/4	1/7	1	1/2	1/7	1/7	**0.036**
Region 3	5	4	1	1/6	1/3	2	1/7	1/7	**0.064**
Region 4	6	7	6	1	3	3	1	1	**0.221**
Region 5	3	1	3	1/3	1	4	1/4	1/4	**0.09**
Region 6	4	2	1/2	1/3	1/4	1	1/5	1/5	**0.051**
Region 7	9	7	7	1	4	5	1	1	**0.258**
Region 8	9	7	7	1	4	5	1	1	**0.25**
Consistency Ratio =0.02									

The crowding of the shores by marinas and yacht may cause both environmental and social problems. Thus, investments should be diverted the less crowded regions. As can be seen from Table 5.15 and 5.16, Region 4 (Eastern Mediterranean), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) were found to be the most preferred regions with respect to yacht/km and marina/km densities.

Local Weights of Criterion

Using the pairwise comparisons relative weights for each criterion with respect to upper level criteria was calculated. Judgments were made using expert opinions. Pairwise comparisons, consistencies and relative weights for each criterion is given at Table 5.17 to Table 5.21. The consistencies of the judgments are in acceptable limits.

Table 5.17 Comparison of Criterion with Respect to Coastal Tourism Resources

	Climate	Protected Bays	Environmental Scenery	Touristic Benchmarks	**Local Weights**
Climate	1	7	5	7	**0.648**
Protected Bays	1/7	1	1/4	5	**0.068**
Environmental Scenery	1/5	4	1	4	**0.215**
Touristic Benchmarks	1/7	1/5	1/4	1	**0.068**
Consistency ratio =0.05					

Climate has the highest relative weight with respect to coastal resources offered by regions which is the fundamental prevailing issue among the other criteria. On the other hand protected bays and touristic benchmarks have the least influence in assessment of coastal tourism resources.

Table 5.18 Comparison of Criterion with Respect to Accessibility to Marina Networks

	Accessibility in the National Marina Network	Accessibility in the Mediterranean Marina Network	Accessibility in the Black Sea Marina Network	**Local Weights**
Accessibility in the National Marina Network	1	3	8	**0.661**
Accessibility in the Mediterranean Marina Network	1/3	1	5	**0.272**
Accessibility in the Black Sea Marina Network:	1/8	1/5	1	**0.067**
Consistency ratio =0.02				

Pairwise comparison of accessibility criteria reveals that accessibility in Turkey marina network is the most prevailing issue. It also highlights the importance of a strong national network.

Table 5.19 Comparison of Criterion with Respect to Physical and Geographical Attractiveness of the Region

	Accessibility to Marina Networks	Coastal Tourism Resources	**Local Weights**
Accessibility to Marina Networks	1	1	**0.500**
Coastal Tourism Resources	1	1	**0.500**
Consistency Ratio= 0.0001			

Yacht tourism cannot develop without coastal tourism resources and accessibility. One criteria gives reason whereas the other gives access. Therefore, pairwise comparison accessibility and coastal resources of a region revealed equilibrium in significance.

Table 5.20 Comparison of Criterion with Respect to Demographic Properties of the Region

	Population	Tourism Income	Socio-economic index	**Local Weights**
Population	1	1/4	1/7	**0.079**
Tourism Income	4	1	1/3	**0.263**
Socio-economic development	7	3	1	**0.659**
Consistency ratio =0.03				

Socio-economic development of a region is found to be the most decisive variable when compared with other criterion. Since social development is one of the fundamental aims of this study, the decisive property of socio-economic development in berthing space demand distribution is expected.

Table 5.21 Comparison of Criterion with Respect to Environmental Properties of the Region

	Pollution	Yacht/coastline length	Marina/ coastline length	**Local Weights**
Pollution	1	6	9	**0.770**
Yacht/coastline length	1/6	1	3	**0.162**
Marina/coastline length	1/9	1/3	1	**0.068**
Consistency ratio =0.05				

Pollution caused by yachts and marinas are quite inconsiderable when compared to the pollution caused by the industries located at the coasts, litter carried out by rivers, maritime transport and municipality waste. Therefore, water quality of the sea which reflects the overall pollution is the identifying parameter of environmental conservation of the coastal region.

The weights calculated for with respect to berthing space demand distribution were given according to four different scenarios proposed for the development of new marina investments for the estimated berthing space demand (Table 5.22-Table 5.25).

Table 5.22 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 1 (Very Weak Sustainability)

	Physical Attractiveness	Environmental Properties	Demographic Properties	**Local Weights**
Physical Attractiveness	1	9	9	**0.818**
Environmental Properties	1/9	1	1	**0.091**
Demographic Properties	1/9	1	1	**0.091**
Consistency ratio =0.00				

In Scenario 1, development is planned according to the market demands. The social growth and environmental constraints are given no consequence. Attractiveness of the coasts directly influences the market opportunities. Therefore, as can be seen from Table 5.22, physical attractiveness of the coasts is the identifying parameter.

Table 5.23 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 2 (Social Growth)

	Physical Attractiveness	Environmental Properties	Demographic Properties	**Local Weights**
Physical Attractiveness	1	3	1/3	**0.243**
Environmental Properties	1/3	1	1/7	**0.088**
Demographic Properties	3	7	1	**0.669**
Consistency ratio =0.01				

In Scenario 2, social growth is the most significant aim. Since social growth is also influenced by economic gain, some importance has also been paid to market demands.

Table 5.24 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 3 (Environmental Conservation)

	Physical Attractiveness	Environmental Properties	Demographic Properties	**Local Weights**
Physical Attractiveness	1	1/9	1/3	**0.068**
Environmental Properties	9	1	5	**0.770**
Demographic Properties	3	1/5	1	**0.162**
Consistency ratio =0.04				

In Scenario 3, environmental conservation is the most significant aim. In this scenario environmental integrity is protected at all costs. Since environmental awareness is needed for the conservation of the environment, social development is also sought in this scenario.

Table 5.25 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 4 (Strong Sustainability)

	Physical Attractiveness	Environmental Properties	Demographic Properties	**Local Weights**
Physical Attractiveness	1	1	1	**0.333**
Environmental Properties	1	1	1	**0.333**
Demographic Properties	1	1	1	**0.333**
Consistency ratio =0.00				

Sustainable development is not only an issue of economic, social or environmental but a combination of all three. Balanced development of all three issues is necessary for the harmonious development of the industry.

Table 5.26 Comparison of Criterion with Respect to Spatial Distribution of Marina Investments for Scenario 4 (Very Strong Sustainability)

	Physical Attractiveness	Environmental Properties	Demographic Properties	**Relative Weights**
Physical Attractiveness	1	1/9	1/8	**0.054**
Environmental Properties	9	1	2	**0.589**
Demographic Properties	8	1/2	1	**0.357**
Consistency ratio =0.04				

After the calculation of relative weights for each criterion for the 4 scenarios, overall priority weights of each alternative were determined. The overall weight of each region according to the scenarios adopted is given at Table 5.27.

