Waterfront Architecture

Impressions

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Poznań 2016

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Typesetting:
Kaja Ast

Astudio

ISBN 978-83-939283-6-1

Poznań 2016

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INTRODUCTION

The art of space shaping is a combination of the paradigms: *arche*[1] – the idea and *tecture*[2] – buildings, as well as the conditions: climatic, pphysiographic, and antropogenic, which means environmental ones. According to the author's concept, architecture and waterside town-planning are formed by natural environment (seas, dunes, rivers, and rubble), spatial buildings (cities, harbours, and docks), as well as ships, sailing boats, yachts, beacons, and navigation buoys. These notions constitute the subject of the present book.

Arche

Tales of Milet regarded water as arche. He proved that the Earth rests upon water. The concept, according to which water is a life factor, was particularly widespread in aquatic civilisations – of Babylon, Egypt, and Greece. However, water – arche – does not stand for any concrete water. It is water-abstract revealed by a temporary water form which has the source of motion, and maybe even life inside.

Searching for these sources in water may of course be connected with the essential role of water in everybody's lives in each era and each geographical or cultural area, as well as with addiction of the particular civilisations to water. Mesopotamia, located between Eufrat and Tiger, formed its civilisation in the basin of these rivers. Egypt, in turn, owed its existence to the life-giving overflows of Nile, without which it would have turned into a desert. Hellada and Fenice gained their dominance owing to naval trade. Civilisations developed along rivers, across seas and oceans, toward banks on which settlements and estates were founded.

William H. McNeil, in his panorama of the history of human societies, compares Eurasian nomads with pirates behaving in the same way in the naval outskirts of civilisation; the first ones are called steep pirates, while the second ones – „cossacks of the sea". Just before them A.J.Toynbee, in his „Study on history", pointed to the fact that the seemingly illogical and accidental settling of Indoeuropeans in different places of Eurasia ceases to be this way when you perceive the process as occupying the „shores" around the „sea". The „sea" from which they reached the „shores" was their great-motherland in the steep interior of Eurasia [65].

The main arteries of transport and exchange of goods within great land organisms were rivers. They supplied farmers and shepherds, towns and the developing industry with water, and constituted the source of energy – both for mill wheels and for large hydroelectric power stations. Along with the progressing environmen-

[1] *Arche* (gr.) – beginning, cause, origin, reason.
[2] *Tecture* (lat) – cover.

tal pollution and degradation of natural river ecosystems, river beds do not hold huge flood waves. Rivers, which have long facilitated transport, become a subject of disputes in the period of water deficit and environmental pollutin. Most rivers have changed their course and rubble transport under human interference. In densely populated and industrial areas both water course and bed course are controlled by humans. Societies around the world, not only in the desert, have faced the problem of the deficit of fresh and clean water. Irrenovable reservoires of ground waters are often exploited, which leads to drying up of surface flows.

It is indispensable to come back to the balance of nature, ensuring a fairly natural, balanced energy and matter circulation, including water circulation, turning back to rivers which, carrying water from mountains to seas, bond land areas and, simultaneously, are stable landscapeelements in landscape evolution and the history of human culture.

That is what Z.Gloger wrote on settlement in the 19th century: the right bank of rivers flowing from the south to the north is washed more intensively than the left one[3]. Lack of familiarity with that fact led to wrong settlement localisation. „ Planes of the left bank of Vistula have numerous colonies of so-called Dutchmen, that are German settlers who arrived in Poland in the period of the Sas rules. On the right bank there are said to be few colonies. Above Czerwińsk we photographed a typical Mazury colony, called Praga. The owner was an oppressed man because of big losses that Vistula had inflicted on him by constantly washing his fields. (...) Within 10 years 13 units have been gone, so he currently pays taxes for 36 units, while owning only 23. If that damage to the land done by Vistula continues in the same relation (which must follow because of lack of any river-bed regulation, in a few years the house and garden of the unlucky colonist will be subject to annihilation" [30]

CLIMATE[4]

When towns are located by big water reservoirs whose surface is much bigger than the town area, one can discuss influence of these reservoirs upon the town climate. The influence is so strong in the case of a town, thatit constitutes one of the main climatic elements. In our latitude the sea gives off the heat accumulated in the summer and does not allow dropping of the average monthly temperature of December below 0°. Towns located deep in the land have their average temperaturebelow zero; the deeper into the continent, the lower the temperature is. It is inversely in May – the sea, cooled after winter, takes heat from the air and lowers its temperature.

[3] This is due to the Coriolis force caused by the rotation of the earth.
[4] Based on the S. Różański, *Budowa miasta i jego klmat* [64].

Considerable changes in atmospheric pressure as well as high air humidity are biologically harmful.

The sea causes more intensive movement of the air (winds, breezes), weaker temperature fluctuations, late spring, lower heat, longer autumn, and milder winter; it causes the air to be much cleaner and contain more iodine.

Lakes influence town climate to a smaller degree, but their size, depth, shore configuration and character (sand, marsh, meadow, wood) are decisive here. The largest Polish lakes have the surface of about 75 to 106 square kms, and an average one has the surface of about 20-30 square kms. Big lakes undoubtedly moderate extreme temperatures (until they get frozen); the range of their influence is biggerif there is no dense forest or park on the shore. The lakes increase the speed of wind and cause riising of breeze due to the difference of temperatures on the surface of the lake and land, which may amount even to a few or more degrees. The temperature arrangement changes during the day, of course (especially with strong insolation) and during the night; consequently, the direction of breeze changes (always towards the environment of higher temperature). At the end of the breeze range there rise vertical currents which cause cooling and self-cleaning of the air.

The near-the-ground layer by a big river is strongly warmed by the water. The phenomenon occurs most forcibly in late summer, but mainly in autumn and winter, which reduces the danger of ground frosts nearby the river. The warming influence of a river does not reach very far; in the distance of 200m. away from the bank high negative vertical gradients, proving occurrence of thermal inversion in the area, were asserted. In periods of drought and very weak winds, especially in autumn, mists may rise over the river. On bright summer days fairly high values of relative humidity were stated in marshy areas.

Towns located by small lakes or those which have ponds or small rivers in their areas are subject to the influence of open waters only to a small extent. A lake, especially a big and deep one, stores heat and moderates extreme day temperatures due to heat exchange between the water and the air. A large mass of deep water has a big heat capacity. A shallow lake or pond gets warm quickly, because of sunrays, up to the bottom; however, it also gives off all the heat quickly, but half of that heat is absorbed by evaporation. Thus, the biggest changes of temperature in water surface occur during the day, while the sun is operating. The western coast is better illuminated because of rays reflected mainly in the morning, and eastern ones in the afternoon. Lakes situated in deep concavities lose the light of the rising or setting Sun (the moments in which there are most of reflected rays). Lakes have a cooling action in spring, and warming – in autumn. After freezing, and especially after being covered by a layer of snow, thermal differences of land and a lake fade away. It emerges in a stronger way during the night, when colder air from the land (difference of a few Celsius degrees) heads for the lake. Weaker, but very significant, motion occurs in the opposite direction during the day. These motions are particularly important in summer, in a heated old town, full of aerosol. Even weak turbulence, and especially vertical currents, play an essential role in cleaning and cool-

ing of the air. Therefore, localisation of a town centre by a lake or river, or making artificial water basins, is so important (increased turbulence, humidity, vertical currents, self-cleaning) [64]

TECTURE

The research field comprises town-planning notions on water-land contact point and, simultaneously, architectural objects. Hence, one can write on the structure of towns located on the shore and on their buildings and floating objects: ships and sailing vessels. Numerous factors are decisive as to the waterside character of towns; even a long distance from the shore often makes us regard them as waterside or seaside ones. It is so with Coimbra, for instance.

Shores create gravitation zones within a few dozen kilometres along the water-land contact point. In the same manner, most towns in Poland would have to be regarded as waterside ones. It is an appropriate moment for revealing and exposing that particular character in spatial development of towns and rivers now.

Towns and waterside regions can be divided into traditional, modernist, and post-industrial ones (table 1).

A change in leading developmental factors concerns town-planning structures of towns and whole regions in river basins and on sea- and lakeshores.Quitting exploitation of these areas as industrial ones, reducing the ..... with buildings and tourism, as well as accepting utilisation, according to ecological requirements, may save them from danger.

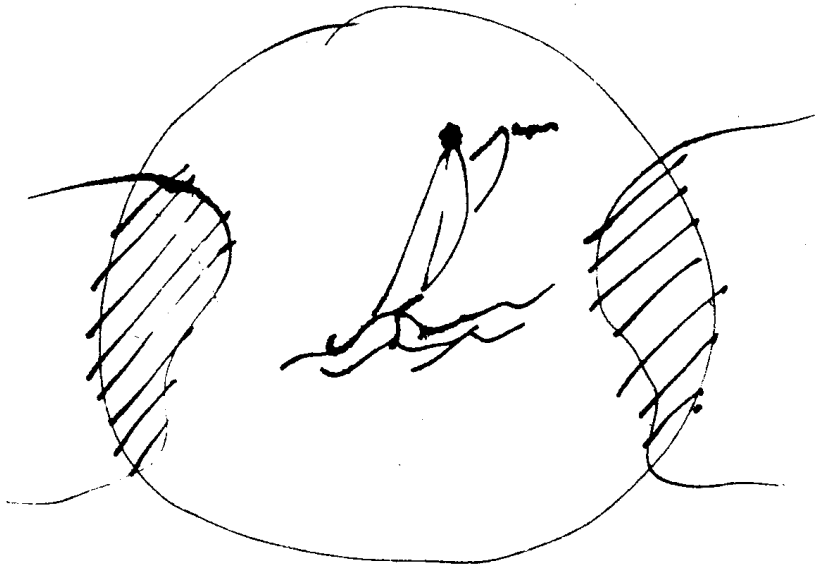


Fig. 1. The range of research on the contact point of land-water-land and objects changing on it according to the content-related arrangements discussed with T.Głowacki (New Zealand)

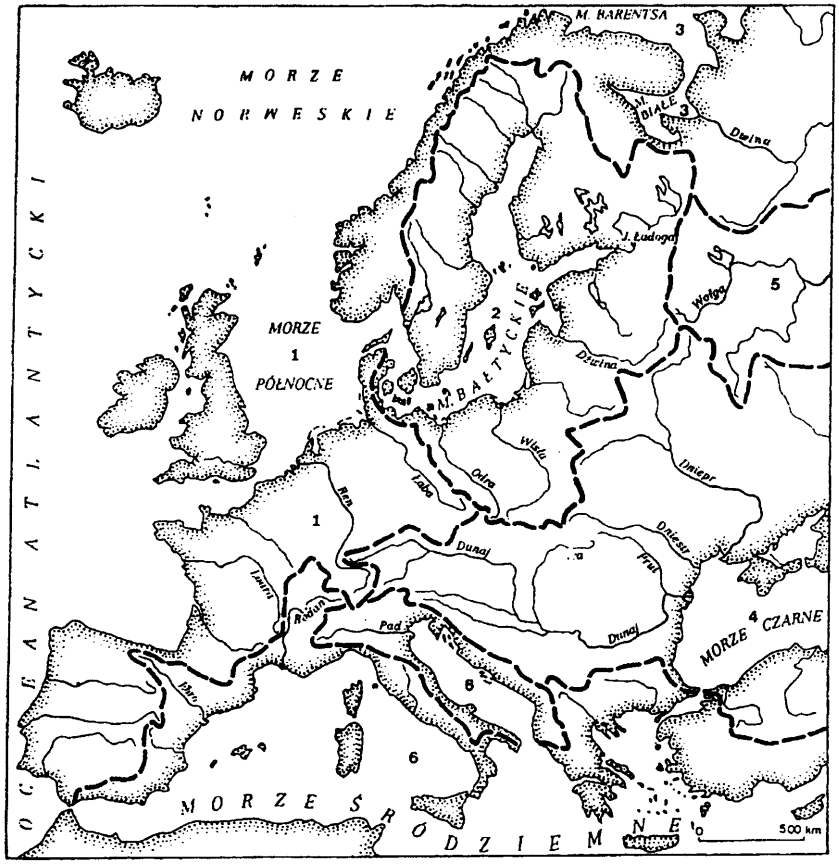


Fig. 2. The European watershed and watersheds of basins burdened by regional settlement arrangements [65]

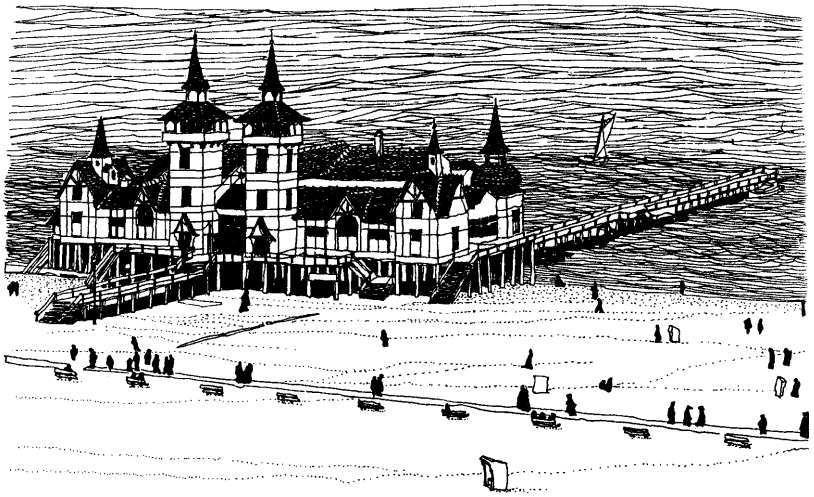


Fig. 3. The unexisting Szczecin pier, along with the boarding house. On poles and piles (R.A., based on the photographs of 1900-1905)

Table 1.

The division of cities and regions due to factors of development

The division of cities and regions	Factors of development	Examples
Traditional	Fishing Accommodation Communication Services Representation Tourism	Rab, Hel Albufeira, Swinoujscie Venice, Funchal (city centre) Lisbon (Baixa) Venice (St. Mark's Square) Sopot
Modernistic	Communication Representation Services Production Industry Accommodation	Gdynia, Lisbon (harbor zone) Coimbra (Moderna)
Postindustrial	Services Hotels Banks Business centers Conference centers	Rotterdam (reconstruction of the city and harbor), Funchal (lido), Docland, Mission Bay, Hudson River, New Jersey – New York, Warsaw – Praga harbor (project)

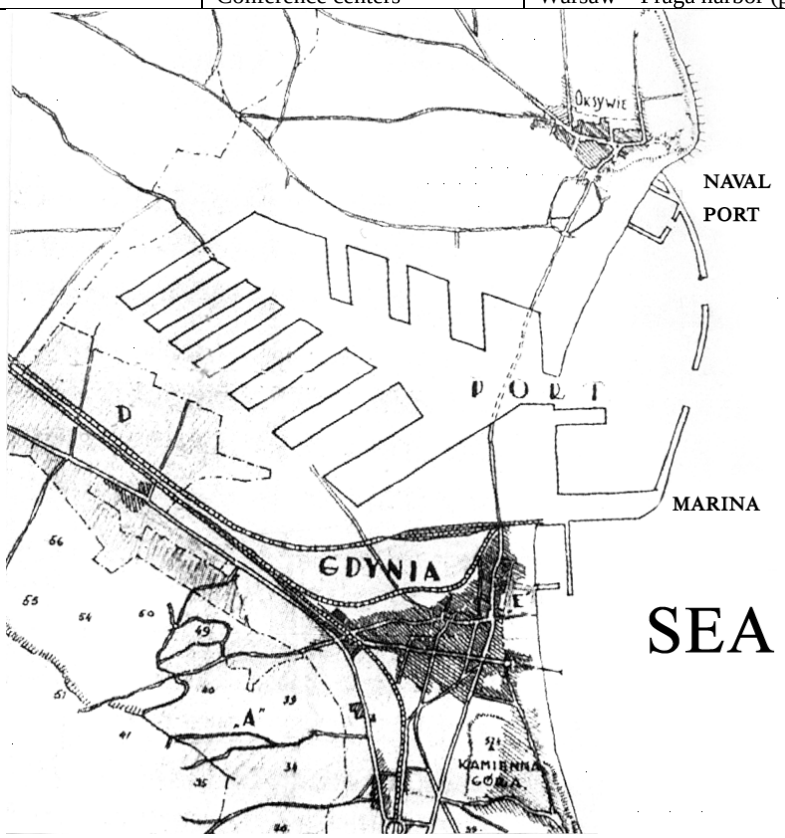


Fig.4. Gdynia – an example of a modern harbour town. There are such functional spheres as transport, housing, work, and recreation [66]

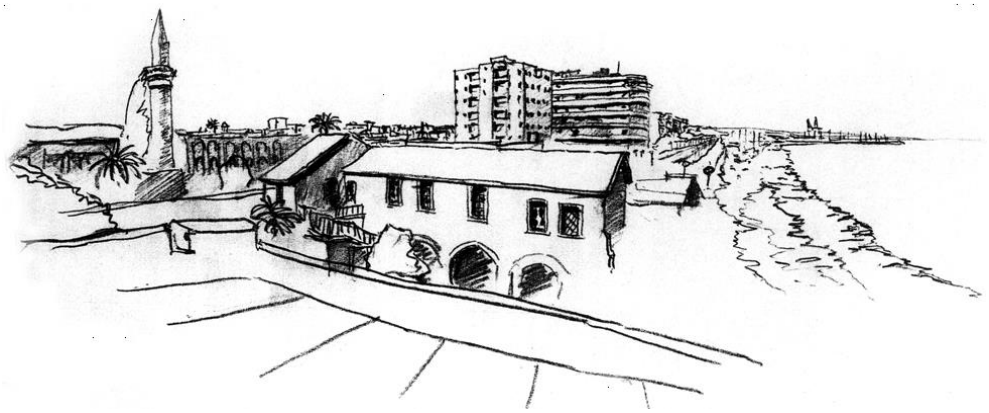


Fig. 5. Larnaca (Cyprus) – the hotel zone along the shore (R.A., 1999)

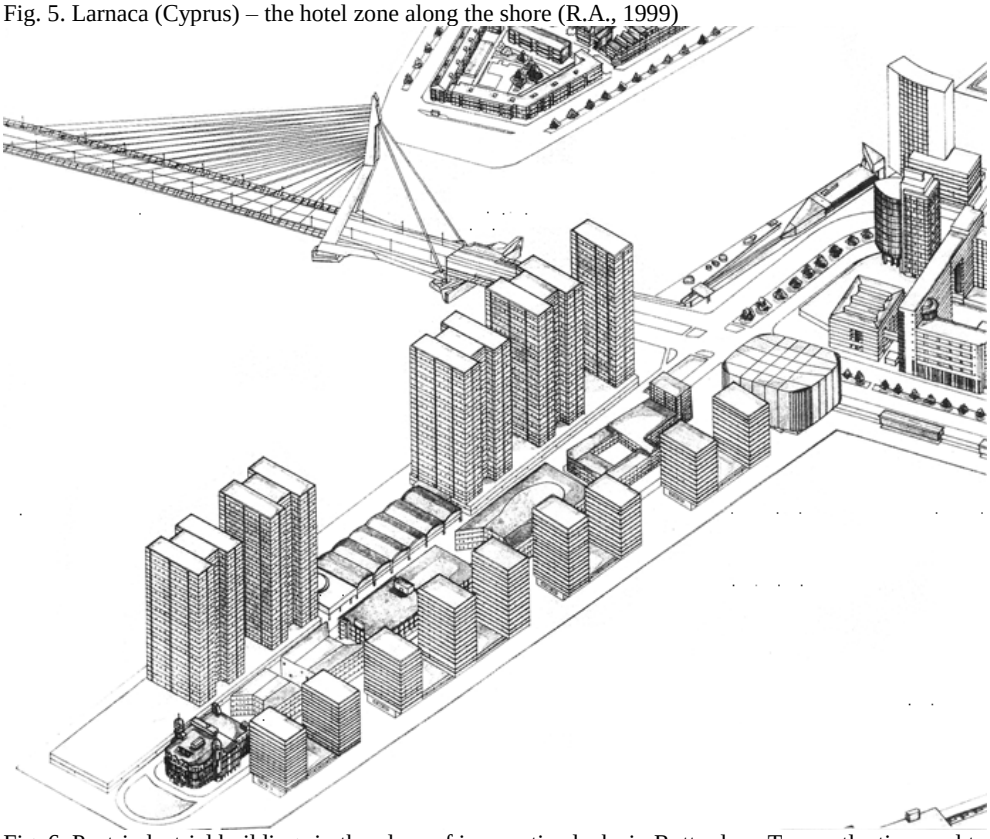


Fig. 6. Post-industrial buildings in the place of inoperativedocks in Rotterdam. Trans-atlantics used to sail off from these wharves in the 19th and early 20th century [67]

1. METHODOLOGICAL ASPECTS

1.1. Elements of town-planning composition in shore belts

Proper recognition of environmental harmony depends on many factors. One of them, extremely useful to an architect as space creator, but also to a cartographer, navigator, or any other observer, is the ability to perceive as a whole. It was noticed that the sight system organises the space perceived and is oriented towards distinguishing certain meaningful wholes in an image. When observing the environment, one can spot various objects on a plane or figures against some background. As a characteristic thing, it was discovered that splitting of an image into a figure and a background is immediate, evident, and takes place almost always.

Organisation of elements of a whole may be noticed owing to separation of relations coming about among particular parts of an image. Compositions have values which cannot be predicted from characteristics of particular elements. Symbiosis or decomposition of forms can be recognised owing to the rules of image organisation, formulated by psychology of the form on the basis of the general theory of perception. That psychological theory emerged at the beginning of the 20th century and the first one to apply it to architecture was J. Żórawski[1].

The rules of shape make it possible to create, perceive, and analyse space, also in the aspect of aesttheic theories. Properties of element composition and form symbiosis can be recognised on the groundwork of the following rules: similarity, good continuation, closing, and proximity. The rules of continuation and closing are often treated as the rule of good form.

Good continuation of image elements is manifested through proper direction of each element, determined by a vector or . Only a detail compatible with that direction will be considered proper, or matching the figure.

In the shore belt the symbiosis of town structure and aquatory..... in terms of the rule of good continuation can be recognised when rising and intertwof shore silhouettes takes place harmoniously. Frequently, a headland finial observed from the sea is finished with a dominant in the form of a tower or lofty buildings which emphasise the special character of the shore. A different situation occurs when incoherent elements appear in a shore silhouette, brutally disturbing horizontality of the image. This often occurs in industrial, harbour, and military zones, as well as in areas marred by wrong architecture.

The rule of closing provides for replenishing lacking parts of composition in the process of perception. For instance, sailing through a long, straight canal is inattractive and monotonous. A winding river or a net of town canals constitute better attractions owing to their closing with dominants of bridges, silhouettes of curving

[1] It was also developed by Arnheim, Lynch, Gibbson.

banks, bends, and branching water routes. When approaching a harbour froma sea, in turn, navigation is conducted onto specific closing of a water route in the form of leading marks, buoys, lighthouses, harbour heads, or sea silhouettes.

According to the rules of similarity, similar elements of an image are grouped in perception process. When recognising shoreline configuration from the sea, the rule is intuitively applied by navigators. Identification of one of the elements with binoculars, e.g. a cluster of trees, enables one to recognise the other, similar forms on the shotre, with no need of second analysis.

The rule of proximity assumes grouping of fragments lying close to one another. It is of basic importance when perceiving the silhouette from the sea, because it enables one to distinguish partial forms from the configuration background in the form of consecutive detailed images.

Both the process of creation and space perception require linking all the rules of shape. On their basis one can analyse correctness of designed town-planning and architectural arrangements. Connecting market interiors , squares, aquatories, streets, boulevards, and canals on that basis ensures symbiosis of the town-planning arrangements with their environment.

Another approach of the notion of shape perception is to treat them as asystem of analysing information. According to that concept, information on image elements is included mainly in such fragments in which a change in continuity of some feature occurs. A silhouette, or figure, is recognised along contours, in corners and bends, and in places where colour and light change rapidly. The difficulty of estimation may be different, depending on the fact wtheher the given shape contains many information points, which should be taken into consideration in the analysis, or only few. It is easiest to spot regular, symmetrical figures as their are characterised by biggest redundancy, which means that certain elements can be predicted on the basis of others. The rules of form assume such element grouping as to provide for highest redundancy.

Synthesising information included along contours, in corners, silhouette bends, and in places where colour and light change rapidly, is of special importance in forming a space image from naval observation of shoreline. Observation of distant objects is by nature a kind of contour perception of few information points. Identification of one of them contributes to proper prediction of consecutive, similar elements (redundancy). Rapid changes of lighting of shore configuration are equally important because one can recognise the depth of shoreline on that circumstance. This is a kind of specific introduction of a third dimension to a flat contour image. Colour plays a basic role in forming one’s idea of land silhouette and its distance from the observer. It stresses the diversity of elements of shore environment, e.g red household roofs, green trees, white walls and facades, yellow beach patches and seaside cliffs. Simultaneously, it favours recognising of the perspective and depth of waterside space.

Fig.1.1. Compositions have properties which cannot be predicted on the basis of particular forms. The buildings of the Merag settlement on the island of Cres are not visible from the sea; they are appear in the foreground after a ship approaches harbour heads. The background of the mountain range remains unchanged both during silhouette and detailed observations (ink+watercolour, R.A., 1989)

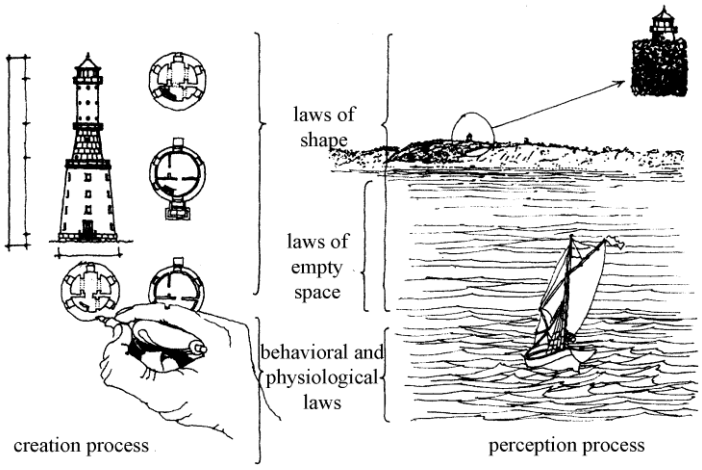


Fig. 1.2. The theory of perception on the water-land contact point – selected factors of activity of the processes of creation and perception as rendered by interdisciplinary methodological recognitions – psychological, behavioural, physiological, as well as pilotage and terrestrial navigation (R.A., 1992)

Table 1.1
Selected activity factors of the processes of creation and perception based on processes of architectural designing nad aesthetic nad navigational perception. Author's interpretation in the aspect of interdisciplinary methodological nad psychological, behavioural, and physiological recognitions, as well as pilotage instrumentation and terrestrial navigation[2].

Laws	Factors
THE LAWS OF SHAPE	
An integral aspect of perception	
The law of hierarchy	arrangement of components, gradation, hierarchy
The law of pointing	extracting a wholeness, parts of the boundaries, the repetition of forms, interval ranks
The law of proportion	dependence of parts, sums, harmonious proportion
The law of harmony	completion, compatibility
Perception as a system of information analysis	
The law of redundancy	information about changing the continuity of image features along the contours, in the corners and fractures, in places where color and light are changing rapidly
THE LAWS OF SPACE	
	observation conditions
	phenomenon of blurring
	overlapping of images
	refraction
	perspective deformations
	the law of constancy of size
	relative motion of items
	delusions (physiological)
THE BEHAVIOURAL AND PSYCHOLOGICAL LAWS	
	shifting of the image on the eye retinas (stereopsy)
	angle of eye convergence
	the size of the retinal images of familiar objects
	experience and knowledge about space

[2] It is the author's interpretation based on interdisciplinary methodological recognitions – psychological, behavioral, physiological and pilotage and terrestrical navigation.

Fig. 1.3. A view of the Munich old town through the fifth (roof) facade from the church tower. The observation was made in intensive up-and-side lighting; intensive colours and brightness. In that specific picture an illusion of location close to the Alps emerges, while in reality the distance between Munich and the Alps amounts to about 100 km. What emerged here is a considerable apparent distance shortening (ink + watercolour, R.A., based on the photograph, 1992)

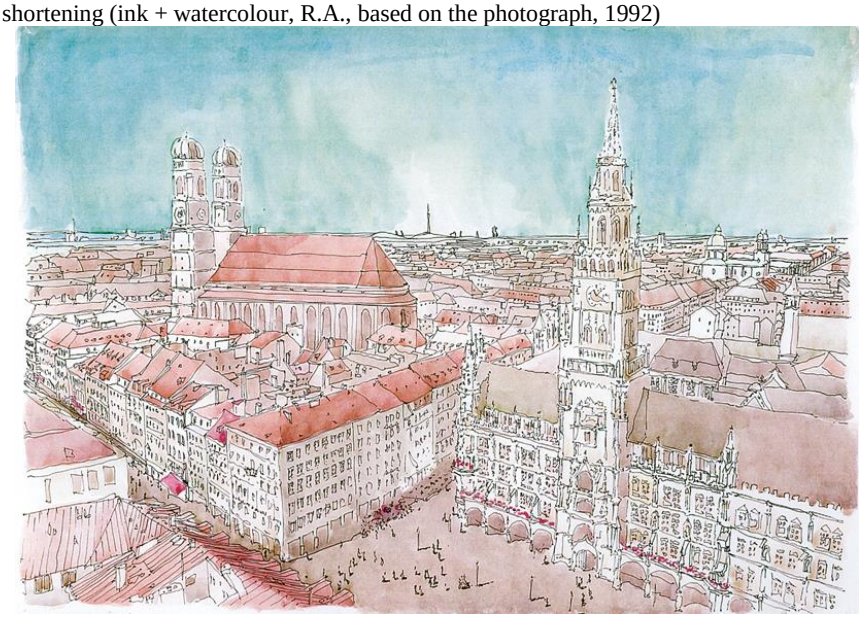


Fig.1.4. A church-tower view (90 m.) through the market square with a town hall and cathedral toward olympic areas with the dominant of the olympic tower (300 m.) . The sketch made with the sun – no chiaroscuro and contrasts (ink + watercolour, R.A., based on the photograph, 1992)

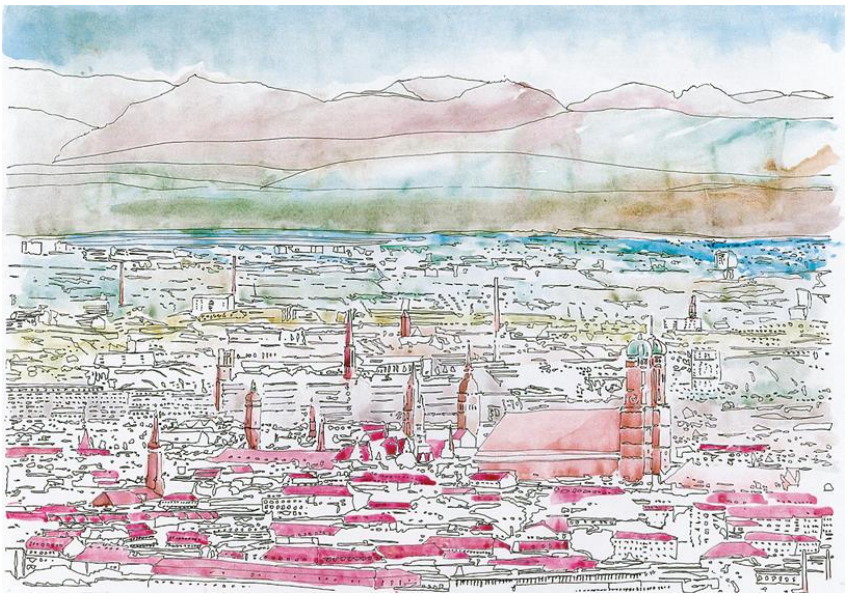


Fig.1.5. Munich – observation from the view platform of the olympic tower toward the old town (4 km away) and further to the Alps (distance of 100 km). The drawing was made on the basis of a photograph with a telephoto lens of 300 mm. The town structure is in the form of horizontal colourful spots – a dispersed part of the light reaches the observer's eye (air perspective, photo filters, and lenses of binoculars absorb colourful rays). Tonal values make it easier to interpret the distance. Vertical elements seem to be more slender than observed from a normal perspective. Reading out the image depth facilitates picking out tower elements – vertical ones (ink + watercolour, 1992)

2. EXTRA-REGIONAL ATTRACTIONS

The area of lower Oder, the mouth of Oder to The Basin of Szczecin, further on through Piana, Świna, and Dziwna towards the Baltic, makes it possible for inhabitants to run different activities. The town and country settler's net is intertwined in a special way with the water network of harbour connections. Apart from protection and development of town-planning market arrangements along with their back, one should also take care of arranging waterside areas. This concerns commercial, fishing, and yacht harbours along with the infrastructure, bridge and ferry crossing, summer resorts, spas, and beach management.

The natural Oder environment, basins, reservoirs, meadows, connected with the seaside elements (islets, beaches, and cliffs) forms various local values occurring in the area examined. One should also point to particularly beautiful spots, distinguished by nature, e.g. the view of Lelowa Góra and Lubiń from the waters of the Basin of Szczecin (Prof. W.Szafer Reservation), the view of the sea from the Gosań hill in Z.Czubiński Reservation or Wzgórze Wisielców (the Hangman Hill) near Wolin.

The natural seaside attractions in the zone of the Basin of Szczecin, Nadodrze and Pomerania Lakes, connected with the existing town settlement structure cause the region to be prepared for application of recreational concepts of hotel towns. This concerns the functions of small, especially monumental towns and settlements, and their environment. It regsrds adaptation of the market complex as a complex of hotel tenement houses with social and service facilities of multiple forms of utilisation. The attractiveness is associated with the program of building revalorisation and recultivation of local peculiarities of town environment. If the idea of forming a recreational town-hotel chain comes off, there will be conditions suitable for organising relaxation and sightseeing on different bases, e.g. traditionally through tourist agents' and package holidays, by agreements with companies, within exchange between different towns, schools, universities, organisations, and institutions. The conmcept of towns-to-rent may be treated as an original form of local business to be used in the regional, country-wide, and international scales.

The question of revitalising harbours and fishing, yacht, and river basin and inshore navigation is strongly connected with the concept of renovation and adaptation of market complexes. For instance, only a few of several prrts and marinas of the lower Oder region, the basins of Szczecin and Kamień Pomorski, Dąbie, and Szczecin Golęcin, Wolgast, and Seedorf can receive ballast yachts. However, none of them meets the basic sanitary and technical requirements concerning development of modern yachting forms. There are no proper markings of the water route, especially harbour approach; there is not enough sanitary equipment in ports and the hygienic conditions are very poor; at times there is no drinking water at all. E.g. in Łunowo at the lakeside of Wicko Wielkie, or just one tap, as in the fishing port

of Breege in Rugia. On the Polish side of the Basin of Szczecin the network of ports and marinas is dense. They form, along with German ones, a special complex of inland ports covered by the islands of Wolin, Uznam, Rugia, and the Zingst peninsula against the open sea. The waters are accessible for ballast yachts of small submersion. This can be decisive as to higher attractiveness of these reservoirs, both for sea- and inland sailors.

The Polish fishing ports of that area are: Trzebież, Nowe Warpno, Wolin, Stepnica, and Lubin. The marinas accessible for small yachts and fishing boats are: Lubczyna, Wapnica, Przytór, Łunowo, Wicko, Międzywodzie, Gąsierzyno, and Bystra. There are designs of development and transformation of the yacht port of Trzebież into a European transit and stay marina. By the western mouth of Oder there are located the harbours of Ueckermunde and Wolgast; on the eastern side of Piana there are many military marinas, and on the western side there are solitary households, most of which has platforms for small boats. Towards the north there stretches a chain of ports on the basins of Greifswalder Bodden, Stralsundu, and Saale Bodden.

The fishing sailboat called „zeesboot" – half-mast with a fore sail and jib, lugger rigging on a mizzen-mast, of 9-12 m. Zeesboot – as a type of utility sailing ship – were used only regionally in the past; they are an example of boatbuilders' and watchmakers' achievements limited only to a single area: the basins and shallow bays of West Pomerania and Meklemburg, between the Oder basin and the waters of the Darss peninsula. Fishing took place in drift, with sails set up. In the cockpit there was a flow-through fish tank (similar to the Kaszuby „ sadze" in transport boats called „zugs"). At present there are about 50 zeesboots sailing and twice as many of them, unexploited, require repairs and conservation. The annual regatta held since 1965 in Bodsted and since 1985 in Wurstow cause their flotilla to become bigger and bigger. Zeesboots appear at international events. This proves the fact that naval traditions may constitute inspiration to any activities.

The current concept of return of side wheelers on Polish inland waters may be a special example. That type of units could replace 26-33 –year-old motor and bolt tourist ships, used so far by navigation companies in Bydgoszcz, Szczecin, Gdańsk, Giżycko, Warsaw, and Vratislavia, which are used up to a large extent and their physical condition is bad. According to the forecast, one can expect renewing line and trip voyages modelled on trips of Vistula side wheelers of private shipowners.

We should also present the unusual area which has not revealed all its secrets yet. This is Międzyodrze. It stretches between the East Oder (Regalica) and West Oder, on the German border. It starts in Widuchowa, where it is divided into two river-beds, and ends on the Odyniec canal at the Dziewoklicz beach near Szczecin. In total, it is an area of 30 km' s length and 3 km' s width, framed with two river-beds of the navigable Oder. These are wild areas of marsh and swamp, pasture and meadow, crossed with hundreds of nameless canals which change their banksat each water rise. Międzyodrze is a natural retention reservoir, protecting the surrounding against any excess of flooding waters from the upper Oder and the so-

called backwater from the Baltic. Unique vegetation was preserved there; it is the shelter of wild animals (beavers, sables, deer, and wild boars, but there are also big wild wicker plantations.

According to the agreement with Germany, a decision was reached concerning forming of an international park of 5 thous. ha in that area and 8 thous. by the Oder in the neighbourhood. This is not a park of international status, but a landscape type, kept in the state of wildly developing nature but, at the same time, open to water and land European tourism. Plans provide for building hotel complexes, swimming pools, ferry connections, and tourist ships.

SUMMARY

The diverse series of factors favouring the economic conditions in the Oder area causes the region to be classified among most attractive investment spots in Europe. In the future, because of favourable geographical location in relation to the main European routes, and their burden, it has a chance of belonging to the biggest economic centres.

The water and harbour system partially overlaps with the favourable town and country settlement chain, which may increase stability of surface and demographic structure.

The diversity of existential conditions occurring in the Oder region favour development of initiatives and wide-ranging activities of regional character, and also transport tracts. Owing to the natural conditions of that region, the possibility of environmental tolerance should be taken into account in its development.

The anticipated development of the Oder region constitutes a chance also for the neighbouring regions, especially for Great Poland, which may gain a new regional leading factor – an inland transport and port complex in the Warta river basin.

2.1. The oder bridge as a bond integrating waterside regions[1]

A bridge and its road have a considerable share in the development of civilisation. Since primeval times up to the present, the buildings have been determinants of progress and high culture. It was not by accident that the first civil engineering college in the world – the famous Ecole des Ponts et Chaussees in Paris, founded in the middle of the 18th century by the renowned French constructors, J.R.Perronet and D.Ch.Trudaine – was a school of road and bridge construction. As Z. Parandowski writes, a bridge constitutes a special part of a road in the place where the latter comes across an obstacle. Without a bridge a road has no continuity; therefore, the whole of its importance amounts to that point and a bridge expresses the

[1] Based on the materials of the project of the road bridge over the Oder River in Ciechanów; design team: L. Zimowski, R. Ast, K. Borowski (text).

essence of the road itself[2]. A river constitutes a natural limitation of land roads and, what follows, economic and cultural expansion of society. Therefore, a bridge is a special place in arrangements of great transport.

Conscious, intended construction of a river crossing must provide balance between matter and thought. Matter is a countable technical structure of a bridge, expressed in terms of otimalisation of construction, durability of materials, engineering solutions deriving from geological, hydrological, static and durability examination, and others. Thought stands for hard-to-measure notions of symbolics, the idea and aesttheics of bridge, expressed in terms of perceiving and creating beauty, harmony with the environment and the rules of spatial composition. Many diverse extra-technical conditions from the field of matter and thought – historical, political, social, economic, cultural, moral, and others – are connected with implementing an engineering work. When building a bridge, one should necessarily take into account all the categories mentioned, but also many others. This can be achieved by an architect as the main designer – town-planner, engineer, and coordinator of the construction process being able to operate in three-dimensional space with his thought, material, and calculation.

A bridge should be a spatial structure, defined according to three parallel guidelines: function, form, and construction. Function stands for usefulness and comfort; form – for harmony and aesttheics; construction, in turn, is an optimal technology. All the guidelines influence the widely understood idea of comfort of town utilisation and beauty of the bridge.

Bridge beauty is a multi-aspect notion. On the one hand, it is a visual sensation concerning the building itself and expressed in its proportion and lightness. In detail, it concerns: the form of its parts (footbridge, pylons, supports, wiring, hangers); material, colour, and texture matching applied, as well as details and elements of small architecture (lamps, balustrades). On the other hand, it concernsa wider spatial context, namely a bridge image in a landscape and the landscape view from the bridge. A bridge in an open space is not entangled in urbanised structures, but in structures of the natural environment; consequently, it must become an element of nature. The beauty of a bridge consists in joining of opposite elements: nature and art, water and steel, nature and technology.

Thinking about the beauty of a bridge is connected with technological quality and comfort of utilisation. One should apply human- and environment-friendly structures, use ecological and energy-saving technologies of object erecting, and modern systems of equipping technical infrastructure. When providing good technological and engineering solutions, one should also take care of the outfit. At that point an intellectual dispute arises: what is more important – aesttheics or technology. An architect answers that efficient technical instruments must serve function and aesttheics. In order to realise these postulates, one needs: dreams, an investor,

[2] *Miejsce mostu w kulturze,* Architektura, 1995, nr 12, p. 32-27

and unlimited imagination of the designer. The engineering design must cause the work to last and serve for centuries

Studies of the program and space concept of the Góra Śląska development and concept products of a bridge were worked upon according to the methodology of spatial planning. According to that method the plan of strategic development of the region in connection with the new bridge crossing on Oder proceeded in four stages:

I: recognising resources – inventory analysis,
II: studies and analyses – choice of localisation and technology,
III: intentions – program,
IV synthesis of intentions – design.

The first stage of studies concerns inventory characteristics of the existing resources of spatial managements of chosen administrative units. On the basis of cartographic interpretation and local picture, general town-planning cataloguing is made (scale of 1:25 000:1:500), developed on the basis of verification of cartographic data (area measurements, surveys), encompasses urbanised areas (towns, villages, settlements), agrary areas (fields, meadows, wasteland), forests, reservations, areas of protected landscape; industrial and recreational areas, waters (rivers, lakes, retention reservoirs), technical infrastructure (thoroughfares; gas, energy and water-supply networks), sanitary facilities (dumping grounds, water systems), existing dangers (areas of negative influence), transport system (road and railway network), potential resources in material and social-cultural fields, and others.

The second stage consists in quick and multi-criterial determination of localisation of the bridge crossing, along with facilities and accompanying areas. One should pay a special attention to recognising town-planning and architectural space (reconstruction and preservation of values of the place), and also finding out about physiographic conditions and area utilisation. Detailed studies and analyses should include:

– historical studies – return to solutions which are old and desisted from, seeking a historical context, recognising monumental and protected structures,
– planning studies – analysing relations with functional zones of the area, recognising the possibility of spatial interaction with neighbouring areas, connections in the scale of the subregion.
– Physiographic studies – measuring the area, height, and configuration,
– Studies of technical possibilities of investment – choosing location of optimal geological conditions (geological studies of the ground – full longitudinal and cross-section, capacity, and ground layers), and hydrological (studying width and length of a river, state of high and low water, speed and mass of the water flowing through, river currents, aggradation, moving sediment and bottom material, changeability of shoreline, washing, freezing and melting periods, flow

and mass of ice floats, level of underground water), accessibility of building materials and technologies preferred,

– Transport studies – connections within the region (the network of local, voyvodship, and national roads), quality of pavement, recognising the necessity and possibility of new connections, , connecting the bridge to the road network, taking into account the newly planned motorway and transport bonds, connections with the regional cycling route network,
– Climatic studies – studying climatic conditions (insolation, wind speed and direction, level of precipitation, average temperature) in order to assess quantity and quality of infrastructural equipment and „thermal conditions" of accompanying facilities,
– Architectural studies – studying aesttheic values, recognising similar solutions, seeking proportions and forms of the whole, as well as parts of the bridge (elements of small architecture, detail),
– Natural and ecological studies – analysis of region ecosystems, influence of investments on the environment, studying advantages and dangers (level of noise, fumes), environmental protection,
– Marketing studies of influence upon the environment – analysis of suitability (technical and economic solutions), plan of modern investment-propagating campaign (*public relations*), interest of potential investors, legal regulations, ground ownership, means and resources of financing investments, detailed business-plan, balance of expenditure and profit, determining potential group of users, and others.

