GIS OF THE CROATIAN CITIES AT THE ADRIATIC COAST

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Abstract: In the paper it is pointed out how demanding GIS is. The role and importance of GIS is examined on GIS of the Croatian cities and islands at the Adriatic coast. The maps of some cities (e. g. Zadar, Sibenik, Dubrovnik, etc.) and islands (e. g. Mljet, Kornati, Zlarin, etc.) at the Adriatic coast are on Internet.

1 INTRODUCTION

The future prospects of an area depends to a great extent on existing opportunities and constraints but also on possible actions which can be envisaged to guide development in the area. Such actions have to be based on a realistic assessment of problems, trends and options in a variety of policy areas such as population growth, employment, overall and sectoral economic development, social services, infrastructure development, environmental protection and human health, quality of life, etc.

2 THE ADRIATIC COAST

Much has been said about the beauty of Croatia. "Heaven on Earth" has been described in many books by artists, in paintings and countless photographs. "God wanted to crown his creation, so on the last day he created the Croatian Adriatic from his tears, the stars and sea breeze", wrote an author long ago about the splendour of this most beautiful and preserved ecological corner of the modern world. Long beaches, rocky mountains within reach of the sea, fervent summers, untouched nature and unique city monuments have turned the vacations of many travellers into an exceptionally beautiful dream. It is often said that most travellers by chance stumble across the Adriatic. Every other visit discovers more of the diversity, blessedness and hospitality of this land. It would seem that we are not objective to those who have not visited this jewel of the Mediterranean. The only way to prove our objectivity is through ones own experience of the sea with its thousands islands (Figure 1).

Adriatic navigator is very interesting web portal. It's not a pilot or a conventional navigational guide, nor can it be used as a substitute for standard navigational literature. Its purpose is to serve as a supplement to marine charts and conventional cruising guides (URL 1).

Figure 1. The Adriatic coast
2.1 Geographical Position And Location

Croatia is situated close to densely populated and industrially developed European countries. Geographically, it is situated on the cross-roads between Central Europe and the Mediterranean. Many internationally important transport routes cross Croatia. The importance of the geographical position of the Republic of Croatia is also enhanced by the Adriatic Sea, the northernmost gulf of the Mediterranean which is the closest to the central part of the European continent. The most important routes are also several important transversal routes from the Austrian and Hungarian border to the Adriatic coast (to Rijeka and Split).

2.2 Natural And Geographical Features

The Adriatic Area includes the narrow coastal belt separated from the hinterland by high mountains. This is predominantly a karst area with very dry summers. The few streams mainly follow narrow gorges in breaking their way through to the sea. The Croatian coastal area may further be divided into the northern (Istria nad Kvarner) and southern part (Dalmatia). It also lends itself to a longitudinal division into the islands, the coast proper and the immediate hinterland.

Adriatic Sea stretches from the northwest to the southeast between the Balkan and Apenine peninsulas for 783 km, its average width being 170 km. Its average depth is 252 m; its northwestern part is shallow (maximum 23 m in the Bay of Trieste), while it is much deeper in the south (1200 m in the South Adriatic basin). The prevailing winds are the cold bura, the humid jugo and the refreshing maestral.

The Croatian Adriatic coast is one of the most indented in the world: it has 1185 islands and islets with a total coastline of 4,058 km, the total length of the mainland coast being 1777 km. The largest island are Krk and Cres; other large islands include Brac, Hvar, Pag and Korcula. The largest peninsulas are Istria and Peljesac, and the largest bay is Kvarner Bay.

2.3 Relief

A considerable part of Croatia lies at an altitude of over 500 m, but there are no mountains higher than 2000 m. Lowlands prevail in eastern and northwestern Croatia, while the highest mountains in the mountainous part are found in the area which separates the continental mainland from the Coast (Risnjak 1528 m, Velika Kapela 1533 m, Pjesivica 1657 m) or close to the sea (Ucka 1396 m, Velebit 1758 m). The highest mountains in Dalmatia are Biokovo (1762 m) close to the sea and Dinara (1831 m) in the hinterland.