Table 5.27 Overall Priority Weights for Regions

	Scenario 1 (Very Weak Sustainability)	Scenario 2 (Social Growth)	Scenario 3 (Environmental Conservation)	Scenario 4 (Strong Sustainability)
Region 1 (Muğla)	0.272	0.136	0.067	0.145
Region 2 (İzmir – Aydın)	0.181	0.086	0.044	0.100
Region 3 (Antalya)	0.166	0.117	0.241	0.165
Region 4 (Eastern Mediterranean)	0.093	0.142	0.154	0.134
Region 5 (Marmara)	0.082	0.073	0.066	0.066
Region 6 (İstanbul)	0.097	0.065	0.044	0.075
Region 7 (Western Black Sea)	0.062	0.168	0.150	0.130
Region 8 (Eastern Black Sea)	0.047	0.214	0.234	0.184
Overall Consistency Ratio	**0.06**	**0.05**	**0.06**	**0.05**

The new investments for the regions should be planned in compliance with the priorities specified at Table 5.27. Scenario analysis states the need for development in neglected regions. From the Table 5.27 it can be gathered that currently from a sustainable point of view priority must be given especially to the undeveloped Regions 7 and 8 which are located at the Black Sea coastline. New investments in these regions will alleviate socio-economic development while reducing the yacht tourism pressure of popular regions such as Region 1 (Muğla). Also with the distribution if yacht tourism infrastructure throughout Turkey will decrease the vulnerability of the yacht tourism by presenting more alternatives and increasing resources.

Spatial distributions of future investments corresponding to 2030 berthing space demand according to the overall weights given in Table 5.27 is given at Table 5.28.

Table 5.28 Regional Distributions of Future Investments Corresponding to 2030 Berthing Space Demand for the Proposed Scenarios

	Scenario 1 (Very Weak Sustainability)	**Scenario 2 (Social Growth)**	**Scenario 3 (Environmental Conservation)**	**Scenario 4 (Strong Sustainability)**
Region 1 (Muğla)	4,785	2,387	1,179	2,551
Region 2 (İzmir – Aydın)	3,184	1,521	774	1,759
Region 3 (Antalya)	2,920	2,051	4,239	2,903
Region 4 (Eastern Mediterranean)	1,636	2,497	2,709	2,357
Region 5 (Marmara Region)	1,442	1,276	1,161	1,161
Region 6 (İstanbul)	1,706	1,140	774	1,319
Region 7 (Western Black Sea)	1,091	2,950	2,639	2,287
Region 8 (Eastern Black Sea)	827	3,770	4,116	3,237
Total	**17,591**			

As space, time is also a fundamental factor in development plans. Especially since the construction of nautical tourism infrastructures is, by its nature, a long-term process, the integrated planning of spatial and time based development is a primary condition for the successful performance of a yacht tourism development plan.

CHAPTER 6

DEVELOPMENT of NEW INVESTMENTS OVER TIME

The development of a yacht tourism area over time is an important consideration for planners concerned with yacht tourism. In this study development of new investment within a region is considered as the decision of development for the new berthing spaces over the study period. Butler (1980) has suggested a tourist area life cycle (TALC) which charts the hypothetical development of destinations (regions) over time in terms of a series of stages defined by tourist numbers (number of yacht) and infrastructure (berthing spaces). The model consists of six stages (Agarwal 1997a:66), each characterized by a number of identifiable periods (Figure 6.1). These stages will be defined for yacht tourism.

Exploration – Main attraction for number of adventurous yachtsmen, is unspoilt nature or cultural features.

Involvement –Larger numbers of yachts and need for yachting infrastructure rises.

Development – Yacht tourism business becomes a recognizable economic potential. Large numbers of yachts begin to change the regional characteristics. At the end of this stage danger of overuse may appear as a problem.

Consolidation – The rate of increase of yachts starts reducing.

Stagnation – The region has reached and exceeded its carrying capacity. The region becomes unfashionable with environmental, social and economic problems. Major promotional efforts are needed to maintain visitor numbers.

Decline – Yachts now visit new and unspoilt coasts. The yacht tourism in the region goes into decline.

Rejuvenation –Here the attempt is to 'relaunch' the yacht tourism in the region by providing new facilities, attracting new markets and re-investing.

These stages are shown in Figure 6.1.

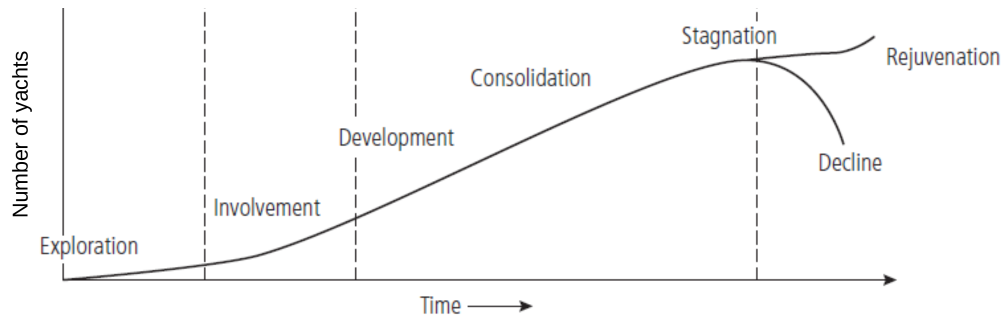

Figure 6.1 Development Stages of the Regions According to Yacht Tourism Development (Diedrich Amy, 2009)

Turkey is still in development stage for yacht tourism. Figure 6.2 shows the yacht tourism development in the proposed 8 regions of Turkey within the years 1998 - 2008

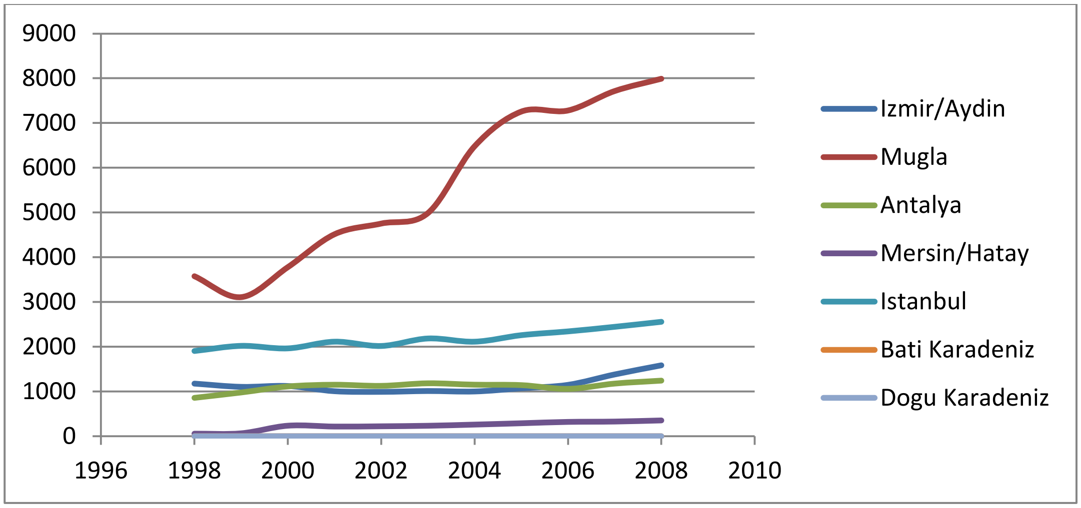

Figure 6.2 Development of Berthing Space Capacities of the Regions

As it can be seen from Figure 6.2 only the development in Region 1 – Muğla is nearing its completion stage with a sharp right hand side rise curve. Development of Region 2, Region 3 and Region 4 shows an almost straight curves indicating exploration stage. From the Figure 6.2, Region 6 has started its development cycle and is in involvement stage. At Black Sea regions Region 7 and 8 developments have not begun thus these regions are in exploration stage. When planning the future investments for the regions the development cycle should be considered to determine the speed of the yacht tourism growth for the region.