The third stage of studies is shaping the program, hypothesis andjustifying construction of the bridge and accompanying facilities in symbiosis with further development of the region, as well as selection of ideas concerning complex functions and attractions as a result of indicating the leading factors – recreational and commercial ones.

Within the program they provide for methods of gaining investors (inflow of domestic and foreign capital) and possibilities of calling new functional and exploitation units. In order to make forecasts real, survey and comparison studies concerning up-to-date and anticipated needs – on the part of both investors and users – are necessary. Therefore, there are consultations and negotiations with gestors, investors, performers, and users. In the program variants of possibilities of exploitation are given, along with an estimated rotation of users during a day, season, and year. The result analysis concerns anticipated profits in material terms and in the sense of activisation of the neighbouring administrative units and the region (increased attractiveness, possibility of capital inflow, tourist attractiveness).

The fourth stage is making a synthesis-design, consisting of full-brand graphical, model, technical and economic, as well as descriptive studies, along with all suitable agreements in the field of spatial planning , infrastructural supply (water, electric current, gas, sewage, tele-communication), health and safety at work, san.-epid. Agreement, fire protection, army. A synthesis design results from the three

initial stages, especially from analytic studies and the designing and spatial assumptions. One should include the so-called zone attraction program into the project, concerning the importance of investment in tourism. A verbal description, graphical charts, and models make up the study-and-design documentation of implementing purpose.

The town and administrative unit of Góra are situated at the intersection of important routes of wheel transport of surrregional range with multi-directional development of fast roads by means of inscribing them and connecting with the existing transport and exchange of goods in Europe. Those routes are:

– **Łódź-Lipsk** (Łódź–Zduńska Wola–Sieradz–Ostrów Wlkp.–Krotoszyn–Rawicz-Góra–Głogów–Żagań–Żary–Chociebuż–Lipsk),
– **Poznań–Praga** (Poznań–Kościan–Leszno–Góra–Lubin–Legnica–Jawor–Jelenia Góra–Liberec–Mlada Boleslav–Praga).

The relatively close location of border regions makes regional and international cooperation possible for: Saxony-Łużyce-Czech Sudety-Barycz region (contact point of southern Great Poland and Oder Silesia). The bridge on Oder is an indispensable factor of activising the areas of right-bank Oder[3] – transport line and evacuation route in the case of flood. The historical past of the region, mainly the medieval one, and the intercity relations, constitute an „extra-idea" hint for the future. The bridge – a cultural link and component of regional transport routes – is going to be an effect of such cooperation and a factor for achieving civilisational development and common advantages deriving from economic progress.

The trestle bridge of reinforced concrete and the bridge constitute a four-lane transport route of two directions, with a light line across the middle of the route; the route is divided with a balustrade with independent lighting.

The bridge is going to have cycling routes of 2 m.'s width on both sides, and a 1-metre belt of pedestrian traffic. The span of the footbridge amounts to 252 m., and the span between the embankment crowns – to 486 m. The height of 11 m. above water level allows keeping the river navigable.

The unity of form and construction, as well as the aesttheics of the bridge are an attempt at reconciling tradition and historical stylistics, as well as the beauty of landscape, with the necessity of building a road of great traffic intensity- the road which respects the requirements of traffic safety, evacuation, and norms. The composition allows convenient combination of the trestle bridge and the main bridge with the existing roads, reaching the point of crossing, as well as keeping transport in order and introducing speed regulation.

[3] Description refers to one version of the proposed bridge (authors: L. Zimowski, R. Ast, K. Borowski, A. Kałążna, J. Onderka, S. Kanas, M. Pawłowska, M. Wojtalik, T. Maciejewski). Technical design is selected as a contract made.

2.3. The landscape park of Przemęt[4]

In the north-east of the Leszno region there is a group of lakes of Przemęt and Leszno. For a long time it has been a natural water and wood environment, with small fishermen's and farming villages. The climatic values of those surroundings, their holiday, bathing, and tourist favours were raised by doctors and region-amateurs of the period between the World Wars in local publications (in „Ziemia Leszczyńska:, among others).

Later, in the years of town-planning transformations, the lakes, and particularly the biggest one – Dominickie (344 ha), started to attract people from bigger towns: Leszno, Kościan, Rawicz, and even from Poznań, Wrocław, and from the industrialised regions of the former Legnica voyvodship – Lubin, Głogów. Since the 1960s one has been able to observe seasonal settlement in those areas and building holiday houses, also called investment in some other house". Simultaneously, tourist, sports centres, holiday resorts, and marinas emerge, especially in Boszkowo-Pudełkowo and in some other waterside spots (Olejnica, Brenno, Wieleń).

Fig. 2.1. Draining fishing nets in Lubiń by the Basin of Szczecin. Forms untypical of inland require special space in seaside towns (phot. by A.Szczur)

[4] It was created in 1991 to protect the environment and the beauty of the land of Przemęt.

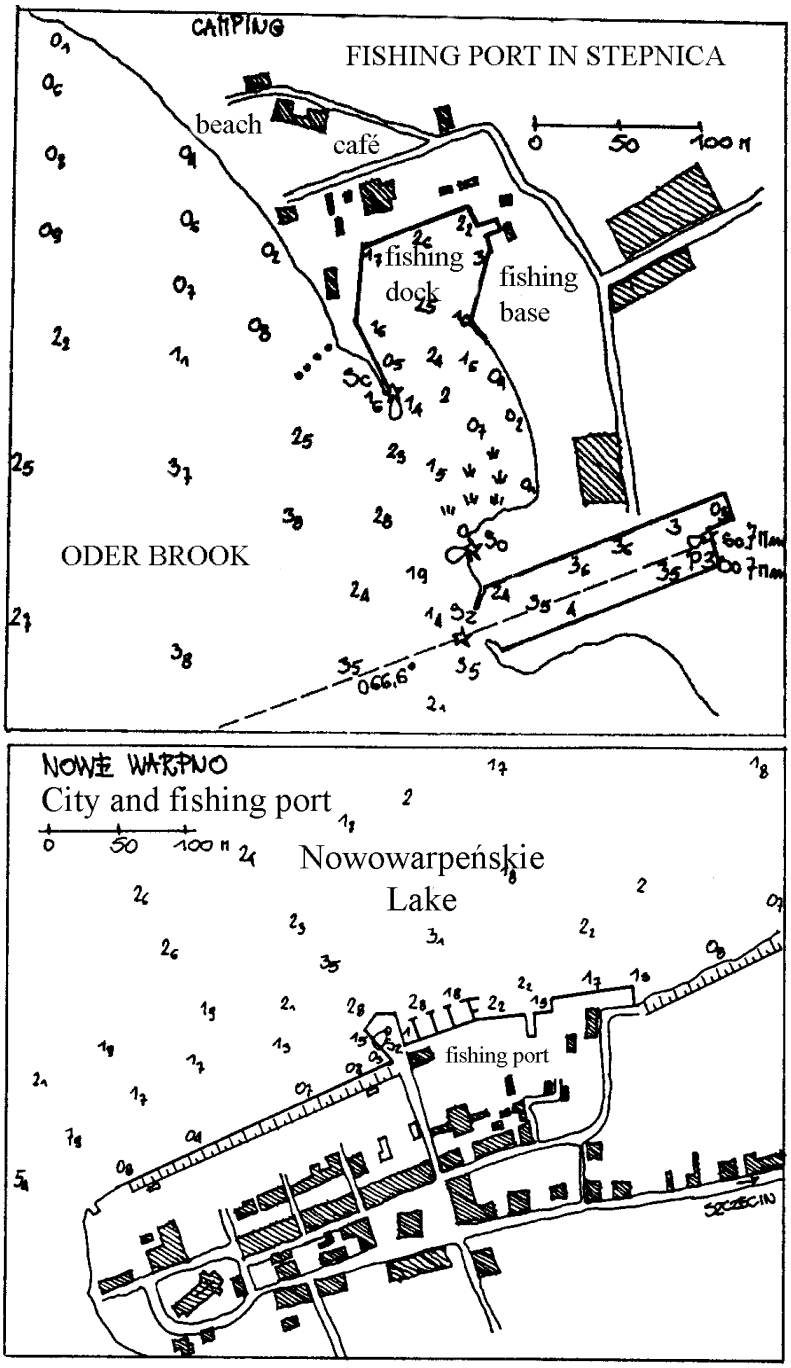


Fig. 2.2. Management of the shore areas of the Basin of Szczecin: a) the fishing port and marina in Stepnica, the original scale of 1:5000, b)fishing harbour coupled with the old town in Nowe Warpno, the original scale of 1:5000 [5]

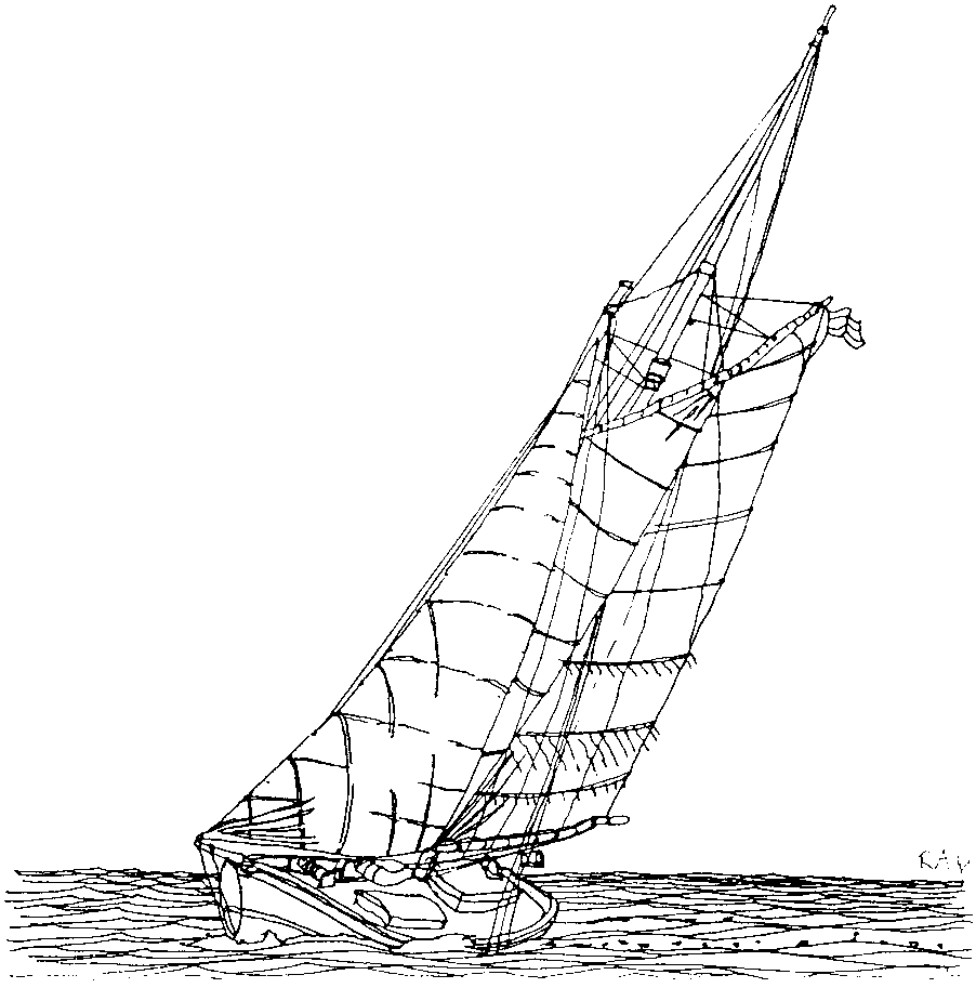


Fig. 2.3. A zeesboot adjusted to tourist navigation. The name comes from the net called „ zeese" and the manner of fishing, and derives from Slavic languages (R.A.)

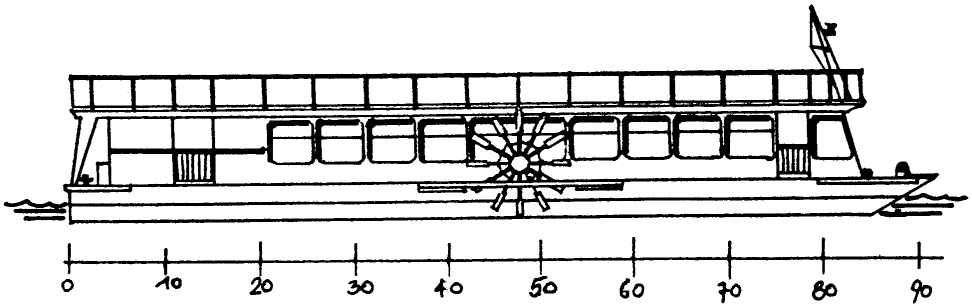


Fig.2.4. A side wheeler according to the design by Kaszubskie Przedsiębiorstwo „Pomeranka", Gdańsk [5]

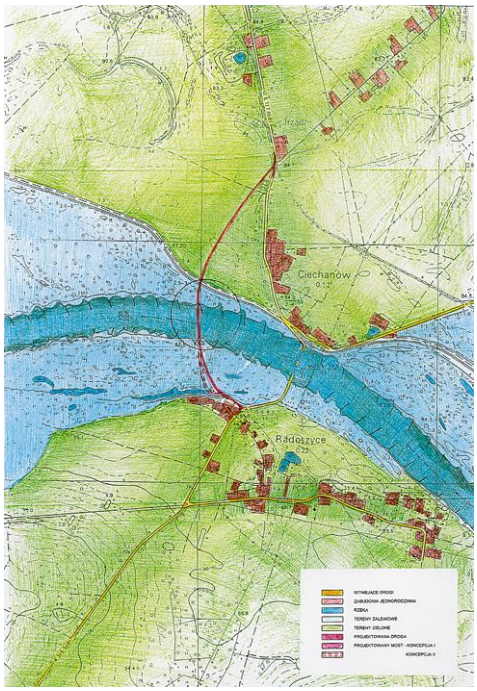


Fig. 2.5. Location of the Oder bridge

Fig. 2.6. A bridge projection with one pylon

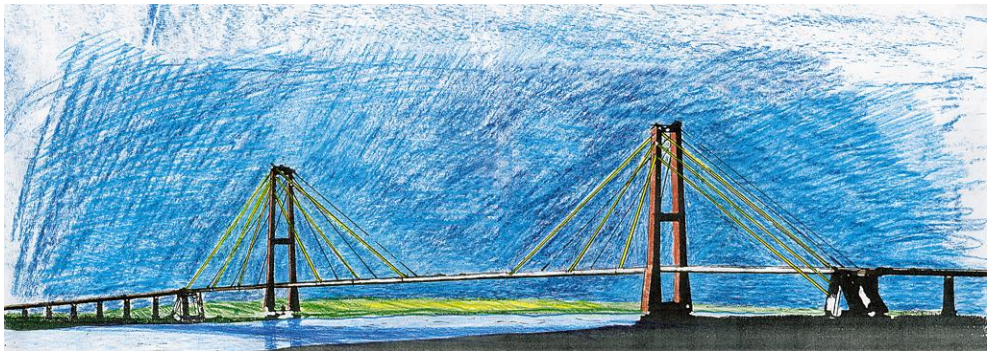


Fig. 2.7. The Oder bridge in Ciechanów, the concept by R.A. modelled on the Danish bridge linking the mainland with the isle of Silt

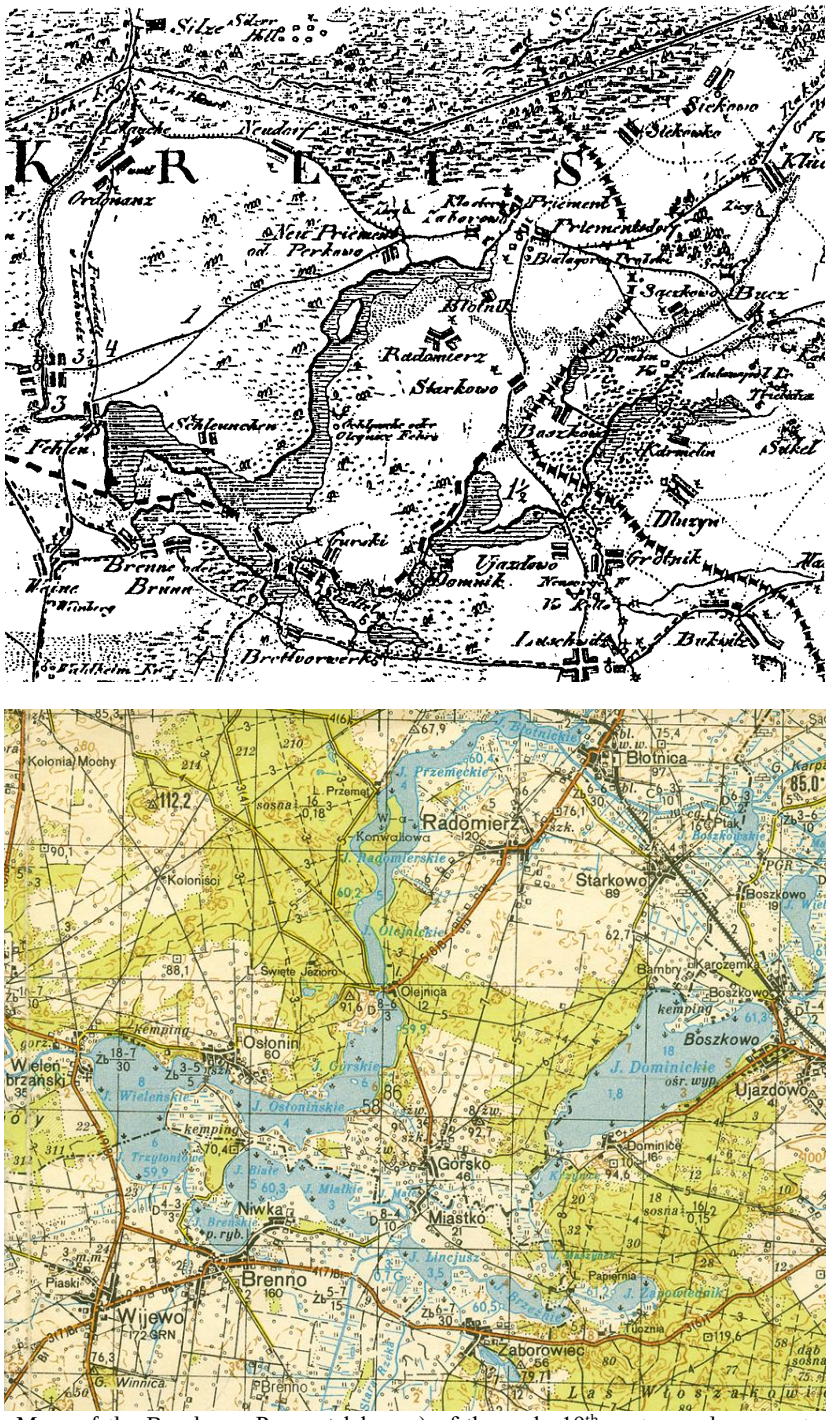


Fig. 2.8. Maps of the Boszkowo-Przemęt lakes: a) of the early 19th century – larger water surface visible, the lakes of Białe, Miałkie, Górskie, combined into one reservoir, b) the current one

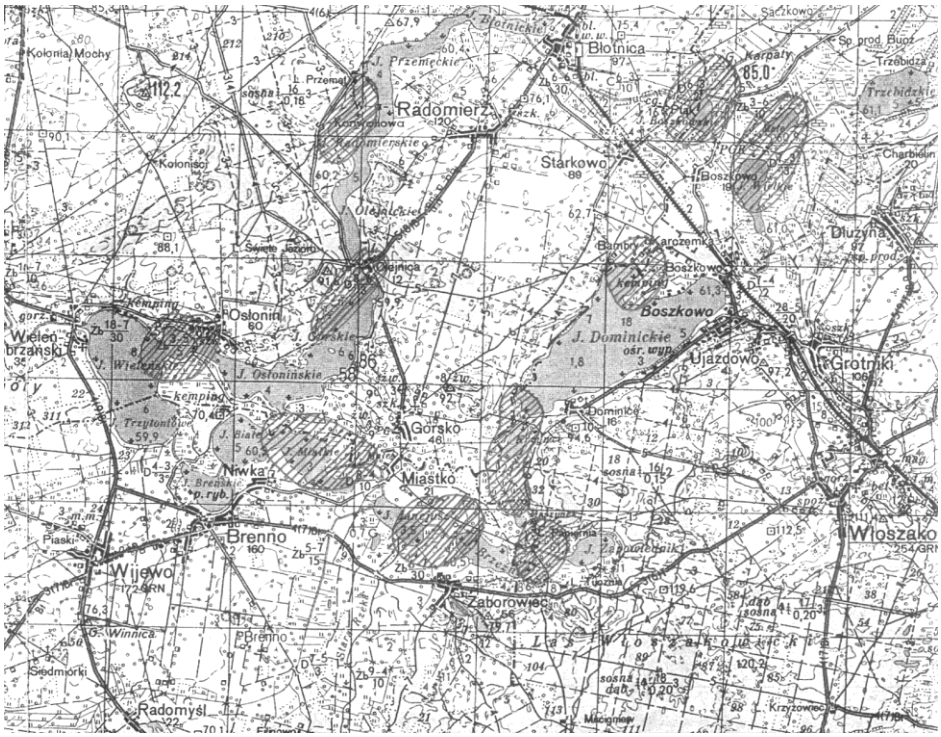


Fig. 2.9. The overgrown reservoirs of the Boszkowo-Przemęt lakes

3. A SAILING BOAT AS AN ATTRACTION FOR A HARBOUR AND A TOWN

Recently, sails have been re-introduced as a means of ship-driving. Trade ships are constructed with sails diminishing the use of fuel; old ships are renovated and new sailing boats of different use are built. Seaside regions want to take pride in sailing boats again. These may be sailing boat-museums standing in dry docks or at a wharf, a floating replica or a modern structure of the end of the 20th century. The world fleet of great sailing ships is currently being reborn as nautical school units, sail and motor pleasure-boats, sailing ships of different use (e.g. scientific and research ones), and museum-ships as surregional attractions of worldwide fame. Sailing ships still traverse the oceans, shape harbour spaces and inspire human imagination.

Very few originals have stood the test of time; they are the most precious exhibits of nautical museums, which constitute wonderful specimen of boatbuilding techniques and the development of navigation throughout the 50 centuries of the epoch of ships driven solely by the force of wind. The following ships are relics of the times when „ships were made of wood, and people of iron": the Viking boats and sailing ships named „Fram" and „Gjoa", as well as the raft called „Kon-tiki" in Oslo, the „Cutty Sark" clipper in Greenwich, the „Pommer" windjammer in Mariehamn, the „Falls of Clyde" four-mast ship in Honolulu, the „Constellation" full-rigged ship in Baltimore, the „Wasa" galleon in Stockholm, the „Victory" battleship in Portsmouth, the „Wavertree" capehorner, the famous „Peking" bark in the renovated harbour at Southern Street in New York, and our Polish „Dar Pomorza" fregate moored in the basin of the Gdynia Harbour, to be moved to a dry dock – most probably to the Kosciusko Square in Gdynia – in the future.

Sailing warships ceased to sail in the middle of the 19th century, and the remaining trade sailing ships – in 1947, along with the death of G.Erikson, the last shipowner of four-mast trade barks. The tradition of sailing on large ships is supported by nautical schools. The Nautical College of Gdynia train their students on the „Dar Młodzieży", which continues the tradition of the „Lwów" pre-war bark and the built-over „Dar Pomorza" ship, renowned for its victories in the Operation Sail regatta.

The worldwide fleet of school sailing ships participates in Tall Ships Race, the rallies of great sailing ships held every second year. Such fregates as „Kruzenstern" and „Siedow" (formerly „Padua" and „Magdalene Vinnen), and the „Towariszcz" bark come from Russia, the „Gorch Fock" from Germany, the „Sagres" from Portugal, the „Libertad" fregate from Argentina, the „Esmeralda" barkentine from Chile, the „Eagle" bark and the „Gazela Primeiro" barkentine from from the USA, the „Danmark" and „Georg Stage" fregates from Denmark, „Christian Radich" and „Sorlandet" from Norway, the „Amerigo Vespucci" and „Christoforo Colombo"

fregates from Italy, „Nippon Maru" and „Kaiwon Maru" from Japan, the „Sir W. Churchill" and „Malcolm Muller" schooners from Great Britain. In the years of 1968-1980 three large South American three-mast school barks were built: the Columbian „Gloria", the Ecuadorian „Guayas", and the Venezuelan „Simon Boliwar". These are only a few of the greatest sailing ships.

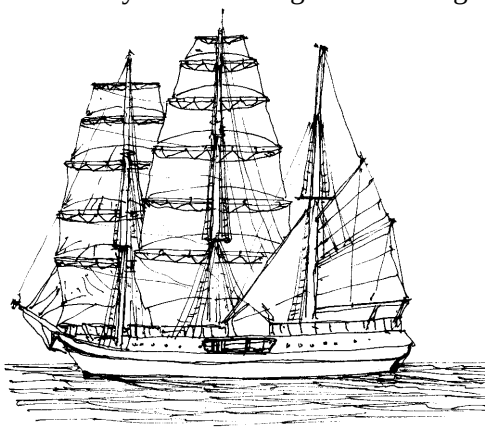


Fig. 3.1. The „Alekasander von Humboldt" sailing-boat converted from the „Kiel" lightvessel (constructed in 1906) according to the design by Z.Choreń in the Polish shipyard

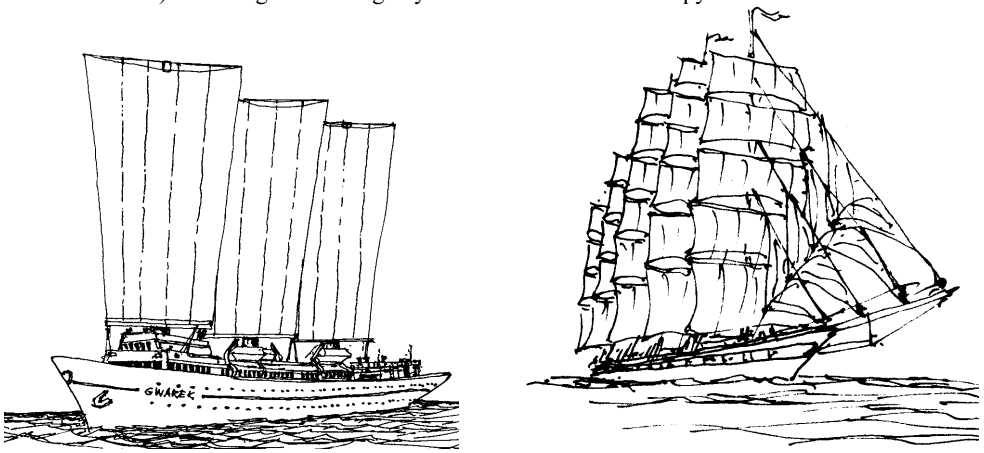


Fig. 3.2. The „Gwarek" s/y – was supposed to be launched as a Polish tourist sailing vessel in 1988 a) the view according to the Polish design by Z.Choreń, but with a lengthened stern, b) the view of the 5-mast "Royal Clipper" tourist sailing vessel after the reconstruction, with the stern lengthened by 12 m

One can come across more and more renovated hulks and lightvessels; more and more new sailing constructions are designed for tourists and holidaymakers. The new form of recreation is becoming more and more popular and brings profits to shipowners. The famous „See Cloud" clipper takes people on voyages to the warm waters around the world of the world in comfortable conditions. The hull of the „Elbe" lightvessel, re-converted into a barkentine and appearing under the

name of „Atlantis", sails on the Mediterranean Sea as a tourist ship. New tourist ships, such as „Wind Star", „Wind Song", „E.Hemingway", and „Pinta" with the shape of a classic windjammer are constructed in order to increase comfort and safety, as well as profits.

Several modern sailing ships have been built in Poland according to the design by Z.Choreń since 1980. In the spring of 1980 the „Pogoria" barkentine (the sail surface of 1014 m2, the total length of 47 m), on which three other sailing ships – „Iskra", the Navy school ship , the „Kaliakra" barkentine sold to Bulgaria, and „Oceania" serving scientific and research purpose of the Polish Scientific Academy – were based, was launched in the Shipyard of Gdańsk. In 1982 the „Dar Młodzieży" fregate (105, 4 m. long, including the bowsprit), and later „Drużba", „Mir", „Palladia", and „Kherson" (currently being only a Ukrainian sailing ship), were launched.

Fig. 3.3. The advertising board by one of the famous yacht designers – T.Głowacki from Auckland, New Zealand. At present, he is designing a new S.V. for Poland – "Polonia"

In 1992, initiated by capt. K. Baranowski, the „Fryderyk Chopin" sailing ship was built. Currently, construction of the comfortable sailing ship of „Polonia", designed in New Zealand by T.Głowacki, is being planned. „Gwarek", the motor and sail tourist ship was supposed to serve wide assemblies in Poland and was to be released for exploitation in 1990. Its hull used to stand unfinished in the shipyard over the years (1987-1997). Eventually, a foreign investor bought it and is currently converting it into a tourist ship – „Royal Clipper". This is advertised as the most modern one in the world.

Emergence of new organisational and legal structures in the recent years, as well as the forecasts of new forms facilitating free navigation, portend wide-ranging development of navigation and, what follows, development of harbour,

hotel and service, and boatbulding resources, and of all those factors which determine attractiveness and position of a region in international relations.

3.1. Shaping marinas and harbours

The architecture of fishing boats

In the second half of the 19th century the economic importance of local seaside regions grew due to the development of technology, transformations in transport, and increased demand for the main resources of the sea – fish. The leading factors of the development of the Polish Pomerania were: trade, fishing, boatbuilding and shipyard industry of large harbour cities: Szczecin, Gdańsk, Elbląg, as well as fishing ports, yacht marinas, treatment and holiday resorts of seaside towns and villages.

Local navigational conditions, the kind of fishing and had a substantial influence on construction of ships and fishing boats: pomerankas, and net boats, small auxiliary boats called , in which a part of technical solutions derived from the native boatbuilding tradition, and another part were borrowed from the neighbouring nations of great navigational achievements – the Dutch, Germans, and Scandinavians. Deeping boats and zugas, in turn, unadjusted to overcoming breakers, were borrowed from Scandinavians and the neighbours from the Eastern Pomerania by our fishermen.

It can be analysed with the example of the Eastern Pomerania, along which rich fisheries stretched, in what way the coastline configuration influenced the shore use and the development of forms of fishing units.

The two-hundred-miles' coastal belt stretching from Szczecin to Hel was deprived of harbours, except for Kołobrzeg, and of natural shelters for deeply-immersed ocean-going fishing units. The plain coastline, with no bays and islets, was exposed to the attacking sea and north-western winds. The wide sandy beaches were separated from the open sea with strips of shallowings, the so-called submerged bars.

Such a sitution influenced constructions of boats used in that region and caused formation of the large flat-bottomed fishing boats, being the most characteristic fishing units. One could sail on it straight from the beach to the fisheries 20 miles away from the shore. That type of boat reached the Kaszuby shore and was locally named „pomeranka" (fig. 3.6), as it came from the Western Pomerania. It was called „strandboot" in the Western Pomerania. The boat, 8,5 m. long and of interesting constructional solutions, was made around 1850. First it had a sprit sail, then a gaff one, and it was equipped with a motor in 1939. Some pomerankas lived up to 1945 and few of the boats, which went through the war, were destroyed some years later when measures were taken to prevent inshore fishery for the sake of border protection. Fishermen keeping boats on open beaches were force to get rid of them. After the situation was moderated, fishermen used only engine-boats. What is in-

teresting, hulls of utilised fishing boats were used on land as tool and fishing equipment yards. They were formed by cutting a hull halfway, arranging it stems upwards and covering with a roof.

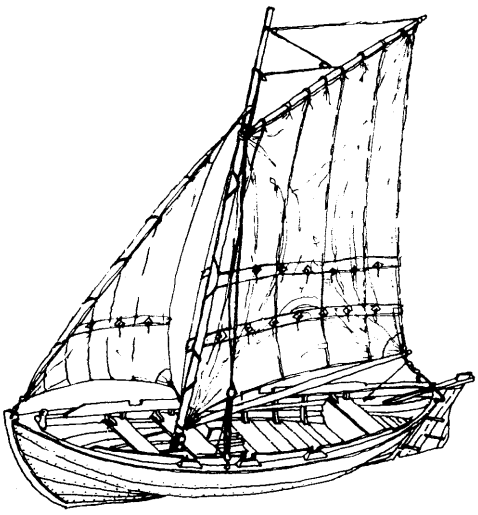


Fig. 3.4. Pomeranka – the drawing made according to the book by A Celarek [16]

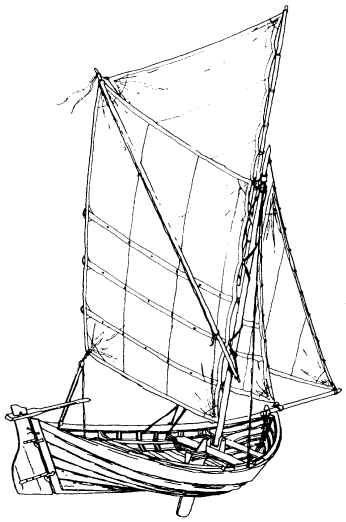


Fig. 3.5. A net boat, driven with rows, served transporting , a huge trawl net serving salmon fishing; with sails, flounders were caught in it by means of ”secs” which are sets of hooked ropes [16]

In the Bay of Gdańsk and in the region of the Hel Peninsula the variety and specialties of fishing unit construction were wider. Pomerankas were used for transport and connection with Gdańsk and Puck. They fished in smaller boats because of small distances from fisheries on the side of the sea on the Hel sandbar. The boats were small sheer seines driven with rows and sails.

Around 1887 ten fishing boats were bought in Kołobrzeg for fishing with drift nets. They derived from the 18th century’s Norwegian hwaler boats. These have had influence on the construction of numerous fishing units (almost until now). Fishing boats, though quite small (6,5-7,0 m long), towered over open boats with their seaworthiness. Fishing could take place much further from the shore and last much longer. Owing to their emphasised keels they sailed better and were more stable. Their small cabins made it possible to rest when drifting with nets. However, they were not capable of overcoming breakers and landing on beaches; therefore, harbours had to serve as their support. These fishing boats lived up to World War I in the Eastern Pomerania; later, they started to use sail and motor fishing boats (about 11,0 m. long), and then motor-driven ones.

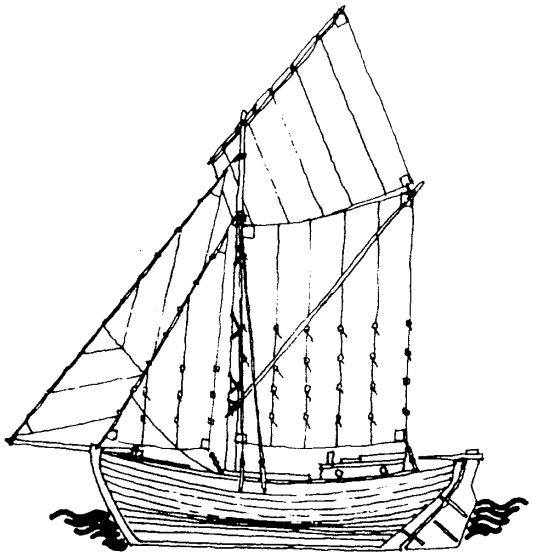


Fig. 3.6. A deeping fishing-boat. The hull line reproduced on the basis of the fishing-boat converted into a shed in 1905 by Józef Gojka from Jastarnia-Bór (6,90 m. long, 2,75 m. wide, about 0,70 m. draught) [16]

The fish market in the Bay of Gdańsk would not exist without large transport boats serving shipment of living fish. They were named „zug" in the peninsula and in the region of the Bay of Puck. Gdańsk was a large specialised centre of fishing trade. The role of

Zug owners was limited to buying fish from fishermen and delivering them to commercial firms, which distributed them to the tables of inhabitants of Gdańsk or shipped them further worldwide. Dutch and Danish swabs – two-mast sailing ships with gaff sails and auxiliary engines – called at Gdańsk for eels. Their cargo holds were flooded with water, they took about 200 centners of living fish. B.Konkel from Kuźnica bought such a swab from the Danish and converted it into a fishing boat. This was utilised (marked as „Jas-10) until 1984. The cargo holds flooded with water, in the same way as zugs, had blacks from the Bay of Gdańsk and launches from the Vistula Basin.

Zugs lived up to the early 1920s. Railway, which reached Hel in 1921, contributed to their decline. Fish transport became faster and more secure than under sails. The so-called „luggers" – towed boats driven with their own engines, equipped with cargo holds with flow-through water – were used for some time after zugs had gone out of use. These units were used until recently in state-owned fishing companies for storing purchased eels.

Until 1920s sea fishery was limited to fishing in the Baltic fisheries; they rarely transgressed the Danish straits. Small marinas in Hel, Kuźnica, Jastarnia, and Puck constituted bases for fishing boats. Gdynia, the small fishermen's village was described in the following way in 1910: „A jetty, or a pier, a smallest, narrowest, shortest, chronically leaky, ending in a bench, over which there was sticking a paraffin lamp lit at 9 a.m. and put out undisputedly at 10 p.m. Some boats and a sailing boat were waving near the jetty." [8]

Fig. 3.7. The beach of the fishermen's village of Gdynia in the early 20th century. The hulls of old fishing-boats standing with their stems up, serving as stores and depots for fishermen (R.A. according to [66])

Fig. 3. 8. A fishing-boat model hanging in the lighthouse of Rozewie. Oak hulls vanished along with the change in technology of fishing-boat construction (phot. by R.A.)

After Poland regained its independence in 1918, a powerful development of the Polish trade and naval economy, including fishery, took place on governmental and social initiative. The first Naval Office of Fishery was located in Wejherowo from 1921; in 1928 it was moved to Gdynia. Fishing ports in Hel and Jastarnia were developed and new ones were built in Gdynia and Władysławowo. In 1929 two fish-

ing boats from Denmark were bought for the Naval Institute of Fishery for research and training purposes. The fishery shipyard of Gdynia existing from 1930 started building fishing boats with draught of about 50 BRT. „Mopol", the first company of deep-sea fishing, with a considerable share of Dutch capital, with Dutch shippers and crews, started fishing on the North Sea in 1931. In 1933 a similar company, called „Mewa", was established, and then „Pomorze", „Korab", „Delfin", and the only one of completely Polish origin – „Ławica" – in 1939.

Fig. 3.9. The railway station in Hel. The form characteristic of resorts and spas (phot. by R.A., 1989)

The renowned Dutch summer resort called Scheveningen was the operational base of the luggers of „Mewa". In that port there was the first foreign duty-free yard in which captains supplied their ships with provisions and Polish products. There was also the Centre of the Polish Sailor – the first foreign institution for Polish sailors. Fishing ended in January and luggers sailed to Gdynia or stayed in Scheveningen on winter lie.

Simultaneously, trawlers started to be introduced into deep-sea fishery along with old luggers. In 1939 the fishing fleet numbered 10 trawlers, 20 luggers, about 170 fishing boats, 37 engine- boats, and over 700 row-and-sail boats. Fishing took place mainly on the Baltic and the North Sea. They caught mainly cods, herrings, and sprats. In 1939 about 12 500 t of sea fish was caught.

The world of wooden fishing boats falls into oblivion. World War II caused a huge damage to the fishing fleet. Various boatbuilding works and fishing companies were monopolised in 1940s and 1950s. Also, changes in technology and fish-

ery organisation took place. All these things contributed to the fact that we can see wooden fishing boats only in the Hel museums and the atmosphere of vital port towns and cultivation of the tradition can be observed in marinas, ports, towns and cities of the Danish straits, the Bay of Kiel, and the shore of the North Sea. And what about Gdańsk - one of the busiest and richest towns of the former Hanza? The historic channels and wharves of the Motława river, once „pasted around" with hundreds of various barks, fishing boats, ships and yachts, are empty. The traffic was banned for small units for fear of the alleged safety of navigation. The biggest harbours of the world – Hamburg, Rotterdam, Amsterdam, Kiel, and New York – try to attract small picturesque units to their channels, as this determines the richness, attractiveness, the long-lasting naval tradition of seaside towns and regions.

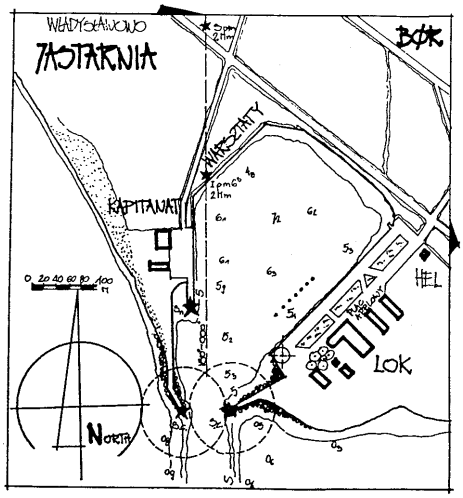


Fig. 3.10. The harbour of Jastarnia – drawn according to the "Żagle" magazine, 1989, nr 1

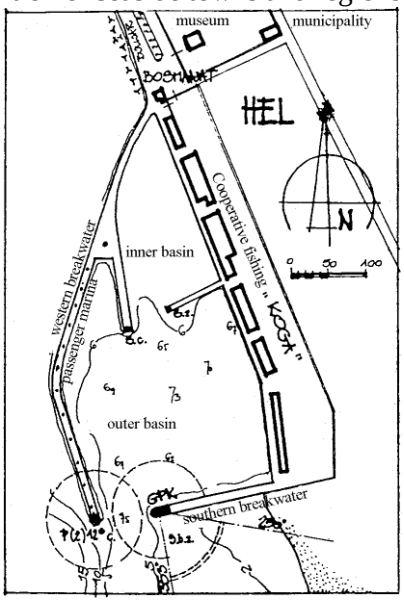


Fig. 3.11. The harbour of Hel, source as in fig. 3.12

Currently, there are favourable conditions for propagation and development of traditional Pomerania units. The Company of Fishing Boats, established in 1985, with the harbour in Górki Zachodnie, associates owners of old fishing boats converted into sailing yachts, the so-called „ old timers". Also, private boatbuilding companies emerge. For instance, the „Windpol" company, which builds wooden fishing boats and comfortably equipped oak-wood boats as recreational and sports yachts for Polish, Swedish, and German customers, was set up in 1988.

As mariners predict, in a short time harbours and marinas are going to be filled with picturesque ships determining the atmosphere of port towns being a vital surregional attraction.

OVERCOMING BREAKER WAVES

In order to understand the construction of a boat overcoming breaker waves properly, one should become acquainted with the conditions in which a breaker wave is formed and with an average structure of a shore and sea bottom along the coast. As mentioned earlier, a beach is separated from the depth of the sea with two or three shallow belts. A wave coming from the open sea comes across these barriers, accumulates, shortens its length, becomes steep, and is refracted. The direction of waves caused by the action of winds is usually compatible with the direction of the winds. However, it sometimes happens that the waves overtake the wind and get to where the latter does not. Such waves and waves left after storm are called dead waves. Near land all waves tend to change their direction to a more perpendicular to the shore. Sometimes two or more kinds of waves coming from different directions overlap.