2.4 Rivers And Lakes

Croatia's rivers belong to the Adriatic and the Black Sea basin. The rivers in the interior are large and calmer (Sava, Drava, Danube). The coastal rivers are shorter and have a higher gradient. The longest coastal rivers are the Mirna and the Rasa in Istria and the Zrmanja, the Krka and the Cetina in Dalmatia. Karst streams running partly underground prevail in Lika.

Croatia has no large lakes (the largest, Vrana, near Biograd has an area of 30 sq. km). The most attractive are the Plitvice Lakes (a chain of 16 lakes with the river Korana as the effluent), the Red and Blue Lakes near Imotski (unique karst phenomena), freshwater lake Vrana, a cryptodepression on the island of Cres and lake Prokljan (along the Krka river near Sibenik). The best know man–made lakes are Lokve and Bajer in Gorski Kotar and Peruca along the river Cetina in Dalmatia.

2.5 Culture And Religion

Belonging to the Middle–European and Mediterranean cultural and civilisation circle and tradition. Extremely rich and valuable cultural and historical heritage is pointing to a millenium old presence of Croatia in the area.

The specific urban culture of coastal and island areas is easily seen in towns such as: Porec, Rovinj, Pula, Zadar, Sibenik, Hvar, Korcula and Ston, with Split (Diocletian's Palace) and Dubrovnik representing a part of the world cultural heritage under UNESCO protection.

Croats are overwhelmingly Roman Catholic, while virtually all Serbs are Eastern Orthodox. In addition to various doctrinal differences, Orthodox Christians venerate icons, let priests marry, and couldn't care less about the Pope.
3 THE OPPORTUNITIES FOR DEVELOPMENT AT THE ADRIATIC COAST

In addition to its geographic location and natural and geographical features the Adriatic coast offers many opportunities for development, owing to its natural resources (coastal area, islands, natural parks, tourism, etc.) and cultural heritage.

Eight national parks (Brijuni, Kornati and Mljet on the coast and the Plitvice Lakes, Krka, Paklenica, Risnjak and Northern Velebit inland) and almost 10% of its territory environmentally protected, a rich cultural heritage, developed tourist infrastructure, hospitable people and accessibility are major, but not the only, aces of tourism in Croatia.

The authentic mediterranean atmosphere, long gone in other places, a thousand islands – each a world in itself, towns rich in historical and cultural heritage are without equal. Of the many medieval towns with cultural and historical monuments, the ones under UNESCO protection are: the Diocletian Palace in Split, the old nucleus of Trogir, the Euphrasius Basilica in Porec, the cathedral in Sibenik and the city of Dubrovnik.

The spirit and culture of the Croatian people is evident not only in their everyday life or in the streets, but also in museum collections, exhibitions, concerts of classical music and theatre. In the same measure they can be found in the folk customs that come to life during festivals or in town museums where life has been going on in the same stone-paved streets, same churches, same squares for hundreds of years.

Few, if any – even if they have only seen it once – have forgotten the town–monuments such as Dubrovnik, Split, Trogir, Sibenik, Porec, Zadar, Pula and many others.

Some of the more attractive opportunities for development are cycling, horseback riding, nautics, climbing, diving, sport fishing, rafting, speleology, naturism, white–water kayaking, adventure racing, canoeing, flying, etc.

3.1 Cycling

Enthusiasts of two–wheel travel may move at a slower speed than their motorised counterparts, but their experience of the environment involves all senses – the fragrances of meadows and the freshness of waterfalls, singing of birds, and the wonderful taste of spring water. Village roads, forest tracks, paths through meadows and vineyards take them to places not to be found on the maps of the usual tourist sightseeing tours. Sociable encounters with the local population, colourful ethnography, home-cooked food and delectable wines all add spice to this gently paced adventure. In national parks and nature parks circular cycling routes are marked. If you happen to find yourself at the Plitvice lakes you will be able to enjoy some of the most beautiful cycling routes to be found anywhere in Europe.

All areas are open to cycling tours. They do not require too much effort, while at the same time bringing you into direct contact with an incredible diversity of landscapes – the mountains and valleys of sunny Istria, trails through the forests of Gorski kotar.