6.1 Planning New Investments for the Regions

In order to reduce the vulnerability of the development system to policy changes, development plans are produced for 5 scenarios up to 2030 with 5 yea intervals. Time period used for planning is chosen as 5 year in accordance with SPO’s development plans.

6.1.1 Strategies adopted in development plans

In order to set different time dependent development scenarios following strategies are adopted.

- Yacht tourism development of the area should be compatible with the regions, development in tourist area life cycle (TALC)
- New investments should be proposed only after all the existing infrastructure resources are exhausted.
- To enhance harmonious development between fishing development and yacht tourism, at the end of the planning period, 2030, the fisheries used as yacht tourism resources should be relinquished to aquaculture sector.
- In this study those marinas where the construction completed, however the operation has not started yet were not included in the existing capacity. These marinas are taken into consideration in the capacity calculations by assuming that they will start to operate within the planning stages in 2010-2015.
- In the computations, capacities of the new marinas are assumed as;
    - 300 berthing spaces for the marinas located at Regions 5,6,7 and 8 to improve the marina network in the regions
    - 400 berthing spaces for the marinas located at Regions 1,2,3 and 4 to prevent overcrowding and pollution.

      In selection of these marina sizes, reduction of the number of new marinas and the adverse effects of larger sizes of the marinas are taken into consideration

The properties assessed in time-dependent development scenarios are:

- **B_{ex}:** Existing capacities of the operating marinas in the region at 2010,(Table 2.2)
- **B_{dem}**: New berthing spaces needed in the region to reach adequate capacity in 2030. These values are taken from Table 5.28 in accordance with the scenario studies carried out.
- **B_{fis}**: Berthing spaces which can be provided by the fisheries (Table 2.5),

- **B_{no}**: Capacity of the constructed marinas in the region which have not started to operate yet. Included in the computations after 2010 (Table 2.4).
- **B_{gap}**: New berthing space capacity required in the region to offer adequate berthing space capacity at 2030 (**B_{gap}** =**B_{dem}-B_{no}**)
- **M_{new}**: New marinas planned to start operation in the indicated time period for the scenario, in accordance with the strategies adopted.
- **B_{new}**: New berthing spaces to be offered by the new marina investments in the indicated time period for the scenario at 2030.
- **B_{tot}**: Total berthing space capacity of the region at 2030. (**$B_{tot}=B_{ex}+B_{new}+B_{no}$**)

From the estimation studies for Turkey, total berthing space demand (**$B_{Turkey(2030)}$**) for 2030 was found as 33,425.

Actually, **$B_{Turkey(2030)}$** should be equal to **$B_{tot(2030)}$** computed theoretically from the scenarios. Because of the assumptions made during the scenario studies this is not satisfied completely. But the difference is found to be within acceptable limits.

6.2 Time-dependent Development Scenarios for Yacht Tourism

Four different time-dependent development scenarios for yacht tourism are presented in the following parts.

6.2.1 Scenario 1: Very Weak Sustainability

This scenario enhances the economic gain and do not propose any measures for the protection of environment and social growth. Therefore, it directs the investments to existing popular yacht tourism areas mainly Region 1 (Muğla), raising the already high pressure on the coasts of the region. Existing infrastructure, required berthing spaces, development of new berthing spaces and 2030 berthing space capacities of the regions for indicated periods are given at Table 6.1.

Table 6.1 Development of Berthing Space Capacity in Scenario 1: Very Weak Sustainability (2010-2030)

Regions	B_{ex}	B_{dem}	B_{fis}	B_{no}	B_{gap}	M_{new}				B_{new}	B_{tot}
						2010 - 2015	2015 - 2020	2020 - 2025	2025 - 2030		
Region 1 (Muğla)	7,004	4,815	0	1,300	3,515	3	4	2	0	3,600	11,904
Region 2 (İzmir – Aydın)	3,670	3,184	0	0	3,184	1	2	2	3	3,200	6,870
Region 3 (Antalya)	2,030	2,890	0	1,300	1,590	0	1	1	2	1,600	4,930
Region 4 (Eastern Mediterranean)		1,636	256	1,100	536	0	0	1	1	800	1,900
Region 5 (Marmara)	500	1,442	0	350	1,092	0	1	2	1	1,200	2,050
Region 6 (İstanbul)	2,630	1,706	0	0	1,706	1	1	2	2	1,800	4,430
Region 7 (Western Black Sea)	-	1,097	865	0	1,097	0	1	1	2	1,200	1,200
Region 8 (Eastern Black Sea)	-	821	1,300	225	596	0	0	1	1	600	825
Total	**15,834**	**17,591**	**2,421**	**4,275**	**13,316**	**5**	**10**	**12**	**12**	**14,000**	**34,109**

For this scenario spatial distribution of investments to the regions from 2010 to 2030 is given at Figure 6.3 using Table 6.1. Figure 6.1 shows the new investments needed between the 5 year interval planning periods.

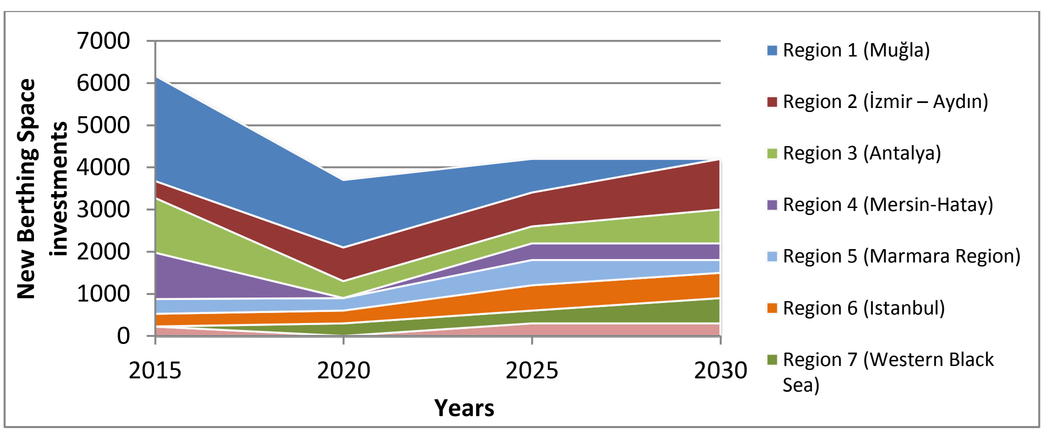

Figure 6.3 Regional Distribution of New Berthing Space Investments for Scenario 1: Very Weak Sustainability, (2010 -2030)

As can be seen from Table 6.1 and Figure 6.3, application of this scenario will pose serious risks to sustainable yacht tourism development. Although probably this scenario will give very positive economic results in short term it will cause irreversible ecological problems for Region 1 (Muğla) and Region 2 (İzmir - Aydın). In order to preserve the existing coastal tourism resources to achieve sustainable development caution should be taken against the negative impacts of this scenario. TALC of scenario 1, Very Weak Sustainability is given at Figure 6.4.