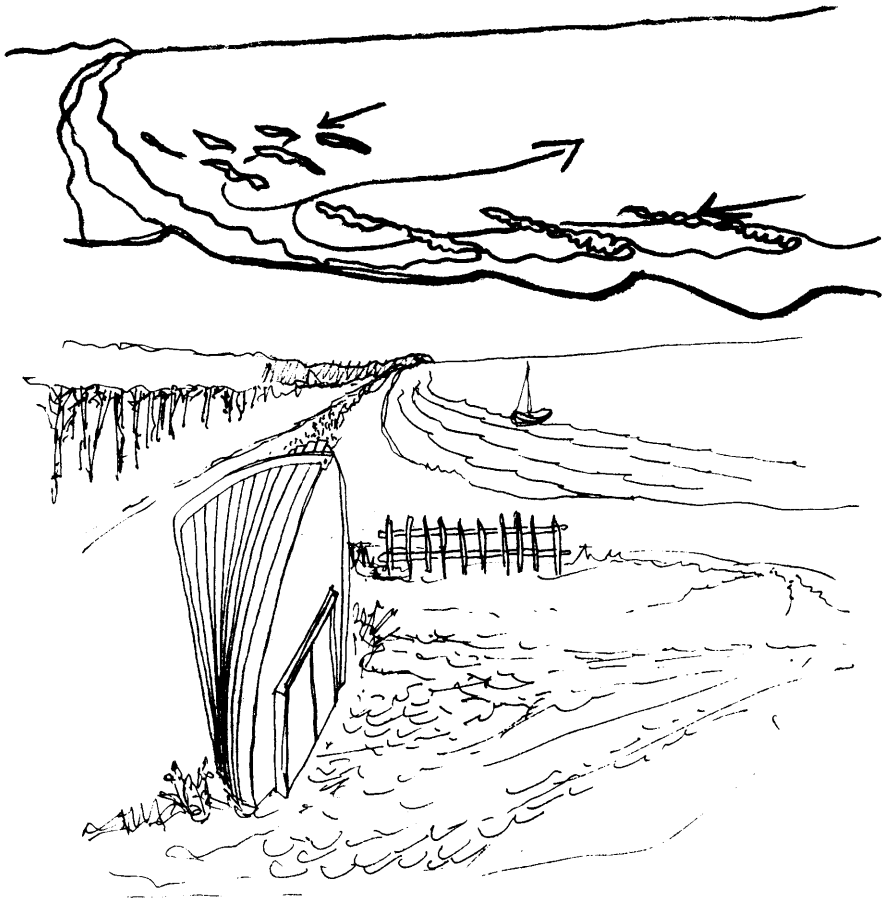


Fig. 3.12. The scheme of breakers and an average shallowing arrangement at seashores (a), and a view of a beach and dunes (b) (R.A., 1997)

The most dangerous breakers on our coast occurs with western, north-western, and northern storms. Then, from high cliffs, near Rozewie for example, one can clearly see three lines of surfs running parallel to the shore. That is exactly the wave refracted over submerged bars. The calmer water between those belts is the depth separating the particular shallows.

The phenomenon of wave accumulation on shore shallows occurs always, even with slight waving. It was used by experienced fishermen for assessing the distance from the shore during navigation when the visibility was poor. The way the boat rolls shows that the wave becomes higher and shorter. If one has enough practice, they can assess over which submerged bar the boat floats and, accordingly, how far it is from the shore.

A wave running from the shore pulls an external layer of water behind it and creates a shore-directed current. The water, having reached the shore, returns over the bottom and creates an emerging current. The current grooves passages in submerged bars; in some places it is particularly strong and then rises to the surface.

When sailing out into the sea, one should find places deepened by the emerging current. However, the current should not be too rapid and form strong whirlpools. Fishermen from the given village took their boats to the shore in such places. When a boat was pushed onto the sea, the helmsman was holding the steering row, and two people sitting on the front bench were holding the boat with rows, with its bow on the wave; the others, first paddling, and then pushing the boat away from the bottom, having jumped inside, speeded up the boat. On the shallow situated closest to the shore waves are not refracted in such a dangerous way as on the submerged bars, as they are much smaller; however, they have a different defect – due to the fact that the water is more frothed there and contains more air bubbles, it has too little power to carry off the boat. It sometimes happens that after a wave has flown away, the bottom of a boat runs aground, and the next wave approaching does not lift the boat sucked with its bottom to the sand of the boat, but flows into it.

The most dangerous moment was passing of waves refracted on submerged bars more distant from the shore. Due to that fact, one had to observe the breakers before the crossing and pick out certain regularities in wave refraction, as they always come in groups and the biggest and the smallest ones recur after passing a defined number of crests.

As passing of the boat through the refracted waves was inevitable, the boat had to be directed with its bow to the refracted water roller. Each diversion of the boat from its course was likely to cause an arrangement with its side to the wave and capsizing.

The manoeuvre of descending from the open sea, through the breakers, to the shore was more difficult than putting out. One could always give up putting out, but the boats caught on the fisheries by the storm had to turn back and overcome the breakers overloaded with extra equipment and the catch.

If the breakers were dangerous, the boats leaving the fisheries sailed to the furthest submerged bar and , anchored there, mooring to the buoys or drifting, were

getting ready to overcome the surf. They threw off sails, put a mast, and replaced the steer with a steering row. Sometimes they tied a stone or an anchor by its blade in such a way as to drag it on the bottom, not to hook on it. Fishermen took off hampering clothes and boots which made it difficult for them to remain on the water surface in case the boat capsized. They tied everything that could fall overboard. The helmsman would choose the most appropriate moment to pass over a shallow, They accelerated the boat to its highest speed with rows in order for it to stay in the dangerous zone of refracted waves for as short a period as possible. The speed ensured also ensured them good steering necessary for keeping the stern straight on the wave catching up with it from behind. At the depth they would slow down, waiting for the most appropriate moment to overcome another submerged bar.

3.2. The construction of harbour basins and their back

The harbour of Władysławowo

During the time when harbours were built for sailing boats, the rules by Franzius-Schultz (1890) were suggested to designers. The manual for harbour constructors by Schultz, based on these rules, includes the conditions which a good harbour basin entrance should fulfil. According to them, a harbour entrance should be situated towards strongest waves so that a ship sailing into the harbour could be directed by them and would not be drifted on breakwater heads. It was indispensable to design space sufficient for making an emergency manoeuvre; if such a manoeuvre was to occur, it should have been covered by the breakwater head sticking out furthest into the sea.

As one can see, the safety of an entering sailing ship was most important. The power of waving in a harbour aquatory was, in turn, a secondary matter. The manoeuvre reasons decided about the shape of the entrance. In the following years sailing ships lost its primacy on the seas in favour of steamers, motor-boats and commonly used tugboats. Protection of the harbour waters against waving and winds was considered the most important factor. The famous Polish hydrographer – L.Mistat – wrote in his study entitled „Układy falochronów" ("Breakwater arrangements", 1939) that „comfort in ship man cannot determine the arrangement of breakwaters, on which the calmness of the waters of the whole harbour depends. (...) Some other nautical premises in that field are already a matter of the past, especially when one considers the danger and risk of ships passing through the tight locks, to the basins, or coming out of them straight into the current of the river (...), and using the help of tugboats is considered an indispensable order in the passages". Acting according to the new doctrine, Mistat recommended sheltering the harbour aquatory and situating the entrance in the direction from which the expected waving is lowest. The so-called dead angle of 30º is assumed as a criterion of the sheltered entrance. The entrance of the harbour of Władysławowo has such an en-

trance. The prominent authority in harbour construction – S.Huxckel – assesses it as „the most convenient of all the harbours of the Polish open sea. Due to that fact, the Władysławowo harbour is continually visited by German, Danish, and Swedish fishing boats finding a shelter from storms".

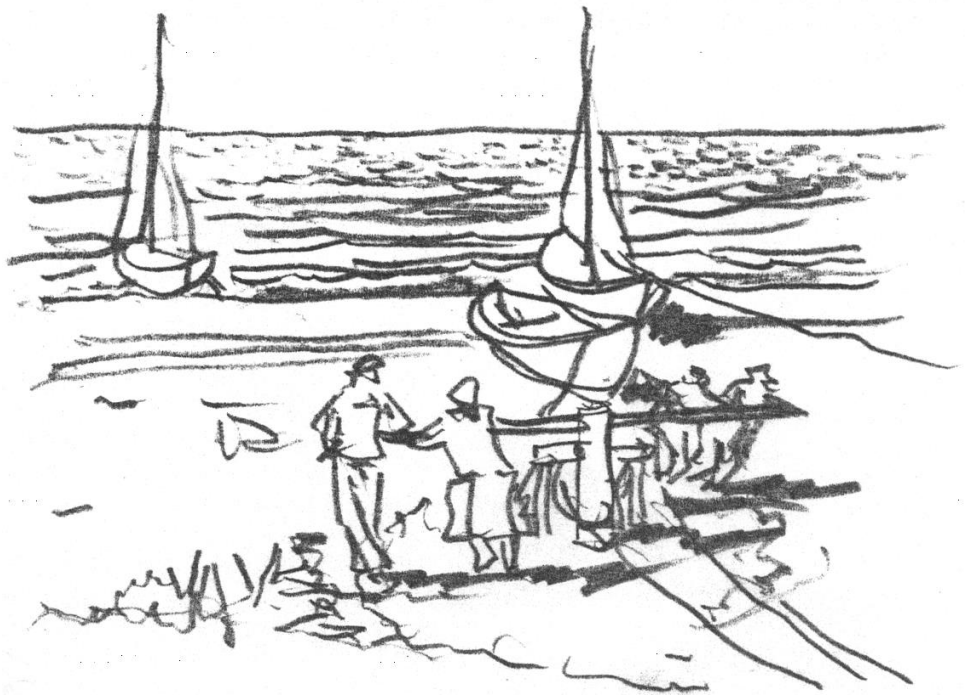


Fig. 3.13. Chałupy – the Hel peninsula, a boat being hauled by means of a manual lift; currently this is done by mechanical launching winches or tractors (R.A., according to [16])

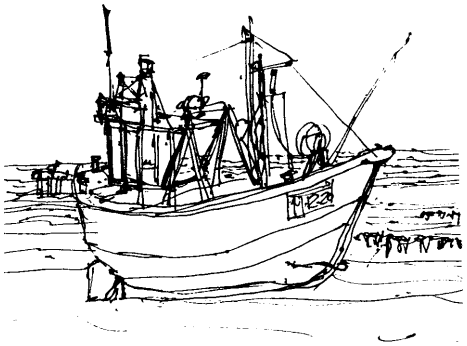


Fig. 3.14. Międzyzdroje – a steel fishing-boat for fishing on the Baltic, adjusted to flowing through seashore submerged bars, hauled onto the beach by means of beach lifts (R.A., 1996)

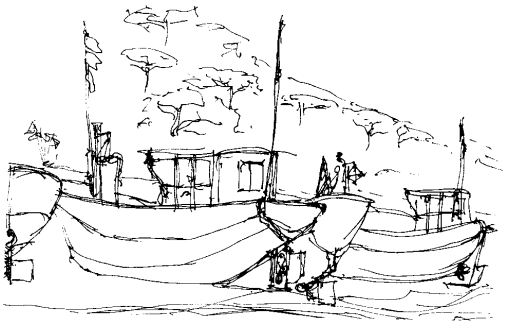


Fig.3.15. A small flotilla of fishing-boats on the beach of Międzyzdroje (R.A., 1996)

In that harbour there are difficulties connected with the sand accumulating near the entrance. From time to time a long shallow is formed along the western break-

water, between the „green" head and the shallow buoy. This makes it impossible for sailing yachts to stand with their starboard windward under the shelter of the longer breakwater. Emergence of the shallow writes off the designer's intentions and makes the harbour entrance dangerous for sailing yachts. Numerous cases of drifting units onto the breakwater, or the star-blocks covering it, prove that fact.

BUILDING OF THE FLEET HEADQUARTERS AND THE ACCOMPANYING FACILITIES. ACADEMIC CLASSICISM IN ART

The construction of the fleet headquarters was planned in the neighbourhood of the North Basin, at the feet of the steep Kepa Oksywska, near the buildings of the village of Oksywie. The new complex was to consist of huge headquarters, the navy barracks, and the residential complex for officers and petty officers.

The author of the design made in 1924 was M.Lalewicz, an architect and professor of the Department of Architecture at the Technical University of Warsaw. The whole enterprise was grouped – based on the examples of French town-planning arrangements – along three axes arranged in the shape of a fan. He located the semi-circular building of the gate, the yard, and the representative headquarters in the centre, the barracks and accompanying buildings – on the western axis, and the residential complex, which was supposed to be of some different spatial shape than the ultimately realised one – on the eastern axis. The commandment building and the barracks were girded with a wall, which made an unaproachable, almost defensive impression; hence, it was called a stronghold-camp in the 1920s. The complex was of monumental character and – as the critic of those times wrote – „it remained closely connected with our monumental buildings of best European tradition" [66].

Fig. 3.16. The square in the Navy College of Gdynia (R.A., 1992)

The architectural solution of the assumption constitutes an example of the 19th-century'c historicism – the trend predominant both in Polish and in European architecture of 1918-1925 and operating with more or less simplified forms characteristic of the style of the great epochs: Renaissance, baroque, and classicism. The fleet headquarters represent one of the historical trends.

In 1925 mainly works were done. The constructional works concentrated on building the pier marking the outer harbour from north. The substantial part of the

pier (710 m.) was constructed of wood filled with stones and only its head of 30 metres was made of reinforced concrete.

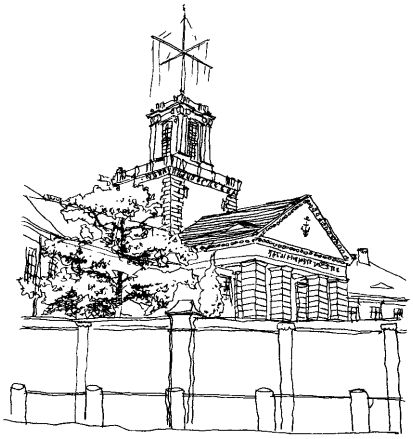


Fig. 3.17. The building of the fleet commandmexnt in Oksywie. (R.A., 1992)

Fig. 3.18. A residential complex for officers and petty officers (R.A., 1992)

Fig. 3.19. The gate of the fleet commandment in Oksywie. A drive to the war harbour leads from the traroundabout.
traffic circle. (R.A., 1992)

4. SEASHORE AS A PHYSIOGRAPHIC PHENOMENON

4.1. Introduction

Seashore, situated on the contact point of land and water, is a specific area. It constitutes a defined dynamic system, in which various factors work incessantly, disturbing its balance. Each disturbance causes a given reaction in the form of processes aiming at restoring the stability of the system.

The borders of a naval coastal zone and its particular components are defined in various ways by different authors. Such terms as: seashore, coast, and a coastal zone are found most frequently. These terms are often used without any further specification.

The border belt of land and the sea of no specified width, encompassing both its above – and underwater parts, is usually taken for a seashore.

A coast is an area located between the lines of the lowest and the highest water level. Its width differs on the coasts of tide and tideless seas. In that area the surfaces of water and land adhere, and the line marked by that adherence is called the waterline.

A coastal zone is defined as a belt stretching along the border of land and the sea, composed both of the above- and underwater parts. The depth at which the influence of waving on the bottom begins is considered the seaside border of the coastal zone. Most frequently, it is the value equal to half the length of waves emerging on the given reservoire. Thus, the border depends on hydrodynamic conditions and its location differs in seas and oceans. The line reached by breaker waves during highest water levels, recorded directly or indirectly, is considered the landside border of the zone discussed. The above-water part of a coastal zone is, therefore, made up by the „proper" coast, while the area located below the minimal waterline, forming an underwater coastal , is defined as „sub-shore" or „ offshore"[1].

The land area adjacent to a coastal zone, including the forms of riparian profile, such as cliffs, dunes, alluvial lowlands and plains, is called waterside.

Waving and water movements connected with it are regarded as the main factors of most geomorphological processes occuring in a coastal zone. They result from the interaction between the atmosphere and the hydrosphere, due to which a given amount of energy, being the source of waving processes, is transferred. In addition to wind waving, tides and wind (storm) accumulation, as well as different currents (such as: wind-driven, compenasational, suspension, etc.) are the hydrographic factors operating in a coastal zone. The impact of river waters in the re-

[1] For the purposes of spatial delimitation the coast is recognized as a form available in the visual penetration of the sea.

gions of their estuaries may also be significant. The litosphere, in turn, participates in interaction processes in a coastal zone as a base of various erosion and accumulation forms of profile and as a foundation providing defined amounts of loose deposit material for shaping these forms. Sea organisms play a vital role in the functioning system of a coastal zone. Some of them are even able to influence the surface rock layers and deposits in a direct way (e.g. benthonic organisms), while others provide specific kinds of biogenic deposit derived from accumulated remains left after their atrophy. Some organisms produce rocks, various forms and profiles on their own (e.g. bioherms – coral and algae reefs and atolls).

4.2. Cliffs and the development of the southern coast of the Baltic Sea

Cliffs

Sections of cliff shores constitute characteristic observational points on the overall flat coast of the Polish sea. The cliffs are counted by geologists among active ones. Their total length amounts to approximately 45 km. They are present all along the coast. For the purpose of recognition of cliff characteristics, they are included in pilotage books or sailors' guides together with drawings. For instance, the Rozewie cliff has a uniform top towering at about 30–35 m. above sea level. From the sea one can spot a clear abrasion sill and numerous landslide niches. Not far away, eastward, there is the Chłapowo cliff, which sharply appears with its vertical abrasion sill in the view from the sea. Its height amounts to 40-50 m. above sea level. The short Rowy cliff section of 5 m. above sea level constitutes still another kind of cliff. The Dąbki cliff is made up of two sections of a few kilometres of a few up to 35 m. above sea level. The Ustka cliff is 10–15 m. high, formed of dune sand. In the middle of the Polish coast there is the Jarosławiec cliff. It constitutes a convex shore, 2 km long and 9 km high on the eastern edge and 24 m. – on the western one. There are characteristic big landslides of earth masses. The Sarbinowo cliff is made up of numerous short sections of different structure and height of about 10 m. Not far away, there is the westward-located Ustronie cliff, whose slope profile is close to vertical, with clear marks of large rockfalls. The total length, including the Sarbinowo cliff, amounts to over 8 km. In the early 1960s a large landslide was formed near Śliwino, called the Śliwino cliff. The slope profile is concave, slanting at 40-50º. The Trzęsacz, Pobierowo, and Wolin cliffs form a long, characteristic strip on the western coast. The Wolin cliff ismade up of two sections – from Międzywodzie to Wisełka and further, to Międzyzdroje. The height of the eastern section amounts to 70 m. The inclination of that part of the cliff amounts to about 60º. Also, the two sections of the Pobierowo cliff are connected with an accumulation terrace and a dune.

The technical belt of the shore

The role and importance of the „technical belt" separating waterline from land, as well as the „protection belt" situated behind the „technical belt", when observed from the sea, in the offshore space of the Polish Baltic, is extremely vital. Leaving the technical belt unchanged guarantees, above all, preservation of the natural landscapes: dunes (e.g. Międzyzdroje, Dziwnów, Pobierowo) and cliffs (e.g. Trzęsacz). Relations among the particular elements are so clear that any decision may destroy the harmony (a beach protects dunes against destruction, dunes protect the nearby areas against floods, while dune vegetation prevents sand from moving and, at the same time, acts as a „windshield" for the town).

The balance of forces occurring in nature, which contributes to profile forming in the local and continental scale, determines a kind of natural phenomenon. The balance is probably best manifested in cliffs. The struggle of land and the sea is apparently settled by water itself, to its own advantage; however, at some moment washing moraine boulders away from a cliff wall results in formation of a rockfall blocking the washing force of breakers at the feet of the slope.

During any designing processes one should always mind the exceptional character of the place: the waterside area is a place on the border between two elements – water and land (defined by the elements of the environment). The coastal space of the Polish Baltic is also a borderline, so development of towns, harbours, marinas, and summer resorts should be inscribed in the seaside landscape in a special way, constituting a symbol of the country.

The shore dominants and characteristic landscape elements visible from a ship's deck may act as navigational signs. Also, wide rivers, bays, channels, and harbours may play the role of dominants; the dominating role is emphasised by their location, type of silhouette, distinguished form, and social role. It is possible to create in a cultural landscape in a skilful way owing to proper recognition of the environmental harmony. The integral process of recognition is also very important, as it is characteristic of the human eye to mark off certain meaningful entities of the image and split it into the foreground and the background.

The technical belt is the place where spa, recreational, relaxational, and sports functions coexist. Protection belts repeat these tasks in addition to tourism, commerce, services; moreover, they should constitute a kind of ecological filter for the technical belt.

It will be possible to improve the present state of spatial composition if planned activities are started within particular administrative units.

For instance, in Międzyzdroje, they set up the „Międzyzdroje 2000" club, setting the planned town development as its target. Nowadays three characteristic elements of the town structure occur there: the modernised high buildings, the trashy and makeshift service and trade part, and the old villa district. A specific character of the town is being searched for. Acceptance of the villa and guest-house model seems to be most attractive. Introduction of industry into that place has been

given up; development of a sailor's marina is suggested in place of the former post-German factory. Sanatorial services and exploitation of the local mineral springs are planned owing to the landscape and climatic attractiveness. The town development is supposed to be based on tourism. The pressure of the so-called „short-time" investors is unfavourable for the town, as they only intend to build temporary facilities in no time and make quick profit. Hotel owners, interested in putting up structures and keeping them in the right order, would bring more advantage to the town. The necessity of designing within the existing Międzyzdroje structure corresponds to the possibility of town development; in terms of the territory there are no big opportunities since water limits the town in the north and south, and the areas of the Wolin National Park – in the east and west.

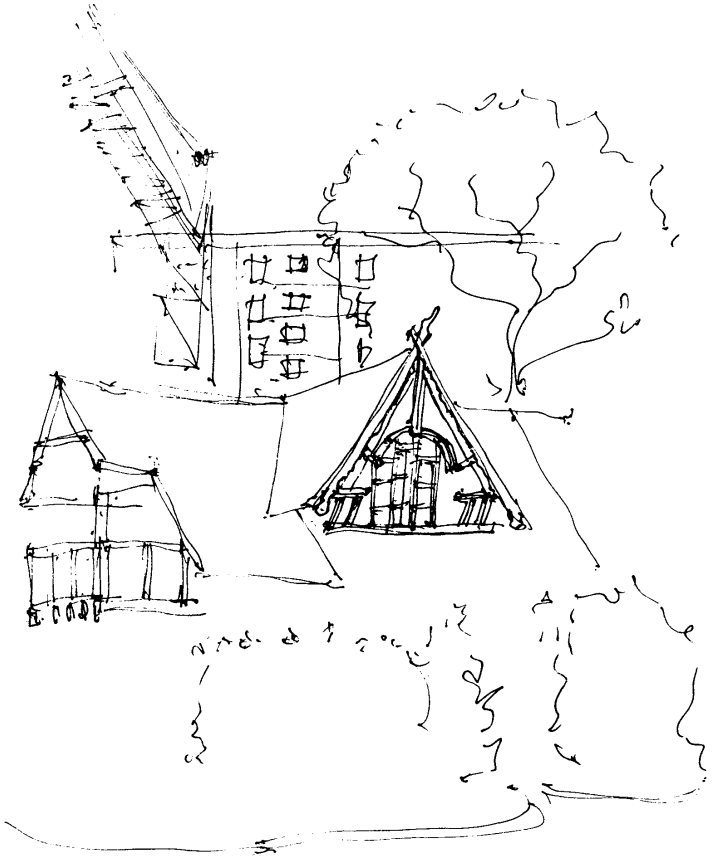


Fig. 4.1. The Miedzyzdroje resort was developed with romantic wooden buildings. At present, concrete hotels are built here, at times in the technical belt of the coast (R.A., 1995)

The works aiming at making the nearby spots equally attractive seem to be most appropriate. For instance, Dziwnów appears to be one of the towns of unexploited opportunities. The coastline here is marked by the continuous belt of vegetation, behind which there is the urban zone. The Dziwna river, flowing through the west-

ern part of the town, and the outer harbour with breakwaters constitute a gap in that arrangement. Dziwnów may develop in the western and eastern direction; in the south the town is closed by the harbour located at the Kamień Basin. A close connection of the town with the town-planning arrangement of transport is being developed; among others, another water-route connection has been planned. At present, in the summer season, one can set out on a voyage to Kamień Pomorski and back.

In the case of Dziwnów it is hard to discuss any function split into the right-shore and left-shore part. The existing drawbridge is of very low flow capacity. However, it is possible to situate elements which are not directly linked to tourism and relaxation (e.g. fishery and gardening) in one spot, for instance on the island. Parallel to the above activities, restoratiohn and architectural renovation of the town are being planned. Currently, many of the activities are merely makeshift ones, not taking into account the sense of aesttheics among tourists, holiday makers, and guest-house visitors. Many old, pre-war buildings are on the decline since there are typical „ghastly structures" of the bygone half of the century next to them, and the hastily rigged up gastronomic outlets resembling builder's barracks.

It is necessary to develop the Baltic coastal zone, but the works should proceed without any damage to the natural landscape. Therefore, it would be risky to deprive the Nautical Office of their custody over the technical belt and hand it over to communes, as this may bring about wilfulness and chaos.

4.3. The Portuguese dunes and shores – Ria Vouga

Coastal currents and winds shape dunes, which constitute the transitory belt between land and the sea and protect the land against the pressure of the sea, sands, and wind, especially during storms.

The life on the dunes is determined by environmental conditions: the intensive sun radiation, soil hungry in organic matter, increased salinity, poor resources of fresh water, and strong winds. The species of vegetation existing here, e.g. the thistle, stabilise the dunes with the dense net of their roots, by means of which they constitute an extremely vital layer. Also, the diverse fauna is connected with the dunes; among the species there are certain distinguished insects, such as e.g. Cynthia cardu, and some birds, e.g. Larus argentatus (the herring gull), Pluvialis (the plover), and Sterna albifrons (the little tern).

Protection and utilisation of the dunes are subject to detailed and rigorous rules, which are supposed to guarantee the dunes fulfilling their function of shore protection against the sea pressure. It is forbidden to perform any activities which contribute to degradation of the dunes and the vegetation and fauna existing on them, as well as treading paths, changing the course of streams and the coastline, building houses and roads on the dunes and beaches, which disturb the natural balance between withdrawal and restitution of the sand.

Coastal areas should be utilised by humans providing the latter take the particular properties into account. Roads leading to construction areas should run at the distance of at least 2 km off the shore. However, only special offshoots should reach the sea. On the dunes there should be staked out raised stone paths using the natural area configuration.

The systems are in a dynamic balance and degradation of a single element may start destruction of the whole system.

Dunes are formed of the sand carried by the sea and, then, by the wind. The sand accumulates in the form of small hills, which are fixed by vegatation. As a result of the activity of the wind, dunes get higher and higher. A constant sand movement forced by the wind and waves occurs, and the vegetation causes dunes to persist. Dunes and their vegetation constitute the best shore protection. Therefore, they deserve special care.

S. Jacinto

The S. Jacinto dune reserve was established in 1979. It is limited in the north by the saections of S. Jacinto and Torreira and the communes of Aveiro and Murtosa; in the south – by the Sandy Road , in the west – the Atlantic Ocean, and in the east – the state road. A major part of the area making up the reserve belongs to the state. The only exception is the small area in the north-east, close to the road which is privately owned.

Dunes have been formed on the sand belt situated under the water and parallel to the coastline. The belt, due to the activities of waves and winds, started to rise above sea level. The whole territory of the reserve is formed by sands stopped by pine and acacia woods planted by foresters. Artificial reservoirs have been formed inn order to create appropriate conditions for protection of certain species of birds. The reserve is rich in lichen which covers a large part of the pine woods. With their own requirements as to the type of soil, localisation, and exposure, they play an important role as an indicator of natural environments contaminated to a small extent only.

In order to protect the values and resources of the natural environment, strict reserves, occupying the area of 102,5 ha have been established.

Afforestation of S.Jacinto with green pine started in 1888 and lasted until 1924. It aimed at stopping the dunes and using the areas for arable crops later.

Within 100 years they fulfilled their function and became and integral part of the region, still remaining in the hands of foresters. They have never been an area of wood- obtaining (unlike other woods of that type) and that is why their richness results not from economy, but is based on the quality of the biotope which had evolved in the natural parts for all those years.

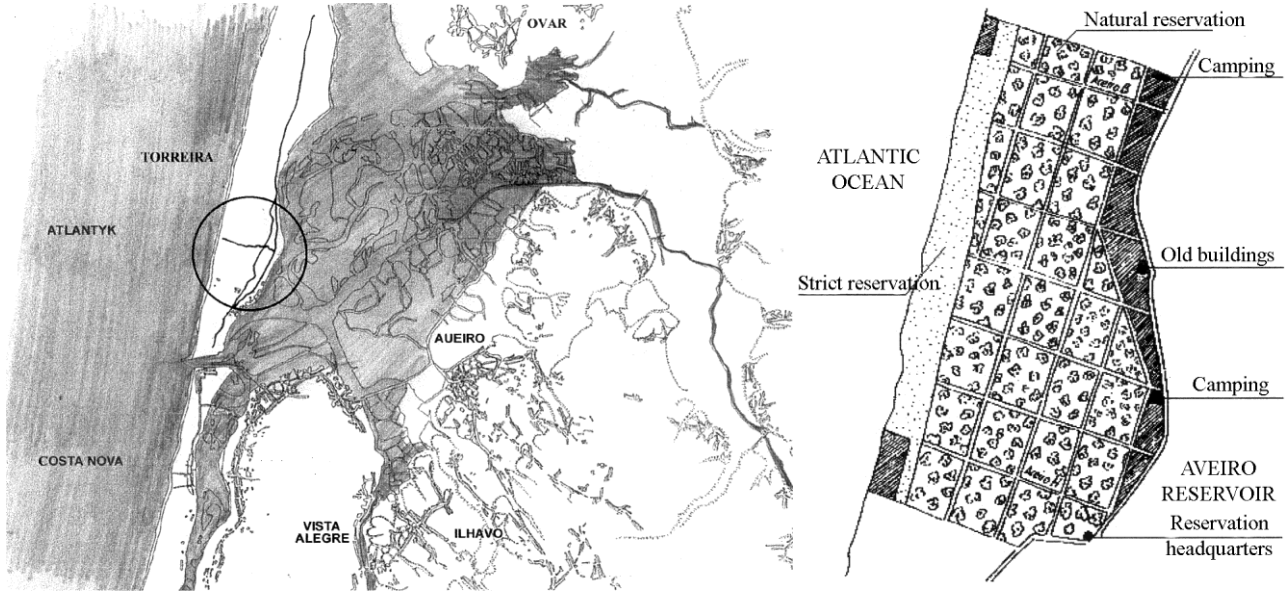


Fig. 4.2. The basin of Ria Vouga : a) the map with the marked reservation area, b) the reservation plan

The woods are annually visited by thousands of tourists who follow the „path of nature exploration" and discover the values present in nature, as well as the meaning of balance, of which woods are vital components.

Woods and greened areas, being the last element of the natural evolution of vegetation sets, are of primary importance on different levels:

– they provide shelter to a great variety of plant and animal species,
– diminish the speed of winds,
– restrain soil erosion,
– regulate water level,
– increase humidity,
– release oxygen,
– constitute a living laboratory in which scientific and research works can be conducted;
– constitute an important area serving the development of activities favouring environmental education, especially among young people.

Torreira

Torreira is situated on the sandbar between the Atlantic waters and the basin of Ria Vouga. There is a great similarity to the Hel Peninsula, and even to the Wisła Sandbar.

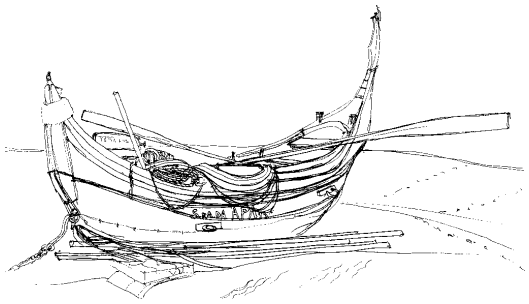


Fig. 4.3. Torreira – a fishing-boat for fishing on the Atlantic coast, adjusted to overcoming breakers; hoisted onto the shore with tractors – formerly it was done by oxen (R.A., 1997)

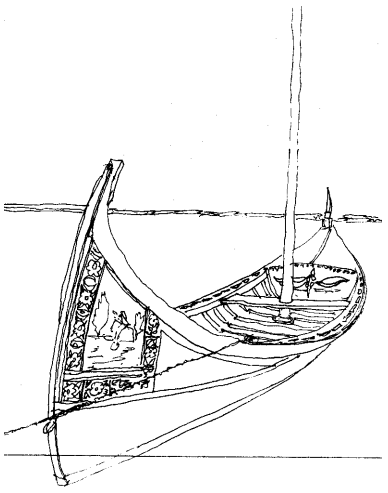


Fig. 4.4. Torreira – moliceiro – a fishing and transport boat typical of the Ria Aveiro broads (R.A., 1997)

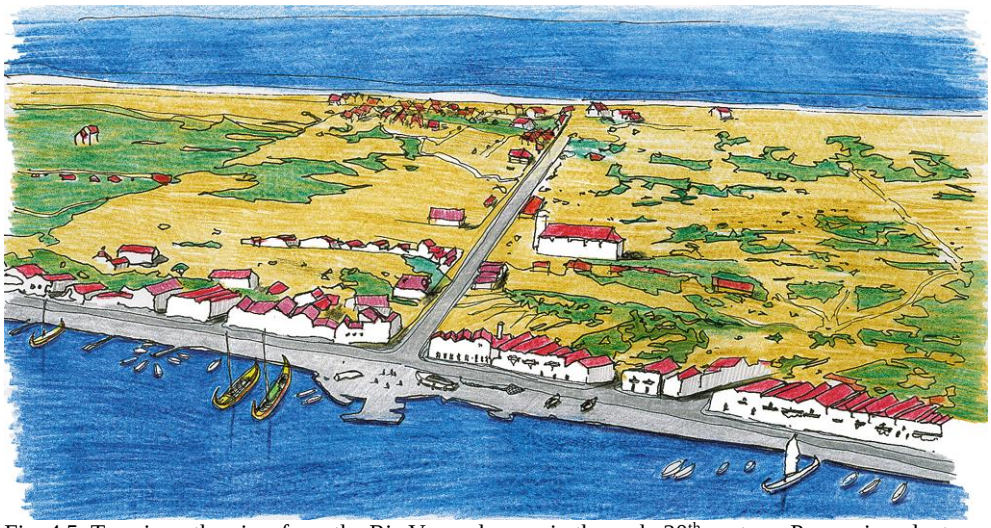


Fig. 4.5. Torreira – the view from the Ria Vouga lagoon in the early 20th century. Processing plants and first tourist facilities developed on the side covered from the winds (R.A., cf. Fig. 4.6)

Fig. 4.6. Torreira – the on the Atlantic side in the early 20th century. The fishing buildings adjusted to fishing and fish processing in the coastal zone; apparently, chaotically spread on the sandy dune (R.A., according to the photograph of the early 20th century, by the photographer's of "Fotografia Guedes")

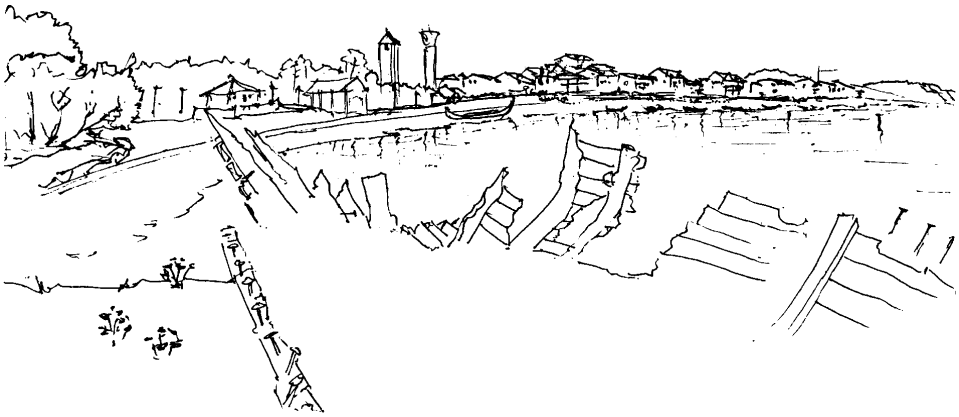


Fig. 4.7. Torreira – the view from the lagoon of Ria Vouga. Remains of the transport fishing-boat in the foreground (R.A., 1997)

Fig. 4.8. Torreira – the view on the ocean side through the Atlantic beach. At present, the service and tourist functions predominate over the fishing ones (R.A., 1997)

Fig. 4.9. A summer villa in Torreira by the road between the lagoon and the ocean (R.A., 1997)

The basin of Ria is subject to shoal patch. Also, its surface is getting smaller; in the south, the town of Aveiro is spreading its harbour and suburban areas, filling the basin. Moreover, the renowned seaside resort of Costa Nova is spresding at the expense of the Ria waters. The northern part is more natural and is not subject to the expansion of the suburban buildings.

Torreira has two elements crystallising spatial and economic development: the waterside at the Via Rouga broads and the fishery settlement on the Atlantic beach. Both centres are connected by means of the road along which *mariscu*, seafood, were transported in donkey-driven carriages. They fished in the ocean, at a small distance from the shore, on special boats capable of overcoming breaker waves. Another technique consisted in taking the free end of a net into the sea and coming back to the shore a few dozen metres away, which formed bends – a trap – on the water. Next, the net was pulled onto the beach by harnessed oxen. That way, called *vagueiros*, served catching fish roaming along the coast. In figure 4.6, made on the basis of an aerial photograph of the early century, one can see groups of buildings on a sandy patch of the sandbar. Also, the nets, which have a special place in the town-planning system, are visible there.

On the side of Ria food processing factories and warehouses were located. *Mariscu* were transported by boats to the towns of Aveiro and Ovar.

Moliceiro were characteristic transport boats. Silt and algae for soil fertilisation on agricultural land were transported in them. The boats were shaped in a special way, with high bows and colourful guild or family paintings. The harbour of Aveiro in the town centre, where the boats sailed, is called the Portuguese Venice.

The development of tourism at the end of the 19th century led to developing villa buildings in seaside zones and towns.

4.4. Studies on the dispersion of the Tet river in the Mediterranean Sea

This was a very interesting experiment which may make people aware of the hazard connected with carrying pollutants by river and sea waters, and the influence of this hazard on the development of tourism and residential areas. The study consisted in two-time letting rhodamine – the red, non-toxical dye – into the river and observing how the fresh water of the Tet river is scattered in the sea, resulting from the southward wind and the phenomenon of tides. The operations were called Pelican I and Pelican II. The main reason for the study was the bad bacteriological condition of the summer resort waters and the mouth of the Tet river.

Results of similar studies of water condition on 1500 French beaches are generally known, but bans on bath were not always respected. The lack of epidemiological studies made it impossible to determine consequences of pollution in a precise way; however, it is certain that one should take the risk of water-related diseases into account. Even the risk of typhus cannot be ruled out. Pollutants appear periodically, which makes an epidemiological analysis even more complicated.

Depending on the wind direction, the water quality in the sea deteriorates on one or the other side of the Tet mouth, according to the following mechanism: when the wind blows from the south (or south-west), the beaches north of the Tet mouth are polluted, and when it blows from the north (e.g. influenced by the high tidal water – the north-west wind), the beaches south of the Tet mouth are polluted. However, that simple mechanism is not enough to account for the phenomenon discussed, because it sometimes happens that under the influence of the naval wind the beaches in Canet are polluted, while results of analyses are positive in Sainte-Marie.

The impact of local currents does not account for the changes, either. It seems that the key to these phenomena lies in the special functioning of the Tet mouth – in the fact that water is at times stopped by the more or less silted shore belt. Occasionally, when the water is exceptionally low, the intensity of the current flow almost fades.

On the silted shore belt, with no human interference there occurs a certain balance between very weak water inflows and losses caused by filtering through that belt. Sometimes a rapid overflow may occur; in that case a considerable part of fresh polluted water keeps flowing into the sea for a long time. Changes in wind directions can, therefore, account for certain wrong observations.

It has become indispensable to synchronise operations performed on the land (topographical pictures), on the sea (taking samples for analyses), and in the air (aerial pictures). The concept of the experiment was very simple: dye the Tet waters in such a way as to observe how they spread in the sea. Aerial pictures were supposed to make a quality interpretation possible, determine precisely the parameters of the experiment, temperature and quality of the water, direction and intensity of winds and currents at different depth.

The contaminated zone is not limited to the offshore zone, so polluted places can also be found on the open sea.

The depicted situation causes unrest not only because of the development of tourism. Continual spreading of pollutants cannot be neutral to the naval environment; it can even curb the development of fishery and fish-breeding.

Spur construction at the Tet mouth would contribute to a better protection of the area between Tet and the harbour of Canet, but it would not preserve the beach of Sainte-Marie. The ultimate possibility would consist in reinforcing the shore belt in such a way as to preserve the natural assets of the water environment at the Tet mouth and minimise the hazard of pollutant penetration.