Your bicycle can also take you to the islands which, come the hot days of summer, may not be quite so green, but the blue of the surrounding sea more than compensates for it. The shipping lines between the islands run on a regular daily basis, and the cost of transporting your bicycle is minimal. The combination of a cruise with bicycle tours of the area is growing in popularity. Having embarked on a cycling adventure across the islands your itinerary must include the national parks of Mljet and the Brijuni Archipelago, or indeed the larger islands – Krk, Cres, Rab, Pag, Ugljan, Pašman, Dugi otok, Brač, Hvar, Vis and Korčula.

3.2 Horseback Riding

In Istria we have the Istrijanac – a locally bred, high spirited thoroughbred horse. There are several equestrian centres in this region, and wonderful areas for an adventure on horseback. With the Alkars of Sinj, in the valley of the River Cetina, horse riding became a knightly occupation as long ago as the beginning of the 18th century. Riding through the valley you will discover the natural, cultural, historical features and specific characteristics of this picturesque area. And while there, do not fail to sample the local specialties – including grape brandy, cheese, bread baked under a peka (a baking lid), as well as lamb or kid meat prepared in the same way as bread.
Those of a more adventurous bent can opt for a ride down the rugged tracks of Mount Velebit, and be rewarded by a staggering range of natural phenomena and magnificent vistas of the sea and the islands.

3.3 Nautics

Nautical tourism certainly represents one of the most attractive forms of the overall tourism offer of the Republic of Croatia. We can rightfully say that Croatia, the land of a thousand islands and a beautiful, indented coastline is a "haven for boaters".

Croatia is home to 50 marinas, all gathered together under the Croatian Marinas Group, with a capacity of over 13,200 sea berths and 4,500 dry berths. The marinas are constantly working to upgrade and enrich their services, and to adapt to the modern needs and wants of nautical guests. Many nautical tourism ports have further enriched their services: from top quality traditional cuisine, water and electricity, health care clinics, charter company services, to the use of apartments, and electronic monitoring and security services to protect the property and equipment of guests. Adriatic Croatian International Club, better known among boaters as the ACI Club, is the leading nautical tourism company in Croatia, representing a unique chain of 21 marinas stretching from Dubrovnik in the south to Umag in the northern Adriatic Sea. In its 20 years of operation, the ACI Marinas have aimed to develop and popularize sailing, and have achieved a recognizable level of high quality service.

Visitors to the modernly equipped Croatian marinas can receive the usual reception service in addition to technical services. Restaurants, snack–bars, shops, laundromats and other facilities have also been added to make the guests' stay more pleasant.

Our efforts to harmonize the development of nautical tourism in Croatia with the need for environmental protection have been rewarded with the numerous Blue Flags granted to our marinas. This prestigious international recognition awarded by the European Foundation for Environmental Education symbolizes a preserved, safe and pleasant environment, which is accompanied by exceptional tourism promotion.

There are over 140 charter companies, with a capacity of 2,700 comfortably and modernly equipped vessels, operating in Croatia today. These companies have been united under the Croatian Charter Vessels Group. The world's largest vessel rental companies also offer their vessels on the Adriatic Sea, through domestic charter companies.

3.4 Climbing

The mountains of the Republic of Croatia mainly belong to the Dinaric range, and to a lesser degree are an eastern extension of the Alps and a remains of the old Oriental landmass. In the north west part of the Republic both systems meet, in a so-called transitional zone. Although the mountains are not very high, there being no peak above 2000 m, they are very interesting. The Dinaric range, most of which is in Croatia, is known in the world as a classic region of deep karst. Its essential feature, of possessing an equal richness of both surface and subterranean relief, give Croatian climbing a special character. Climbing in the karst has a lot in common with being in the high mountains. The sharp karst shapes, the domination of bare karst, the lack of water, poverty of vegetation, harsh climate and sparse population require the same efforts from the climber as many much higher mountains. But there are also differences among the Dinaric mountains. Those in the north are lower and milder (in Gorski kotar, for example) and those in the south are higher and more deserted (the Dalmatian mountains) (Table 1).