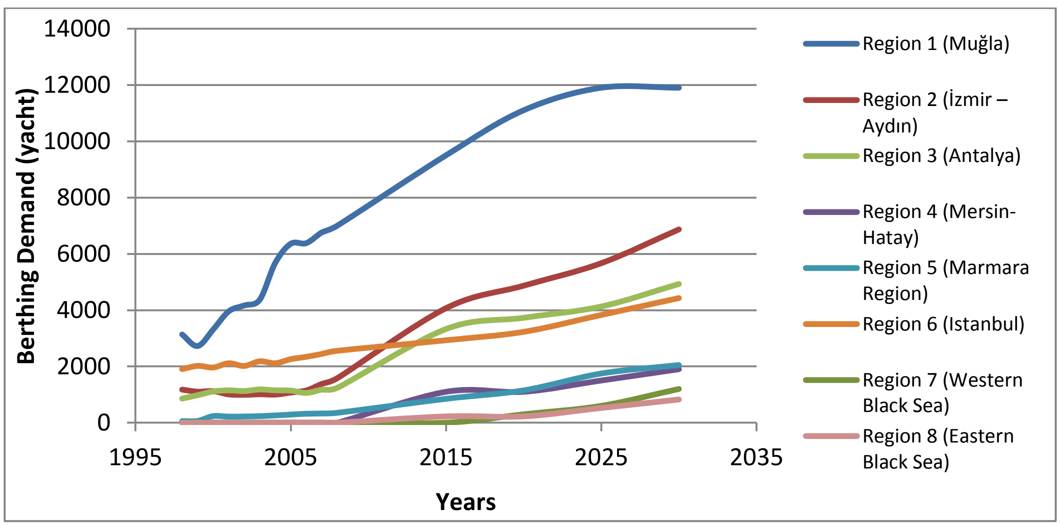

Figure 6.4 TALC of Coastal Regions According to Scenario 1: Weak Sustainability (1998 – 2030)

As it can be seen from Fig 6.4 Region 1 (Muğla) has started to lose its appeal and started stagnation stage. Since there were no constraints on the development the loss of appeal of Region 1 (Muğla) has been caused by social and environmental problems and rejuvenation of the region is very difficult. Also the remaining regions other than Region 2 (İzmir-Aydın) had not had a chance for adequate development. Region 2 (İzmir-Aydın) benefitted from the market demand and had a rapid development. At 2030, the left-over demand from the highly favored Region 1 (Muğla) and Region 2 (İzmir-Aydın) is distributed mostly between Region 3 (Antalya) and Region 6 (İstanbul).

According to Scenario 1 these regions will complete their involvement stages and enter into development stage by 2030.

Scenario 1 Very Weak Sustainability enhances the economic gain specifically at already developed Region 1 (Muğla), Region 2 (İzmir-Aydın), Region 3 (Antalya), and Region 6 (İstanbul), at the risk of negative impacts on environment. On the other hand Region 4 (Eastern Mediterranean), Region 5 (Marmara), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) remains in the exploration stage not benefiting from the economic opportunities.

6.2.2 Scenario 2: Socio-Economic Growth

This scenario seeks to alleviate the socio-economic growth of the undeveloped areas, decreasing the differences between social properties of the regions. Thus in the application of this scenario new investments prioritize at Black Sea Regions and Eastern Mediterranean. Existing capacities, required investments and planned development for five year time period is given at Table 6.2.

Table 6.2 Development of Berthing Space Capacity in Scenario 2: Social Growth (2010-2030)

Regions	B_{ex}	B_{dem}	B_{fis}	B_{no}	B_{gap}	M_{new}				B_{new}	B_{tot}
						2010 - 2015	2015 - 2020	2020 - 2025	2025 - 2030		
Region 1 Muğla	7,004	2,387	0	1,300	1,087	2	1	0	0	1,200	9,504
Region 2 İzmir – Aydın	3,670	1,521	0	0	1,521	1	1	1	1	1,600	5,270
Region 3 Antalya	2,030	2,051	0	1,300	751	0	0	1	1	800	4,130
Region 4 Eastern Mediterranean	-	2,497	256	1,100	1,397	0	1	2	1	1,600	2,700
Region 5 Marmara	500	1,276	0	350	926	0	2	1	1	1,200	2,050
Region 6 İstanbul	2,630	1,140	0	0	1,140	1	1	1	1	1,200	3,830
Region 7 Western Black Sea	-	2,950	865	0	2,950	1	2	3	4	3,000	3,000
Region 8 Eastern Black Sea)	-	3,770	1,300	225	3,545	0	2	4	6	3,600	3,825
Total	**15,834**	**17,591**	**2,421**	**4,275**	**13,316**	**5**	**10**	**13**	**15**	**14,200**	**34,309**

For this scenario spatial distribution of investments to the regions from 2010 to 2030 is given at Figure 6.5 using Table 6.2.

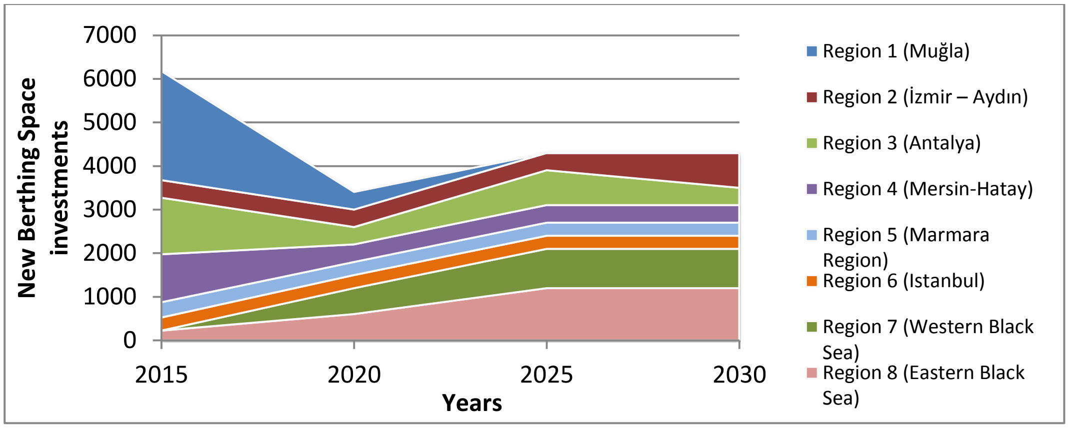

Figure 6.5 Regional Distribution of New Berthing Space Investments for Scenario 2 (Social Growth), 2010 – 2030

As can be seen from Table 6.2 application of this scenario will enhance social growth but do not improve environmental integrity. In order to preserve the existing environment caution should be taken against the negative impacts of this scenario. TALC of Scenario 2 (Social Growth) is given at Figure 6.6.