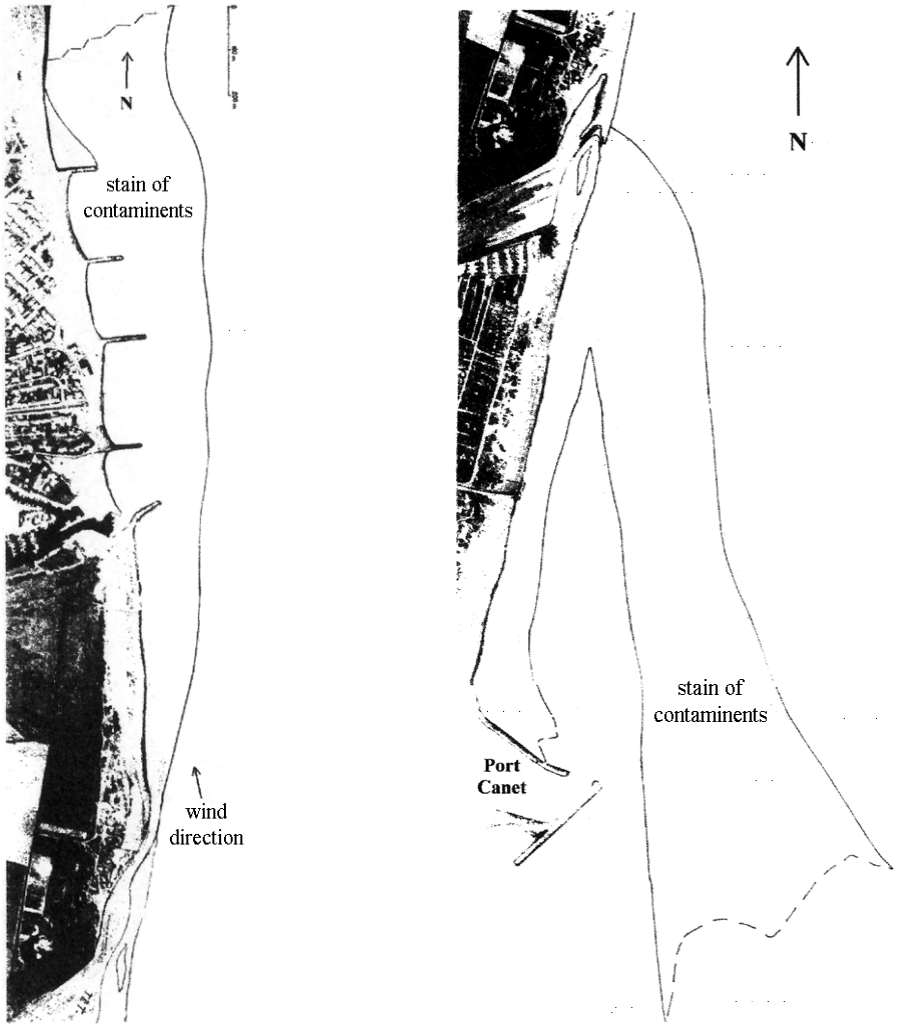


Fig. 4.10. The map of the mouth of the Tat river; the coast: a) north of the mouth, b) south of the mouth

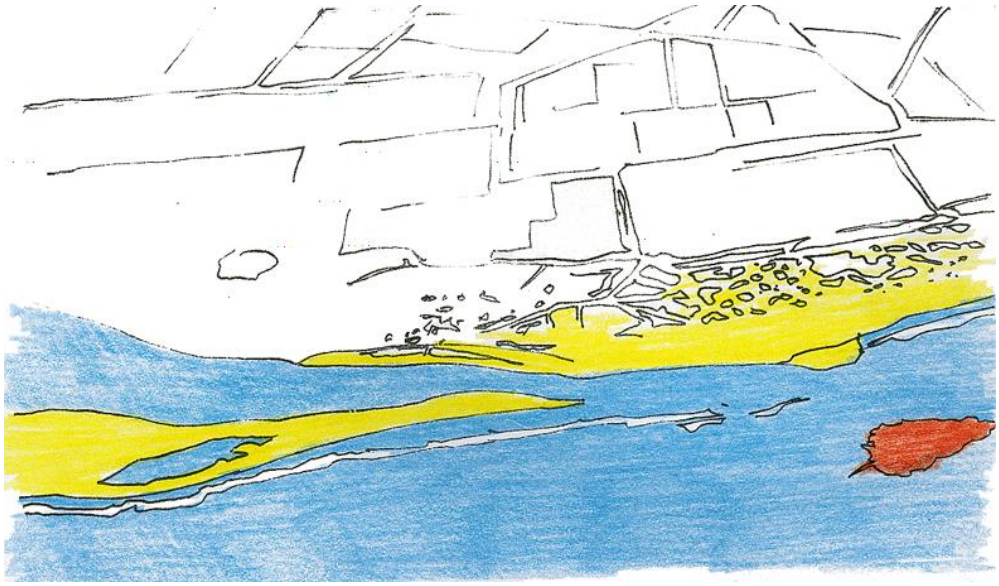


Fig. 4.11. Pelican I: 10 min from the moment of letting the first dye in, 40 m. from the shore. The second portion was poured in at the very mouth of the river to pick out the difference in , caused by the initial speed of the (all the drawings were placed here according to the direction of the stain movement; R.A. on the basis of [55])

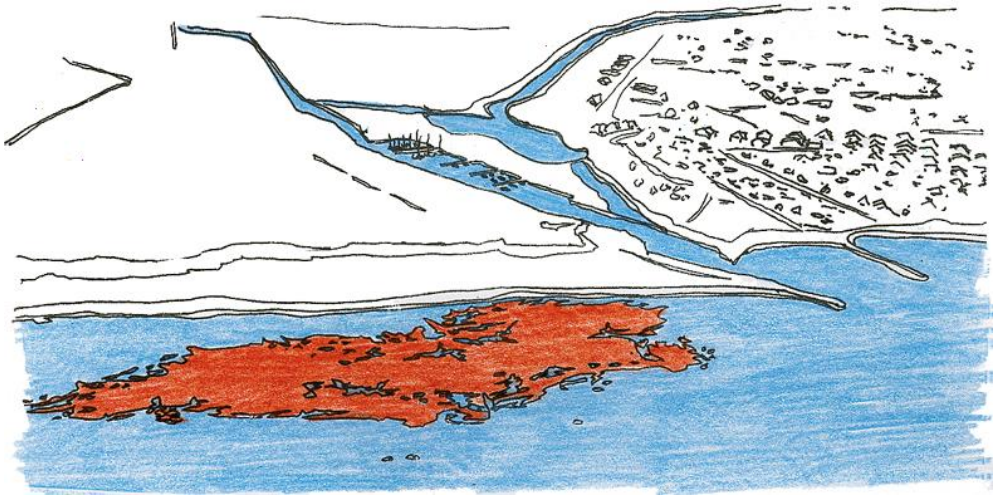


Fig. 4.12. Pelican I: the stains have merged – the beach of La Crouste is threatened

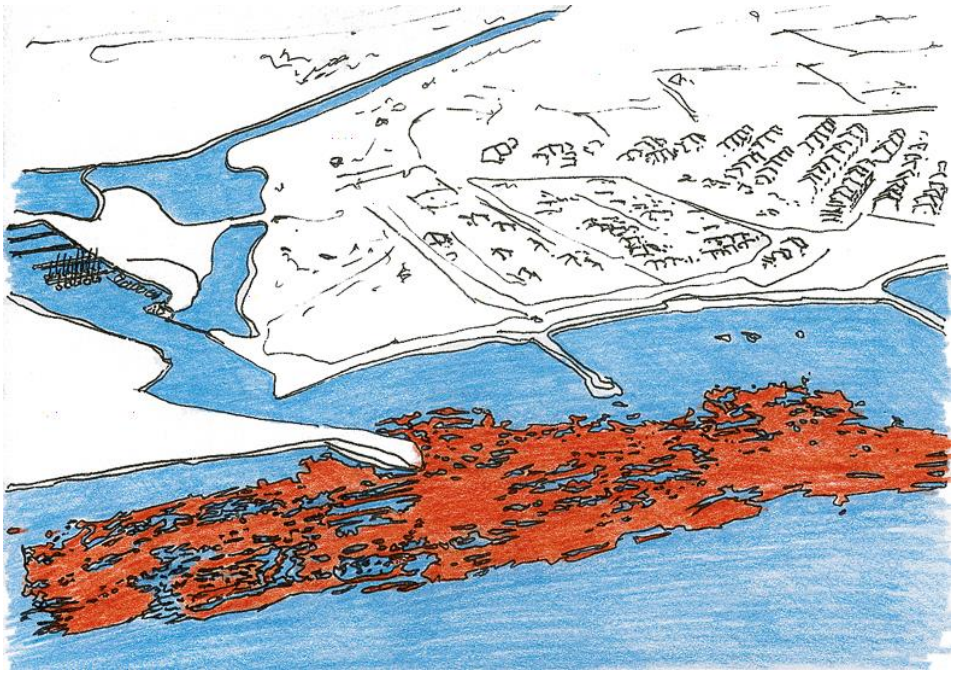


Fig. 4.13. Pelican I: the stain has reached the beach of Sainte-Marie – the solution is becoming clear

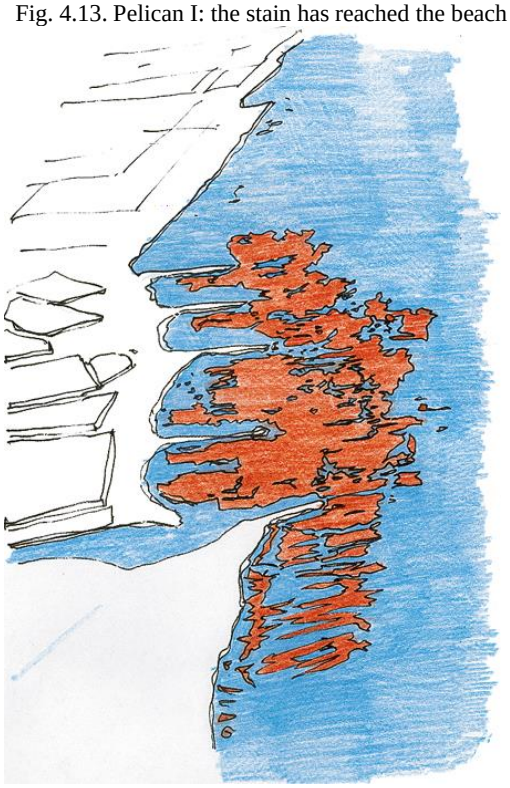


Fig.4.14. Pelican I: one can see that the dye is circling the groins and the stain is slowly getting into the bays

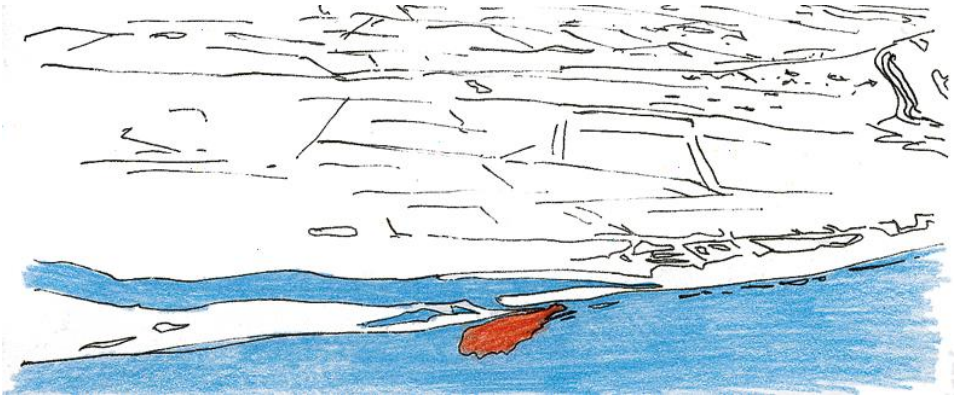


Fig.4.15. Pelican II: 5 min. After pouring the dye in one can see that the stain at the Tet river has moved since the moment of the Pelican I operation

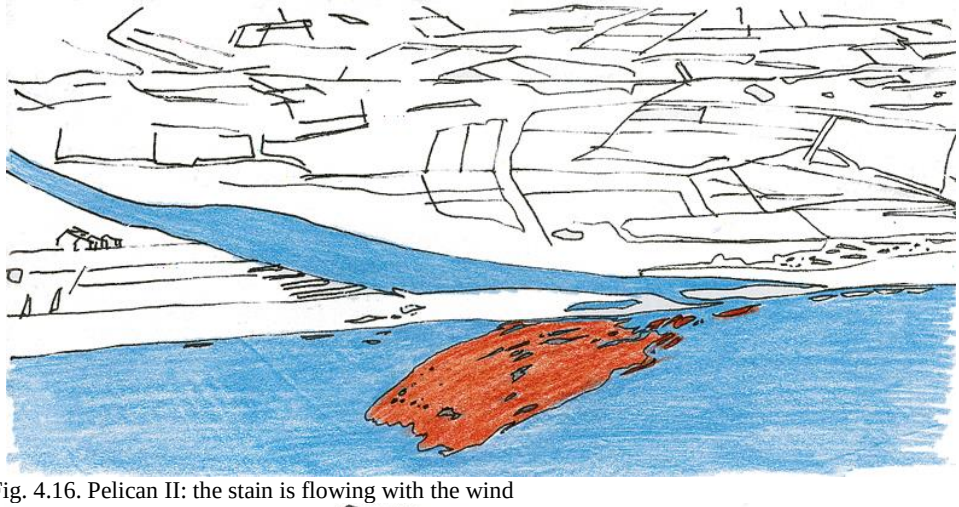


Fig. 4.16. Pelican II: the stain is flowing with the wind

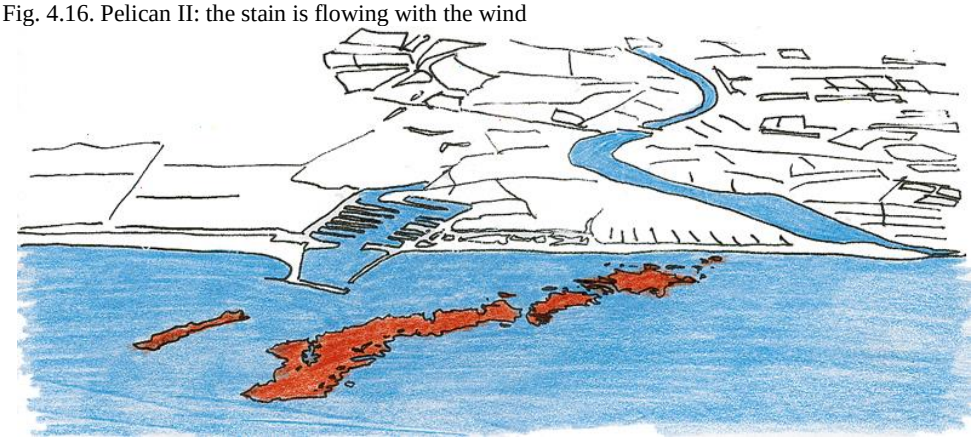


Fig. 4.17. Pelican II: the stain is divided into two parts – one is coming back to the beach, while the other is moving to the open sea. The second pouring in took place opposite the southern head of the Canet harbour – the current did not change and both stains are situated on parallel routes

4.5. The tunisian *wadi*[2] and the bay of small sirta

The bay of Small Sirta (Kabiska) constitutes a phenomenon among the African shores of the Mediterranean Sea. Due to tides amounting to about 2 m., a large area of the sea bottom is exposed, stretching up to 50 km away from the islands of Karkanna. The bay is inhabited by numerous species of birds, crustacean, and fish.

The Karkanna archipelago

The Karkanna archipelago lies at 5 m. above sea level, occupying the area of 40 km. The two main islands belong there: Al.-Gharbi (in the west) and Asz-Szarki (in the east); uninhabited islets constitute the rest.

As a ship approaches, the islands slowly emerge from the sea and the palm-trees seem to grow straight out of the water. Then, a dark green wall of the palm-tree woods is outlined against the background of which the white towns with their house clusters and spots of sanctuaries with their glowing domes stand out.

The archipelago is a culmination of the broad submarine plateau of low inclination made up of shoals in which depressions and patches of silted sand appear alternately. These zones, barely covered with waves during low tides, are cut by wadi – 5–12 m. deep tidal channels, on which feluccas navigate under triangle-shaped sails.

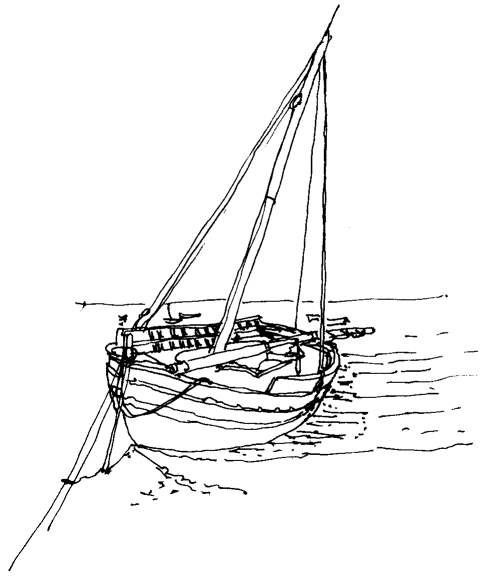


Fig. 4.18. Felucca in Tunisia at the bay of Small Sirta. Over half the boats and fishing-boats for coastal fishing do not have engines (R.A., 1997)

The town of Safakis constitutes a natural market for the inhabitants of the island. Captains and freighter sailors knew the shelf topography, all the depressions, and wadi of the bay of Small Sirta by heart; they played a crucial role in the commercial life of the town. The islanders' connections with Safakis were so strong, that theyenjoyed the exceptional privilege of living within the town walls. Inhabitants of the town could, in turn, graze their herds on the islands, set up gardens, and settle there.

Fixed fishing instruments are put up in many places around the islands, and owing to the presence of the

[2] *Wadi* (arab.) - dry riverbeds in the desert filled with water only during the rainy season. Here, the water channels in the sea at low tide.

shoals – even 50 km north-east of them. Gilthead,

Fish traps are made of palm leaves, while trunks serve building construction, and palm juice is used to produce the syrup called *lakmi*, which turns into wine after fermentation. There are also olive-trees, fig-trees, and vineyards; however, 15 000 inhabitants of the island live mainly on sea resources. In summer 120 000 stay there, because immigrants and tourists come along.

On fisheries traps of palm-leaves are arranged in the shape of the V letter, which causes fish to come through a wide tunnel to a small chamber, where they fall into crawfish traps made of twigs and leaves of date-palms. During a tide the same type of crawfish traps are often used, and in the summer - plaited drift nets for catching mugile. Octopus is caught on the shore with one's hand or a trident. The most unique technique consists in setting a trap in the form of jugs connected by means of ropes called gargoulettes, which are the favourite hiding for octopus. The harbour wharves in the bay of Small Sirta, on the islands of Karkanna and Djerba are crammed full of jugs in the shape of amphors ready to be taken for fishing.

Sponge fishing takes place in summer, when the waters are clear. Sponge is hunted for from the surface by means of some kind of glassed bucket and fished out by means of a harpoon of five teeth.

Barges of flat bottom, adjusted to sailing on shoals, of single or double sails, have virtually disappeared. They have been replaced by harbour fishing boats for net fishing, setting out from new harbours.

Ways of catching fish

The technique called tavtaron is traditionally used in the bay of Small Sirta. Seine is taken to the sea in boats, and then pulled onto the shore by people standingon the beach. At the same time, fish is chased to nets from sailing boats. However, that type of fishing deteriorates fish , fry, and underwater vegetation.

Another means is fishing by lights, from which 30% of the Tunisian fish comes. It is possible to catch fish by means of trawl nets owing to the use of motor fishing boats whose mother harbours are mainly Safakis and Al.-Dakdija.

However, rowing boats and sail feluccas are used in most fisheries. Drift lines and trammel nets are taken away on them. Drift and anchored lines stretch up to 3 km and consist of a rope between the floats, a bottom net, or hooks with a bait. The whole is marked with red banners. It is also extremely popular to fish by means of floating nets (floats), called trammel nets.

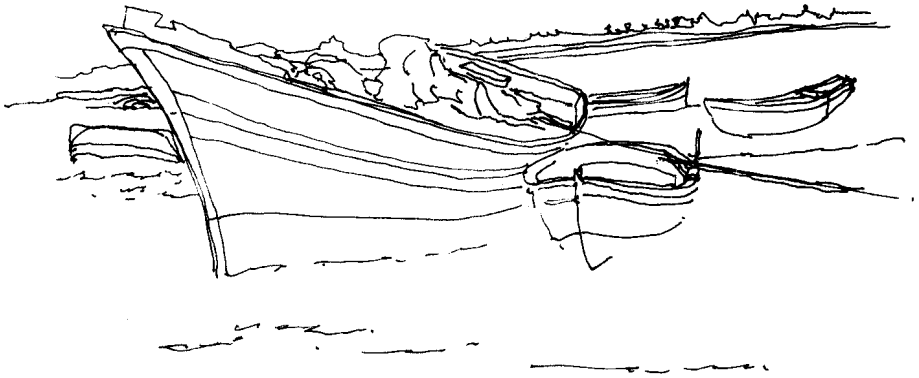


Fig. 4.19. Felucca and auxiliary boats on the island of Djerba in the bay of Small Sirta (R.A., 1998)

Susa – an Arabian town

The old town is arranged on a square, attached to a small hill in such a way that barges reach the walls. Nowadays the town is the capital of of the Tunisian Sahel.

In the north, along the beaches, there is the hotel zone, turned eastward and developed only recently. Gradually, it gives way to the dense urban structure. The suburbs, developed in the period of independence already, lead to the old European town, erected on the seashore.

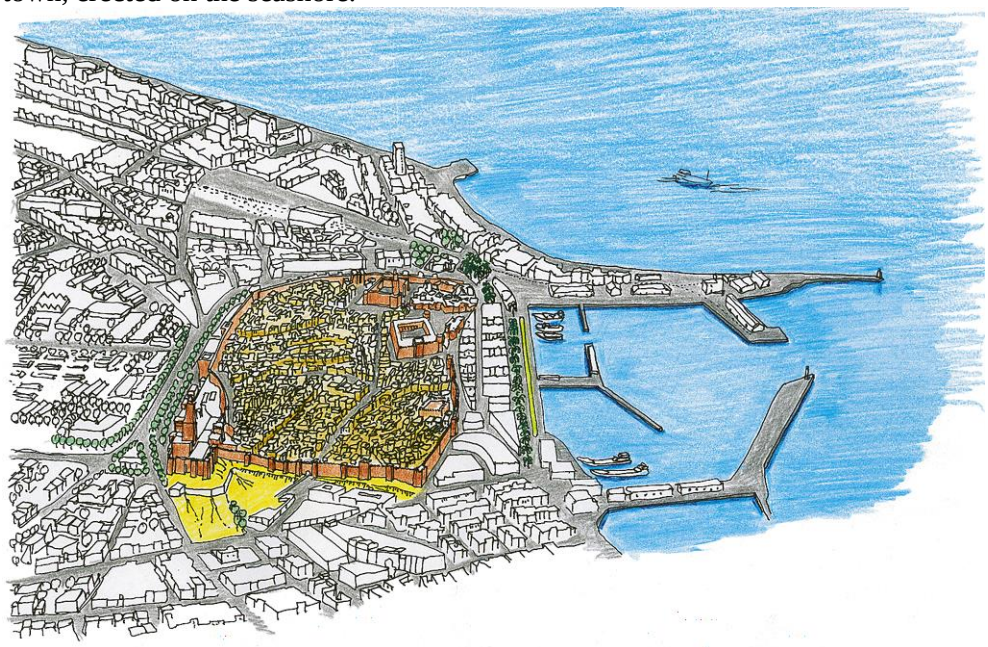


Fig. 4.20. Susa in Tunisia – the old town of Kasba surrounded by a European town (of the 19th and 20th century) with the commercial and war harbour, representational buildings, boulevards, and the hotel zone (R.A. on the basis of [73], 1998)

„The European town" is turned to the sea, with its back to the Arabian town, and it has risen around the locational square. Under the old town walls, nearly reached by the sea waves, a 100-kilometre-wide embankment was been raised and the Armand-Fallieres boulevard was marked there. In 1912 the town hall of Hotel de Villa in Spanish and Mauritanian style was erected here. The development was planned to be a finial of the harbour (of 1899), which was supposed to link Susa to the rest of the world by means of the railway opened in 1896. The only limitation which that Susa, as a garrison town was to obey certain military rules, was the ban on construction within 250 m. from the wall and erecting buildings higher than 10 metres on the seashore. The old Arabian town found itself between the old military garrison founded by the French in 1884 and the European district. The loss of its military character in 1921initiated further development of the agglomeration.

A casino (currently the theatre), court, bank, cinema, and numerous cafes were built. A tourist complex with a yacht marina was developed in the 1970.

5. COASTAL TOWN-PLANNING

5.1. Shaping the naval coastal belt

The North Sea

Human life on the coast has been marked with constant protection of the land against its flooding by the sea. After the last glacial period (around 10 000 years ago), the coastline shifted from the Middle England to Dogger Bank towards Northern Yutland. Since that time, the sea level has risen by approximately 40 cm, which brought about the intrusion of the North Sea up to about 300 southward, into the land. Between the year of 800 BC and the early period of AD there was clearly a more peaceful phase. The first traces of settlement of those times allow one to conclude that residential buildings were arranged as equal to the ground, so there was evidently no need to protect them against after-storm floods. Later, the sea level started to rise more intensively. The settlers were forced to erect earth embankments in order to protect their property against floods. At the beginning the embankments were merely a few decimetres high. As time went by, they had to be adjusted to the constantly rising danger of flood damage; at last they reached the height of 5m. Many of those have been preserved until today.

By means of erecting embankments the settlers could protect their households and cattle against flooding, but they were unable to protect the land. Its salinity, due to floods, brought considerable damage. Therefore, a continuous line of flood banks had to be built. First of such banks were formed around the year of 1000 A.D. The closed line of embankments – the golden ring – was presumably formed in 1200 A.D for the first time.

Locks, closing under the pressure of water from outside, started to be built nearby river mouths in order to prevent sea waters from entering river-beds and flooding coastal areas. Owing to auxiliary outlets, one could also regulate the level of inland waters. Where there was no sufficient natural water outlet due to the rising condition of sea waters, intermediate pumping stations had to be built.

After erecting embankments, inhabitants of the shore had to repair them and heighten constantly. Steady control of their condition was indispensable. Therefore, particular people were put in charge of particular sections. If one was unable to take care of his or her section, they had to stick their spades in the embankment as a sign. Then, they gave up not only the supporting activities on the embankment, but also their properties behind it. The ones who took their spades out, took over the duty of bank preservation, as well as the properties of their predecessors. The challenge: „The one who does not want to erect banks has to soak in the water”corresponds with the law of the spade.

Fig. 5.1. Breaking of the flood bank by the North Sea – the town completely destroyed by the sea [37]

From the 12th up to the 16th century numerous strong water currents broke banks and caused considerable losses. The flood of January 16th, 1362 claimed lives of about 10 000 victims on the northern coast. In the modern times there occurred the big floods of 1825, 1855, 1906, 1962, and 1976. However, progress in bank-erecting caused the losses to be relatively small.

Throughout the centuries one has also managed to regain the lost land. These areas (polders, the earth carried by the sea, overgrown with vegetation) are recognisable mainly owing to the presence of old bank lines.

New measurements for shore protection were determined by the flood of February 16/17th, 1962. In the Low Saxony alone, the water broke a bank in 61 places, damaged about 300 km of embankments, flooded around 370 km2 of inhabited land, caused people and cattle to drown and exposed houses to damage. Careful studies led to the conclusion that the existing banks did not provide enough protection. A new level of critical water, as well as the height of wave rising were determined; also, a new transverse section was worked out. The programme of protecting the coast of the Low Saxony, prepared in that way, included heightening and reinforcement of 585 km of banks, building 650 km of bank protection roads, and 24 new locks and 7 intermediate pumping stations. The procedures were largely carried out and the restoration process was finished around the year of 1992.

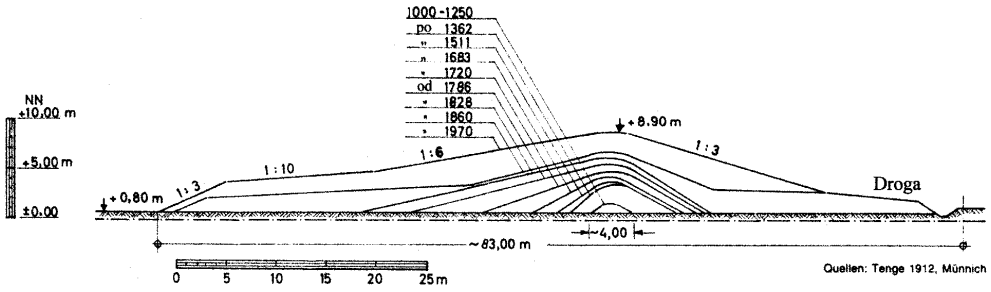


Fig. 5.2. A profile of by the Leybucht bay, showing their increase in height over the centuries [37]

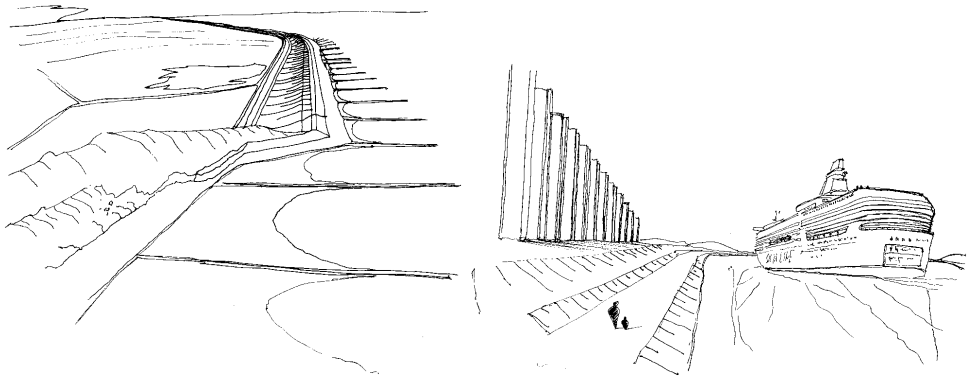


Fig. 5.3. The means of stabilising the Dutch coast: a) groins, bands, the wind protecting depression areas; the beach in the foreground; b) wind-protection dams – giant buildings in the form of pylons stretching for kilometres in places where storm winds push ships sailing the channels off their course; the anti-wind screens were created by the famous architect – M.Strijs (professor of the Academy of Architecture in Rotterdam, winner of numerous international contests) (R.A., 1995)

The Baltic coast – the Hel peninsula

Different assemblies – scientific institutes among others – deal with the strategy of shore protection. With their assistance, methods of monitoring and revaluation of these areas, as well as technical standards for protection systems were developed. Depending on the hazard, trims, steel walls, sand pumping, prostheses (artificial dunes), growing grass and Caspian willow, as well as protection of pyramids and star-blocks are used on the Polish Baltic coast. In special cases, drainage plates are applied. That is how protection of the cliff in Śliwino Bałtyckie looks like.

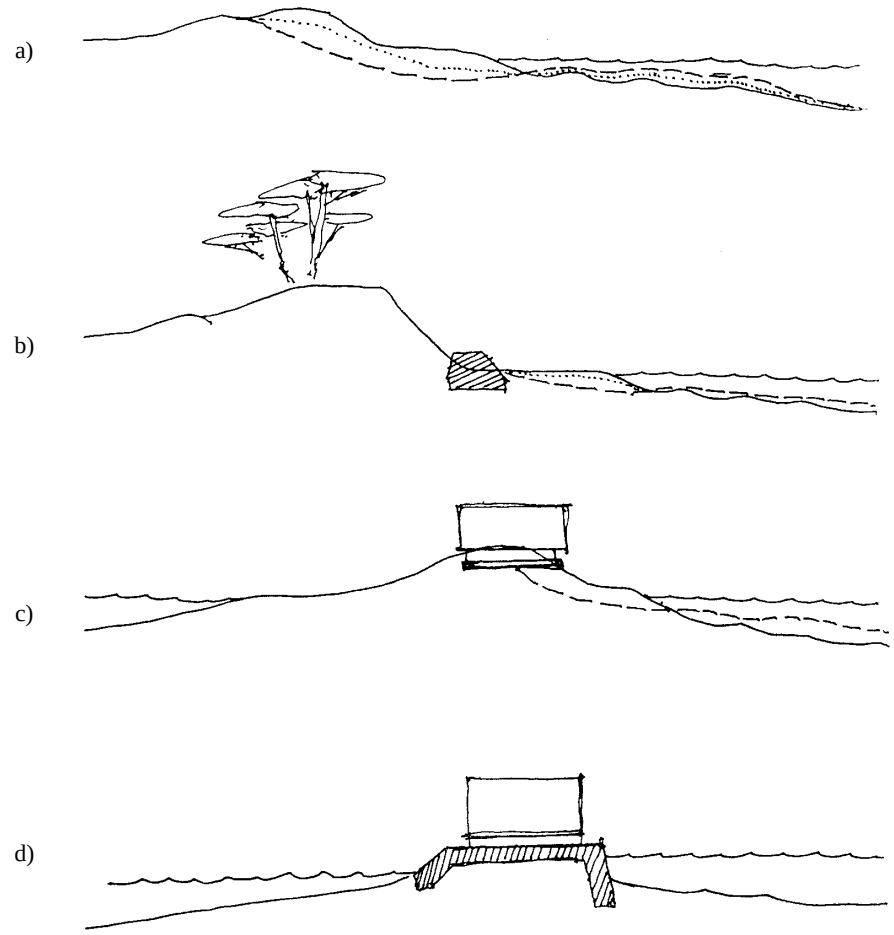


Fig. 5.4. Schemes of natural shore reconstruction after storms and building interference: a) a natural shore; b) a shore stabilised with bands; the beach is subject to destruction; c) locating hotels on the top of levee exposes it to washout during storms; some buildings were founded on plates, e.g." Amber Baltic" in Międzyzdroje, in order to shelter them; d) at times, within the frame of stabilising shores, islands, and sandbars, tops of levees are embedded in concrete; ——— a levee line, - - - - - - - - destruction caused by storm, ... natural shore reconstruction after storm (R.A., 1999)

The real danger of breaking the Hel peninsula, which emerged in the recent years, mobilised its inhabitants to organised activities and seeking optimal protecting solutions. The team of experts of the Institute of Nautical Sciences of the Szczecin University (acting on behalf of the Ministry of Transport and Naval Economy), directed by K. Furmańczyk and S. Musielak. When analysing aerial photographs, special attention was paid to the occurrence of abrasion bays and dune depression in places of potential hazard to the survival of the peninsula or flooding of the developed areas. The course, range, and shape of banks on submerged bars were studied in detail, and places of discontinuity, and their distnce

from the shore, were determined in submerged bars. The condition was complemented by protection buildings (groins) and regions of artificial sand admission. The outcome of the analysis of the collected materials, as well as photo-interpretation works, allowed making a synthetic chart of the hazards of the Hel peninsula. Shore sections endangered with washout due to low seashore dunes (or lack of them). Endangered shore sections, as well as the point of highest danger, were marked. When making the chart, information on the occurrence and number of submerged bars, their shape and trims within them was taken into account. The latter may locally increase the danger of shore erosion, as waves reach regions located close to the shore. Also, sections threatened with washout due to the great dynamics of shore shifts were staked out.

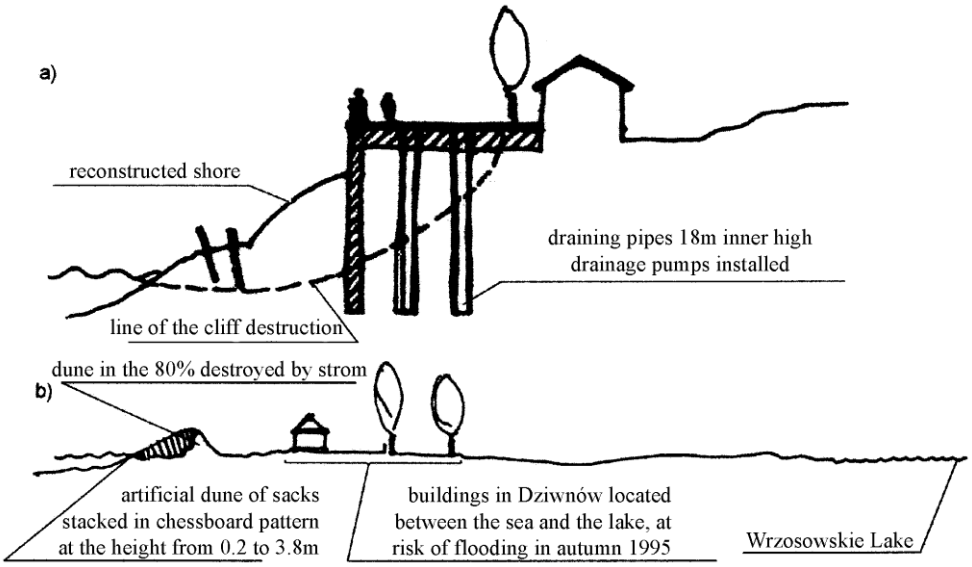


Fig. 5.5. Examples of shore protection used in the Szczecin Nautical Office : a) Śliwin Bałtycki – an example of shore protection by means of piling; the Rewal cliffs are built of silts and clay which form an impenetrable layer inclined toward the sea; sewage flow is prevented by using a pump and pipe system; b) Dziwnów – a land belt between the shore and the Wrzosowskie lake protected by dunes, which were destroyed in 80% in the winter period; the dunes are reinforced with polypropylene bags arranged to the height of 3,8 m. (R.A., 1995)

By means of putting together the results of all the analyses mentioned, a new classification of the hazards of the Hel peninsula was worked out. Sections particularly susceptible to deterioration were staked out (the most endangered shore sections threatened with washout, as well as relatively stable shore sections which are not exposed to any particular hazards). The outcome of the study proves the great diversity and changeability of the dynamic processes occurring there, even on the neighbouring shore sections.

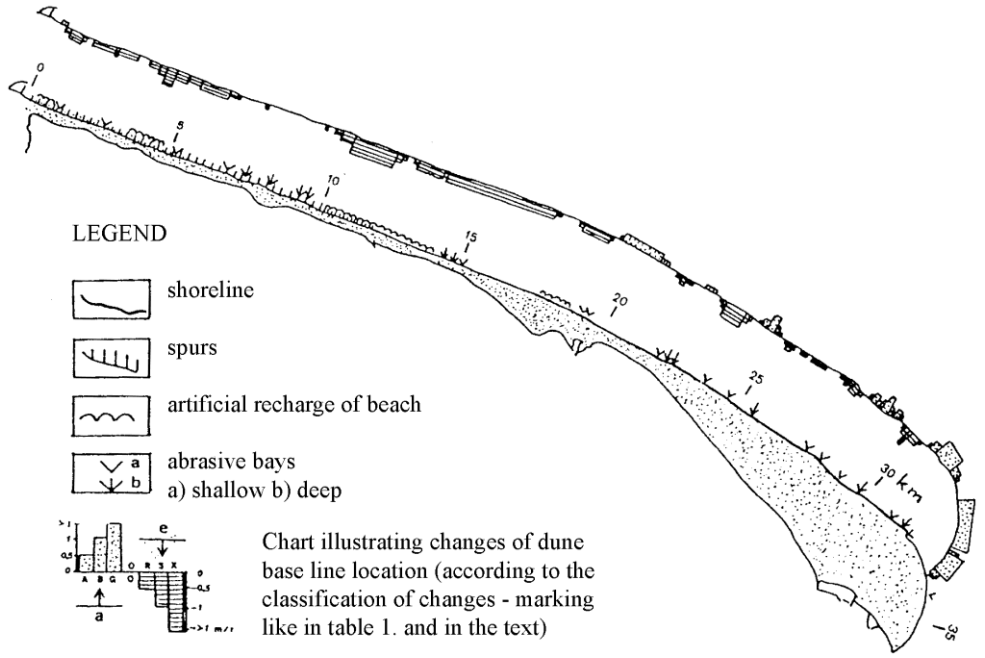


Fig. 5.6. Analysis of changes in dune arrangement shifts on the Hel peninsula [29]

The peninsula is clearly divided into the western and the eastern part. Shore sections qualified as particularly exposed to deterioration, and the ones threatened with washout predominate in the western part (0-19 km). Concentration of threatened sections occurred in two regions – at the base of the peninsula (the region of 0-6 km) and in the surroundings of Kuźnica (9-12 km). Only two small shore sections in that part were regarded as less endangered. In the eastern part only six endangered sections of small length, generally, were staked out (200-600 m.).

On the indicated shore sections of the Hel peninsula, most often with low dunes, there is the danger of complete dune washout and overflow of sea water. This threatens the buildings, the road, railway, and cable installations, vegetation, etc. The danger is even bigger because around 45% of the surface of the Hel peninsula is less than 2,5 m. above sea level high, and preservation of the bank of seashore dunes may cause widespread, long-lasting losses.

It is worth adding that the peninsula shores on the side of the Bay of Puck are also endangered, although waving is not so strong here as from the open sea. The main danger here is the possibility of undercutting low flat shores during high water levels. Also, the accumulating ice poses a substantial threat.

5.2. Redevelopment of harbours

A town situated near the open sea contacts it not only through its harbour, but also reaches the coastline directly with its buildings. Many a time, a town area is linked to the beach over many kilometres, while the harbour region contacts the open sea only at one point of its outlet. This entails the necessity of taking the role of a coast in seaside town-planning. The coastal line constitutes a real, optical border of town development, whose values are town-planning and landscape assets of the shore.

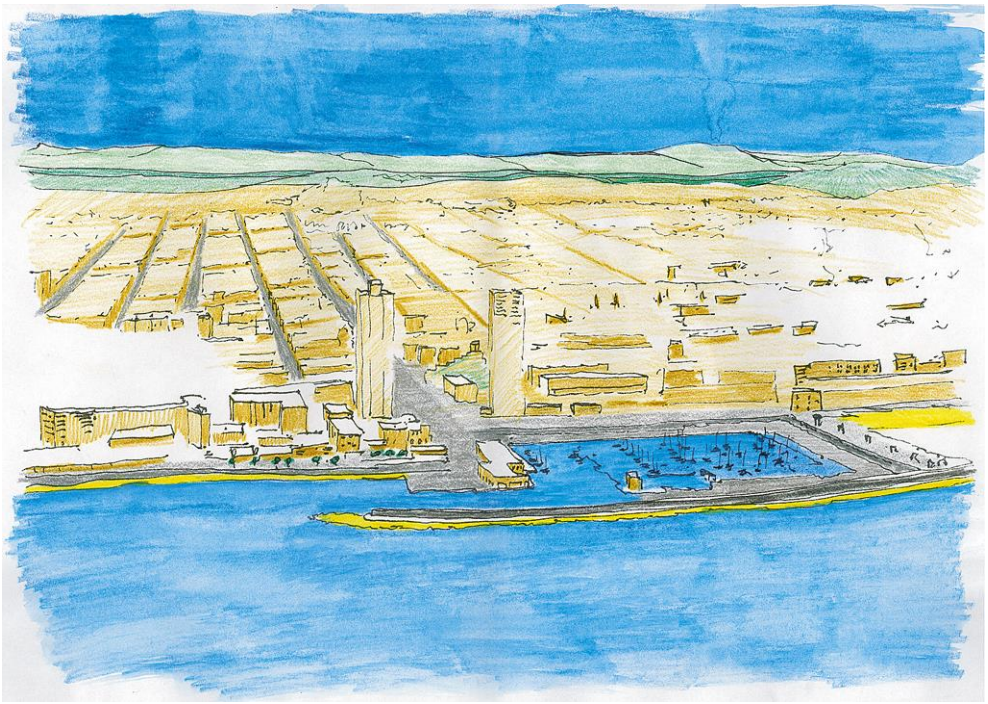


Fig. 5.7. Barcelona as observed from the sea. In the coastal zone the urban attractions have been located in the forms of interesting buildings and architectonic functions, monuments, squares, and harbour basins competing e.g. against the church of Sagrada Familia by A.Gaudi (R.A., on the basis of a map)

A big town may be situated in a different way in relation to the seashore. Some towns have their front turned to the shore (Genoa, Naples, Gdynia, Sopot). Others, whose development began in areas located far from the open sea, reached the shore only later. Town-planning arrangement of a naval littoral depends on its geological structure and configuration. A big-town front stretching along sandy shores will look different than one located on a high, rocky shore.

Depending on the shore type, one can distinguish three main types of shore configuration of a region:

– a sandy shore in the form of a beach stretching along an urban area and further; along the beach there is a chain of dunes, often covered with vegetation; the transverse arrangement of dunes should be adjusted to their height and the beach cannot be narrowed (it constitutes natural protection against waves); example: Sopot, Jelitkowo;
– precipitous shores of changeable height, narrow beach (areas between Gdynia and Sopot);
– rocky, irregular, precipitous shores of membered outline with narrow bays cutting deep into the land (the Croatian and Greek shores).

According to the general town-planning concept, the line of a seashore determines the direction of a continuous seaside vegetation belt, whose extension is a suburban area. A gap in that arrangement is made up by harbour areas with an outer harbour and breakwaters. Those areas are closely connected with the urban transport system.

Along the coastline there are local communication arteries connecting particular seaside districts and linked with outlets of streets perpendicular to the shore. Roads perpendicular to the coastline perform, apart from their transport functions, also the function of opening the town (inside) onto the sea. Some of them have a very representative character and end in some effective element at the seaside (e.g. the quay of Sopot, the end of the 10 February Street in Gdynia). Transit arteries located in the bring about more problems seashore belt, as they may cut the town off the sea (Chicago, New York).

The assumptions of the developed seaside street, especially determining its distance from the shore and the height and kind of its buildings, require a separate discussion. In many towns there was a tendency to place a promenade along the shore, built over with public institutions, hotels, and tenement houses. As this was broadened, the width of the beach diminished until a narrow belt remained (Nice, Hastings). The busy street formed a direct framing of the shore which was losing its character.

Where the shore was to serve relaxation, it was purposeful to form a wider vegetation belt. The arrangement of vegetation girding a seaside town contributes to improving its microclimate and calming the effects of wind gusts. The town silhouette, along with its cranes and harbour instruments, as well as the wide space occupied by residential districts, parks and promenades, is contrasted with the background of vegetation. From a distance, the town features are not very clear, as they are blended with the background of the land horizon or the clear line of hills. The view watched against the sun merges in a hazy whole; when observed with the sun, in turn, it forms a light solid, against the background of which all the foreground town elements vanish. As one approaches the shore, town fragments acquire more and more significance and the horizontal coastline stressed with the foreground line of buildings becomes the proper town front. The monotonous naval

horizon is criss-crossed with height dominants which are not only towers, sky-scrapers, cranes, and masts, but also solids of whole town districts rising on hills.

One should also consider harbour location in relation to an open shore in a town area. A harbour used to fill the developed part of a town, occupying the areas which are indispensable for town expansion. This may lead to cutting the town off the sea. A good town-planning solution consists in admission of the town centre in to the shore by means of situating the harbour on one of its sides and turning the town development in the opposite direction. A ferry, bridge, or tunnel may serve crossing the narrow harbour channel.

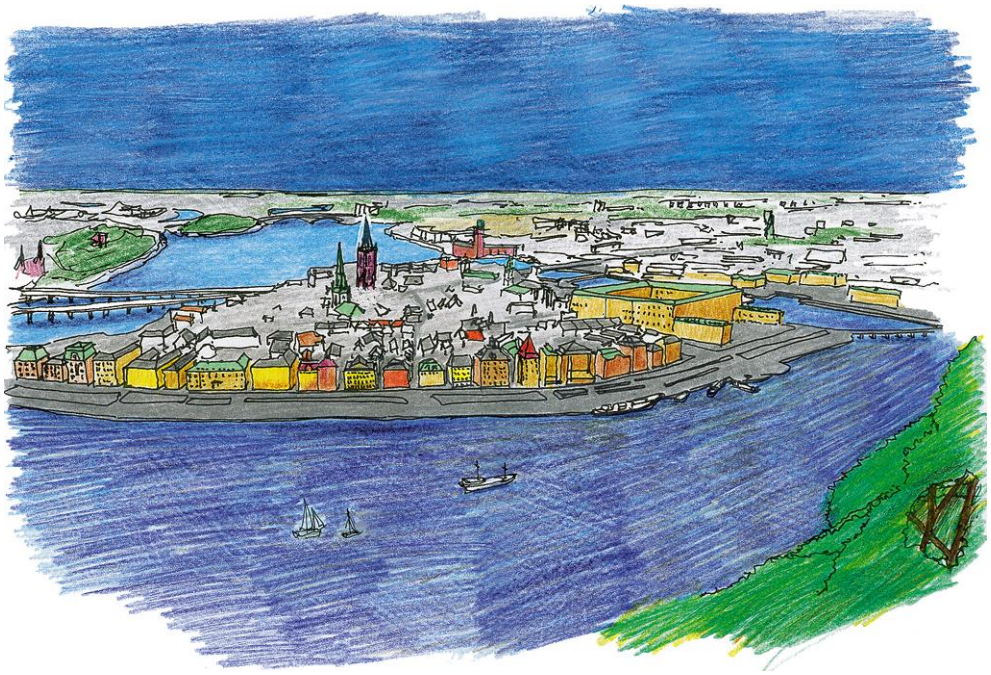


Fig. 5.8. Stockholm. The islands are connected by means of bridges and ferries. The transit routes cut the old town off the water. The old town has no location squares crystallising the space, and the 18th century's buildings have formed representational squares. The harbour areas, including the navy ship-yards, were converted into museums (R.A., 1998)

New techniques of transport (ships of high tonnage and draught, unable to sail deep into harbours) and cargo reloading (containers, crop elevators, etc.), as well as passenger transport, caused a change in allotment of many areas in harbour towns. Also, the human outlook on environmental protection, importance of the sea to a town, and its silhouette – waterfront – is changing.