<table>
<thead>
<tr>
<th>Coastal Belt and Mountain Croatia</th>
<th>Islands</th>
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<tbody>
<tr>
<td>Dinara – 1,831 m</td>
<td>Brac – 778 m (Vidova gora)</td>
</tr>
<tr>
<td>Kamesnica – 1,809 m</td>
<td>Cres – 650 m (Gorica)</td>
</tr>
<tr>
<td>Biokovo – 1762 m (Sv Jure)</td>
<td>Hvar – 626 m (Sv. Nikola)</td>
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<tr>
<td>Velebit – 1,758 m (Vaganski vrh/peak)</td>
<td>Losinj – 588 m (Osorscica)</td>
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<td>Licka Pljesevica – 1,657 m (Ozeblin)</td>
<td>Vis – 587 m (Hum)</td>
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<td>Velika Kapela – 1,534 (Bjelolasica)</td>
<td>Krk – 569 m (Obzova)</td>
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<tr>
<td>Risanj in Gorski kotar 1,528 m</td>
<td>Korcula – 568 m (Klupca)</td>
</tr>
<tr>
<td>Svilaja, Dalmatia – 1,508 m</td>
<td>Mljet – 514 m (Velji Grad)</td>
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<tr>
<td>Snjeznik, Gorski kotar – 1505 m</td>
<td>Lastovo – 417 m (Hum)</td>
</tr>
<tr>
<td>Ucka – 1,401 m (Vojak)</td>
<td>Rab – 403 m (Kamenjak)</td>
</tr>
</tbody>
</table>

Table 1. The highest mountains at the Adriatic coast in Croatia
3.5 Diving

Since times immemorial the Adriatic Sea has been the shortest maritime route leading from the Central Mediterranean and the centres of the great civilizations of Antiquity towards northern lands and the Central European mainland. Having been such a vital route down the ages, both on land and beneath its blue waters can be found indelible traces from all periods of the development of European and world civilizations.

Treasury of Croatian and European wealth The northern part of the Adriatic Sea (notably Istria and Kvarner) has been more easily accessible to tourists for a great many years – a factor which has made the tourist season longer, while Dalmatia – due to its poor road links – has a shorter but more intensive season, in July and August. Inadequate road links have had an influence on other aspects involved in the development of tourism, results of which are that a large part of the Dalmatian coast is still sparsely inhabited and underdeveloped, and therefore preserved in an untouched natural condition. And those are the very characteristics of Croatia’s untamed shores, washed by the clean waters of a sea, which constitute the comparative advantages sought by true lovers of natural seaboard and submarine beauty remaining in the few existing coastal areas of the world.

Although the littoral region and submarine areas already offer a range of attractive locations for both rest and diving, those familiar with the Croatian coastline are aware of the fact that the natural and cultural wealth of this part of the Adriatic still to be discovered are yet to show the true value of the Adriatic. We therefore invite you to not to ignore the opportunity of being an active partner in that journey of discovery, shaping and preservation of this European treasure trove.

3.6 Sport fishing

Before embarking on a fishing expedition it is necessary to obtain a license. To obtain a license it is necessary to present proof of identity (passport, driver's license etc.) Licenses are issued by tourist agencies and offices in all towns along the coast.

Licenses are issued for recreational angling, underwater spear–gun fishing, hand trolling, long lining and tuna fishing. The whole Adriatic Sea is open for fishing and special limitations are applied in aquatoria of national parks (Kornati, Brijuni, Krka, Mljet), and for some smaller locations.

3.7 Rafting

Rafting as a mode of transport up and down waterways also has a long tradition in Croatia. However, white–water rafting as a modern form of adventure began only in the late 1980s, and served to attract notice to the amazing beauty of Croatian rivers, which up until that time was known only to relatively few kayaking adventurers and fishermen. The founders of the Riverfree Club, pioneers of commercial trips through the rivers and experts on the waterways of Croatia, did not anticipate the subsequent level of interest and the resulting popularity of rafting on rivers which do not abound with savage rapids and high waves. Nevertheless, thousands of people have since enjoyed their close encounters with the unforgettable magic of rivers, of green river banks, sheer canyons and crystal–clear depths. Rivers in the continental parts of the country are flanked by dense forests and by mountains, while those closer to the sea boast broad green banks and deep and shady mysterious canyons. What they all have in common is greenish clear waters that one can see through right down to the river bed. The classification of difficulty of Croatia’s white waters is, on average, category III; only on the Rivers Dobra and Una can you count on category IV waters.