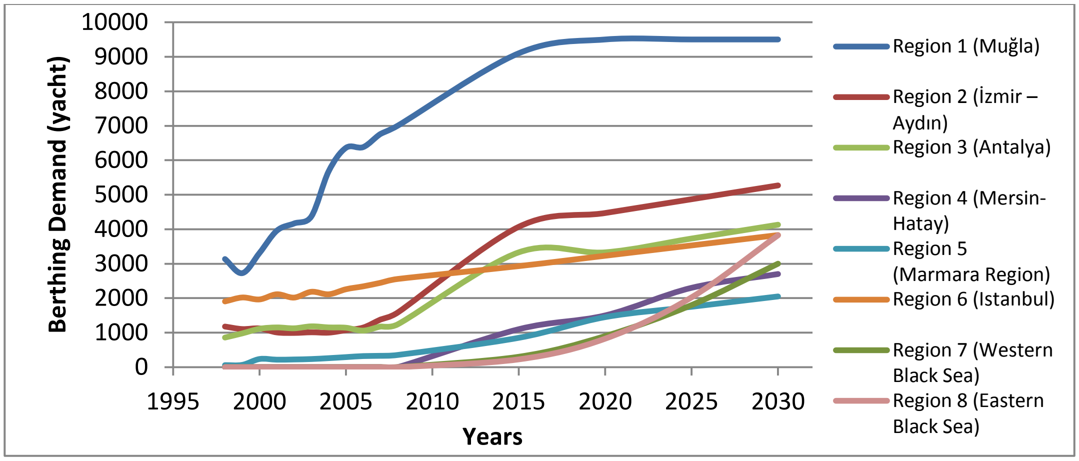

Figure 6.6 TALC of Coastal Regions According to Scenario 2: Social Growth (1998 – 2030)

In this scenario Muğla has entered its stagnation phase, which helps to divert the benefits of yacht tourism to other regions.

Although Region 2 (İzmir-Aydın) follows a rapid development at first, its development decelerates after 2015. The steep increase in 2010 - 2015 periods are due to the marinas (IC Çesme Marina and Teos Marina) started to operate recently.

Black Sea Regions (Eastern and Western Black Sea) are the regions which benefit the most from this scenario which is consistent with the strategies for socio-economic growth of the undeveloped areas. To protect the social integrity of these regions precautions are need to be taken in order to prevent degeneration of regional social structure.

6.2.3 Scenario 3: Environmental Conservation

This scenario preserves environment without seeking economic and social growth. Although preserving ecological integrity is a very desirable outcome, this scenario runs the risk of exhaust all the economic resources in order to sustain ecological conservation. Existing capacities, required investments and planned development for five year time period is given at Table 6.3.

Table 6.3 Development of Berthing Space Capacity in Scenario 3: Environmental Conservation (2010-2030)

Regions	B_{ex}	B_{dem}	B_{fis}	B_{no}	B_{gap}	M_{new}				B_{new}	B_{tot}
						2010 - 2015	2015 - 2020	2020 - 2025	2025 - 2030		
Region 1 Muğla	7,004	1,196	0	1,300	-	0	0	0	0	0	8,304
Region 2 İzmir – Aydın	3,670	774	0	0	774	1	1	0	0	800	4,470
Region 3 Antalya	2,030	4,486	0	1,300	3,186	0	3	3	2	3,200	6,530
Region 4 Eastern Mediterranean	-	2,691	256	1,100	1,591	1	1	1	1	1,600	2,700
Region 5 Marmara	500	1,161	0	350	811	1	1	1	0	900	1,750
Region 6 İstanbul	2,630	774	0	0	774	1	1	1	0	900	3,530
Region 7 Western Black Sea	-	2,691	865	0	2,691	1	2	3	3	2,700	2,700
Region 8 Eastern Black Sea	-	3,817	1,300	225	3,592	0	2	4	6	3,600	3,825
Total	15,834	17,591	2,421	4,275	13,316	5	11	13	12	13,700	33,809

For this scenario spatial distribution of investments to the regions from 2010 to 2030 is given at Figure 6.7 using Table 6.3.

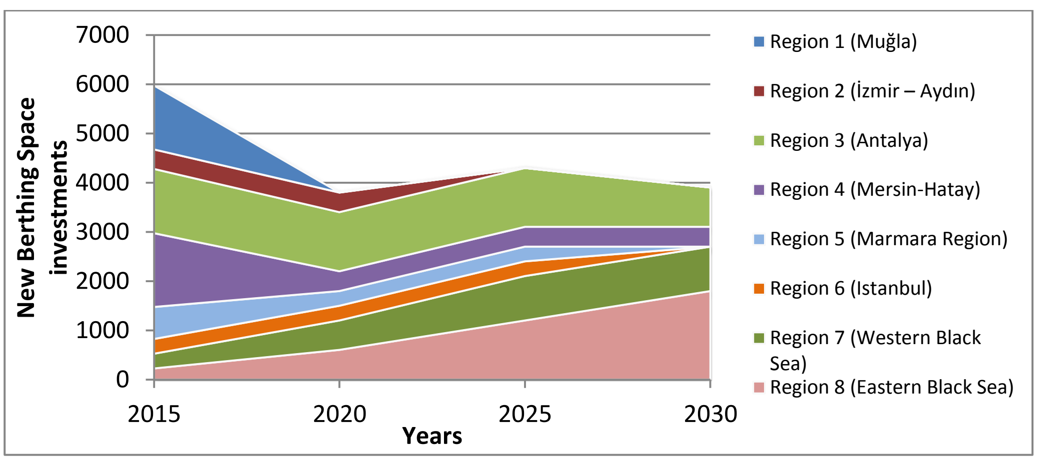

Figure 6.7 Regional Distribution of New Berthing Space Investments for Scenario 3: Environmental Conservation, (2010 -2030)

As can be seen from Table 6.3 application of this scenario will divert the yacht tourism from the highly pressured coasts to the stagnant and unpolluted coasts. In order to preserve the advantageous environmental conditions existing in the unpolluted coasts, development must be planned and monitored carefully. TALC of Scenario 3 (Environmental Conservation) is given at Figure 6.8.

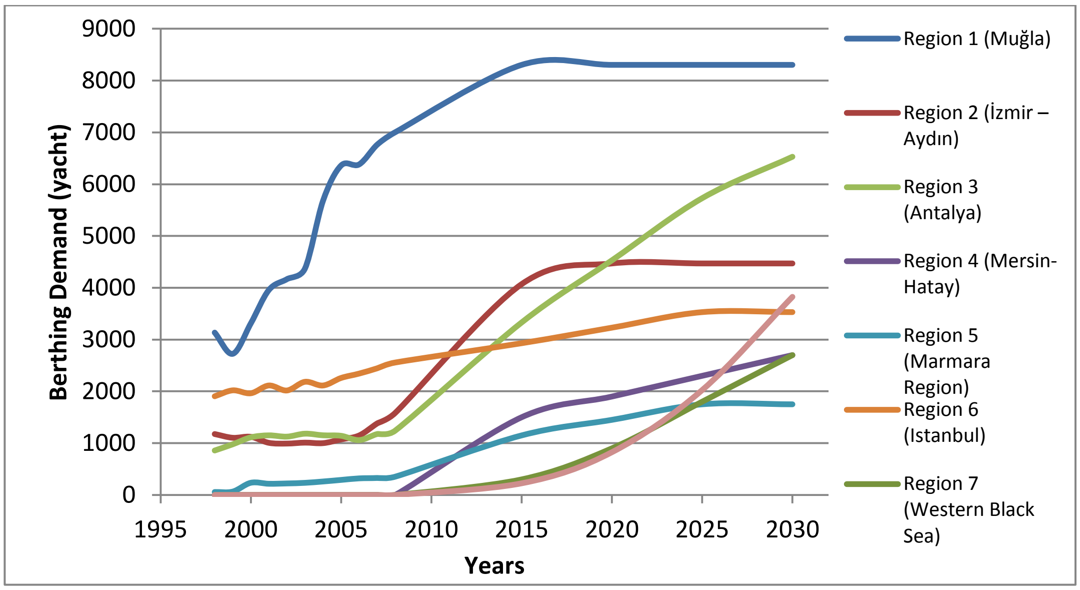

Figure 6.8 TALC of Coastal Regions According to Scenario 3: Environmental Conservation (1998 – 2030)