A town constitutes a system of organically interconnected subsystems – social and town-planning. They co-operate on the basis of feedback, but are fully autonomous. Each of the subsystems mentioned was shaped by a sequence of historical events; owing to that, their interaction is always conditioned by the past – by the

experience of designers and constructors, as well as by the background and preferences of inhabitants.

Processes of recognising and creating town spaces have a continuous character; they can be studied incessantly owing to the accumulated knowledge. Along with the knowledge developed systematically and recorded in books, there develops the knowledge based on customs, folk sayings, proverbs, the one included in measurement systems, works of art, apartment and town structure, their plans and sketches. Also, codes with informational marking of a town (interiors, streets, through roads, and space symbolic), as well as colloquial language and some varieties of occupational languages make up the knowledge of space. Constant, conscious or intuitive, recognition of the immediate environment, e.g. flats, streets, way to work, accompany collecting information on the town or region.

In a well-known space one can move in an almost automatic way, requiring no special attention. Then, the process of recognition subsides and the internal system of identification (auto-guide) plays the role of a guide. Self-controlling psychophysical processes take over the role of a guide and read out well-known elements in an error-free way, making a proper frame of reference out of them. All elements of a well-known town-centre street, built of traditional details: door portals, windows, and the façade scale, slanting roofs, eaves, jutties, street pavement, its texture, smells of shops, bakeries, the noise and din of passers-by and vehicles, make it possible to determine its location in space in a unique way; simultaneously, they constitute a subconscious form of a guide, forming what we call *genius loci*.

Another situation may occur in a new, different or difficult, space in which attention is constantly focused on various environmental aspects, requiring reading or assessment. A rural area may constitute a new space to town inhabitants, while areas of modern blocks of flats – housing estates – may appear new to inhabitants of town centres. Both town-planning arrangements and building scale, as well as distinctness or lack of architectonic details, cause misunderstanding and call for increased activity. A similar situation concerns different environments, e.g. cultural ones (African or American towns to Europeans), geographical (the sea to a highlander), and others. There are also some difficult situations (e.g. a busy street, yacht entering a harbour), which call for active perception.

A harbour town makes it easier to the observer to spot the variety of frames of reference and spatial forms. This is particularly clear when coming out of narrow town-centre streets into a wharf. The specific character of the place can be identified by means of contrast of town-planning and naval scales[1].

[1] These issues are studied in the Department of Marine and Industrial Architecture of Gdansk University of Technology, among others, by D. Kaźmierczak and J. Bąkowski

Redevelopment of London docks

Areas of old docks have created biggest opportunities of developing seaside towns since World War II. So far, the chances have not been used at all. The architecture of docks, which corresponds with water and stresses its importance, is as significant as town-planning arrangement. In the London Dockland 8 square miles are developed with no integral planning assumptions concerning quarter development. Only the main transport structure and delimitation lines are planned. That way of building is called „organic" and regarded as the source of success by some people. Planning, often associated with bureaucracy, delays, and considerable expenses, was supposed to contribute to making such a dead place as docks more attractive. The problem was about creating plastic visions, images, and not plans; colourful photographs of boats, swans, sunsets, and isolated relics of the past – the „heritage" of that place.

In the initial stage, especially, closed exclusive residential districts emerged, deprived of any social infrastructure – common squares, generally available streets, cafes, etc. One cannot deny the fact that this was a case of erraneous town building from the very basics; later, the situation was normalised. The building development of the Heron wharf – the complex of offices, small companies, and apartments. Apart from such complex assumptions, attempts at wharf refining in the smallest scale emerged. The designs of Shadwell wharf and Lavender docks can constitute examples. Both refer to classic, typically English building patterns and, at the same time, they preserve features of seaside buildings – high, extending building facades emerging as if out of water, of colours characteristic of harbours (red and navy blue) constituting a background for masts and cranes. This should indicate the similarity between London and other harbour towns.

Apart from that cosy town planning, there are also enterprises of greater flourish – both in the scale of single objects and whole groups. It is characteristic that many of them refer to the architecture of ships or their symbolic. One of the first objects were Cascades on the Isle of Dogs. The twenty-storey solid emerges almost from the water, with the detail taken straight from some ship. The main commercial centre at Canary Wharf is designed even to a larger scale. This one is the biggest town planning enterprise in Europe at present, making full use of its location on the Thames. The design evoked many controversies, as it disturbed the former Renaissance axis; also, the architecture seemed too American to the critics. Nevertheless, the centre makes a grand impression – the big axis assumption ends in a water surface; on the side of the river a complex of skyscrapers, which house offices (for about 40 000 employees), and also hotels, a conference centre, banks, clubs, health-care institutions, and others. It seems that this direction of problem solving will predominate in London in the future. For instance, in his works, T.Farrel associates the wharf with the rest of „city"; other architects also aim at a limited joining of the city.

Redevelopment of harbour areas on the Hudson river

Both banks of the Hudson river have become, by far, the biggest in the world area of designers' activities. In the same way as in London, there is no established essential plan of dock redevelopment, but in many designs made at present there are proposals of moving and linking different functions, which poses a hope of bigger profits than the mono-functional solutions found on the banks of the Thames.

New York and Jersey City are two towns, psychologically, politically, and physically separated by the Hudson river. From Washington Space to the Statue of Liberty there is being erected a unique waterfront – of 18,5 miles on the side of Jersey City and of 10,5 miles on the side of New York.

The Jersey City shore had been completely filled with harbour and transport instruments up to the 1950s. In the 1960s and 70s, in spite of the emergence of residential buildings, nothing special happened. Only the 1980s are marked by the conditions for designing the development of the coastal part of the city, including the so-called Gold Coast. The designs encompassed 22 300 apartments, 13 mln square feet of commercial areas, and 2950 hotel places.

On the side of New Jersey in 1850-1950 there took place considerable transformations of the waterfront, connected with the development of passenger's and reloading wharves. In the 1930s, in turn, development of transport began, especially near Manhattan, which threatened it with being cut off the river. The 1970s brought the development of modern transport techniques, which caused a decline of the traditional functions of harbours and wharves. In harbour, railway, and warehouse areas about 39 000 apartments, 21 mln square feet of service areas and 1500 hotel rooms.

In many studies there appears an opinion that an integral plan cannot be worked out because the waterfront counting 578 miles is too large and diverse. Thus, the proposal has emerged to suffice at co-operation and consultation among designing units.

The architecture of Saint-Nazaire

In Saint-Nazaire one can observe a totally different approach of the waterfront problems. The author of the design, Y. Kersale, solved the dock problem by means of non-architectonic measures. He applied scenographic techniques – elements as if from stage shows. The ones who enter the Saint-Nazaire harbour at night witness an unusual light spectacle. After the several years of darkness the harbour became an almost mythical place to sailors. During the German occupation they built a base of submarine here – a concrete block of 300 m. length, 120 m. width, and 18 m. height. During the war the city lay in ruins, but the base was left untouched. The big solid cut the city off the harbour and caused the Atlantic coast to be practically unused. In the 1980s they decided to bring that part back to life. Creation of an eco-

museum was the main part of that reconstruction. In 1986 the 78-metre-tall submarine found its way to the museum instead of to a scrap.

The Mission Bay

Mission Bay occupies the area of 300 acres, which is not much as compared to the London docks. Its owner is the SPR Company, formed by a merger of two railway companies which occupy most of the area.

The plans of reconstruction of Mission Bay constitute a part of a long complex process. In 1980 they started to prepare the main plan of area management. The ultimate plan, which received a prize later, met opposition of different communities of San Francisco. Forming of another town-centre was suggested in it, including 42-storey office buildings, numerous residential buildings, and a network of channels linked with the existing China Basin Channel. The opposition of the existing financial district was caused by the small distance of the new town-centre – the concerns were based on experience of Oakland, where the primary centre sustained losses because of the close neighbourhood of a rival. The inhabitants living in the neighbourhood of the Portero Hill district opposed concealing of the view of Mission Bay and the Bay Bridge by the proposed new skyscrapers. Some other voices were directed against colossal expenses connected with covering the costs of erecting high constructions, as almost the whole area is situated on the bay morass. In 1984 a decision was reached concerning preparation of a new plan of Mission Bay management. The design was supposed to contain at least 7500 residential units, 4 mln square feet of office space, 2,5 mln of development space, and buildings of up to 8 metres' height.

The hired architects and planners under the leadership of D.Salomon were asked not only to make an integral plan, but also to assess different strategies of the area development and prepare exact regulation lines of housing estates, offices, research centres, transit, and open space. Regulation lines marking residential buildings are particularly important, as they decide whether a new part may unite with the rest of the city.

Daniel Salomon, intending to preserve the characteristic features of the residential buildings of San Francisco, prepared basic rules, later included into the design, which not only regulated the height and size, but also took into account the traditional small architecture of the area. The traditional residential buildings and their character were violated at that time by misscaled designs which broke all the unrecorded rules. The designs by D. Salomon proved that the traditional type of buildings could be kept with a simultaneous consideration of the current conditions (cars, fire protection, etc.).

The Waterfront of Sydney

Sydney went through the same kind of trouble as each big agglomeration whose waterfront calls for "sprucing up". Initially, concepts emerged to turn the Darling

bay surroundings into a landscape park or a medium-intensive residential area, or a commercial centre with offices rented by means of tenders, which would bring considerable profits to the city. The governmental intervention determined the fate of the bay: the city interests were combined with the needs of its inhabitants. There emerged exhibition halls, a conference centre along with hotels, an aquarium, and a nautical museum. Also, space was found for a 1-ha's garden in a traditional Chinese style. The design by Ph. Cox and J.Andrews brought a considerable diversity into that place: the casino (presumably the largest in the world), the restaurant complex, shops, and such conventional elements of town-planning as parks and – what is obvious – the seaside promenade. The 200th anniversary of the discovery of Australia had a considerable influence upon the coastal transformation. It may have been the tradition of the age of discoveries and great sailing vessels that influenced the restoration of the bay waterfront in such a way. The spatial structure of the Exhibition Centre overlooks the park. Its eastern glass façade allows one to have a look into the bay.

In the town-planning assumption some formerly existing elements were left: the concrete pylons and highway elements as a national heritage and the of the epoch of the concrete jungle passing away.

The Maritime Museum, founded by the Commonwealth, was situated near the bay entrance. The facility can house big sailing vessels in full rigging. The diminishing display spaces are reflected in the cascade of the roof curvatures. One can seek similarities to the fashionable modern Australian residential architecture, and to the silhouette of the Sydney Opera House, but the materials are so different, and the difference in surface configuration is so vast, that an association with sails or motion comes to mind [3].

5.3. Examples of towns at the Atlantic and the North Sea

The French and Danish coast

The coast of the La Manche channel is characterised by sandy beaches, high cliffs, and wide dune strips. One can see the white cliffs of England from the Calais area through the 38-kilometres' (in that place) channel. On the southern coast (Normandy and Bretanny) there are tide water fluctuations reaching 17 metres and strong tidal currents along the shore. Therefore, the first tidal power station in the world was built near Saint Malo. In Arromanches, in turn, a unique engineering work was developed in the form of a temporary harbour in which the Allies landed during World War II. 2,5 mln soldiers arrived at the harbour within three months.

There is the unusual building of the monastery of Saint Michel, seated on a 80 metres' granite island surrounded with a 16-kilometres' shallowing, flooded by the tide. The dam, designed at present, is supposed to drain the area and the island is to unite with the land. The Atlantic coast of France – from Biarritz to Bordeaux – is relatively monotonous. It is formed by sandy beaches, pine woods, dunes, and few

resorts and harbours. In the 19th century, in order to stop the rambling dunes and drain the marshy meadows, pine woods were planted in the depth of the Aquitannian coast. Bordeaux, the largest city of that region, was reconstructed 100 years earlier than Paris, in the Enlightenment, and received wide boulevards and public parks. In the 19th century the small harbour of Biarritz started to compete against the resorts of Côte d'Azure.

North of the mouth of Garonne the coast is diversified owing to the islands, cliffs, and bays. Fishermen catch tunas, lobsters, and oysters; on the shore there stretch vineyards and salt-works.

Fig. 5.9. The railway station in the harbour of Cherbourg (France). On the right - a yacht marina; on the left – a passengers' basin. "The Titanic" sailed on its last voyage from here in 1912. The passengers were leaving the train through a special chute directly to the ship moored at the wharf. The crane lifted and lowered the chute during tide fluctuation (R.A., 1998)

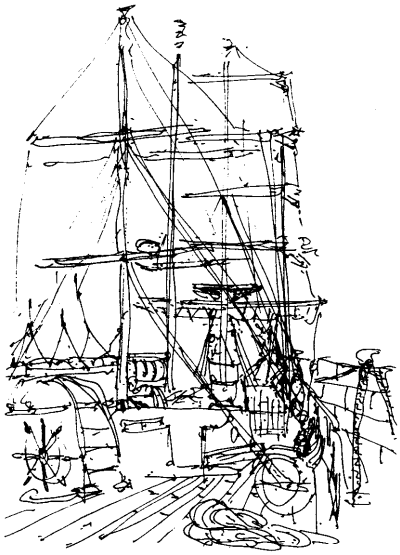


Fig. 5.10. The sailing vessel architecture is formed by masts, yards, fixed and movable rigging, the deck equipment, hull, etc. The "Pogoria" s/y at the quay of Cherbourg (R.A., 1998)

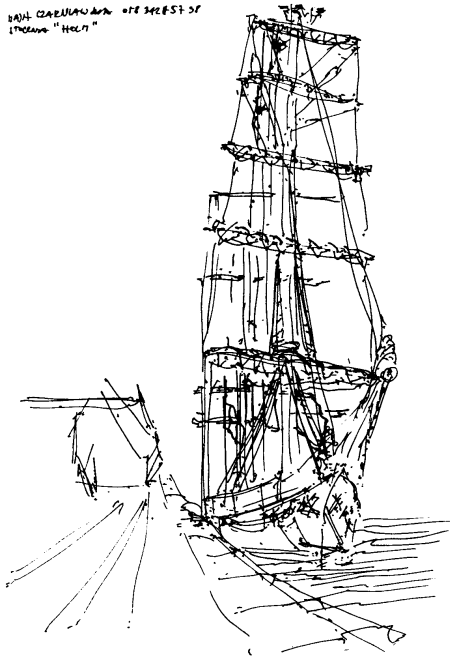
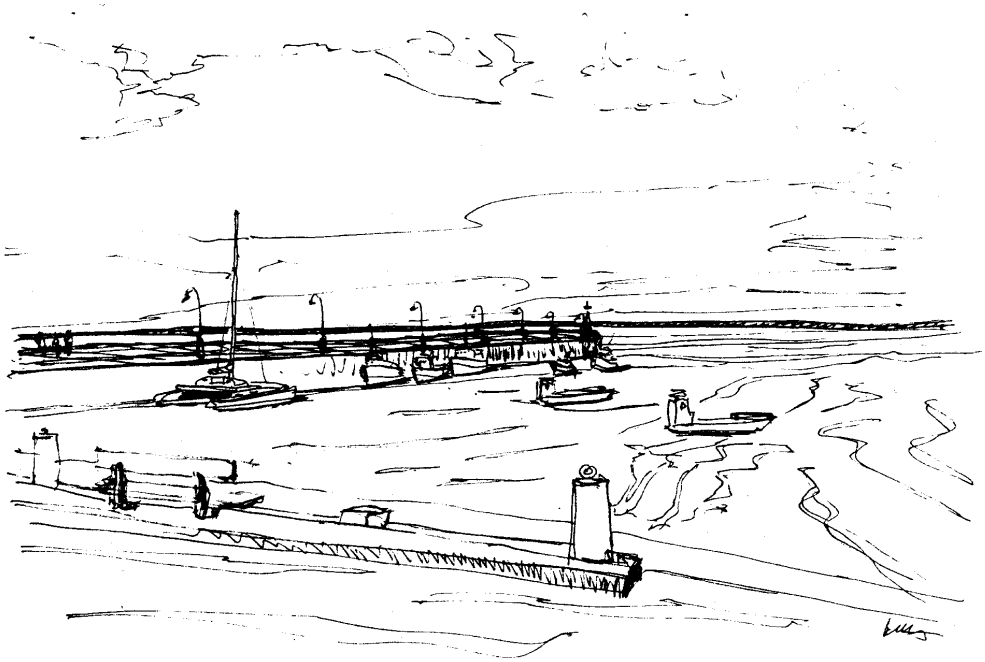
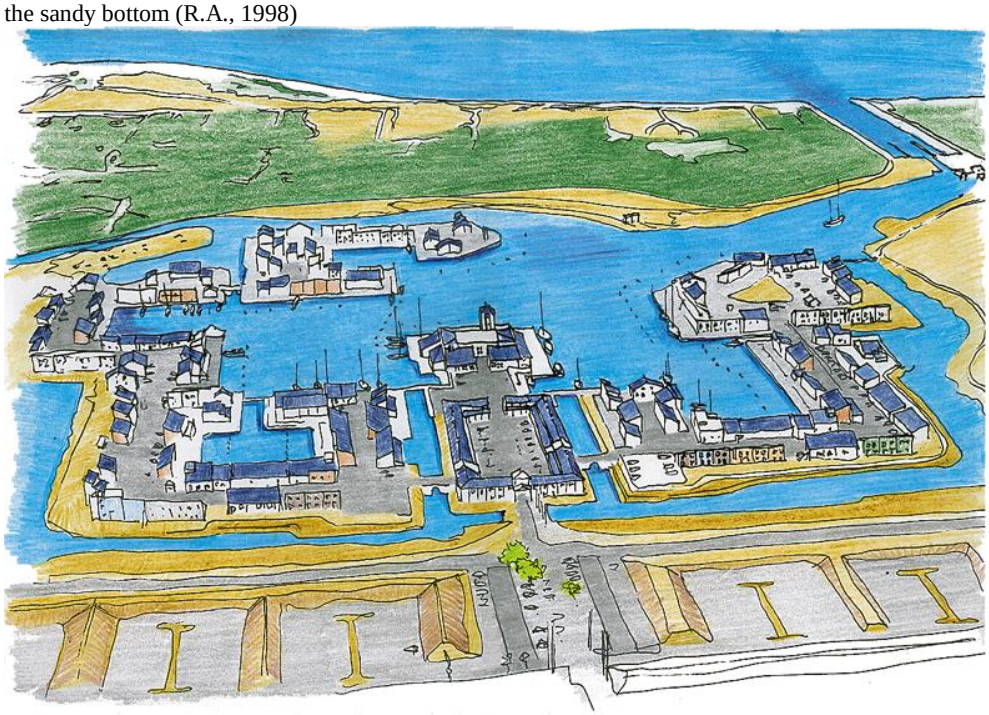


Fig. 5.11. "Pogoria" at the wharf in Cherbourg. The sailing vessel at the quay becomes an architectural object and a town attraction (R.A., 1998)



Rys. 5.12. The Cancale harbour at La Manche in France. During low tides ships and boats stand on the sandy bottom (R.A., 1998)



Rys. 5.13. The North Sea; the yacht marina and tourist sailors' town in Ebeltoft, Denmark. Because of tides harbour basins cut the lock-gate off the sea (R.A., based on a bird's-eye view photo, 1987)

Funchal on Madeira[2]

Madeira stands for wood in Portuguese. Its discoverers in the 15th century set fire to the lush vegetation in order to prepare a convenient place for development of a town. After seven years, in 1426, the following newcomers still saw fire on the island. After building the fort and town of Funchal Madeira became an important factory for Portuguese mariners sailing around Africa toward India.

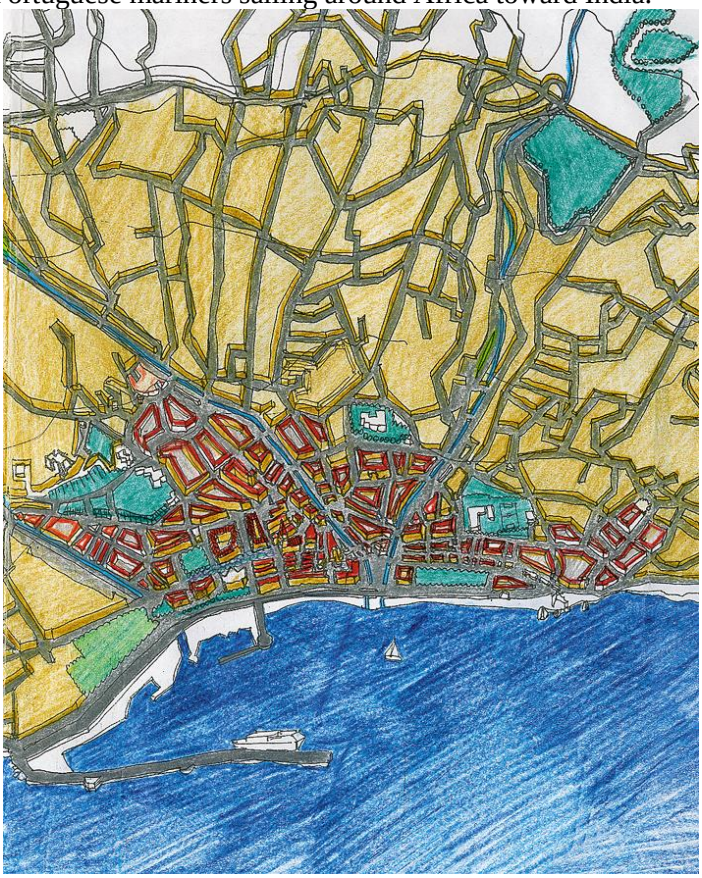


Fig. 5.14. Funchal – the capital of Madeira. The old town was developed at the ocean-mouth of mountain brooks. The development proceeded from the coast (o m. above sea level) towards the mountain of Monte (over 600 m. above sea level). The harbour covered with the quay was constructed only in 1950s. In 1960s they built an airport; formerly, planes used to land on the ocean (R.A. according to a map, 1994)

[2] The famous Polish explorer Count B. Tyszkiewicz visited the island in 1882, during the voyage around the world on a yacht "Dramajtis". Here he lived in the villa of the Austrian empress, here was visited by S. Rogoziński during the first Polish scientific expedition on the "Lucia Margarita" lugger, here he survived the illness and death of his wife Elizabeth Bancroft. However, most complete documentation is about a stay of Marshal Jozef Pilsudski, who was on the island in the winter from 20 December 1930 to 21 March 1931.

The convenient location on the Atlantic – 800 km off the coast of Morocco and 1000 km away from the Sagres cape in Portugal, the subtropical climate and beauty of the landscape cause Madeira to be renowned as an extremely attractive place to spend one's leisure time – the destination of tourists from Scandinavia, England, and America.

The island constitutes the peak of a volcanic mountain emerging from the depth of 4000 m. up to the height of 1861 m. above sea level, with the highest peak of Pico Ruivo. From October to May the mountain is covered with clouds and the sun reaches the coast under a sharp angle. The precipitous shores and lack of sandy beaches are not conducive to bathes. Therefore, a complex of swimming-pools were constructed along the shores. The famous lido of Funchal constitutes a recreational and hotel complex designed by recognised architects, e.g. O.Niemeyer, the designer of the Brasilia city. On the lido there are luxurious resorts, landscape and botanical parks, and swimming beaches with steady average temperature of water and the air amounting to 22–24°C.

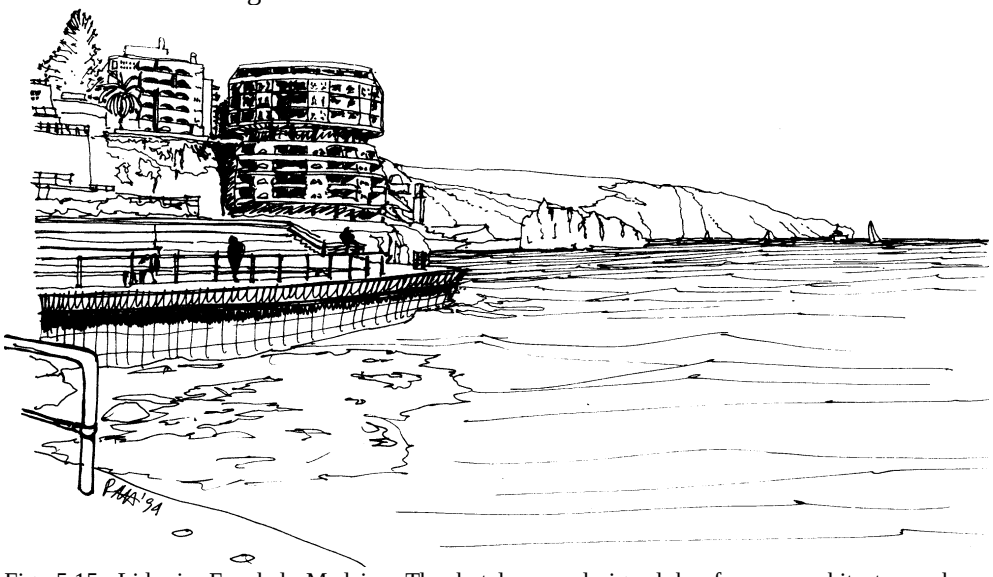


Fig. 5.15. Lido in Funchal, Madeira. The hotel zone designed by famous architects, such as O.Niemeyer among others. The Atlantic waves overflow to basin sets (R.A., 1995)

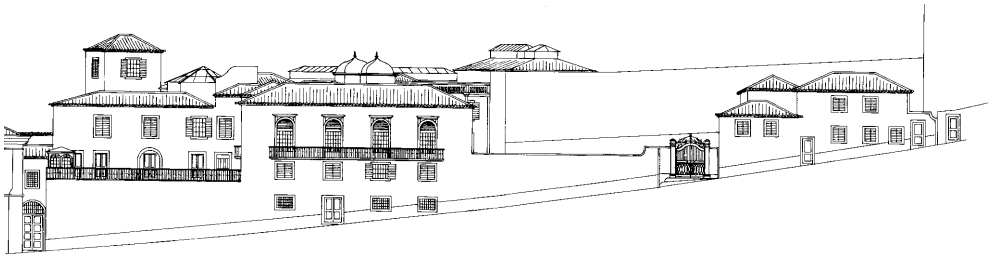


Fig. 5.16. Funchal – the cloister of St.Clara. The typical Portuguese, Manuelian architecture

Tourists are attracted by the originality of the island and the specific folklore of the descendants of whale, sea lions, and seal hunters. The rich past is manifested in the picturesque harbours of Machico, Porto Moniz, camara de Lobos, and Porto da Cruz. Inside the island, in turn, there are precipitous mountains in which *mira-douro*, observation points, constitute the main attraction. The settlement of Curral des Ferreiras, for instance, can be admired from a rock ledge hanging at 600 m. over the roofs and streets. The cape of Cabo Girão is made up by a cliff of 570 m. above sea level which is several metres lower than the highest cliff situated on the Green Cape Islands.

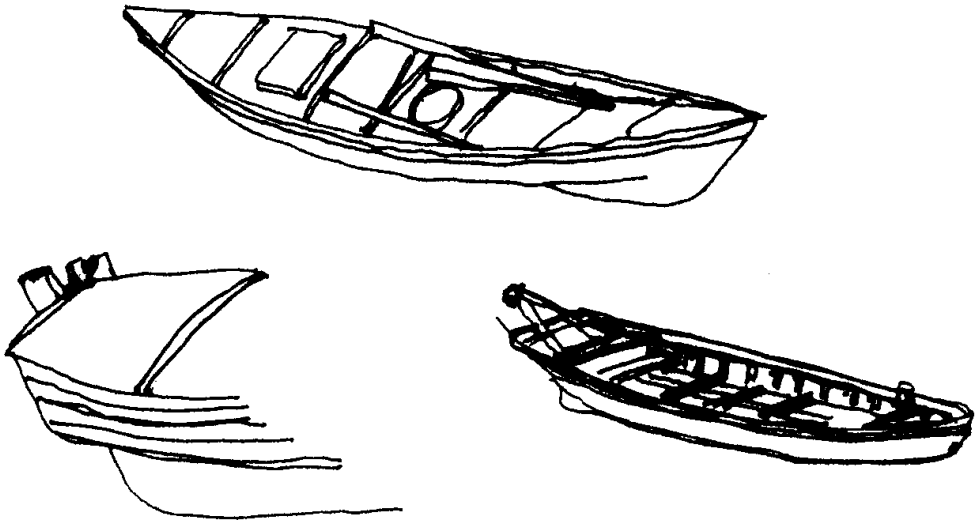


Fig. 5.17. Boats on which inhabitants of Madeira hunted whales (R.A., 1994)

Albufeira in Algarve

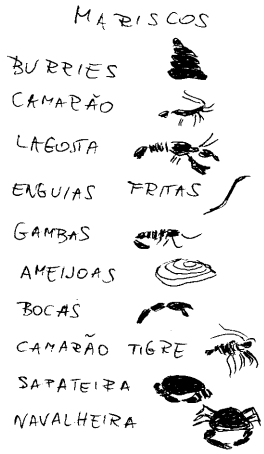


Fig. 5.18. The seafood of the Atlantic coast. Its shapes and colours appear in the Mediterranean architecture as details (W.Ast, 1997)

Albufeira is situated in the Portuguese seaside region of Algarve. The old town, located on a hill, constituted a fishermen's fortified settlement built in the Arabian style, with winding streets, without any square and market structure. Any intrusion of enemies into the town and their escape were made difficult by the labyrinth of streets. West of the hill they located squares (*lota*) in which seafood, caught in the fishery nearby, was sold. Boats were manually hoisted onto the shore; currently, tractors are used.

Along with the development of tourism in the late 20th century, a street leading perpendicularly to the sea, built round with boarding-houses and service facilities,

was marked out. In the area between that street and the town there emerged a market square. At present it is a pedestrian zone. New streets were marked out, parallel to the shore and running on the high cliff; also, there were others, forming the town structure. A hotel, which closed the optical space of the town, was built on the main axis of the town. The beach was entered from a tunnel.

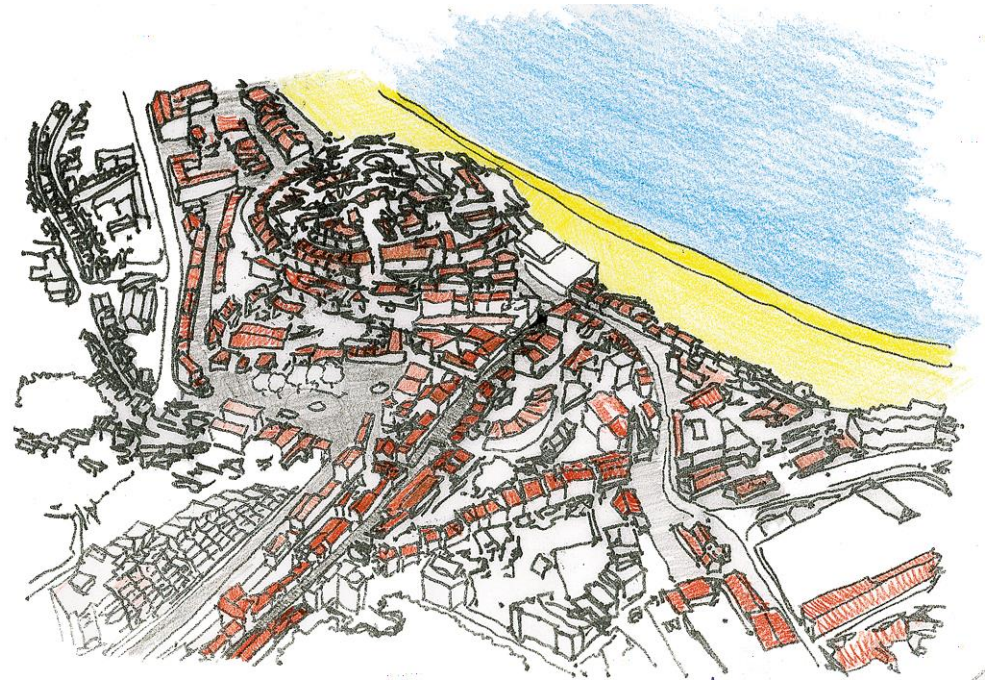


Fig. 5.19. Albufeira on the Atlantic Ocean – lies east of the cape of Sagres, which protects the town against huge waves of the open ocean. The beach is smaller than on the western coast. The elements crystallising the space of the old town centre are: the old town on the hill, fish market, street perpendicular to the beach, seaside boulevard, tourist market (R.A., based on a map, 1995)

Nowadays the surface of Albufeira has increased several times. The slip road of the highway running from Lisbon is formed by three roundabouts which crystallise the structure of Albufeira – the hotel zone. The modern hotels connecting Faro and Lagos. North of that road there is another hotel and tourist zone connected with agrotourism. It is formed by reconstructed and new buildings.

Coimbra[3]

Although Coimbra is not situated directly by the Atlantic, the influence of the ocean on the city climate and functions was considerable. Figueira da Foz consti-

[3] In the first half of the twentieth century in Coimbra worked urbanist with Polish origin L. van Groer. His spatial solutions are highly rated by contemporaries. He developed a system of viewpoints (*miradouro*).

tutes a harbour and recreational place for Coimbra. The Roman town of Conimbriga is located 40 km south of Coimbra adopted its name. During the construction of the university in the 1950s, Roman storehouses, built about 2000 years ago, were discovered.

The spatial development of Coimbra was based on the two crystallising centres: the castle situated on the hill and the cloister at the feet. The old town developed around the castle hill with two squares – on the top and in the middle of the southern bend. The third square, outside the town walls, was the element crystallising the suburb by the Monde river, which is the lower town. Between Coimbra and the lower town there runs the main street of the old town – the road leading to the bridge. Around the city there developed large land estates. In the 18th century gardens were set up in two of them – Jardin Botanico and Jardin Santa Cruz. Surrounded by a beautiful fence, marked out in the French style, they have been taken care of until today and constitute a jewel of the city. In the riverside zone there are equally interesting parks, formed as boulevards planted with plane-trees. In a distance, at the slip road of the IP-5 highway, outside the lock damming the river, there is the Chopal park. Between St. Sophia's church and the Santa Cruz garden they marked out the promenade running toward the river, planted with palm-trees. The river is a real attraction. In the section before the city it is artificially dammed, and further it flows with a full river-bed among the boulevards. Unfortunately, the railway cuts the western part off the river.

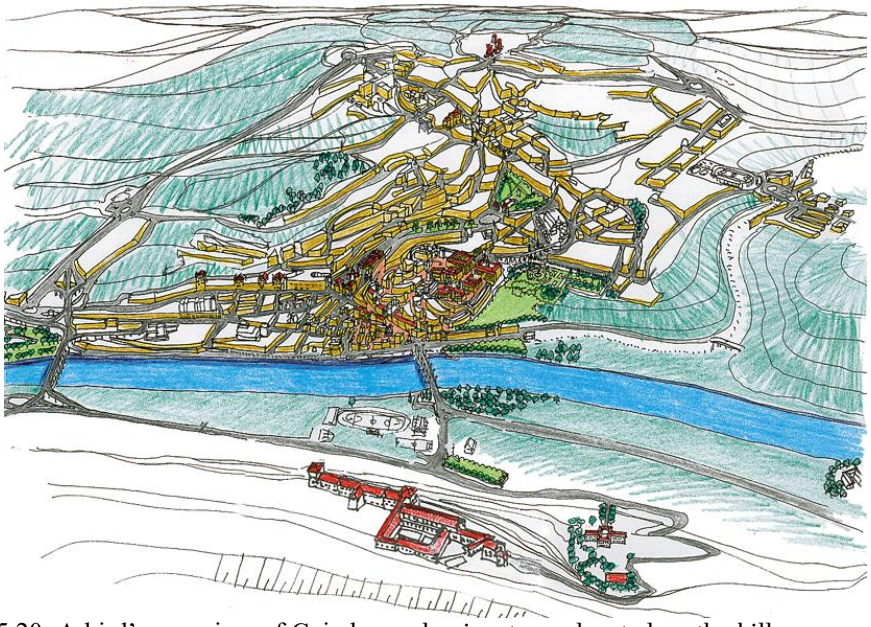


Fig. 5.20. A bird's eye view of Coimbra – dominants are located on the hills, avenues run in the valleys, streets are led along contour lines. The roundabouts crystallise the street structure. Perception of the town structure is different from one of towns located on lowlands (R.A., 1995)

On the neighbouring hills there emerged cloisters, e.g. St. Anthony's north of the city and Santa Cruz on the other side of the river. In the 15th the capital of Portugal was moved to Lisbon. Then, the university buildings became the royal residence. In the 1940s the city went through a: in the place of the historical town centre, on the top of the hill next to the old university buildings, new ones were located. Several hundred families were displaced, historical houses were demolished and several new university buildings were erected; monumental stairs led to the university in the north. An estate was built for the displaced inhabitants nearby the city hospital. The destruction of the old town raised numerous protests; however, the university expansion was appreciated simultaneously. In the city there appeared a dozen or so thousand students who gave it a university style. There emerged services connected with catering for students, who came from all over the world attracted by the fame of one of the oldest universities in the world.

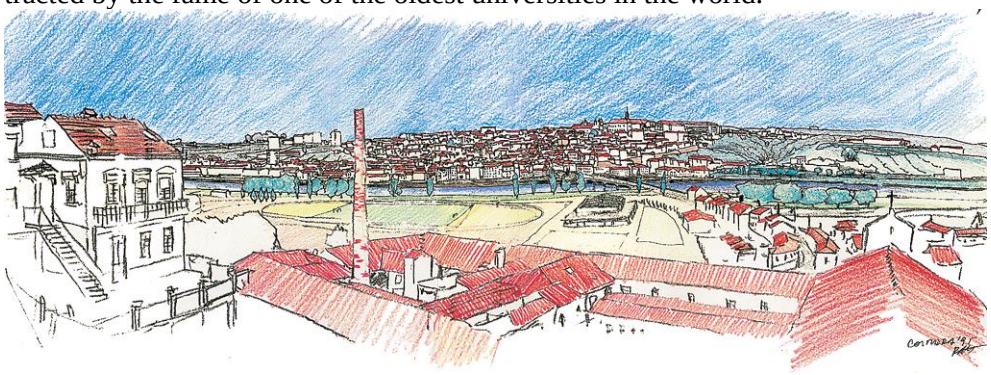


Fig. 5.21. The view of Coimbra across the Mondi river. The university was located on the top of the hill in 1950s. The forms standing out from the town landscape in a negative way are high buildings, criticised by inhabitants as they block out the view and cast a shadow upon other houses (R.A., 1995)

The magnificent city development is based on the transport systems connected with the highway of North-South leading from Porto to Lisbon, and further to Albufeira. The clearways, roundabouts and flyovers form a special arrangement on the hills surrounding the old town. Among them there developed the new Coimbra with one-family houses and multi-family buildings. The new residential and commercial centre emerged in the east of the city, around the fair exhibition hall of "Continente".

5.4. Mediterranean towns on the islands of Kvarner and in Dalmatia

The Adriatic isles are a land of islands (about 70 major ones) located along the shore, stretching at about 750 km. Till recently they have remained out of the way. There were: no convenient connection with the continent, no fresh water or elec-

tricity. Nowadays regular sailing lines – ferries – are upheld, and several neighbouring islands have been linked to the shore by means of bridges. Waterworks providing water from the continent have been constructed, energy lines made, and hotels and boarding houses built. The towns located among picturesque surroundings are rich in monuments and folklore.

The islands can be divided into five groups: southern, central, and northern Dalmatia, the islands of Kvarner and Istria.

The town and island of Cres

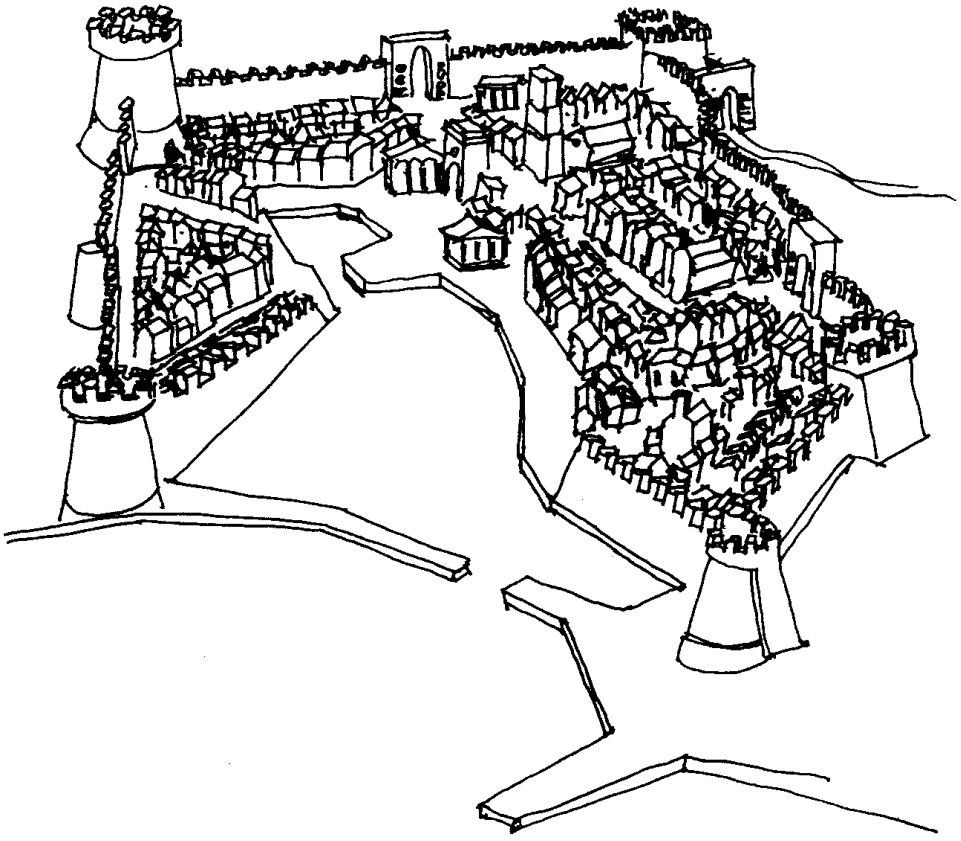


Fig. 5.22. The town of Cres surrounded by battlements. The harbour aquatory, complex arrangements of streets and households, dominants, gates, and towers are visible (R.A., based on a reconstructional drawing from the town museum of Cres, 1993)

The oldest discoveries providing information on the life of inhabitants of the island of Cres date back to the mesolithic period (about 8000 B.C.) and they were found in the cave of Jami na Sredi, east of Osor. The works of art performed by the inhabitants of the surroundings of the Mediterranean Sea – direct ancestors of first

inhabitants of the island, known by the name as Ilirs, where culture was the milestone for the development of that area.

Older Ilirs, and one of their tribes, Liburnians, lived on the hills in settlement forts surrounded by walls (dry walls erected on naturally secured hill tops). They occupied themselves mainly with raising cattle, hunting and fishing, farming and trade. Ilirs contributed to social, economic, and spiritual development (which is proven by sporadic, non-systematic archaeological research). They had enjoyed their liberty until the 2nd century BC, when Romans occupied the eastern coast of the Adriatic. In the late 1st century BC, the Adriatic isles and the interior of the country became a part of the Roman Empire. At the beginning of the new era the most significant Roman settlements were: Apsaros – currently Osor (the main managing centre for the islands of Cres and Lošinj until the 15th century), Crespsa – Cres, Hiberniti – Lubenice and the capital – Insulae – Beli.

Fig. 5.23. The internal harbour of Cres in 1935. Sails and rows were used for propelling fishing boats then, instead of engines (the source as in fig. 5.22)

By the 15th century Cres had been a town and harbour of smaller importance. In those times the decline of Osor and flourish of Cres as the main economic and administration centre began. Its economic power was still growing and the town was strengthened by forceful walls and towers. By the mid-15th century, owing to the increase of inhabiting and economic development, Cres had been developed completely as the town which has preserved its urban character until now. Wealthy families, clergy, and the authorities founded many public facilities, palaces, and stone castles which, through their gothic and renaissance details, prove not only

artistic skills of local constructors and the taste of older inhabitants of Cres, but also the demand on grand houses and comfortable life.