3.8 Speleology

The karstic area of Croatia abounds in caves and holes of which there are more than 850 and they are to be found on the mainland, on islands, by rivers, on the sea bed and in the mountains. For over half of them all we know is that they exist, but everything else is unknown and they are yet to be thoroughly investigated. Some of the more attractive caves, for instance those in Istria, Gorski kotar, in the regions of Liša, Dalmatia and Zagora – are open to visitors with no experience in speleology. Their inventory is rich and varied, comprising dripstones (stalagmites and stalactites), curtains and all the other fascinating features found in caves.

Many underground spaces are protected as geomorphological monuments, such as Modra špilja [Blue Cave] on the island of Bišćevo; Cerovečke špilje [Cerovac Caves] near Gračac; Manitoba peć [Furious Furnace] and many others. Also protected are all denizens of the underground world, relics and endemic species – bugs, shells, sponges, olm (or proteus), a cave leech discovered in Luka's Hole on Velebit. The oldest finds of Homo erectus (dating from about one
million years ago) originate from Šandalja near Pula. Among a number of interesting features on the island of Brač are Zmajeva špilja and the cave altars close to the Blaca desert.

3.9 Naturism

Croatia, in the opinion of many, Europe's most beautiful garden has been an attractive naturist destination for five decades. Naturism from its first beginnings in 1936 on the island of Rab, naturally with the permission of the town authorities, was begun by respectable guests Edward VIII and his beloved Wallis Simpson. From the construction of the first facilities until today the continued development and variety offered to naturists has ensured that regular guests are joined by more and more new guests every year.

That naturism, in Croatia, is constantly adapting to suit the needs and life philosophies of its guests is made evident by the rich variety of sports and recreational activities offered. Respecting the naturist orientation towards the protection nature, which is one of the major commitments of tourism in Croatia, Croatian naturist centres are praised for their protection of the environment and some naturist destinations such as "Valalta" Rovinj, "Koversada" Vrsar, "Ulika" Cervar Porat are adorned with the prestigious international symbol of a protected environment – the "Blue Flag".

3.10 White–Water Kayaking

Clear and warm, green waters of Croatian rivers spring in the mountain foothills, run though canyons, and spill over limestone barriers in the sparkling curtains of waterfalls. It is their beauty that takes our breath away, not the danger sometimes inherent in them. However, if you are not an expert, you can always avoid high waterfalls and dangerous rapids, opting instead for the shore. High water levels in springtime offer a true and exhilarating white water experience, while summer tours are ideal for beginners. All major tourist centres organize kayaking excursions down the Rivers Dobra, Mrežnica, Una, Kupa, Korana, Cetina, Krupa, Gacka, Zrmanja and Trebižat.

And while you glide silently down the river the landscape around you is ever changing – whether enclosed by a forest or opened up by a lake nestling in the embrace of a meadow. Watermills, wooden bridges, churches and monasteries all bear witness to the long standing tradition of a life with the river. The banks of the deepest and most thrilling canyons are reached only by the sun and by rarely negotiable tracks. Rowing along in your kayak you may well discover a site that even many local people have never seen. Although kayaking has a long tradition in Croatia and our rivers are amazing, it is not a mass sport.

3.11 Adventure Racing

There are about ten adventure racing events of varying duration and degrees of difficulty organized in Croatia on an annual basis, ranging from the fairly easy and short events to exceptionally demanding races that last several days. Athletes and recreationalists alike willing to engage in extreme efforts are discovering not only the wilderness of mountain and forested areas, of rivers, islands and the sea but also their beauty. The diversity and wealth of landscapes and terrains provide race organizers with an inexhaustible selection of possibilities in planning adventure routes.

The beauty and, yes, traps, of the preserved natural environment of Croatia offers countless challenges on land and beneath it, under its waters and by them. This is why adventure racing in Croatia soon gained in popularity among local and foreign crews. Events organized include rafting, kayaking and mountain biking, orienteering, paragliding and climbing competitions, marathon races, triathlon contests and other outdoor sports events. They all contribute to the spread of knowledge and experience regarding activities in nature, the development of skills among athletes and recreationalists but also of the professional guides who often participate either as organizers or competitors.