From this scenario it is seen that Region 3 (Antalya), benefits the most regarding the environmental conservation measures. Region 6 (İstanbul), followed by Region 5 (Marmara) shows a steady state development. Region 8 (Eastern Black Sea), Region 7 (Western Black Sea) and Region 4 (Eastern Mediterranean) has an exponentially increasing development, reaching Region 5 (İstanbul). Since, in this scenario environmental conservation criterion plays a dominating role in the development stages, the growth of yacht tourism has to be monitored for Region 3 (Antalya), Region

8 (Eastern Black Sea), Region 7 (Western Black Sea) and Region 4 (Eastern Mediterranean) after year 2030.

Region 1 (Muğla) has already reached the stagnation stage as expected, preserving the ecological integrity. Region 2 (follows Region 1 into the stagnation phase immediately due to the environmental problems existing at the coasts of the region.

6.2.4 Scenario 4 Sustainable Development

Sustainable development is the management of economy, social and environmental parameters in balance by preserving environment while seeking economic and social growth. Existing capacities, required investments and planned development for five year time period is given at Table 6.4.

Table 6.4 Development of Berthing Space Capacity in Scenario 4: Sustainable Development (2010-2030)

Regions	B_{ex}	B_{dem}	B_{fis}	B_{no}	B_{gap}	M_{new}				B_{new}	B_{tot}
						2010 - 2015	2015 - 2020	2020 - 2025	2025 - 2030		
Region 1 (Muğla)	7,004	2,674	0	1,300	1,374	3	1	0	0	1,600	9,904
Region 2 (İzmir – Aydın)	3,670	1,847	0	0	1,847	1	1	1	2	2,000	5,670
Region 3 (Antalya)	2,030	2,885	0	1,300	1,585	0	1	2	1	1,600	4,930
Region 4 (Eastern Mediterranean)		2,269	256	1,100	1,169	0	1	1	1	1,200	2,300
Region 5 (Marmara Region)	500	1,231	0	350	881	0	1	1	1	900	1,750
Region 6 (İstanbul)	2,630	1,161	0	0	1,161	1	1	1	1	1,200	3,830
Region 7 (Western Black Sea)	-	2,322	865	0	2,322	0	2	3	3	2,400	2,400
Region 8 (Eastern Black Sea)	-	3,202	1,300	225	2,977	0	2	4	4	3,000	3,225
Total	15,834	17,591	2,421	4,275	13,316	5	10	15	13	13,900	34,009

For this scenario spatial distribution of investments to the regions from 2010 to 2030 is given at Figure 6.9 using Table 6.4.

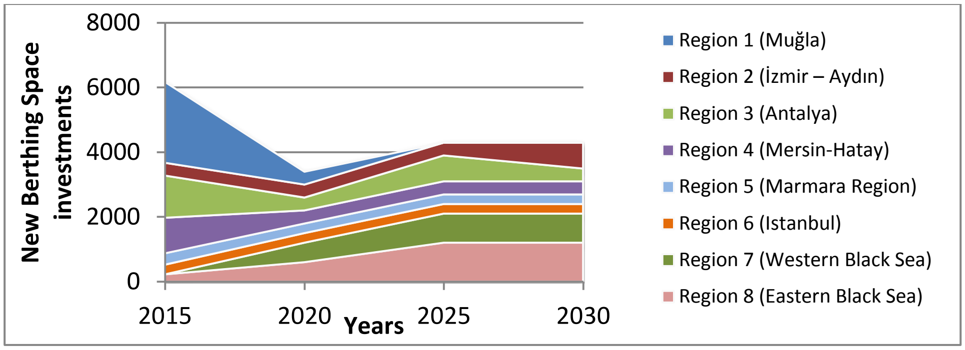

Figure 6.9 Regional Distribution of New Berthing Space Investments for Scenario 4: Sustainable Development, (2010 -2030)

Sustainable development scenario proposes a balanced growth of yacht tourism among the regions, seeking to preserve the coastal resources while enhancing socio-economic growth in undeveloped regions. Therefore, fair and balanced distributions of berthing space capacity among the regions are observed. TALC of Scenario 4 (Sustainable Development) is given at Figure 6.10.

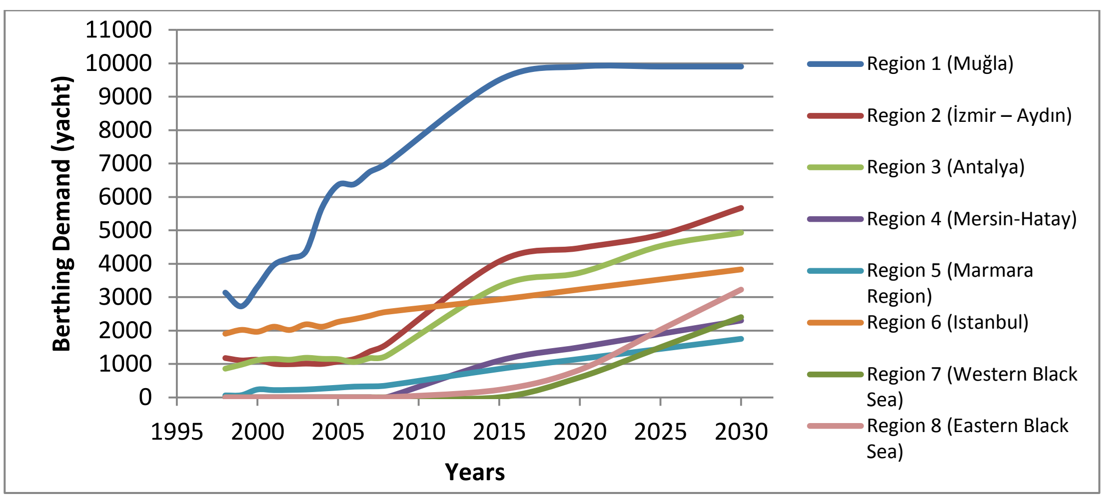

Figure 6.10 TALC of Coastal Region According to Scenario 3: Environmental Conservation (1998 – 2030)

From the TALC curve given at Figure 6.10 for Scenario 4 (Sustainable Development), it is observed that Region 2 (İzmir-Aydın), Region 3 (Antalya) and Region 6 (İstanbul) show similar trends and are in development stage. Eastern and Western Black sea passes from innovative stage in 2015 and has a rapid development stage up to 2030. Similar trend is observed for Region 4 (Eastern Mediterranean). Starting from 2010 there is a sharp increase in yacht tourism development trend. Region 5 (Marmara) has a steady development growth yet being below all the other curves. Region 1 (Muğla) has already reached the stagnation stage by 2015 as expected, preserving the ecological integrity. This scenario since considered for a sustainable development where socio-economic development and environmental issues has kept in balance, has a priority ranking compared with all the other scenarios. Accordingly, Region 2 (İzmir-Aydın) and Region 3 (Antalya) are placed as the most prioritized regions among all the others followed by Region 8 (Eastern Black Sea), Region 7 (Western Black Sea) and Region 4 (Eastern Mediterranean), by their right hand rising steep sloped curves.