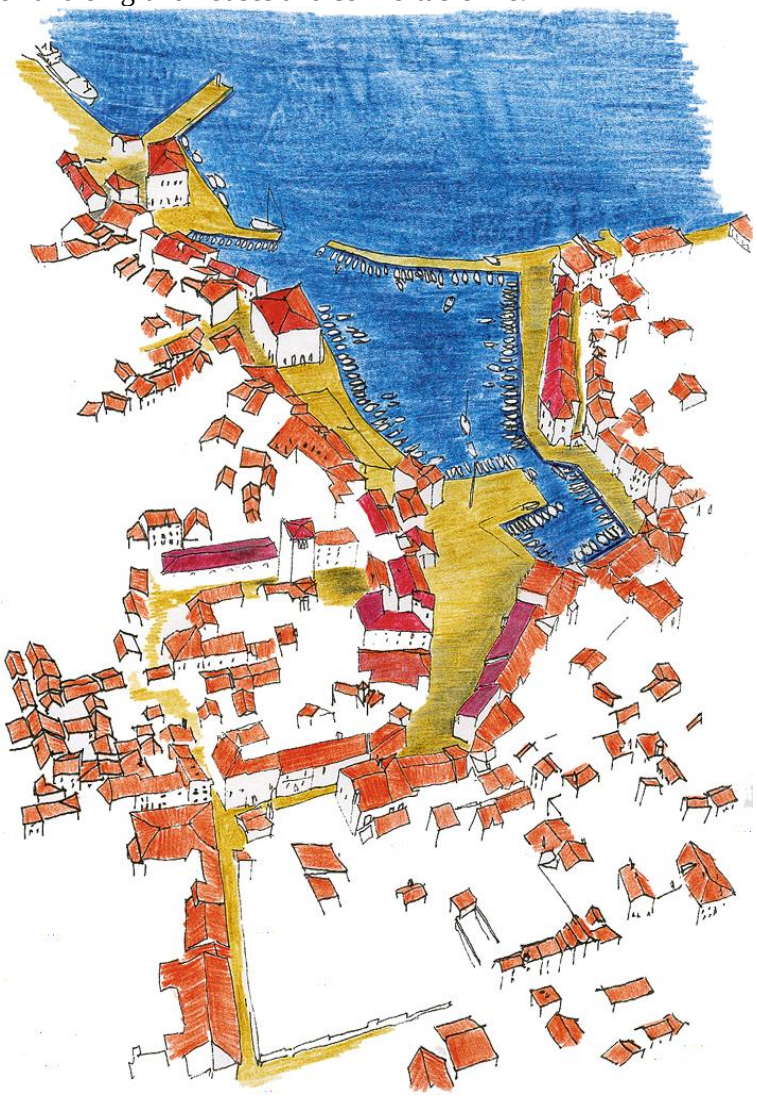


Fig. 5.24. A bird's eye view of Cres (R.A., based on the materials from the town museum of Cres, 1993)

The oldest monuments of Cres are: the 12th-century Romanesque church of St. Isidore (the patron saint of Cres), lower parts of the walls, princes' palaces, loggias, the arsenal, fonic (a warehouse), and the monasteries of St. Francisco and St. Peter extra muros – outside the walls. In the houses, monasteries, and churches of Cres there remained such mementoes of the past as documents, paintings, and small libraries of great artistic and cultural importance.

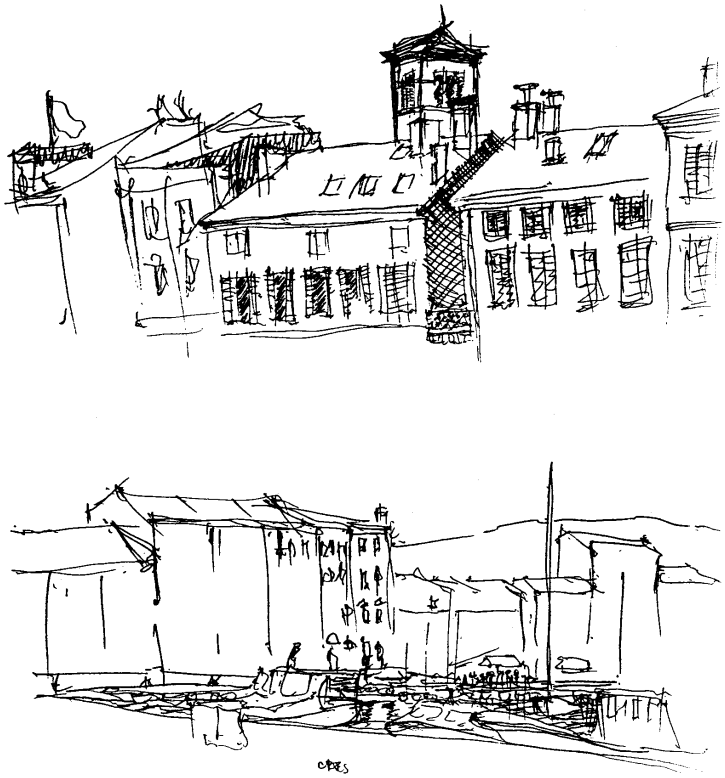


Fig. 5.25. Harbour facades in Cres. The typically Mediterranean details – household scales, angle of roof inclination, Venetian blinds, ventilators, and chimneys - determine the character of architecture (R.A., 1997)

There are a majority of monumental buildings of the period of Venetian rules. The town was surrounded with new fortified walls in the 16th century. Around the harbour new houses of wealthy families were built and a town gate with a 16th-century clock tower and 15th-century loggias were constructed. Through the gate one enters the market square with the gothic and renaissance church.

Cres is surrounded by gardens and olive groves. On the seashore there are: a park, promenade, and two small shipyards for ships and fishing boats. The town has picturesque town-planning harbour and market-square interiors. The internal harbour consists of three aquatories destined for sailing, fishing and tourist boats. The external harbour is destined for visitors' yachts, though it may be dangerous because of strong winds (bora, yugo). Not far away, in the bay, a modern marina was built.

Squares and boulevards form coupled interiors with the harbour and with little squares near the church and the museum. The town-centre streets are narrow and form a maze difficult to recognise. During torrential rains water flows down the streets and squares to the harbour.

Fig. 5.26. Valun on the island of Cres – a view of the group of buildings forming the harbour in the centre of the settlement (R.A., 1993)

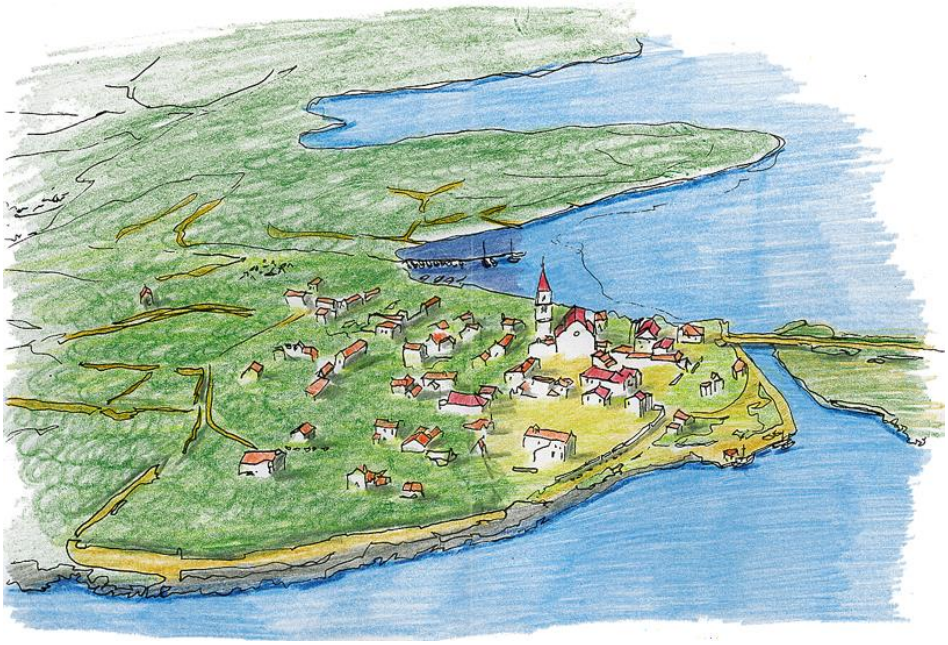


Fig. 5.27. The town of Osor on the island of the same name – it is linked to the island of Cres by means of a drawbridge. After the period of splendour the town lost significance. At present there is no yacht harbour because of coastal shallowings. Yachts wait for opening the drawbridge in the middle of the reservoir (R.A., 1997)

Osor

The several-metre-long movable bridge connects Osor with the island of Losinj. It used to be one island, and Romans dug a channel in order to avoid sailing around the present island of Lošinj for a long time. Osor is the oldest spot on the island. In the Roman period it was an important commercial centre which occupied 20 000 m2. Construction of bigger and bigger ships for which the Strait of Osor was too shallow, as well as the epidemics of pest and malaria caused Venetians to move their capital of the island to the town of Cres.

The modest settlement has preserved numerous traces of its former magnificence. From the strait up to the bay of Bijar in the north-east, there remained a part of fortified walls, temple foundations, and other building elements. In the market square there is the 15th-century cathedral of the end of the golden period of Osor.

Veli Lošinj

At present it is a recreational resort at the feet of the Kalvarija hill (234 m.). The buildings of Veli Lošinj are originally inscribed into the physiographic shore arrangements. The natural bay forms a harbour. Winding streets descend into it from the hills. Nearby, typically Mediterranean, baroque and classical, houses of the rich and former captains of navigation were built. Parks, squares, and gardens are planted with palm-trees, cypresses, agaves, stone pines, and oleanders. In the large park there is the villa of archduke Charles I, the last Austrian emperor. The climatic conditions favour establishing of treatment centres (anaemia, high blood pressure, sinus inflammation, convalescence, etc.).

Fig. 5.28. The harbour and coastal buildings of Veri Lošinj in Croatia. The reservoir is not protected against bora – the strong wind blowing from the Welebit massif (R.A. based on the materials of the town archives in Cres, 1997)

Also, the fortified donjon of the 16th century and the Romanesque church of St. Nikolae of the 15th century (with interesting portraits of local sailors and captains) were preserved.

Silba

Fig.5.29.The yacht harbour on the island of Silba and the passengers' harbour is located on the side of the open sea. Between there emerged a little town. A rapid development took place after regaining independence by Croatia in 1991. A water system was constructed and water is delivered by ships once a week (R.A., based on a photograph from the town museum of Silba, 1993)

Silba constitutes a very interesting example of town-planning development of an island town. The island of the same name occupies the surface of about 15 km2 (9,5 km long; min. 700 m. wide); after the season it is inhabited by about 400 people. The town has two harbours on both sides of the islands which crystallise the spatial development. Around the old harbour, located on the side of the open sea, there developed a primitive settlement with streets diverging in a perpendicular way and radially to the shore. On the island hill, between the churches, there is the main street, parallel to the shores. There, little squares and the observational tower for catching tuna were located.

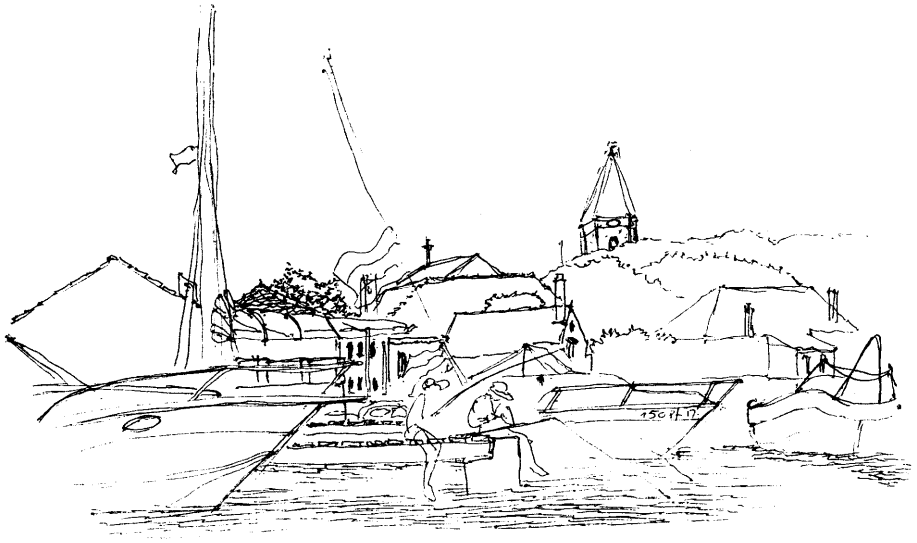


Fig. 5.30. A fragment of the harbour on the island of Silba in Croatia. In the small harbour basin there are at times over 40 sailing and motor yachts, which causes certain problems, such as pollution, noise, and lack of intimacy (R.A., 1997)

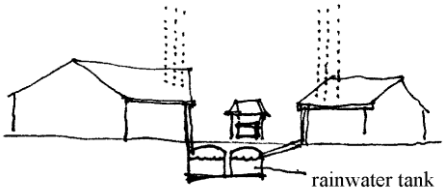


Fig. 5.31. The traditional way of storing „kisza" rainwater on the islands of Kvarner and Dalmatia (R.A., 1994)

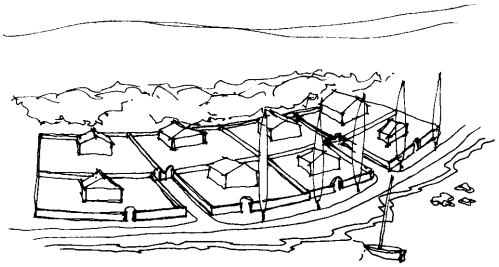


Fig. 5.32. Arrangement of recreational allotments in the coastal zone of Silba (R.A., 1997)

From the main street there is a connection with the eastern side of the island, where a fishing and yacht harbour was built. The eastern coast is covered from the land by the island of Olib. The harbour aquatory consists of a few basins. The basin for fishing boats, with overboard motors is squeezed deepest into the bay; next, there is a basin for fishing boats and sailing and motor yachts. 40 sailing yachts moored at the quays have been observed at a maximum. In the harbour there are the so-called moorings, so one does not have to use an anchor when mooring.

At present, in the old harbour there develops a quay extending into the sea at about 300 m., allowing ferries, passengers' ships, and water-supply vessels to be moored. On the islands of Dalmatia rainwater, collected in special reservoirs, is used. Currently, water is supplied by ships and pumped into the town reservoir,

from which the water network diverges. The pier has installation for fresh water. The quay development also takes place on the neighbouring island of Olib.

The possibility of using fresh water brought about rapid development of recreational and seasonal buildings. Inhabitants of Zadar, in particular, favoured Silba. The island is almost completely parcelled out. Some allotments are still waiting to be developed. It is not easy to construct here, as building materials are supplied by ship and there are no cars on the island. In order to provide parcellers with access to the coastline, ”pocket” arrangements have been designed.

Silba and Olib belong to green islands.

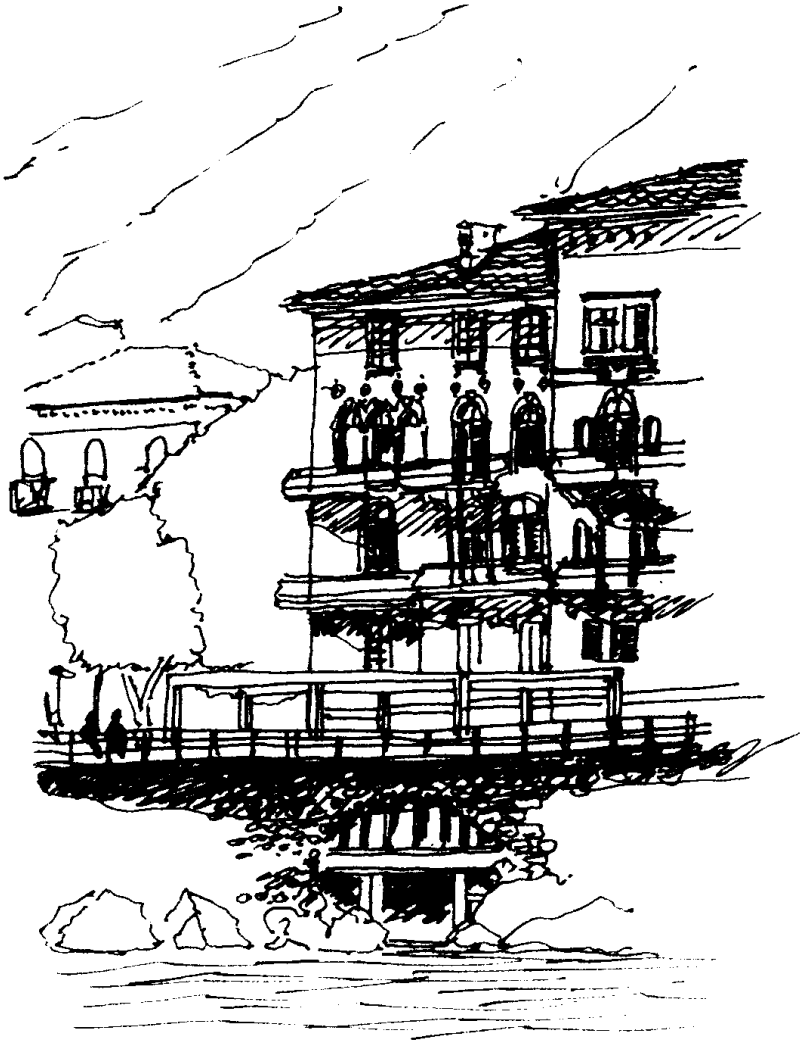


Fig. 5.33. The hotel over the seaside boulevard in Lovran (Croatia). The former boat was converted into a restaurant hall. The framework construction constitutes remains of the glass-framed garden blown up during the war (R.A., 1992)

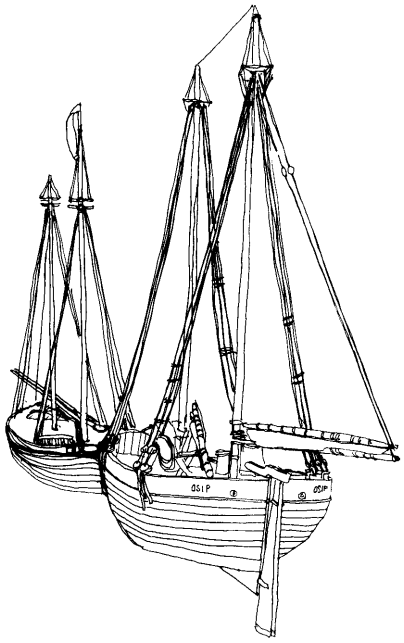


Fig. 5.34. The 19-century's fishing boats for fishery and cargo transport on the coasts of Kvarner and Dalmatia (R.A., based on models from the cloister on the island of Koślun in the bay of Punat, 1995)

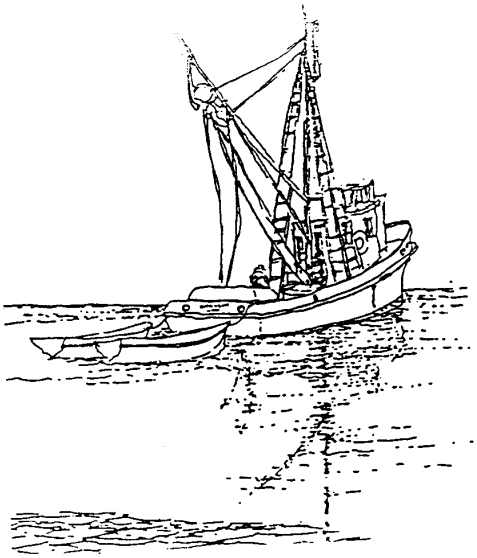


Fig. 5.35. A fishing boat anchored in front of het small fishing harbour of Merag on the island of Cres – Croatia (R.A., 1989)

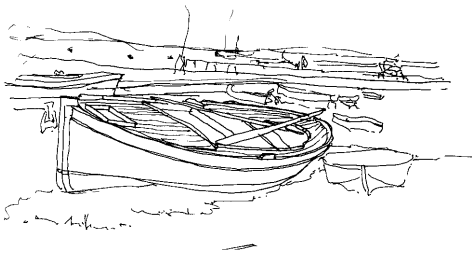


Fig.5.36. A rowing boat for coastal fishery and harbour service in Croatia (R.A., 1997)

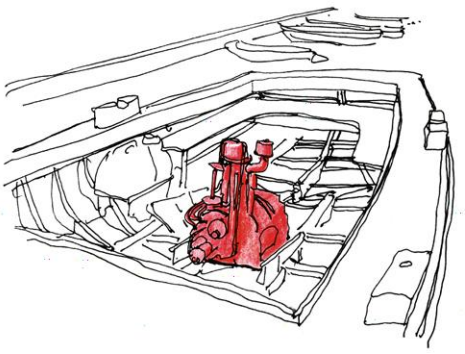


Fig.5.37. The internal or overboard engine applied in fishing boats brought about a real revolution in the development of fishery techniques as well as navigation and mooring in the coastal belt. Sails and masts disappeared from harbours. Currently they are used only in tourism. The Olib island – Croatia (R.A., 1997)

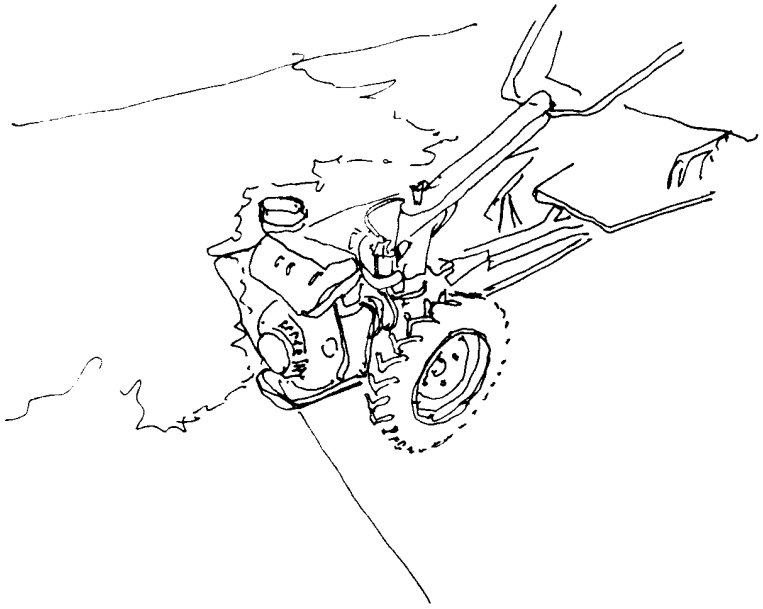


Fig. 5.38. Internal combustion engines have squeezed out donkeys and made it possible to move in nooks of old towns (R.A., 1997)

5.5. Yacht Harbours – Marinas

For about 15 administrative units and towns within the framework of the Phare programme of the European Union. Its target is to prepare the spatial plan of the network of yacht harbours in the southern and eastern coast of the Baltic and to establish common promotion and organisation for the network of yacht marinas. The marina in Łeba was financed by the European Union.

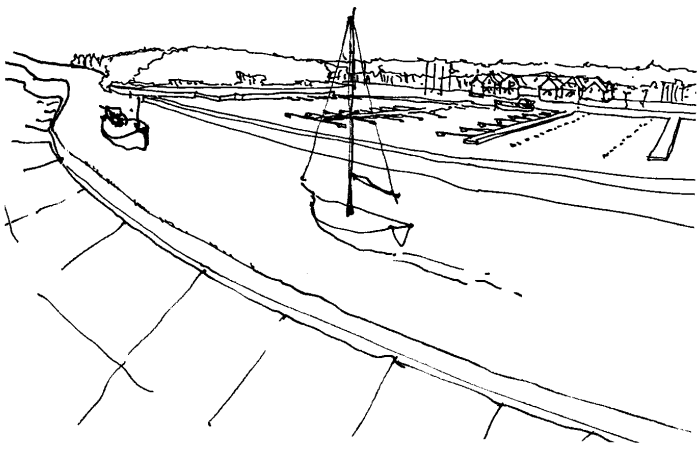


Fig. 5.39. The new yacht marina in Łeba (R.A., 1998)

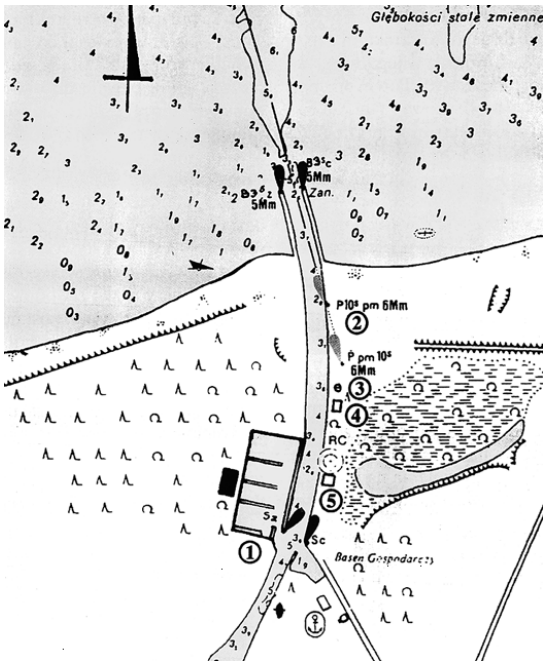


Fig. 5.40. The yacht harbour of Łeba

The second assumption points out that there may be quick demand on places in yacht harbours from Polish sailors – shipowners, being all-year residents. The level of development of Polish nautical tourist navigation is much lower than the one reached in the countries of the European Union (table 5.1). As the western consumption models are strengthened, the demand on small yachts and family motorboats will grow quickly in Poland. It should be emphasised that in Germany, for instance, the number of sailing yachts per 1000 inhabitants in seaside spots is 5,6 and the all-country average for Germany is 0,9 yacht per 1000 inhabitants. The index in seaside voyvodships in Poland amounts to: 0,44 in Szczecin, 0,36 in Gdańsk; while the all-country index is only 3™.

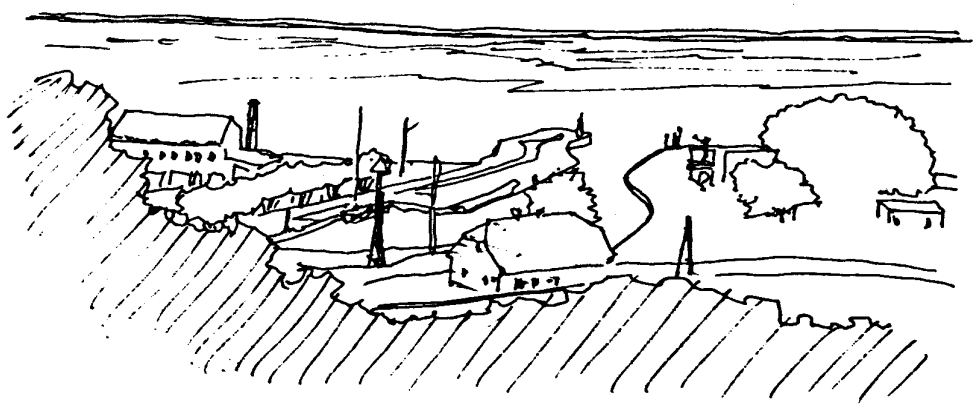


Fig. 5.41. Frombork – a view of the harbour from the cathedral windows (R.A., 1998)

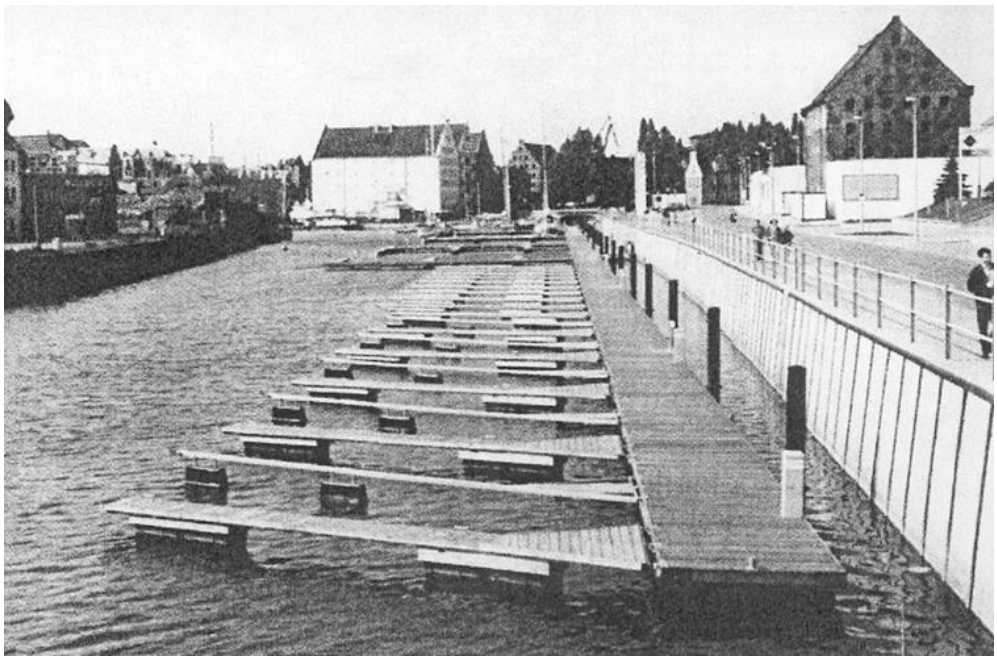


Fig. 5.42. Marina in Gdansk

The consumption model which exists in the countries of the European Union will also be adopted in Poland as welfare grows.

A large group of sailors dream of yachts of their own in order to be able to practice family and social navigation, with no limits as to choosing the crew and dates of sailing. A larger and larger group of sailors-amateurs of private yachts and sailors' ship-owner clubs, which exist in small numbers in Poland, will emerge Bureaucratic and formal limitations of tourism development will be gradually eradicated and in Poland there will be similar conditions of training navigation as the ones in force in the European Union countries; this will constitute an impulse for a quickly growing number of yacht owners.

The third thing is the lack of yacht harbours of proper standard and location, which constitutes a barrier for the development of ship-owner navigation. The base of marinas and yacht harbours existing in Poland differs considerably from the European standards in terms of conditions of yacht stationing, security services, and environmental protection offered. A potential private ship-owner, for whom the decision of buying a yacht or of its construction in Polish conditions is going to be connected with great financial effort, must take into account the conditions of future exploitation – the fact where his yacht is going to be stationed. In Poland it is easier to be a ship-owner than find a safe and moderate (in terms of price) place of yacht stationing. One can put forward a thesis that lack of supply on well-located place0s of yacht stationing constitutes a barrier for tourist navigation in Poland. One can draw a conclusion of the necessity of modernisation, development, and

construction of marinas and yacht harbours, with which the fourth assumption is connected, referring to the development of nautical ship-owner navigation in Poland; it is necessary to form a network of harbours and yacht marinas all along the Polish coast, and in particular in places with population clusters and on attractive reservoirs. Creating supply on places of West European development of the number of private yacht owners in Poland. In other words, the existing demand on places in marinas cannot be met with no prior supply on these places. Location and arrangement of harbours, especially on the central coast, is dictated by the possibility of covering the distance of about 30 miles between the shelter harbours in family navigation.

The strategy of marina development was based on the circumstances emerging from the inflow of yachts of foreign banners and the increased number of Polish units and the increased number of Polish units. It is postulated to develop the existing hydro-technical infrastructure as an initiative of administrative units and towns. On the Polish coast there are 2300 stopover places and an increase by about 7000 is estimated for the year of 2005 for nautical units; in total, there will be about 9000 places.

According to B. Mazurkiewicz[4], the conditions of yacht marina development in Poland depend on: the stopover security of units in Polish harbours, suitable land back of the yacht marina, creating the possibility of using the harbour outside the navigational season, proper location of the harbour on the Polish coast, carrying out the design of marina management with the number of stopover places, depth at each bay, and prognosis of number and size of incoming units determined. When analysing the development of sea navigation in Poland, he observes that the present level of social wealth does not indicate that the number of units will grow in the next 20–30 years.

Considering the above, it is necessary to develop a concrete programme of the development of nautical tourist navigation, linked alternatively with inland tourism as well, mainly as far as using certain basins and lakes is concerned. It seems that including local self-governments in those activities could be of great importance; however, help of the state would be necessary in order to convert the entrances of the existing naval harbours, especially those located by the open sea.

[4] Lecture published in conference materials *Przyszłość polskiego żeglarstwa.* [62]

6. DESIGNING IN WATERSIDE ZONES

6.1. Spatial development of riverside towns

6.1.1 Emden

City development

The city plan of 1570 is clearly defined by using the water arrangement as transportati on routes, fortified elements, and for city cleaning.

In the late 8th century already, Frisian salesmen settled on the northern bank of the Ems river and formed a reloading site destined for naval and river ships, providing service for the areas of eastern Frisia and Westfalia. The then settlement stretched along one road (Pelzer street at present) from the entrance of harbour basins to the church in the west. Establishing of the warehouse law for Emden in 1490 contributed to the development of trade and inflow of inhabitants. Subsequent, parallel streets were marked in the northern direction, up to the so-called old moat (Alten Graben). The system of uncovered draining channels piped off sewage; wooden bridges connected banks of channels, harbour basins, and the moat.

The river Ems flowing nearby was of special importance for the spatial development of Emden. In 1509, due to breaking of embankments during two storms, the river changed its bed and had to be artificially deepened in order for its navigability to be preserved. Reconstruction of embankments and construction of instruments connected with the new water route deprived the city of its direct location by the water.

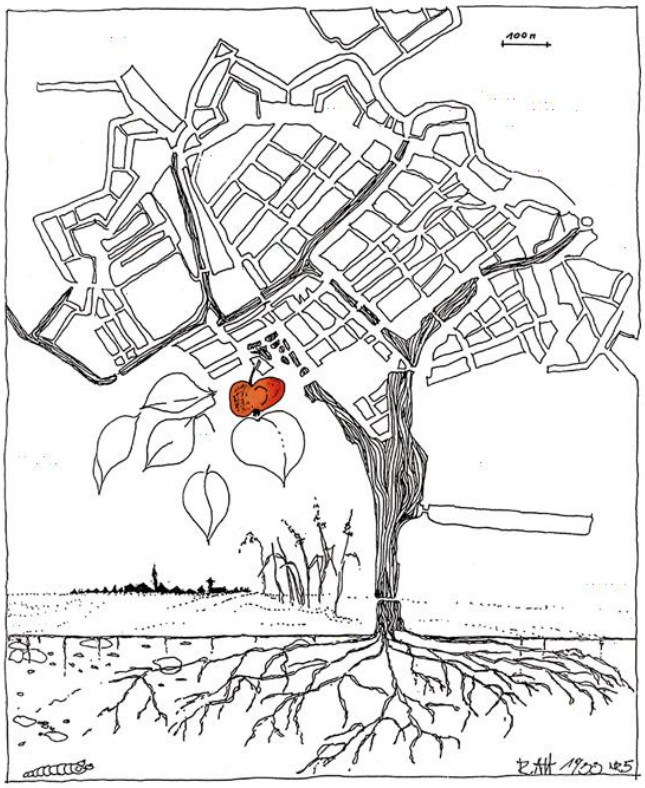


Fig. 6.1. The spatial structure of Emden (R.A., 1988)

Fig. 6.2. The harbour of Emden renovated after the war destruction. Currently used as a tourist marina (R.A., 1988)

Fig. 6.3. The old moat of Emden. Preliminary sketches for the design of transport activation and increasing the atractiveness of residential and recreational facilities (ink + watercolour, R.A., 1988)

The concept of a new city image[1]

Monumental towns, whose building substance has been preserved to a large extent, are characterised by a diverse structure of buildings and social space. The buildings, definitely standing out from the rest, e.g. the town hall, churches, monasteries, city gates, fortified towers, and granaries allow the city to preserve its proper character and always constitute an interesting material for town-planning studies and designs.

Topographic properties of hills, river valleys, naval bays, and channels often determine distinctness of a town. Each town has its own image which is implanted in

[1] The project was completed within the student practice of Poznan University of Technology and the Universitat Hannover under the direction of F. Spenglin, J. Buszkiewicz, L. Zimowski, T. Sudol and R. Ast.

the memory of its inhabitants and visitors - an image in which the above-mentioned points always occupy a special place. The first impression remaining in memory is usually the water silhouette uncovering its characteristic spots as one approaches it. These particular places are the source of impressions and information.

Interaction of space and buildings or their functions in new towns, or ones reconstructed after war destructions, is not as intensive as in monumental, undestroyed towns. When designing new towns and estates, they were directed by different motifs already (e.g. ”a healthy flat”), constructed according to the principle of „light, air, and the Sun”. Great, vacant spaces among buildings opposed the old, tight town.

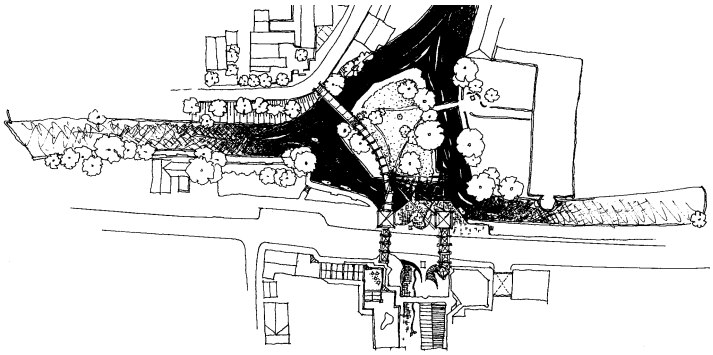


Fig. 6.4. A proposal of management of the town island of Emden (designed by R.A., 1988)

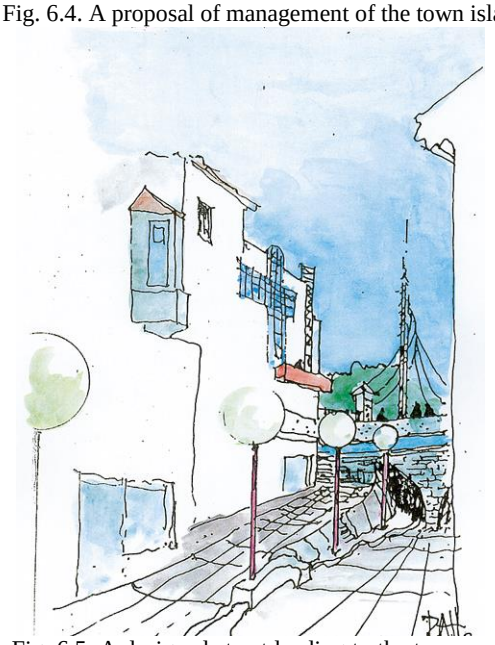


Fig. 6.5. A designed street leading to the town island. The tower on the island is to constitute an orientation point for the concert hall designed by F.Spengelin and realised in 1987 (R.A., 1988)

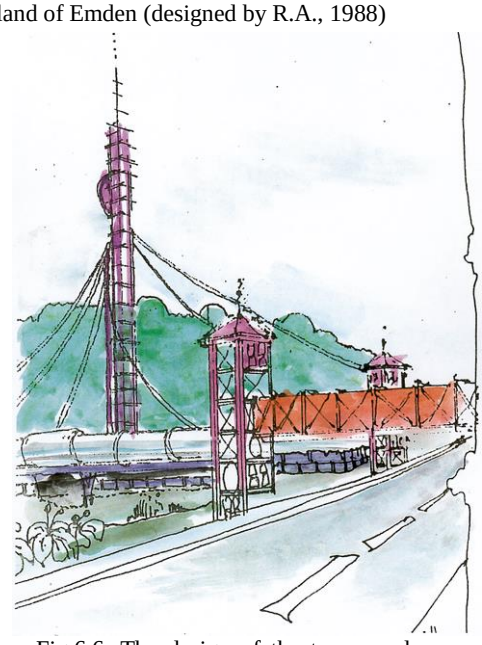


Fig.6.6. The design of the tower and .walking path on the town island of Emden (R.A., 1988)

The problems of road traffic started to be solved in the 50s and 60s already, but fixing of pedestrian zones and limited vehicular traffic made it possible to form a more interesting and rich city landscape. This was also influenced by the growing awareness of these problems.

The above-mentioned tendencies are reflected in Emden. The water arrangement influenced the city formation in a considerable way. The old course of the Ems river allowed a long-distance observation of the city silhouette, formed by the towers, castle, and the massive buildings. The channels clearly divided the city into quarters and, therewith, formed a kind of ”living space” for inhabitants. That arrangement was emphasised by means of connecting water transportation function; however, they still play a crucial role in the field of water economy (draining, keeping the water level constant). Moreover, they serve sports and recreational navigation. This is, however, not clear in the city centre, as water areas are covered by the adjacent allotments to a large extent. Real possibilities of “adding value” to the old town of Emden lie in a proper utilisation of still undeveloped allotments, as well as in the changing function of developed ones. Besides, the character of the city located on channels should be manifested; one should strive at development and complementing the roads running along the channels, building new bridges, forming observational points, and making the centre accessible to sports and recreational navigation. In connection with that, in the designs they focused upon two notions: ”the road to the city” (which means: from the railway station to the town centre) and ”the road within the city” (from the cultural centre in the north, through the railway station, up to Ratsdelft). There exist possibilities of solving these problems by means of changing the function of the slaughterhouse area, whose location on the road between the railway station and the city is special, as well as by the reconstruction of street routes, management of the existing parking sites on both sides of Pottgiesser street and integration of the island of Hahnschen (whose importance will rise when the Folk University and the library make full use of the buildings of the former occupational school). Simultaneously, transformation of the railway square and parking sites was taken into account.

Emden – the city of the naval harbour – seems to be a typical land city to those arriving by train. The unproportional vastness of the square in front of the railway station evokes the need of being encouraged to sightseeing. Hence, the idea of creating a typically urban square emerged. The road to the city will be visible immediately owing to the footbridge on the new crossing and it will lead next to the new Emden attractions. The old slaughterhouse is predisposed to being converted into a fair hall. The guidelines are as follows: to preserve the beautiful brick facade of the 30s, so typical of Emden; the same regards the former refrigeration plant, and erect a new hall construction. The fair square located in front of the slaughterhouse could perform the function of a flower fair. And from there it is very close to the city centre.

THE CONCEPT OF VEHICULAR TRAFFIC

The simplest solution to reach the railway station is the proposal to build a road between the slaughterhouse and the old town. The following benefits are in favour of that solution:
– there is going to be only one crossing of the street with the pedestrian route (the crossing regulated by traffic lights),
– this is going to relieve Abden street, built over with residential buildings,
– there is going to be only one entrance and exit of the railway station area.

A parking site for 56 places is anticipated. The following solutions are suggested in the railway square:
– access to the multi-level parking site without weighing down the internal part of the square,
– only one traffic lane in the square for taxis and delivery trucks
– modernisation of the bus station of size adjusted to the real needs
– delivery traffic to the post-office to be left unchanged.

The way from the railway station to the town

What is a traveller, when leaving the railway building, going to see? In the foreground they are likely to see a large square in which there is a bus station (of no common use) and a parking site for motor-cars) where the relation of the manoeuvre surface to the parking surface is very unfavourable (too big manouevre surface). Further, they are going to see the church tower which points at the old town, but has no fixed road which leads directly there. The access to the town is blocked by the flyover of Larrelter street and the slaughterhouse situated behind it. One more direction is marked by the water-tower, located more to the east, but that one is not very attractive to pedestrians, either, as the pedestrian route is dominated by the roadways.

The postulated changes are:
– transformation of the square in front of the railway station to the size and proportion more similar to human size
– decreasing the square surface for buses to the size which is functionally sufficient
– providing an appropriate waiting-room for ones waiting for buses (there is frequent precipitation in Emden).
– a most direct passage through the slaughterhouse to the pedestrian zone in the city centre (Grosse Strasse),
– removing the slaughterhouse and introducing urban functions into its area; the existing parking back supports such a solution;
– leading a pedestrian route in the west-east direction along Alten Graben street, as the road is important not only for vehicular traffic;

– the area around the water-tower can be managed in an attractive way; the tower should become a landmark of that area;
– designing a bridge (footbridge) over Alten Graben towards Meister-Geerds-Zwinger, which would lead directly to the island of Hahnschen after crossing the street of Hinter dem Rahmen; another bridge, leading towards the Folk University (Volkshochschule) would include the island in the pedestrian traffic.

The railway area – the slaughterhouse

In three designs totally different solutions were anticipated as to the pedestrian route from the railway station to the town through the slaughterhouse area.

The first design reduces the railway square to the scale closer to humans. The pedestrian route leads through covered spaces to the footbridge signalled by the buildings forming a gate. Through a slaughterhouse area, the passage runs at the level of the cultural centre designed over the commercial passage. In the second design the route from the railway is led through the subway under Hochstrasse and included in the passage designed between the existing slaughterhouse buildings. Further towards Grosse Strasse, that is towards the centre, it runs in several smaller passages.