3.12 Canoeing

The most beautiful Croatian rivers run through the karstic areas, which means that they abound in limestone barriers and waterfalls, which in turn, due to the abundance of rain and sun, are bordered by lush vegetation. During the dry season the waterfalls retain sufficient water among the limestone barriers to ensure pleasant sailing by canoe, kayak, or indeed for diving. Rivers lose neither their clarity nor their green hue except during the heavy spring and autumn rains. One is hard pressed to find easier to navigate and yet at the same time more interesting rivers to be negotiated by canoe, complemented by magical sites in which to pitch your tent or to do some recreational fishing.

Waterfalls are often inclined to disrupt a journey by canoe, although where detours are necessary they are not particularly onerous or time consuming and provide a rare opportunity to enjoy the wealth of the falls. In summer time one may venture beneath them to discover and investigate impressive caves. The rivers, and their wondrous canyons,
are never far from the tourist oriented shores, although their relief and biological characteristics differ greatly from those found along the coastline. Taking advantage of this vicinity, coastal tourist destinations frequently organize one-day excursions to the rivers, and since the guides are experienced rowers one does not need the strength needed for rowing, or experience. Indeed, such a river excursion is suitable for the whole family.

In Croatia the tradition of canoeing is centuries old. Remains of primitive canoes carved out of tree trunks have been found in the Plitvice lakes, and those traditional vessels, trupica, are still frequently used for fishing and transport in the River Neretva’s fertile delta.

3.13 Flying

Parachuting, paragliding or balloon flights over an incredibly diverse landscape in good weather conditions continue to attract an ever increasing number of flying enthusiasts to Croatia.

A combination of mountains by the sea and the sun creates first class flying conditions, with the islands being by no means any less attractive. Those who come to enjoy a flying experience are not restricted to a single location. The mountains that run down the length of the coast are simply tailor-made for cross-country flights, for spending hours in the air, with vistas of the coast, the sea and the islands – an unadulterated adventure voyage under the power of the wind! Areas for the best flying experiences: Učka and Ćićarija, in Istria; Gorski kotar; Velebit; Mosor and the mountain of Dalmatinska zagora, up to Dinara. Further south there are Biokovo; Rilić; the Pelješac peninsula; the islands of Krk, Brač and Hvar (URL 3).

4. POSSIBILITIES OF GIS

The strategy for GIS should be based on the principle that it is of utmost importance to redress regional imbalances (coast/hinterland/islands), and to strengthen and upgrade the capacity to manage regional resources through an advanced exercise of territorial policy at the local level, in line with best practices already in use in member states of the European Union (EU).

In order to carry out various analyses it is mostly not enough any more to have classical presentation on a paper map, but we have to create GIS. Fundamental questions that can be researched by means of GIS and answered are: Where is it? – position, What is it like – condition, What has been changed – trend, What is the best (the shortest, the quickest) way? – way, According to what...? – pattern, and What if...? – modelling.

The definition of GIS depends on physical geographical (geomorphology, hidrology, etc.) and ecological factors, human activities and uses of land (type and intensity of development) as well as on institutional factors (administrative and legal framework regulating development and use of space). Goals of GIS can be of three types: global (goals which are general and do not results from area-specific particularities), area-specific and sectoral. Goals need to be as clear as possible to provide guidance.

One of the most important procedures in using and applying GIS and digital cartography is the visualisation of spatial data (Figure 2). GIS enables an overview of changeable spatial data. Maps make an addition insight into the essential issues possible and supplement the research of data tables. Similar to statistical graphs that can be used for making sense of large table data quantities, digital cartography helps in interpreting large, spatially determined data sets. GIS can be useful for education, climate mapping, spatial analysis, demography, environmental mapping, health, local government, regional mapping, tourism or world mapping. (Frangeš at al.).

![Figure 2. Possibilities of GIS](URL 3)
Today, GIS supports more and more tools of graphic programs and they have the tools for manipulating with objects, text, retrieved objects, for special effects, export filters, etc. Digital tools are being developed continuously, and hence, it is expected that more convincing visualisation tools for the presentation design will appear.