6.3 Discussion of Results

In this study, development of yacht tourism in terms of berthing spaces is considered as a decision by running four different scenarios for 8 regions. These eight regions are Region 1 (Muğla), Region 2 (İzmir-Aydın), Region 3 (Antalya), Region 4 (Eastern Mediterranean), Region 5 (Marmara), Region 6 (İstanbul), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea).

Scenario 1 (Very Weak Sustainability) stands for very weak sustainability and high economic gain. Scenario 2 (Social Growth) stands for enhancement of socio-economic growth of undeveloped regions with low key emphasize on environmental issues. In Scenario 3 (Environmental Conservation) the environment is preserved without seeking social and economic growth. Scenario 4 (Sustainable Development) stands for strong sustainable development where it preserves environment while seeking economic and social growth.

In view of the given basic assumptions the scenarios carried out to assess the distribution of berthing spaces in 5 year periods till 2030.

In Scenario 1 (Very Weak Sustainability) the berthing space demand is directed to existing popular yacht tourism areas, mainly Region 1 (Muğla), raising the already high pressure at the coasts of the region without considering any environmental issues. Region 1 (Muğla) reaches stagnation stage around 2030.

Region 2 (İzmir-Aydın) is the other region which benefits the most from this scenario. It shows rapid development after 2010, following a steep right hand side rising curve. The other regions show no economical development till 2015 and starting from 2015, Region 3 (Antalya) and Region 6 (İstanbul) passes on to development stage. Accordingly undeveloped regions, Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) remain in exploration/involvement stages. This scenario reflects an unfair competition among the fully developed and under developed regions.

On the other hand, Scenario 2 enhances the economic development of especially the under developed regions seeking socio-economic balance. The scenario should be viewed under the national development plans. Accordingly, Scenario 2 produces curves which reflect rapid development for Region 4 (Eastern Mediterranean), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea). Meanwhile the remaining regions shows steady development curves whereas Region 1 (Muğla) reaches the stagnation stage in year 2015. This scenario has a drawback of rapid socio-economic development which might have adverse effect on social values.

In Scenario 3, Region 3 (Antalya) shows a rapid sharp right hand rising development curve. Accessibility and environmental integrity of the region, combined with the desire to explore of new and unspoilt areas might be the trigger this outcome. Region 6 (İstanbul) shows a steady development trend whereas Region 4 (Eastern Mediterranean), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) show rapid development, yet lags behind the Region 3 (Antalya). Limited accessibility to these regions might be the reason for this outcome. Interesting enough Marmara remains behind all the other regions. This may be due to the overshadowing of industrial developments yachting tourism. For Region 1 (Muğla) and Region 2 (İzmir-Aydın), development stops at 2020 and 2025 respectively, in accordance with the environmental conservation.

Finally, in Scenario 4, where the sustainable development is the key issue, a balanced distribution berthing spaces among all the regions except Region 1 (Muğla) is observed. Region 1 (Muğla) completes its development at 2020 and enters in to stagnation phase. Region 2 (İzmir-Aydın), Region 3 (Antalya) and Region 6 (İstanbul) follows a steady development curve starting from 2010. After 2015 these regions show very similar trends with nearly parallel curves.

Yacht tourism in Region 5 (Marmara) again lags behind hindered by industrial developments. Region 4 (Eastern Mediterranean), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) shows a sharp right hand size rising development curve. The present fisheries put into use at Region 4 (Eastern Mediterranean), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea) may be considered as a positive input in these scenarios. Region 2 (İzmir-Aydın) and Region 3 (Antalya) can be considered as future potential regions for the yacht tourism development. The development in these regions, does not only complete the marina chains for Eastern Mediterranean Sea, but also enhances the accessibility of the natural and cultural heritages.

Scenario 4 results, considering the socio-economic development and environmental preservation can be taken as a base for national development plans for yachting tourism since the results supports sustainable development issues.

The number of marinas and berthing spaces for Scenario 4 (Sustainable Development) is summarized in Table 6.5.

Table 6.5 New Marina Investments Proposed in Scenario 4: Sustainable Development (2010-2030)

Regions	B_{ex}	B_{no}	M_{new}				B_{new}	B_{tot}
			2010 - 2015	2015 – 2020	2020 – 2025	2025-2030		
Region 1 (Muğla)	7,004	1,300	3	1	0	0	1,600	9,904
Region 2 (İzmir – Aydın)	3,670	0	1	1	1	2	2,000	5,670
Region 3 (Antalya)	2,030	1,300	0	1	2	1	1,600	4,930
Region 4 (Eastern Mediterranean)		1,100	0	1	1	1	1,200	2,300
Region 5 (Marmara)	500	350	0	1	1	1	900	1,750
Region 6 (İstanbul)	2,630	0	1	1	1	1	1,200	3,830
Region 7 (Western Black Sea)	-	0	0	2	3	3	2,400	2,400
Region 8 (Eastern Black Sea)	-	225	0	2	4	4	3,000	3,225
Total	**15,834**	**4,275**	**5**	**10**	**15**	**13**	**13,900**	**34,009**

These distributions are regional outcome of computations. Exact locations marina sites can only be obtained by detailed local scale studies.

CHAPTER 7

CONCLUSIONS

The scope of this study was to produce a yacht tourism development plan for the coastal regions of Turkey.

- In order to find the future demand, forecasting studies were carried out to estimate the future demand. Two forecasting methods, exponential smoothing and ARIMA, were utilized to forecast the future demand for Turkey berthing space demand. Forecast method with smaller MAPE value was selected with respect MAPE values generated by the estimations. The selected ARIMA method estimated the berthing space demand for Turkey at 2030 as 33,425.
- In this study spatial distribution of yacht tourism in terms of berthing spaces is considered by running four different scenarios for 8 regions:

    - The eight regions proposed were Region 1 (Muğla), Region 2 (İzmir-Aydın), Region 3 (Antalya), Region 4 (Eastern Mediterranean), Region 5 (Marmara), Region 6 (İstanbul), Region 7 (Western Black Sea) and Region 8 (Eastern Black Sea).
    - The four scenarios were Scenario 1 (Very Weak Sustainability), Scenario 2 (Social Growth), Scenario 3 (Environmental Conservation) and Scenario 4 (Sustainable Development)

- Distribution of the forecasted demand amongst the proposed 8 regions for the four scenarios produced at 2030 was carried out by AHP decision making model. AHP was used to prioritize the coastal regions in order to distribute the berthing space demand with respect to scenarios developed. A three level hierarchy was produced to rank the regions according to environmental, physical, geographical and socio-economic properties of the regions.
- Weights developed for the 8 regions for 4 scenarios were used to distribute the total berthing space demand among the regions.
- Finally, tourism region development characteristics and phases proposed by Tourist Area Life Cycle (TALC) were used to generate the time-dependent development scenarios for yacht tourism.

Comparison of the 4 scenarios proposed, supported Scenario 4 (sustainable development) to be adopted as a base for national development plans for yachting tourism since the results are in compliance with sustainable development principles.