The third design is a spectacular link by means of the new city gate designed as a representative building with an observational platform.

Total destruction of the slaughterhouse is proposed there: the concepts of managing that area are developed – from the city park to the fair hall. The problem of Emden buildings was also analysed in a creative way there.

6.1.2. Bünde

Bünde is a city located in the outskirts of the Ruhra Basin. Forty cigar factories cause the fact that in the city there developed no elements crystallising urban space, because no one knew at which factory the main square should be formed. Moreover, the specifics of cigar production, great competition, and fluctuating economic situation caused the city to be subject to specific developing processes. The archetypes of town-planning development remained unchanged: the locational assumption in the river meander, where currently there are the church and the park, and the arrangement of the old and new river. Between them there was formed a riverside area, separated from the centre by means of two transportation routes.

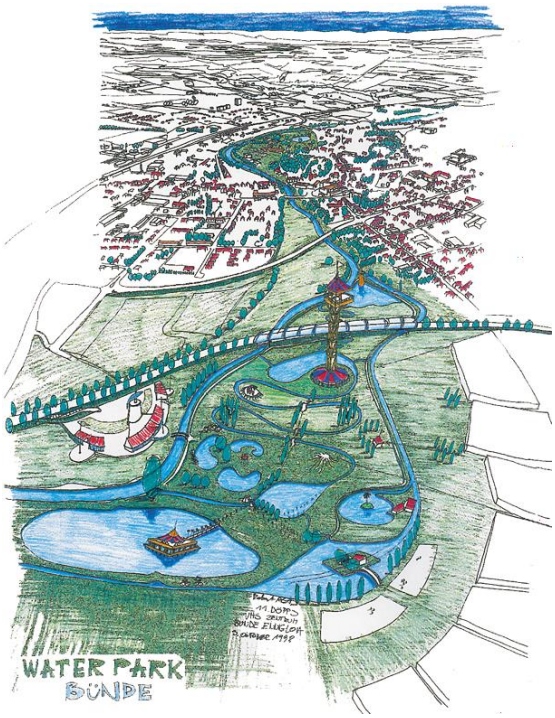


Fig. 6.7. The water park of Bunde. It was suggested to form a tourist and recreational structure in the green wedge cutting into the city centre it was. The town authorities became interested in the idea as they regarded it as an element of regional attraction (designed by R.A., 1998)

Fig. 6.8. Between the old and new river a basin for water sports and recreation was localised. The existing and designed town-planning structure could develop according to new axes directed toward the water (designed by R.A., 1998)

6.1.3. Villach

The spatial structure of the town of Villach is complex. A defined space of streets and squares has emerged in 100%. The richness of passages, nooks, and piazzas find their outlet in the system of main streets, provided with lots of services. It is surprising, however, that the place lacks a square of scale adequate to the town rank – a space to discharge the tension emerging in the maze of the medieval arrangement. The only open space that the Drau river carries divides the town into two unequal parts. A positive effect of that phenomenon is the possibility of watching the panorama of Villach from the water side. The river banks are clipped with vehicular and pedestrian passage and the footbridge. Nikolai Platz situated on the opposite side of the river, as well as the railway square located further, constitute separate crystallising elements.

The remaining, dominant in terms of the surface and silhouette, part of the town, formed mostly in the 20th century, is characterised by lack of clear spatial composition, over dimensionality of some facilities, lack of ordered public space. The arrangement of lines and railway sidings have a major impact on that condition, along with the system of wheel roads of intensive traffic, as well as facilities and architectural complexes of the modernist era, distinguished by a large-scale, dull architecture and aggressive landscape.

The topics discussed concerned the younger part of the town. It was all about completing, intensifying, arranging, and expanding, in general, the functional and spatial structure. Assuming the hypothesis of further town development, the following task was posed: how to expand the existing space of the town centre in order for it to:

– function as a centre of wider range,
– constitute a whole (link parts of the town situated on both banks of the river),
– to form new spatial values expressing the spirit of the times, and simultaneously exposing, as a contrast, the historical structure.

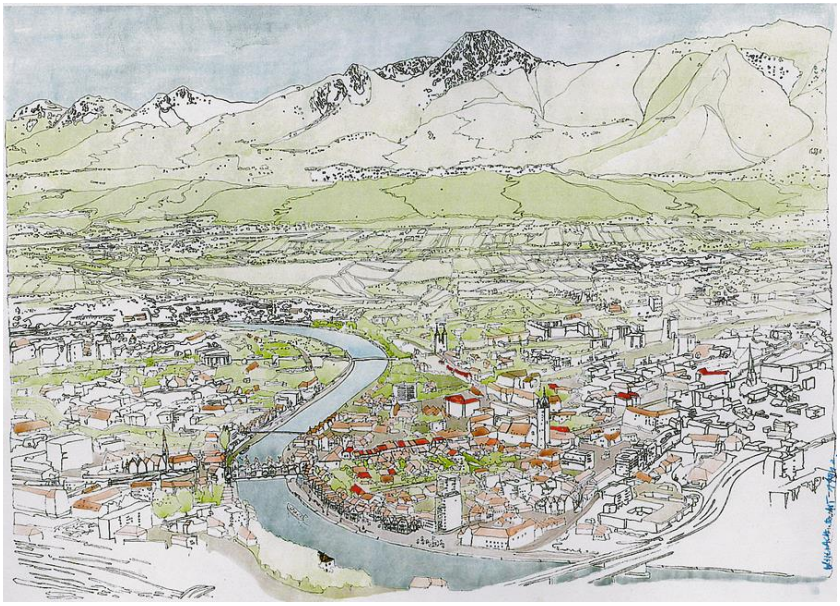


Fig. 6.9. Villach on the Drau river – the Polish concepts of town development. The picture of urban and regional structure in a bird's eye view picture makes it possible to recognise spatial structure as a synthesis of compositional elements – three-dimensional (R.A., 1991)

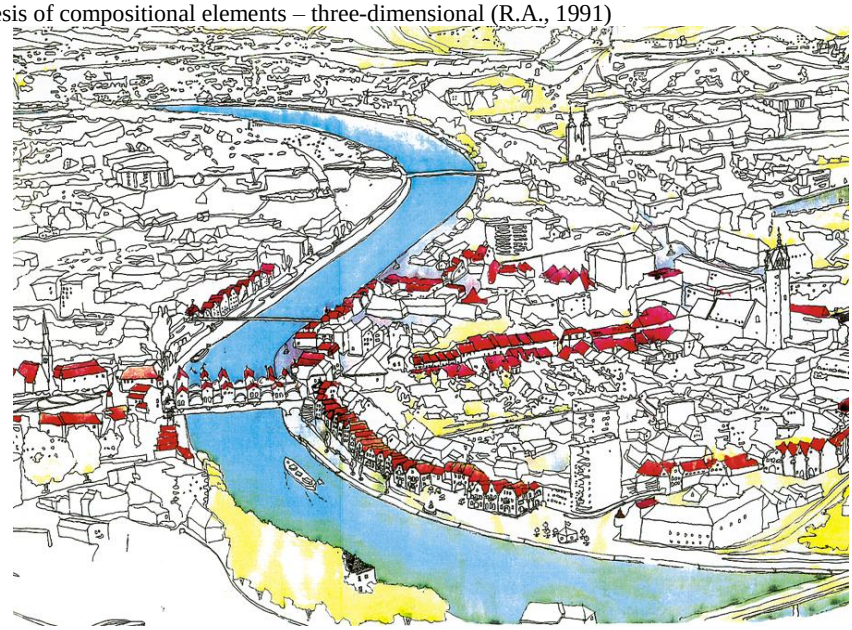


Fig. 6.10. Villach on Drau – specification of spatial structure on the contact point of town-planning and riverside structure of the old town buildings. The bridge over the Drau constitutes a compositional junction of the urban axis (right- and left bank)and the river aquatory. Trade and observation opening onto the river suggested on the bridge.

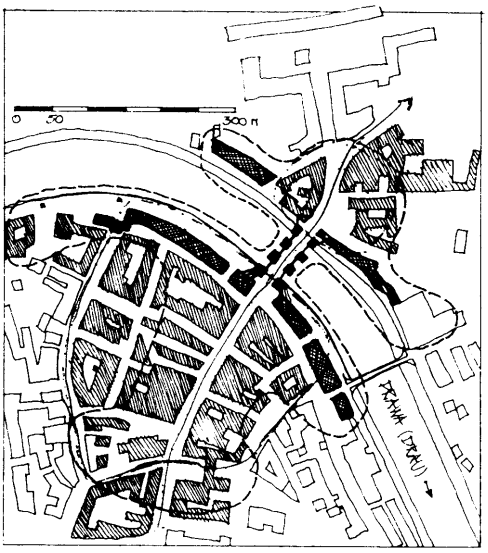


Fig. 6.11. Planning studies specifying the design space of Villach on the Drau (R.A., 1991)

Fig. 6.12. Villach on the Drau – characteristic development of the cloister and church with an onion-like finial of the towers (R.A., 1991)

THE CONGRESS SITE

The Congress in Villach was situated (according to the score of the contest) on the left bank of Drau. This was meant to stress the Drau bank. Simultaneously, an occupational boarding school was founded within the frame of a contest. The car park for that complex was situated on the right bank of Drau, so a footbridge linking both areas was constructed.

Adaptation or reconstruction of the large Congress area was planned in order to hold more significant gatherings or fairs. The town-planning components were considered to such a large extent, that expansion of the Congress site may cause moving of the hotel school; therefore, adaptation of the vacancies in the building will be necessary.

Nikolai Platz

Nikolai Platz is the northern bridge head in the old part of the town. Within the reconstruction of the bridge buildings limiting the space in the direction of Drau were blown up and replaced with new buildings shifted eastward. This step made it possible to direct the road traffic from the railway station to the market square to a large extent. The traffic decreased considerably after introducing the Lederergasse pedestrian zone. Lederergasse was the first semi-zone for pedestrians in Villach,

which meant that transit traffic was excluded there. Owing to the limitation of road traffic and change of the surface, a pedestrian zone with sporadic traffic was created. Lederergasse was the first pedestrian semi-zone, which means that traffic was excluded there. Lederergasse lies in the northern suburbs of the town centre and is linked with the pedestrian zones existing there.

Resulting from designing studies, a concept of spatial opening of Nikolai Platz toward the river, with a simultaneous assumption of a bridge square. The new space, of dominant scale and attractive landscape located in a junction, is a kind of clamp clipping both parts of the town.

Elimination of vehicular traffic and introduction of relaxation spots, flower corso, and gastronomic stands into the new square allows getting new functional quality in a maximally satiated structure.

6.1.4. DESSAU

Bauhaus

The history of Bauhaus, the artistic school which was moved here from Weimar in 1925, is inseparably connected with that town.

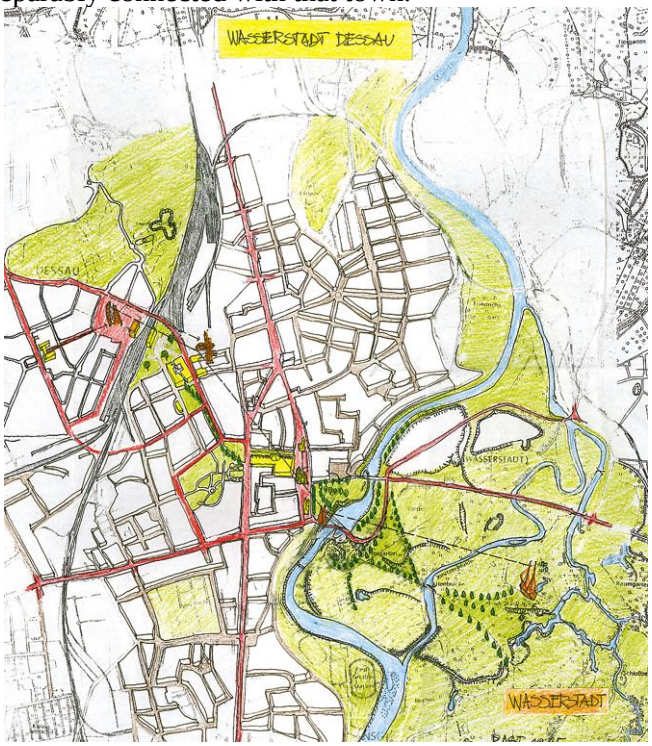


Fig. 6.13. Two town structures: the urbanised Dessau on the western bank (Altstadt Dessau) and the water town of Dessau (Wasserstadt Dessau) in the Mulde old river as a tourist attraction

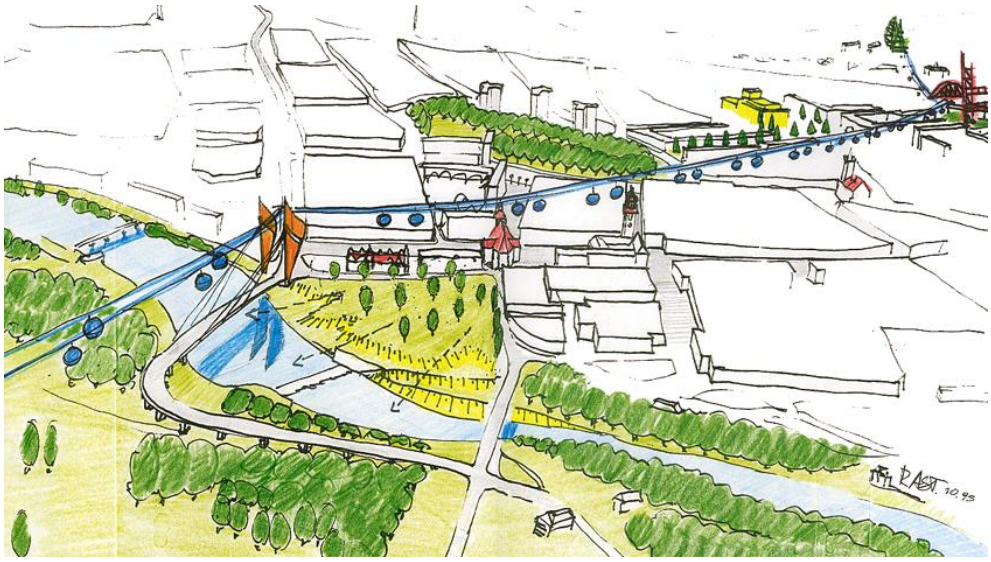


Fig. 6.14 The design of discharging the old town and riverside area through construction of a new bridge and transit road on the viaduct. The concept of linking the junction points in the town by means of the route of cable railway (R.A., 1995)

The college building in Dessau was designed by W.Gropius and erected in 1925-1926.

In 1926 Bauhaus gained the status of Public Art College of Anhalt, which was supposed to provide it with future. The department of architecturewas set up then, headed by H.Meyer. The ultimate liquidation of Bauhaus by Nazis took place in 1933. Since 1990, after the German unification, there are the Sechsen-Anhalt Fachhochschule and exhibition halls in the Bauhaus facilities. The facilities are important elements crystallising the town space and therefore they should be taken into consideration in designing works.

THE TOWN STRUCTURE

The town-planning structure of Dessau, restored after the war damage, is predominated by arrangements of social-realist and modernist blocks of flats. The historical square and market arrangement is clear from bird's eye view. At present there are efforts to organise the town structure around its crystallising elements. Two new service centres emerged: at the railway station and at the old town market. The first one is characterised by an internal square with a pedestrian passage built about with modern materials. The other refers to narrow historical streets; there is a passage with winding water. Both are located between the university square of Bauhaus and the market square with the cathedral.

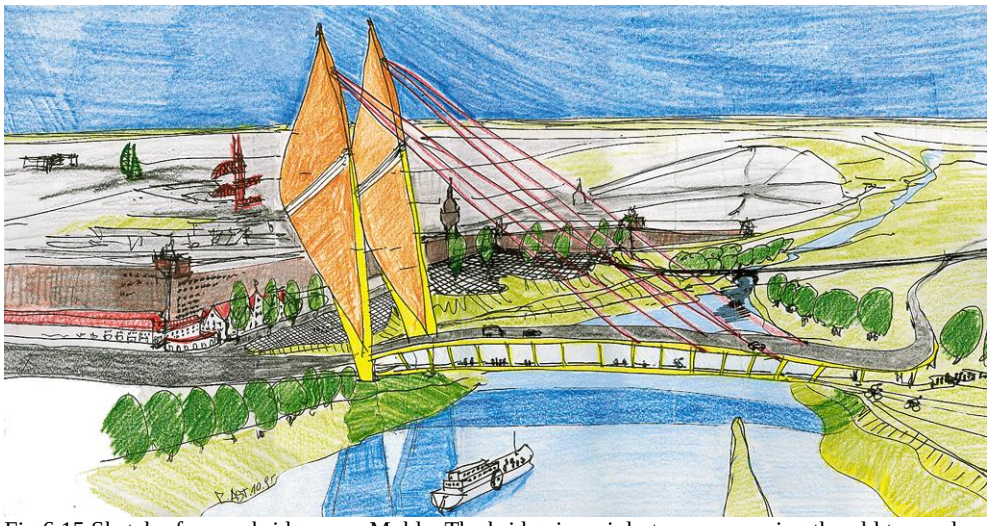


Fig.6.15 Sketch of a new bridge over Mulde. The bridge is mainly to serve moving the old town closer to riverside areas (the boulevard, forum-square, residential buildings) and improving the conditions of transit traffic. Moving of the W-E road to the eastern bank opens new town areas between the old town and the river. The lower bridge belt was assumed for pedestrian and cycling traffic, while cable railway was suspended thereover. The bridge constututes a junction integrating the old town of Dessau with Wasserstadt (R.Ast, 1995)

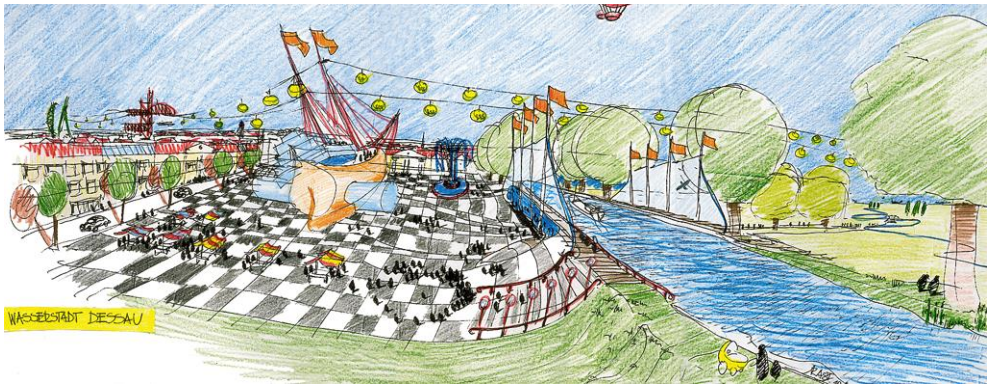


Fig. 6.16. The water forum of Dessau with the glass underwater tunnel leading to Wasserstadt (R.A., 1995)

The Mulde river separates the old town (Altstadt) from the water town (Wasserstadt) formed by flood waters and old riverbeds. The designing proposal development of a water forum on the contact point of town-planning structure and the water town. A new bridge discharging the old town from the transit movement was suggested.

In the riverside zone at the cathedral one can leave open meadow areas or design a square whose two frontages would be formed by two reconstructed modernist blocks.

The new elements are the two-level pedestrian and road (bike) bridge, the glass underwater passage leading to the area of Wasserstadt, revitalisation of the blocks and the market frontage. There appear facilities which are supposed tp make EXPO 2000 attractive, e.g. the glass underwater passage through which one can see the underwater world, the bridge wings as dominants and, simultaneously, the construction of the cableway linking Bauhaus and Wasserstadt – the ship-shaped building. Several kilometres north-east of the town there is Worlitz Park – the great tourist attraction of the town.

6.1.5. Gubin – Guben

The idea of building towns on the European border – the frontier bridge of Guben- Gubin.

Both towns, located on both sides of Nysa, have made an agreement to shape their development together in order to gain spatial unity and create a common market and services exceeding the border divisions.

Within EXPO 2000 they are going to be represented as a double town centre.

Gubin and Guben are towns which are not situated next to Nysa, but on Nysa. The division of that historically arranged centre, as a result of the last war has caused hindering of the development of both its parts. The historical centre is located on the Gubin side. A large part of the old town was destroyed during the war. Restoration of the historical buildings for political and financial reasons may have taken placeto a small extent only, so there are undeveloped spots in that part of the town.

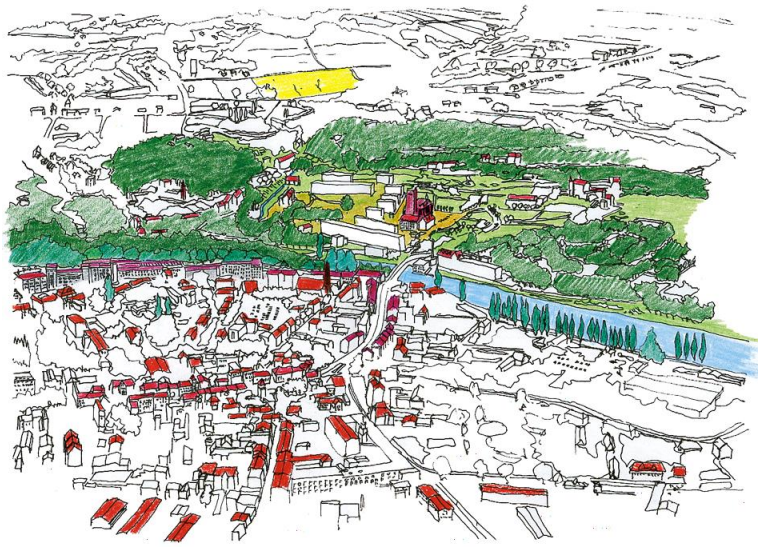


Fig. 6.17. Guben-Gubin – a view of the Nysa transit and the old town on the Polish side, taken from the German side. The war damage and modernist reconstruction deprived the old-town space of a market square structure (R.A., 1997)

Fig. 6.18. Gubin – the reconstruction design of the damaged quarter; view from the cathedral square (des. by A.Skowroński)

The present Guben used to be an industrial suburb . There are many industrial facilities, so it was very difficult to shape the present centre. Many facilities were closed in the period of political and economic transformations after 1989. Many abandoned buildings were left with unarranged surfaces. At present centres of both towns are in bad condition. Gubin, with its free spaces is an opposite of the emptiness and the buildings falling apart in the old town of Guben. Hence, the necessity of taking common steps.

In cooperation with the ARCUS Planning&Design Office of Jelenia Góra, Planung und Beratung are going to debvelop a common structural concept of Guben-Gubin („Design EXPO 2000 model of a European Guben-Gubin town". The structural concept is one of the designs which constitute a basis of common activities. The following ....:

– common sewage-cleaning plant
– footbridge to the Theatre Island and the new configuration of the island
– ecopark (renovation of the onfiguration of the existing town parks

Polish and German economic park located near the new border checkpoint
Construction of a service and economy centre for small and big companies

– Design of a German and Polish school, developing the design of Guben „Maria and Pierre Curie" European school.

The purpose of the structural concept developed within the frame of those works was to point out the key designs and introduce the connections between Guben and Gubin. The ideas and main purposes of the commonly shaped development were formulated there.

The works resulted in introduction of design proposals concerning spatial integration of both towns, obtaining spatial unity and creating a common market and service place beyond the divisions. After a thorough structure analysis of both towns, the following topics were developed within the designing works:

– a common pedestrian passage from the German side to the historical part of the town on the Polish side, completed with the Kirchplatz area and shaping building quarters next to the renovated market
– new configuration of the Theatre Island on Nysa and its surroundings: the facilities of Gubener Wolle and the wharf promenade on the Polish side
– model proposals of humanisation of the complex of block buildings in the old town
– shaping of a new view of both banks of Nysa

6.1.6. Zgorzelec – Górlitz

A student group[2] directed by L.Zimowski and R.Ast prepared the design of EUROPERA Górlitz – Zgorzelec (1994). The design is an attempt at incarnating the abstract idea of mobile Europe, a building which emphasises some quest, movement, dynamics, work, studies, and experiments, and rejecting the stagnant attitude. The town-planning context of the place was preserved, but not in a direct way. This means that the design organises the town space, but does not refer directly to macro-scale town-planning relations. Architectural form was supposed to act upon man in an aggressive way , force him to speculate, provoke, shock, and intrigue. The local arrangement is based on the decision of a third link (the first one is the bridge, the second – the footbridge north of the place planned) and interconnecting large green town areas. On the German side there is the essential building, and in the river current there is the multi-functional hall, while on the Polish side there is a small hotel and congress centre (destined only for Europera) along with the services on the pedestrian promenade along the river bank. The river point (the multi-functional hall) is the culmination point of the whole assumption. As one approaches the interior of the assumption, the architectural fuss rises to reach its apogeum in the form of a floating multi-segment ship. Here, to the observer's surprise, the movement of architecture becomes most dynamic. After all, the river hall comprises five independent ships which may sail away and moor at the school buildings or re-unite, but in a different configuration.

Europera is divided into three parts, which are bound by their relation to the river. On the German side there is a school with a building („The Knife") of adminis-

[2] Team members: R. Barełkowski, N. Hagemann, P. Hałaburdzin, R. Hoehne.

trative functions, with a library, archives, etc.. „The Boat" consists of lecture halls and laboratories; „The Wing" houses studios, workshops, and a large experiment hall, closed to outsiders. On the river there sail five ships integrated in a multi-functional scale – „The Band". The ships, being in the middle of the current, reach „The Snake"with the foyer and all the necessary instalments. „The Snake" is made up of segments. On the Polish side there is „The Eagle" – a conference centre and rooms for teachers. The other facilities are cafes, restaurants, galleries, etc.

Fig. 6.19. Management of the shore zone of Zgorzelec-Gorlitz (phot. by R.Barełkowski)

Fig. 6.20. The Theatre on Water in Zgorzelec-Gorlitz (phot. by N.Hagemann)

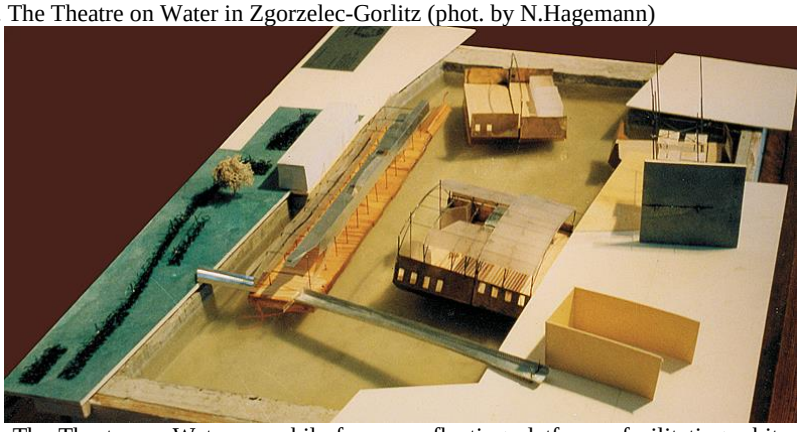


Fig. 6.21. The Theater on Water – mobile forms on floating platforms, facilitating arbitrary performance arrangement (phot. by N.Hagemann)

6.2. TOWN AND LAKE

6.2.1. Breganz

Town-planning analysis and design study

Holy Celtic places were located on hilltops near the shore of the lake called Boden at present. The Rhine forms shallow sedimentation along the shore. The town moving to the lake and along its shoreline together with the river current. At present the town-planning structure is formed by the street perpendicular to the lake, and two road arteries and railway parallel to it. Archeological studies confirmed existence of a Roman harbour under the crossing of the roads – main compositional axes of the town: the road connecting the hills with the lake and the transit road. The distance of the present harbour from the hills amounts to over 1 km.

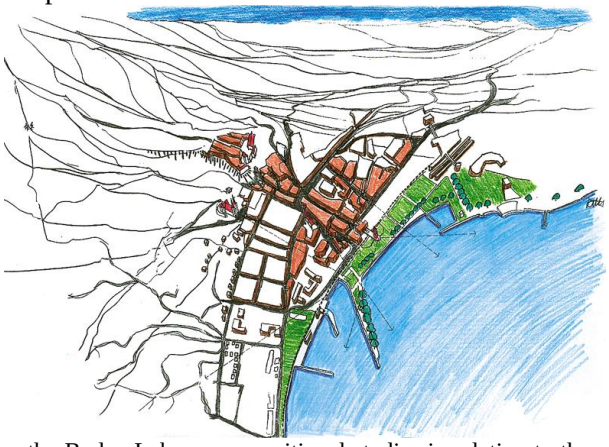


Fig. 6.22 Breganz on the Boden Lake – compositional studies in relation to the market square structure and the axis of optical penetration (R.A., 1994)

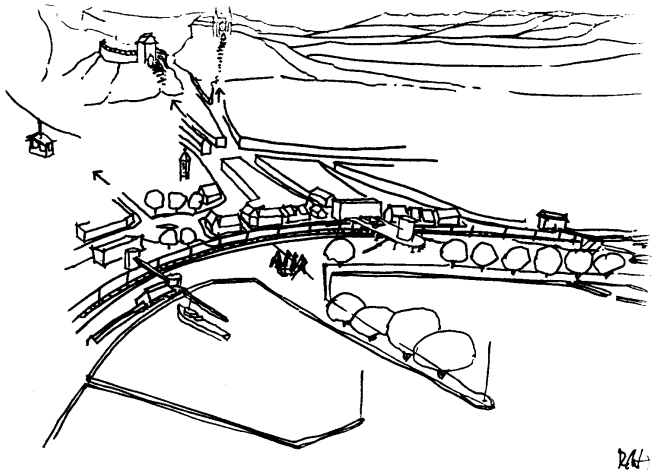


Fig. 6.23. the scheme of pedestrian routes in the structure of the old town between the harbour and the upper town (R.A., 1994)

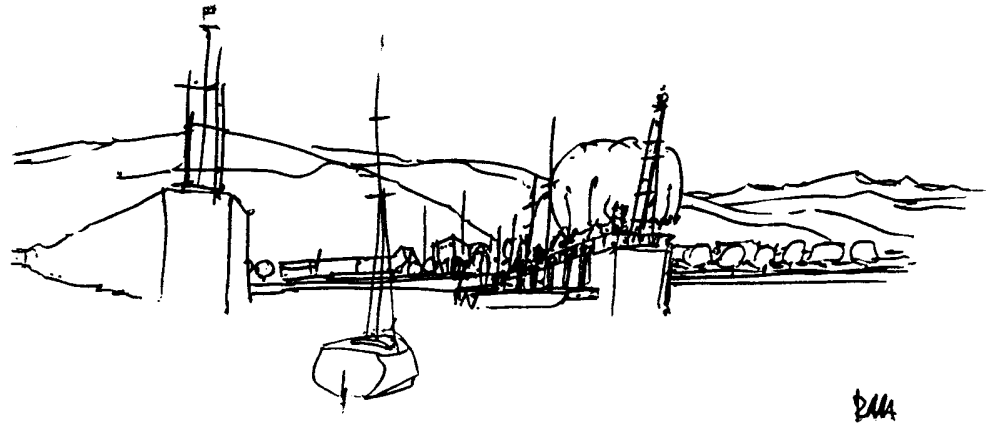


Fig 6.24. View through the heads of the harbour on the facades in the coastal area and the mountain range (R.A. 1994)

Fig 6.25. Office and retail building closing view of the lake and the Alps (R.A. 1994)

Transportation to the region was hindered by the town location on the slope of the Alpine fore-mountain area. In the 1970s a tunnel was built under the mountains and activisation of town development followed (the former connection with the area of Germany or Switzerland was possible only along the lakeshore).

The lake area is cut off from the town by means of the railway. In addition to that, three multi-level car parks, each for 600 cars, are planned in that zone. This is going to solve the transport problems of the town; however, it will isolate the old town from the lake and bring about degradation of the greenery areas.

The commerce and service facility, closing the view of the lake and the Alps on the other side, constitutes an example of brutal interference degrading the spatial values of the main spa street.

The location on the contact point of the mountains and the lake is a town attraction. The cable railway makes it possible to go up the hill (1200 m. above sea level), on the top of which there is an observational point and the beginning of tourist mountain routes. On the shore there are port basins: passenger's and yacht. The theatre on water is an extra-regional attraction.

The design included the rules of town-planning composition, staking out and respecting the axis of optical penetration, and fixing dominants. Railway crossing in the form of a representative bridge, to be extended as a quay into the waters of the Boden Lake, was suggested. The quay would constitute extension of the pedestrian passage (blocked with the office building); simultaneously, along with the lighthouse planned, it would form an elegant town fragment.

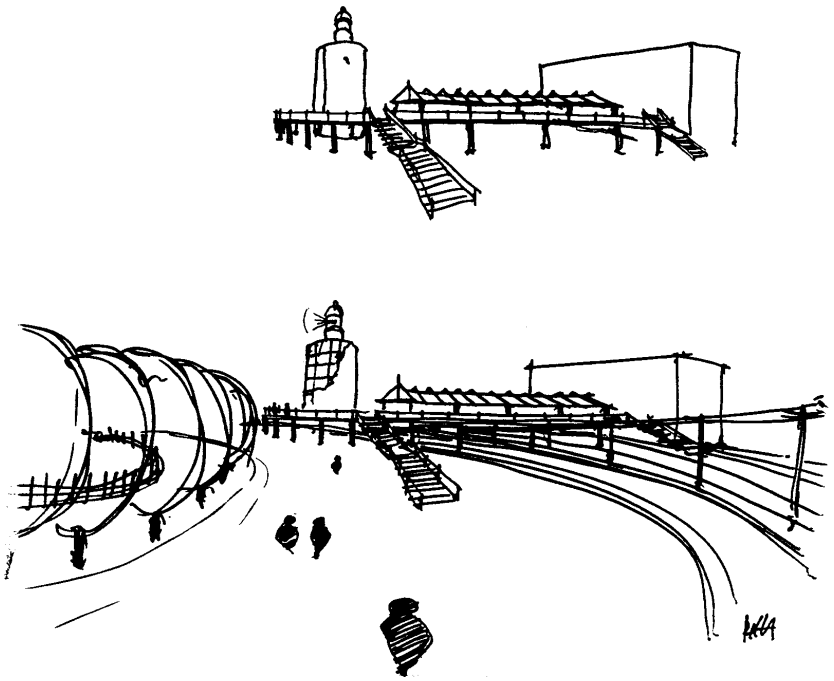


Fig. 6.26. Projected pier and observation tower with a "lighthouse" (R.A. 1994)

6.2.2. Braunau

Braunau, located on the left bank of the Inn river of Austria, is a border town. On the right bank there is, connected with Braunau by means of a bridge, the German town of Simbach. Sailing on the river is practiced regularly, especially by tourist boats. However, it was impossible to build a port or town embankment in that area. The town-planning arrangement of the old town is based on the wide market street, from which side streets branch off, leading to two church squares. The small river flowing in the deep ravine to the old river bed of Inn is an important element of town-planning composition.

The southern front of the town towers about 6 m. over the old river bed, whose marshy areas constitute a real range. The water mazes and sandbars, headlands and the greenage overgrowing them are attractive to sailors and hikers. They also constitute a natural flooding area when the river waters are high.

The local assemblies were interested in creating a water market and a peaceful (currentless) reservoir for water sports. The nearest lake suitable for that purpose is situated about 40 km away from Braunau.

The designing concept concerned configuration of the new reservoir by means of partial flooding of the old river bed and adjusting the reservoir to sports. It was suggested to form a water market built over with service facilities for the purpose of recreation, such as quays for sailing and motor yachts, hangars, club facilities of forms and functions typical of the region. For transport needs, the existing flood bank was maintained and linked with the water market by means of a drawbridge.

Revitalisation of the market area of Braunau on Inn in Austria constitutes an example of solving the problem of attractiveness of the historical town centre with great tourist values. In 1973 a study was made, aimed at solving the problems of the old town centre. The latter is preserved in a good condition, but the way the market and adjacent streets were used did not allow formation of a tourist centre therein, even though the town is a busy border point (Austria – Germany).

Fig. 6.27. Braunau - design of an artificial lake at the place of wetlands and floodplains (R.A. 1994)

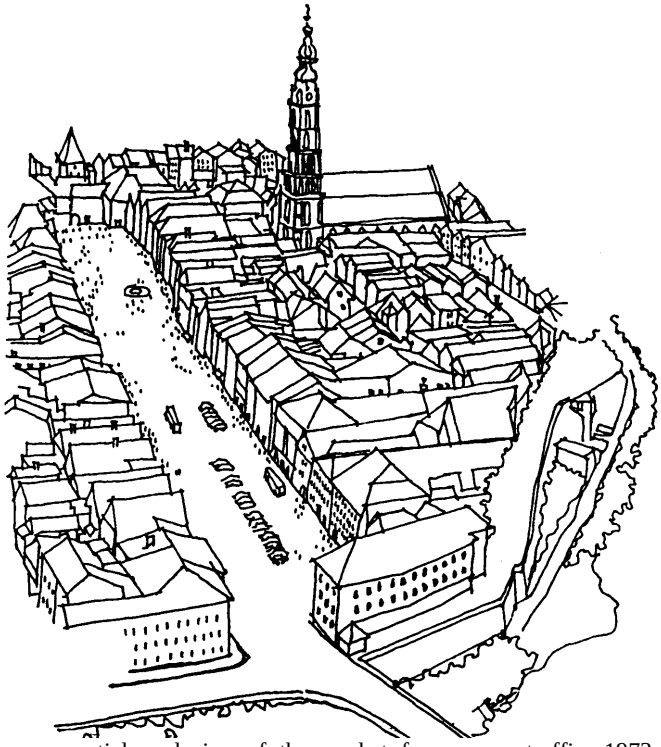


Fig. 6.28. Braunau - partial exclusion of the market from a car traffic, 1973 (T. Bardzińska-Bonenberg [13])

6.3. SEASIDE TOWNS

6.3.1. Kołobrzeg

The harbour of Kołobrzeg is situated on Parsęta in the area of its mouth in the Baltic Sea. The town was formed by the river on an artificial bank, reaching above the level of high water, and was surrounded by swamp and marsh. Nearby the Old Town grange (the present village of Budzistowo) the Wood Channel (Kanał Drzewny), called Wiceminka, separated from the river Parsęta by a lock, branches off westward. It flows parallel to Parsęta at the distance of about 3,5 km and joins the river afterwards.

The history of the Kołobrzeg harbour is strongly connected with the development of the town located at the mouth of Parsęta. Kołobrzeg used to be one of the oldest Slavic settlements in Pomerania. The first mentions of the town date back to about 1000 in the chrinicles by Ditmar of Merseburg (1018) – *Salsae Cholbergiensis*. Formation of the town in that place was caused by salt springs existing on both banks of Parsęta. (on the left bank – on the Salt Island – Wyspa Solna – they were exploited until the middle of the 19th century). In 992, after introducing Christianity, Kołobrzeg became a bishops' seat supervised by Gniezno, on behalf of Bolesław Chrobry, the King. In those times they already traded with Poland in salt and fish.

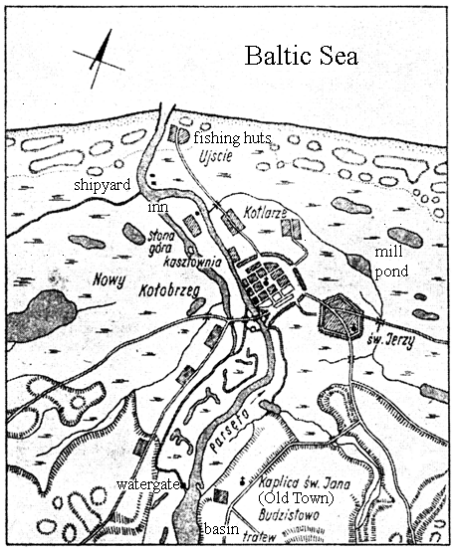


Fig. 6.29. Situational plan of the Kolobrzeg region from the 13th century

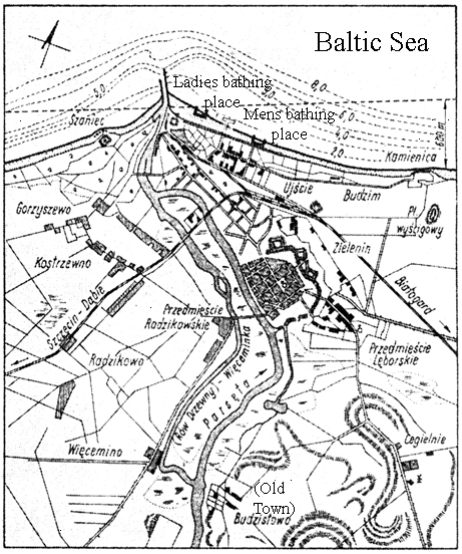


Fig. 6.30. Situational plan of the Kolobrzeg region from the 19th century

In the 13th century, in the place of the present Kołobrzeg, there emerged a settlement managed by two castellans – Kazimierz and Borek. Warcisław, the Prince

of Pomerania, and bishop Herman of Kamień bestowed town rights on the settlement and in that way the new Kołobrzeg was founded. Along with the town rights the settlement was given certain privileges.

The town was surrounded by earth embankments and only in the 14th century – by stone walls. Profits from trade allowed removing wooden buildings and erecting town walls with numerous towers about 1450; consequently, the whole Kołobrzeg was made of stone. In the second half of the 16th century the first town water pipe, leading water off the pond situated south-east of the town, was constructed. Also, first street pavements emerged. It was only in 1666 that the water system supplied the town with fresh water from Parsęta.

The naval trade of Kołobrzeg was associated mainly with the Baltic countries (Sweden, Denmark, Norway, Russia, and Poland), but it was also kept with France and the Netherlands. In 1610 the town represented Hansa for the last time at the hanseatic town assembly in Anklam.

The town had a rectangular market square at that time. The main streets ran perpendicular to Parsęta from the south-west to north-east, and only later from south-east to north-west. Around the town there were gardens and fish ponds, and further some town forests. The suburbs of Ujście, where the actual harbour and shipyard existed, were protected with a defence tower by the mill pond and with the embankment overgrown with willow and wicker. When Kołobrzeg became the capital of the Brandenburgian Pomerania, many offices emerged in the town. The welfare increased and the town livened up. In 1661 new embankments and a harbour pier were formed. They started renovating the harbour. Five years later the first lighthouse was arranged on the building of the administrator of Ujście; also, a new water system was constructed in the town. Regulstion of the upper current of Parsęta began in order to prevent sand from falling to the harbour.

In 1704 the harbour was so neglected and sanded that only small ships could enter it. The planned deepening of the harbourdid not come into effect, however.

At the beginning of the 19th century harbour piers were in a very bad condition, in the same way as the frames of the river bank. A disadvantage of the harbour was small water depth at the harbour entrance – 2,5 to 3,0 m. Therefore, reconstruction of the harbour entrance started in the first place.. the first stage took place in the years of 1839-1849. The following factors were taken into account when elaborating on the design:

– the course of both piers forming a funnel turned toward the sea
– the small length of both piers
– the fact that both heads extended into the sea in the same way.

In 1842 a design of reconstruction of harbour piers was made. The new piers were parallel to each other at the distance of 26 m.; therewith, they expected to reach the entrance depth of 29 m. and the pier course was slightly crooked in order to keep water depth at the entrance at 4,0 m. and simultaneously make it easier for ships to enter the harbour. Becaiuse of the movement of coastal rubble and prevail-

ing west winds, the harbour entrance was directed to north-west. They also considered it proper to move the eastern head of the pier before the western one in order to make better use of the rinsing current of Parsęta. The length of the western pier was to amount to 120 m. and eastern – 200 m.

In order to make access of horse carts to ships on the right river bank possible, the embankment crests were blocked; in that way streets and reloading sites were formed. It had not been necessary on the left bank before. The total usable length of the embankment was 393 m. On the right bank of Parseta there was a stationary crane, hand-driven, with carrying capacity of 3,0 t.

Formerly, ships had to winter on the river over the old stopover basin for dredgers.. Ships moored at dolphins were partially protected by ice-aprons. Irrespective of that, the weirs existing on Parsęta in the town contributed to crushing ice floating over them. On the river, between the harbour and the town, ice surface was crushed in winter in order to avoid ice-jams.

During World War II Kołobrzeg was destroyed in 90% and belonged to the towns which lost their square and market structure. In 1970s modernist blocks, competing with the cathedral in terms of height, were built. It was only in 1990s that the historical arrangement started to be restored.