All of these tools serve to transform raw data into meaningful information. Further analytical work can extract knowledge from the available data and information. Finally, mostly objective information and knowledge on the study area should be presented in an understandable form to the planning team, stakeholder groups, and all other interested parties.

Presentation of spatial, cartographic information has become very popular on IT. GIS representations aim to represent, in a manner that is consistent, some particular phenomenon (Dodge, Kitchin 2001). The outgoing competition in tourism economy demands new and innovative strategies for the presentation of the tourism regions (Luley 2004).

Which map to use within GIS application? A kind of map who will give us information we need (Kraak, Ormeling 1996). If we need some global or specific tourist information about Croatia, the following GIS application and map of Croatian cities and entire Adriatic coast is maybe the right one.

### 5. GIS OF THE CROATIAN CITIES AT THE ADRIATIC COAST

One of the important weaknesses of GIS profession in Croatia is an inability, in a time of limited public resources, to formulate realistic and implementable spatial development strategies and policies. GIS can easily end up as unproductive and even damaging efforts by diverting financial resources needed for other priorities, or by raising expectations that cannot be satisfied. Such failures run the risk of prejudicing people against the idea of sustainable development, participation, and multidisciplinary approaches.

The produced GIS gives the data about the position of each motorway and other roads, settlements, car ferries, airports, petrol stations, marinas (Figure 3), national parks (Figure 4), parks of nature, etc. The visualisation of the produced GIS is achieved by producing an adequate thematic map.

GIS of the Croatian cities at the Adriatic coast is made by means of the program OCAD. The advantage of OCAD is that any object drawn in this program can be connected with the database. The database can be used in producing the maps intended for Internet users and has the functions connected with finding the objects and linking the data. OCAD has its own driver for dBASE tables. It is also possible to make such tables or change their structure.

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<tr>
<th>Object Name</th>
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<td>Zadar</td>
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**Figure 3. Visualisation of marinas in GIS of the Croatian cities at the Adriatic coast**
6. CONCLUSION

Cartography is closely connected with cultural and socio–political trends. Modern technology led cartography and GIS into a completely new areas. Computer application together with other electrical devices brought a line of positive solutions which improved process of map making.

Cartography and GIS are today under a great influence of Internet technology. You can find different types of maps on Internet. Maps are divided into two main groups: static and dynamic.

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URL 2: croatia.com Web Site - a Web Site about Croatia
http://www.croatia.com

URL 3: Croatian National Tourist Board
http://www.croatia.hr/home/Default.aspx

Curriculum Vitae

Stanislav Franges was born in Zagreb in 1959. In 1984 he graduated at the Faculty of Geodesy, University of Zagreb. In 1993 he obtained M.Sc. and in 1998 Ph.D. in geodesy at the Faculty of Geodesy, University of Zagreb. He holds
Robert Zupan was born in Zagreb in 1973. He attended primary and high school in Sibenik. In 1998, he graduated from the Faculty of Geodesy, University of Zagreb. In 1996 he received Dean’s reward and in 1998 Rektor’s reward for student work. At the postgraduate studies he inscribed the course in Photogrametry and Cartography in 1999. In the year 2000, he was elected an assistant junior. From 1999 he has worked at the Institute for Cartography at the Faculty of Geodesy.

His main interests include military cartography and military topographic maps. Assistant work in the following subjects: Thematic Cartography, Digital Cartography, Cartographic Generalization, Cartographic Transformations, Thematic Cartography and seminars Cartography and GIS, and Practical Cartography. He participated at a few international conferences. Got his master degree in December 2003.

He has a lot of experience with vectorization (hand, semiautomatic), but mostly with automatic vectorization and scanning. His special attention is oriented toward making maps (internet maps, topographic, thematic, town plans, tourist maps...). He is also working with MicroStation (IRAS/B, IRAS/C, Provec, ParcelVec,... almost all Intergraph software), OCAD, AutoCad, CorelDraw...

He works with undergraduate students eligible for their degree finals every day, and helps them with their graduate project.

He is a member of MicroStation user community, member of Croatian Cartographic Society and Croatian Geodetic Society.