In this study planning studies are carried out with 5 year intervals till 2030. However this is a dynamic plan therefore has to be re-evaluated by updated time dependent data.

In this study forecasts were done by very limited data. So it is especially crucial that the results of the forecasting should be monitored and evaluated at 5 year periods. Also data collection in yacht tourism is found to be very limited. There is not only lack of crucial data, but most existing data are not readily processed for yacht tourism forecasting and planning. Therefore, there is not only a need for data collection studies also need for useable data for the coastal tourism at Turkey.

In the master plan studies political and scientific considerations both reflect in the final implementation and planning stages. This holds true in planning of yacht tourism and other related coastal activities. However in this thesis work only the scientific ground is taken as a reference base.

For the future studies, development plans should be integrated with GIS for a spatial recognition of the coasts and uses. It is also recommended to redesign the prioritization process with the opinions gathered from the users of the yacht tourism system - yachtsmen. Different viewpoints during the prioritization process will give more holistic viewpoints to the planning process.

REFERENCES

Adler, J. (1989). Origins of Sightseeing. *Annals of Tourism Research, 16*(1), 7 - 29.

Armstrong, J. S. (2002). Selecting Forecasting Methods. In J. S. Armstrong (Ed.), *Principles of Forecasting:A Handbook for Researchers and Practitioners*. NY: Kluwer Academic Publishers.

Boniface, B., & Cooper, C. (2005). *Worldwide Destinations: The Geography of Transport for Travel and Tourism* (4 ed.). Oxford: Elsevier Butterworth-Heinemann.

Cheng, E. W. L., & Li, H. (2001a). Analytic hierarchy process: An approach to determine measures for business performance. *Measuring Business Excellence, 5*(3), 30 - 36.

Cheng, E. W. L., & Li, H. (2001b). Information priority-setting for better resource allocation using analytic hierarcy process (AHP). *Information Management & Computer Security, 9*(2), 61-70.

Curry, B., & Moutinho, L. (1992). Environmental Issues in Tourism Management: Computer Modelling for Judgemental Decisions. *International Journal of Service Industry Management, 3*(1), 57 - 69.

Diedrich Amy, G.-B. E. (2009). Local perceptions of tourism as indicators of destination decline. *Tourism Management, 30*, 512-521.

DLHI. (2010). *Coastal Tourism Structures Master Plan Study*. Ankara.

Dodds, S. (1997). Towards a 'Science of Sustainability': Improving the Way Ecological Economics Understands Human Well-being. *Ecological Economics, 23*(2), 95-111.

Duke, J. M., & Aull-Hyde, R. (2002). Identifying Public Preferences for Land Preservation Using the Analytic Hierarchy Process. *Ecological Economics, 42*, 131-145.

Fahey, L., & Randall, R. M. (1998). Integrating Strategy and Scenarios. In L. Fahey & R. M. Randall (Eds.), *Learning from the future: Competitive foresight scenarios* (pp. 22-38). New York: John Wiley.

Frechtling, D. C. (2001). *Forecasting tourism demand: methods and strategies*. Oxford: Butterworth-Heinemann.

Harker, P. T., & Vargas, L. G. (1987). The Theory of Ratio Scale Estimation: Saaty's Analytic Hierarchy Process. *Management Science, 33*(11), 1383 - 1403.

Herreshoff, L. F., & Spectre, P. H. (2007). *The Golden Age of Yachting*. New York: Sheridan House.

Higgins, A. J., Hajkowicz, S., & Bui, E. (2008). A Multi-objective Model for Environmental Investment Decision Making. *Computers & Operations Research, 35*(1).

ICOMIA, (2005). Boating Industry Statistics. International Council of Marine Industry Associations.

Kovačić, M., Dundović, Č., & Bošković, D. (2007). Nautical Tourism Development Through Integrated Planning. *Pomorstvo, 21*(1), 189 - 210.

Kovačić, M., & Luković, T. (2007). Spatial Characteristics of Planning and Construction of Nautical Tourism Ports. *Geoadria, 12*(2), 131-147.

Makridakis, S. G., Wheelwright, S. C., & Hyndman, R. J. (1998). *Forecasting: Methods and Applications* (3 ed.). NY: Wiley.

Malczewski, J. (1999). *GIS and Multicriteria Decision Analysis*. New York: John Wiley and Sons.

Ministry of Culture and Tourism. (1992). Coastal Tourism Master Plan. Ankara

NOAA. (19974). 1998 Year of the Ocean: Coastal Tourism and Recreation. National Oceanic and Atmospheric Administration. Washington, DC,

Ramanathan, R. (2006). Data envelopment analysis for weight derivation and aggregation in the analytic hierarchy process. *Computers & Operations Research*(33), 1289-1307.

Ratcliffe, j. (2000). Scenario building: a suitable method for strategic property planning? *Property Management, 18*(2), 127-144.

Saaty, T. L. (1980). *The Analytic Hierarcy Process*. U.S.A: McGraw-Hill Comp.

Saaty, T. L. (1986). Axiomatic Foundation of the Analytic Hierarchy Process. *Management Science, 32*(7), 841-855.

Saaty, T. L. (1994). How To Make A Decision: The Analytic Hierarchy Process. *Interfaces, 24*(6), 19 - 43.

Saaty, T. L. (2006). The Analytic Network Process. In T. L. Saaty (Ed.), *Decision Making with the Analytical Network Process* (pp. 1 - 26).

Schoemaker, P. J. H. (1995). Scenario Planning: A Tool for Strategic Thinking. *Sloan Management Review, 36*(2), 25 - 40.

Song, H., & Li, G. (2008). Tourism Demand Modelling and Forecasting - A review of Recent Research. *Tourism Management, 29*(2), 203 - 220.

Song, H., & Witt, S. F. (2000). *Tourism Demand Modelling and Forecasting: Modern Econometric Approaches*. Oxford: Elsevier.

SPO, S. P. O. (2003). *Socio-Economic Rating of Provinces and Regions* Ankara.

Tosun, C., Okumus, F., & Fyall, A. (2008). Marketing Philosophies; Evidence from Turkey. *Annals of Tourism Research, 35*(1), 127-147.

Touran, A., & Lopez, R. (2006). Modeling Cost Escalation in Large Infrastructure Projects. *Journal of Construction Engineering and Management, 132*(8), 853 - 860.

UNWTO. (2010). UNWTO Tourism Highlights : 2010 Edition: Unite Nations World Tourism Organization.

UNWTO. (2011). World Tourism Barometer Retrieved January 2011, from http://www.unwto.org/facts/eng/pdf/barometer/UNWTO_Barom11_advance_january_en_excerpt.pdf

Vaidya, O. S., & Kumar, S. (2006). Analytic hierarchy process: An overview of applications. *European Journal of Operational Research*(169), 1-29.

Villa, F., Tunesi, L., & Agardy, T. (2001). Optimal zoning of a marine protected area: the case of the Asinara National Marine Reserve of Italy. *Conservation Biology, 16*(2), 515 - 526.

Warfield, J. (1996). An overview of futures methods., in Slaughter, R. (Ed.), *The Knowledge of*

Future Studies, Vols I-III, DDMMedia Group,Melbourne.

Wind, Y., & Saaty, T. L. (1980). Marketing Applications of the Analytic Hierarchy Process. *Management Science, 26*(7), 641 - 658.