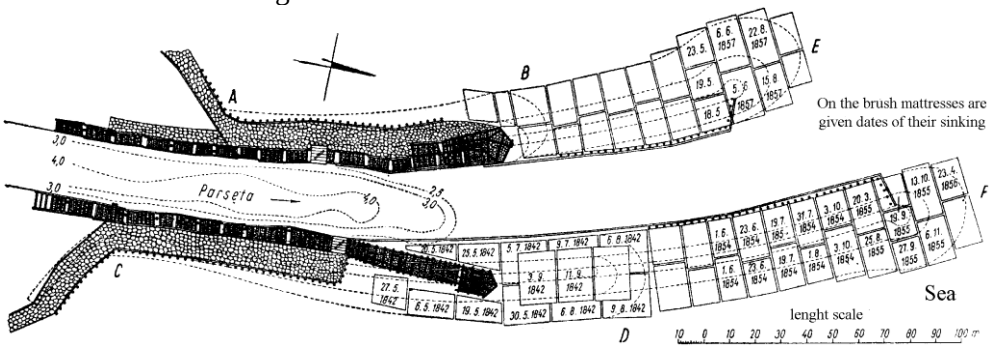


Fig. 6.31. Construction of the entrance to the port of Kolobrzeg (1837) [72]

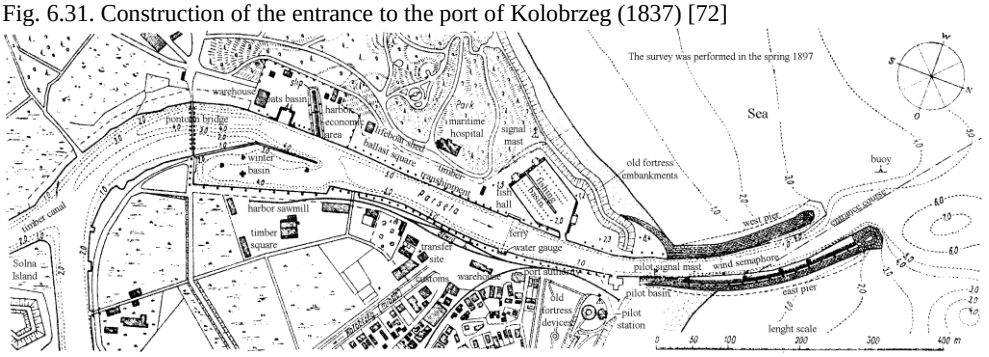


Fig. 6.32. Situational plan of the port of Kolobrzeg from 1897, built according to the Franzius-Schultz method

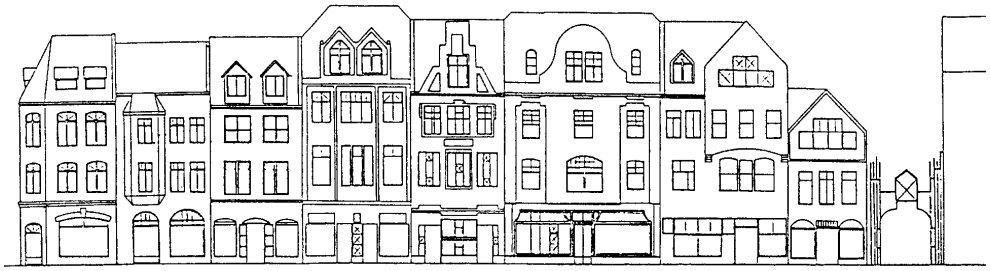


Fig. 6.33. Design of bringing back the square and market structure in Kołobrzeg with buildings in the form of tenement houses (students' work within the international seminar of DOPPS-3, Kołobrzeg 1991).

6.3. Lisbon and Porto

Portuguese towns situated far from the shore were dominated by seaside towns. This was connected with the development of naval trade and management of the sea coast. Coimbra, Lamego, Braga, and Santarem lost its importance in favour of Figueira da Foz, Lisbon, Porto, Viana de Castelo, and others, located on the shore or near river estuaries. Seaside towns were of double character: the upper town was defensive and lower – commercial. Lower towns, limited with no walls, developed into harbour, residential, and hotel zones.

Towns located by mouths of rivers flowing into the ocean would most often arise on the right bank and some suburbs were placed on the left one. It was so in Porto, Vila Nova de Gaia, Lisbon, Almada Barcelos, and Barcelinhos.

Lisbon and Porto, located on the high cliff dominating over the wide water area of the rivers of Tag and Douro, have a special localisation. It was for strategic and economic reasons, connected with changing transport means from river transport into naval one.

Lisbon is located on the right bank of the Tag river, at its funnel-shaped Atlantic mouth; the distance of the lod town (Baixa) from the Atlantic shore is 15 km. Lisbon is located in an amphitheatrical way on seven hills. In the 16th century it gained unusual welfare as the capital of the Portuguese colonial empire.

Porto, in turn, is located in an amphitheatrical way on the right high bank of the Douro river in the distance of 5 km from its mouth in the Atlantic Ocean. Along with the incorporated towns of Vila Nova de Gaia, Leixoes, and Matosinhos it forms a wide city structure.

In both cities – Lisbon and Porto – bridges activise both lower (lower bridge) and upper (upper bridge) towns.

Fig. 6.34. View of Lisbon from Almada through the Tag river. The photograph taken from about 140 m.'s height from the view platform of the Christos Rei statue (R.A., 1995)

Fig. 6.35. View of Ribeira in Porto through the mouth of Douro. The two-level bridge activised the upper part of the town on both sides of the river (R.A., 1994)

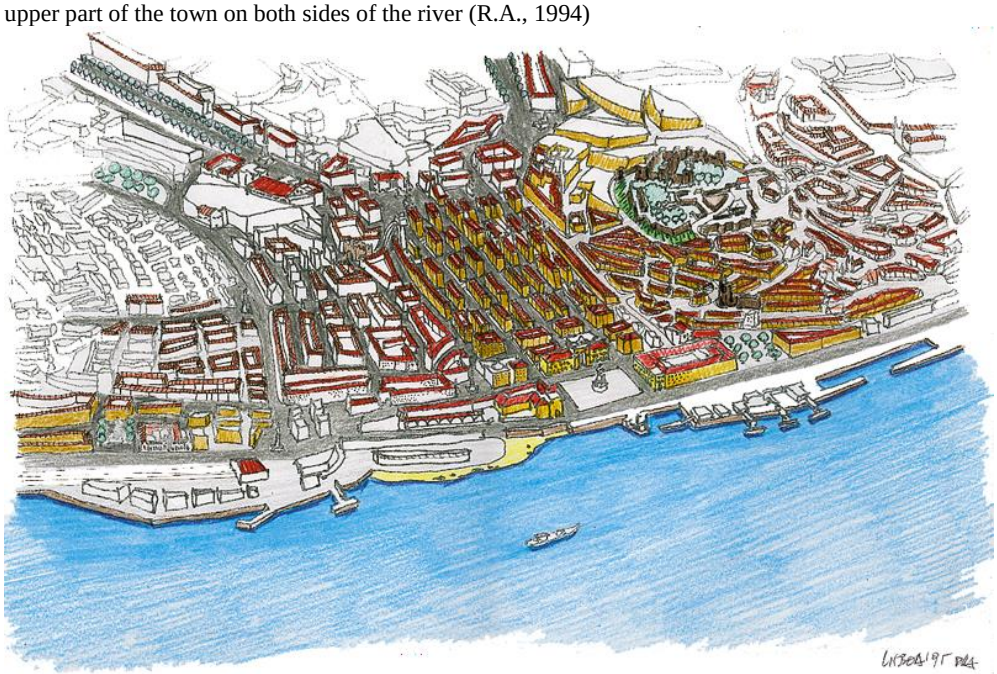


Fig. 6.36. View of Lisbon from Rio Tejo. After the earthquake of 1755 the city centre was reconstructed according to the design by E.dos Santos. New development axes were marked from the Mercado square with the royal residence. The rectangular street network was built over according to the Gaiol system (R.A., based on the map)

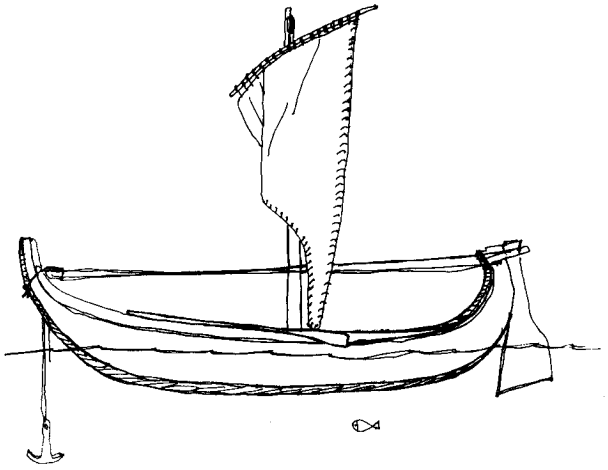


Fig. 6.37. Model of a flat-bottomed boat used for wine barrel floating on Douro in Portugal, in the spot called Penacova (R.A., 1995)

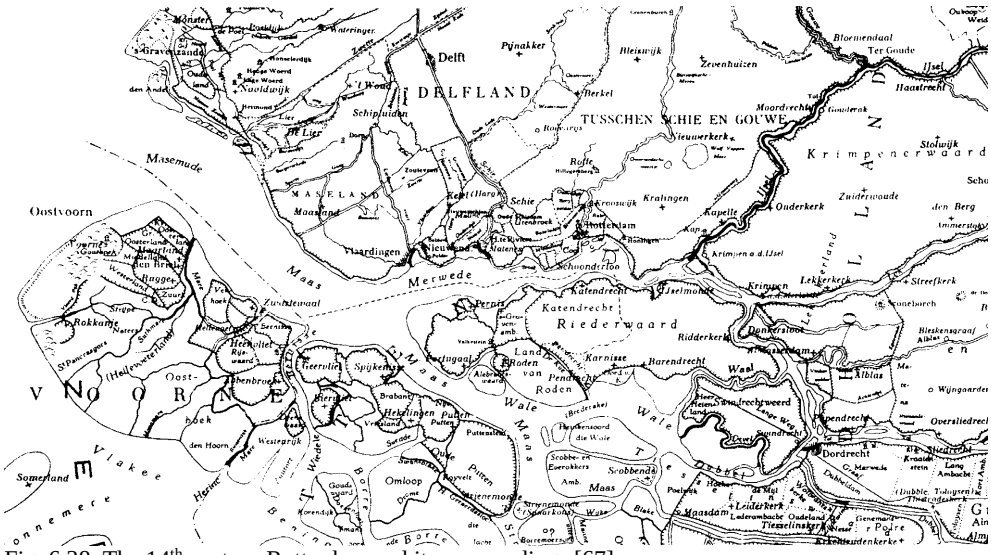


Fig. 6.38. The 14th century Rotterdam and its surroundings [67]

6.3.1. Rotterdam

City development

In the 16th century the city was an important link in the Dutch road network. Its surroundings were completely managed. Development of Rotterdam to a large extent took place in the years of 1575-1615. Waterstad was formed on swamps and riverside shallows. This is the part of the city which has changed most often and renders its essence best. Waterstad was formed on islands which were often trian-

gular due to marsh area draining. The city was protected against floods with two locks between which a green promenade of Boompjes stretched.

Fig. 6.39. Waterstad between the 16th and 17th century – the promenade of Boompjes between two locks visible [67]

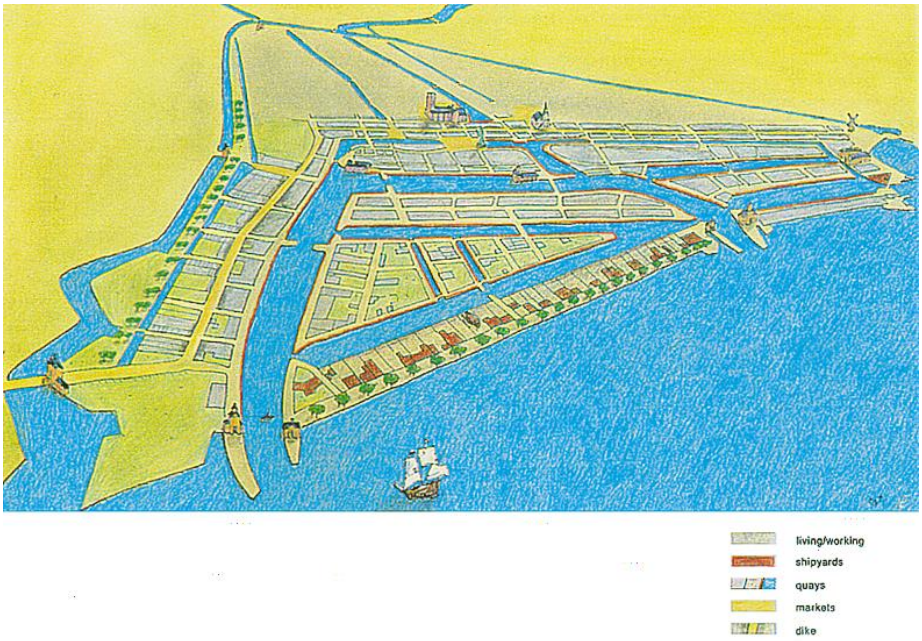


Fig. 6.40. Waterstad around 1930 – the city crossed by railway, the islands connected by the bridge [67]

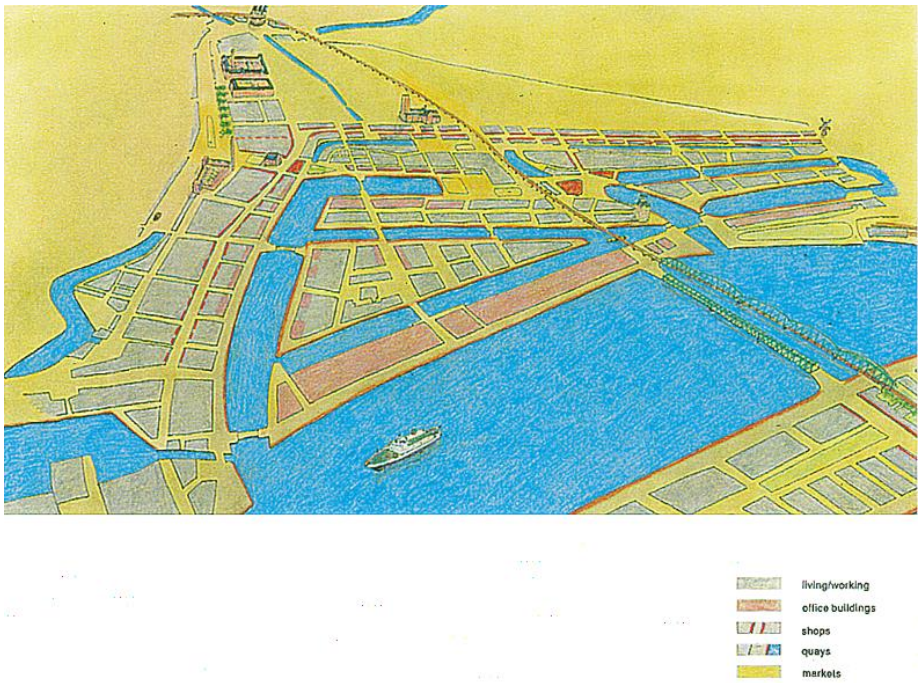


Fig. 6.41. During World War II the city was completely destroyed and some channels buried under rubble [67]

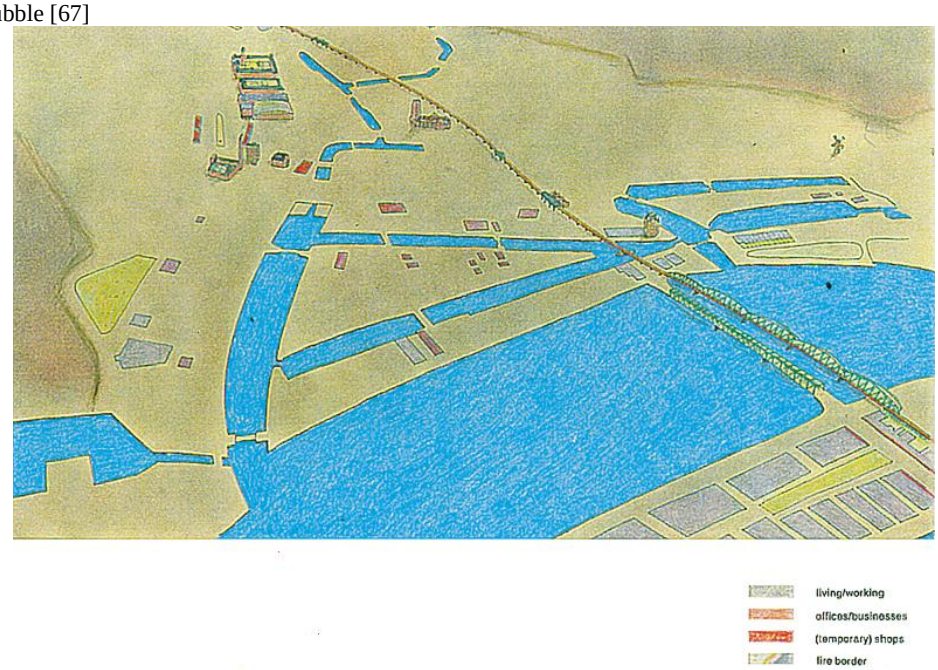


Fig. 6.42. Waterstad around 1990. Turning away from the concept of monofunctionality, which caused empty spaces to emerge, followed. Buildings became more and more dense and various functions, including residential ones, were brought back in the city [67]

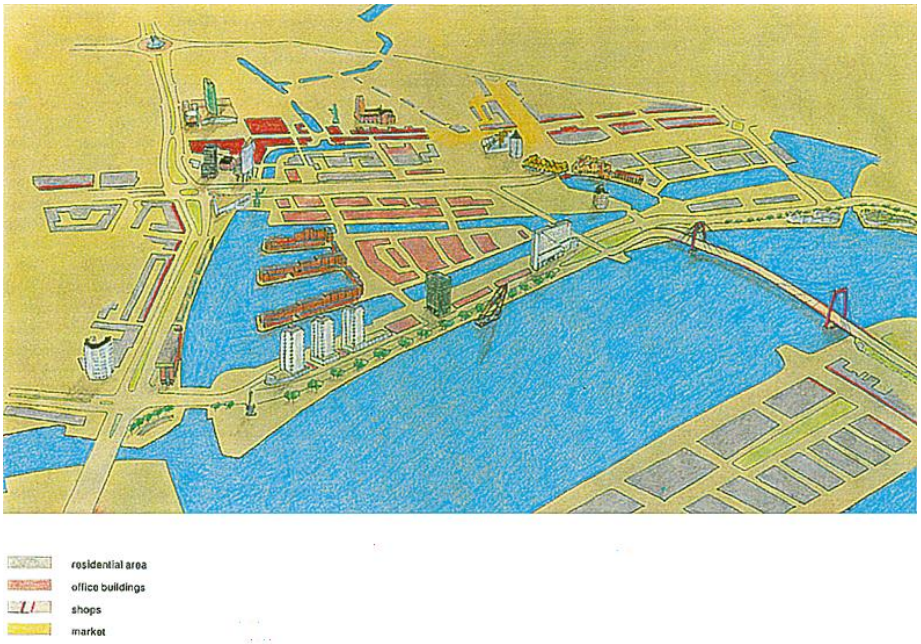


Fig. 6.43. The railway bridge of Hefbrug – a monument of technology and tourist attraction, used as a cafe in the future (R.A., 1995)

In the 19th century bridges and a railway viaduct were built on the river and channels and a railway route crossed the city. Large harbour basins emerged on the left bank of the river, far away from the centre. The Waterstad structure thickened and the open view of the river started to vanish. Merchants' houses gradually turned into institution sites and offices. Rotterdam was becoming a metropoly and the largest harbour of Europe.

After World War I designing activities in the city were aimed at eliminating industrial, marring buildings. Boulevards appeared and road traffic was reorganised. Waterstad ceased to be a residential area and it became a commercial and hotel district.

Rotterdam was completely destroyed during World War II. In the centre only the town hall, the post-office, and the exchange remained. Only St.Lawrence Church and the Schielandhuis house were reconstructed. A few channels were covered with the rubble removed from the city. In the reconstruction design prepared a special attention was paid to transport solutions, development of water transport, and division of residential, administrative, and service functions. The districts were designed in such a way as to preserve an open view of the river. There arose a completely modern city, with no reference to the historical arrangement and buildings. The harbour was moved from the centre closer to the river mouth. Only ships standing in the old harbour in the centre of Rotterdam remind one of the tradition and the past.

The harbour district of Fejenoord

Two options appeared in the plans of Rotterdam transformation. The scenario of „Rotterdam a tempo" is connected with further development of importance of the city and harbour in the contemporary Europe as the largest and most efficient naval and land reloading terminal. Also, harmonious development of existential, social, and cultural functions is expected. „Rotterdam decelerate", in turn, is a scenario taking into account the energetic crisis, unrest of ethnical groups, environmental degradation, increasing crime, etc. In the first scenario a dynamic spatial development of the city is suggested, with full exploitation of the Maas shores and the harbour areas which are not used; in the second one, in turn – calming of old town functions by cultural education, forming a cultural city full of museums, theatres, and artistic initiatives – a city which, owing to its rich culture, could become a tourist attraction with chosen fragments of buildings acting as open-air museums.

Designing concepts were preceded by historic and area studies performed in groups or individually. The area elaborated upon is located in the bend of the Maas river and separated from the rest of the district with a greening strip obtained owing to moving of ground railway to a tunnel. In the southern part of the wedge formed in that way there is Fejenoordstation. The wedge centre is filled by the old harbour of Nassauhaven, half-buried and used as a park for the Fejenoord district.

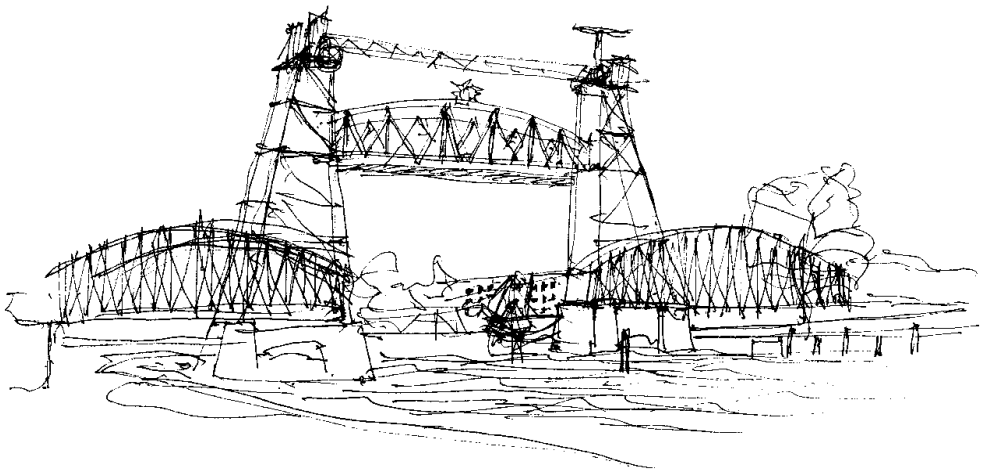


Fig. 6.44. Compositional concept of arranging the quarters of buildings of the Fejenoord district (R.A., 1995)

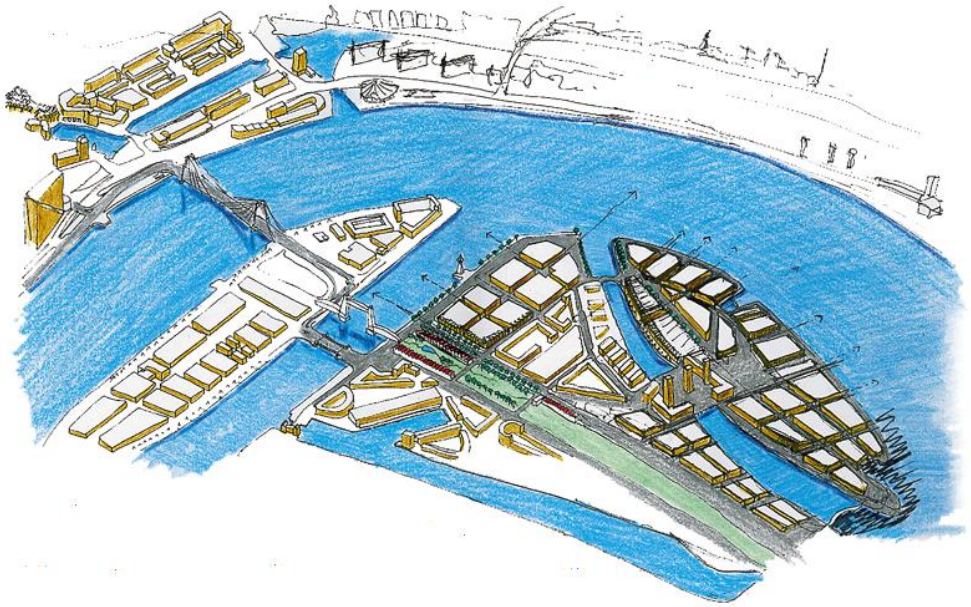


Fig. 6.45. Studies of boatbuilding forms for the purpose of „The Flying Dutchman" design (R.A., 1995)

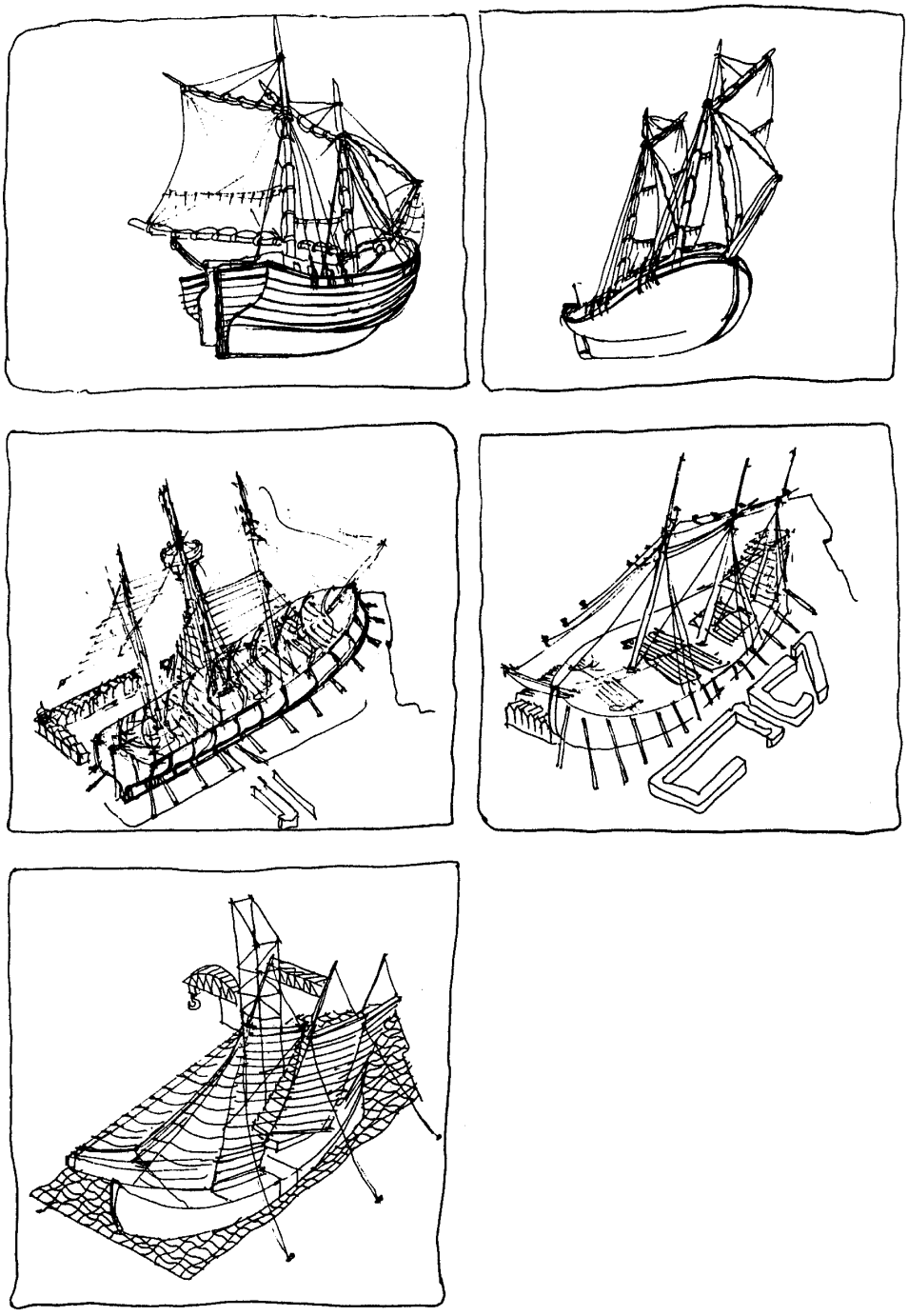


Fig. 6.46. Localisation and spatial expression of „The Flying Dutchman" concept in the existing quarters of the Fejenoord district (R.A., 1995)

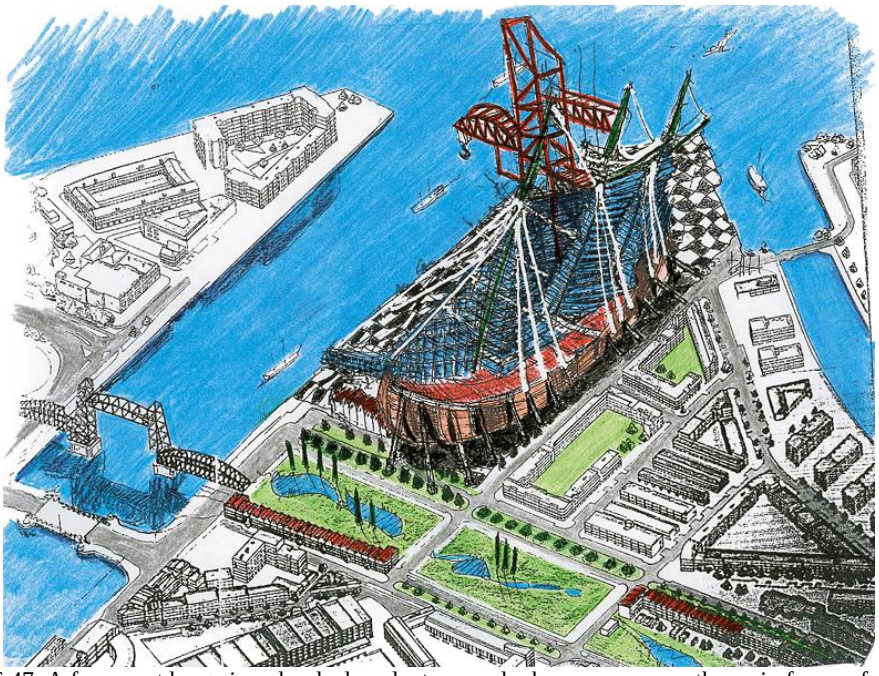


Fig. 6.47. A four-mast barge in a dry dock and a tower – harbour crane – are the main forms of architectural composition (R.A., 1995)

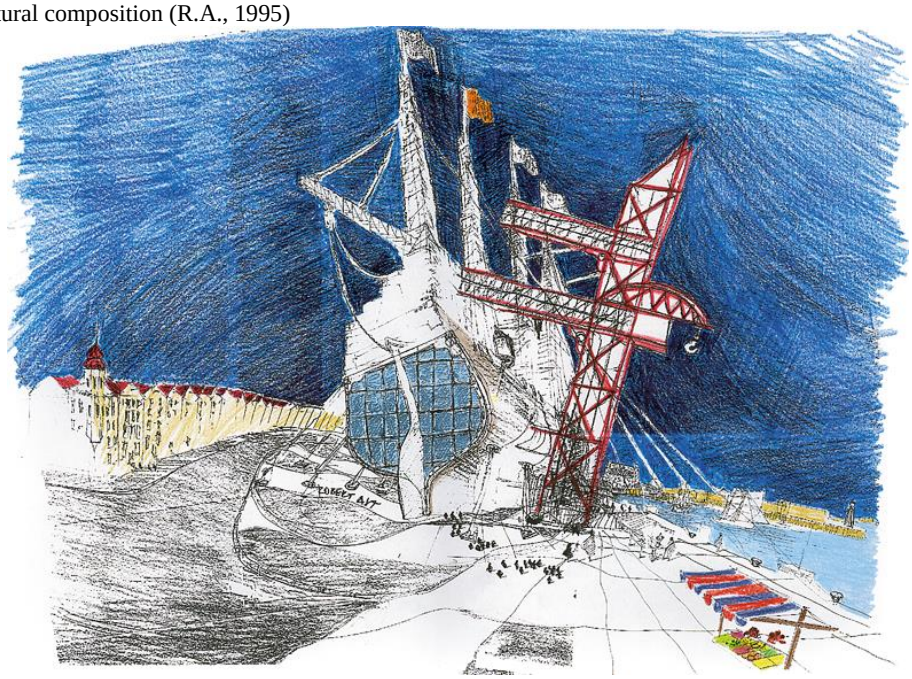


Fig. 6.48. Referring to the idea of a garden city was an alternative designing attempt within the „Rotterdam decelerate" scenario. Low, five-storey buildings with prevalent residential functions were suggested, shaped as a complex of town-planning blocks, streets, courtyards, and courts (R.A., 1995)

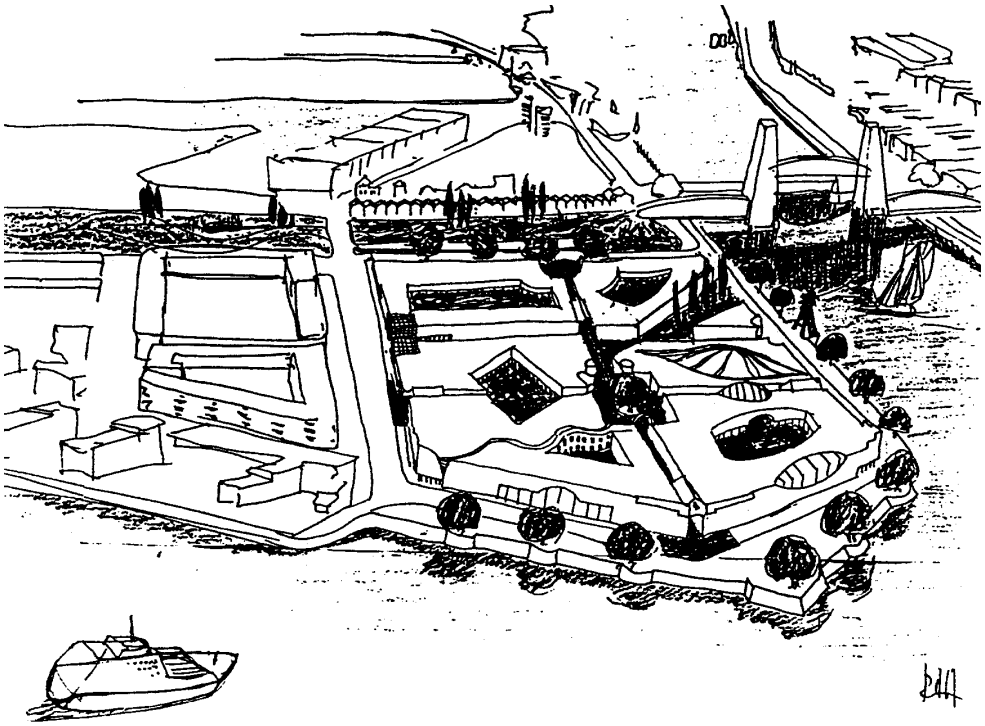


Fig. 6.49. Spatial concept of Moplenwater managemnet. Division of the area into five green quarters visible. The space between fortification channels occupied by public buildings – the city theatre, hospital being built, designed car park (R.A., 1995)

In town-planning sketches they tried to create a concept of internal management of the structure based on classicdevelopment of town-planning blocks. The aim was to standardise the structure of spatial identification and form a uniform river-side front in the scale of the whole complex. „The Flying Dutchman", the edifice and sailing ship standing on a wavy floor which could house a multi-functional structure dynamising district and city-wide functions, was proposed within the „Rotterdam a tempo" scenario. A Rotterdam exchange, exhibition halls, offices, and recreational and service facilities were planned. For instance, in the four masts of the sailing ship they planned offices and studios with panoramic views of the city, harbour terminals, and the shore 20 km away. The red-coloured tower makes vertical and horizontal communication possible on the particular storeys.

„The Flying Dutchman" would constitute a symbol of contemporary transformations taking place in the district of Fejenoord, point to the historical continuum and contemporary application of boatbuilding forms, as well as constitute an optical dominant in the main, junction point of the city – at the crossing of transport water and road routes. The structure refers to the boatbuilding forms of a four-mast barge which stands supported with shores in a dry dock. The original colours are

blue, orange and red; the wavy floor constitutes a boulevard-forum along Koningshaven. The main mast is about 500 m. tall.

Reference to the idea of a garden city was an alternative designing attempt within the „Rotterdam a tempo" scenario. Low, five-storey buildings of prevailing residential functions, shaped as a complex of town-planning blocks, streets, squares, courtyards, and piazzas. The town-planning floor would be formed by green areas, evenly covered with grass.

In both variants green strips are the main structure of hiker and cycling transport: in the place of eliminated railway, leading to the railway bridge of Hefbrug (monumental cafe), in the place of the Nassauhaven harbour converted into a park, and along riverside boulevards.

„Schie Harbour Lloydpier" (K.Borowski, L.Zimowski)

One of the six design subjects performed for Rotterdam within the Summer Architectural Practice, entitled „Rotterdam and Middelburg in the 21st century", was to create a concise town-planning and architectural concept of the area of three harbour embankments of the old Rotterdam port in the city centre on the Maas river which is not used any more – „Schie Harbour Lloydpier".

In connection with the change of technological conditions of reloading, with the considerable increase of reloading masses during the year, and the increasing size transport ships functioning until World War II, the naval harbour of Rotterdam ceased to perform its function. The necessity of developing the harbour toward the river became obvious. Here, we have to do with a classic example of external harbour transurbation. New embankments, sticking to the modern technical requirements; the old, devaluated ones, in turn, scare with emptiness. The problem of spatial solutions of „Schie Harbour Lloydpier".

7. SPATIAL PROJECT STUDY OF THE RIVER WARTA IN POZNAŃ, INCLUDING OSTRÓW TUMSKI AND SRÓDKA. NORTHERN AND SOUTHERN PARTS

7.1 Poznań – a city on five islands

7.1.1. A historical context on the significance of the river Warta for the development of the town to date, and also the context of its future development

In the spatial sense:

The basic subject of "Warta is worth knowing" highlights the return of the city to its river as a factor integrating space, as an artefact of historical, and very attractive micro-spatial element of the composition of town. What is stressed is a symbolical value of the river, and the value of spaces and areas lost as a result of changing history of the town. They spatial decisions influencing their transformation of the river valleys of Cybina and Warta were based on the assumption of taming the nature. Man had proved that he could even change the course of the river. The interference to date has not created any better or more valuable areas from the spectacle and artistic viewpoint. A 90 m long trains of barges for which is the riverbed had been made straight do not sail downstream any more. What was, then, the purpose of this gigantic project and work done in 1968?

At present, nearly 40 years later, we would like to design Poznań districts as compact urban structures located on five islands around the Ostrów Tumski Island and, from the spatial point of view, subordinated to the Cathedral and architectural structures around it. We recreate the Chwaliszewo Island with residential houses and services, we create a small Middle Island with a Contemplation Temple, and by introducing water to the second Floodway Canal now we recreate the Artists Island with art galleries and theatres in the reconstructed Heat Generating Plant. We regard Śródka as a peninsula and compensate for the missing buildings, and we designate the northern part of Ostrów Tumski to be a new residential area, Nowy Ostrów, on the Park Island will create a Landscape Park with Kopiec Piastów promontory as a dominating future.

On all islands we try to create the so-called urban waterfronts with the skyline not exceeding the towers of the Poznań Cathedral.

In the symbolic sense:

The prevalent motif for the whole course of the Warta river within the borders of this competition project is the subject of the Great Symbolical Axis which is metaphorically presented by three most important points. Those are:

1. John Paul II Cultures Sanctuary and an open air Altar at the site of the 1983 pilgrimage in Dolna Wilda Błonia.
2. The Cathedral in Ostrów Tumski – historically the most important site in the development of Poznań.
3. Kopiec Piastów promontory - a new symbolical venue at the Lech Bridge in the open space with a great value of natural landscape.

Those three most important points create conditions for formulating the direct, or even wider surrounding, because they can be (as Ostrów Tumski is already) dominating elements of the spatial arrangement.

The communication arrangement:

Transit:

We recreate the Thousand Year Route connecting Zamek Przemysława II castle, The Old Market, Most Wielki, Chwaliszewo, Ostrów Tumski, Śródka, Św.Jana Church. In order to achieve this we transform the present Solna - Estkowskiego - St.Wyszyńskiego streets into the Thousand Year Promenade. Therefore the whole transit traffic is moved away, it passes by Śródka roundabout from Warszawska Street into Małachowskiego, Wincentego to Armii Poznań streets into the infrastructure seam along the railway line. On the other hand, the Thousand Year Promenade has its Oak Alley, a tram line, commercial and leisure areas, slowed vehicle traffic (a single lane in both directions) on the outer part of a promenade. The Śródka roundabout is also transformed, and in St. Wyszyńskiego street narrower lines of architectural development are restored, in keeping to the existing urban structure.

Main roads:

Main circular lines are planned around the area of the New Residential District, connected by a transit through Cybina with Prymasa A.Hlonda Street. In Wilda we plans the main road along the lines of the present Droga Dębińska. On the other hand, Dolna Wilda should have a local character.

Local roads:

In the area of Śródka ,Ostrów Tumski ,Chwaliszewo, new local roads are planned.

7.1.2. Using the river Warta valley and adjacent areas for leisure and sports, significant for the entire city, with a general access, which may be an alternative for Malta

In the envisaged Warta River Valley, the river valley bottom is differentiated from the river bed. Transforming of the river beds and floodway canals in the past centuries was only limited to superficial changes visible on the outside. Nevertheless, the underground waters still flow through the river valley bottom. Filling in Zgniła Warta, Stara Warta, and moving the main river bed that from the areas of Wilda into the present course, liquidating Struga Karmelitańska, and other superfi-

cial waters did not liquidate underground water flow, which still sculpts the river valley bottom. It seriously influences the cost of investing these areas and the structure of the envisaged constructions.

In the project, we have planned a large-park-garden-landscape areas as an alternative for the city dwellers to spend their leisure time. One of them is Błonia Wildeckie designed around the Cultures Sanctuary. Another one Mid-River Landscape Complex on the peninsula between Cybina, Warta, and Główna rivers, . designed to be situated around the Kopiec Piastów promontory.

7.1.3. Development of areas which are particularly important for the city space, indicated in the graphic appendix #2 with symbols 1-8

Area number 1 is located between the waters of Cybina and Główna. The old floodwaters of Cybina flow is there. At present, the process of filling in those floodwaters with soil continues. This phenomenon is especially strong along the Prymasa A.Hlonda street. Around this area there is a strong forest stand and meadows on the side of lazily flowing Cybina river. The area is shaped by a flood bank stretching from the Lech bridge in the north to the railway line in the south, and a terrace of the Główna housing estate. There is a tendency of filling in the waters still existing between those promontories. The area is clearly divided into the part fit for construction along with Prymasa A.Hlonda street, and the landscape area, where, due to the difficulties with founding buildings, landscape and water area has been designed, steering towards a dominant feature which would be Kopiec Piastów. The park itself is a functional allusion to the landscape assumptions of four example Park Werlitz. It would be an alternative to the Poznań city dwellers to spend their free time. The composition is based on the Kopiec Piastów as a closure of the Great Symbolic Axis connecting the Cultures Sanctuary, The Poznań Cathedral and Kopiec Piastów. The lesser axis of the composition which spread around onto the Cybina river meander, flowing there into the Warta river like sun rays around the greater axis. These rigid composition accents have been softened by renaturalised watercourses, roads, footpaths, and bicycle paths. In chosen spots some larger structures have been planned, such as restaurants, cafes, clubs, sports buildings located in the greenery. This area is excellent for walking, jogging, and bicycle riding. The watercourses can be used for boating and canoeing, or even windsurfing. In the winter, ice skating should be propagated, as internal canals have been designed to be shallow, around 80 cm deep. Around this area the tradition of massive ski runs and ice skating runs can be restored. On the edge of the lazily flowing Cybina river, areas of contemplation and angling can be designated. Peninsulas between the connecting waters have extraordinary *geni loci*.

On the other hand, the area along Prymasa A.Hlonda street is undergoing contemporary urban processes. Residential family houses and commercial services up to the height of six stories is envisaged there. The roofs should slope terrace-like towards the valleys of Warta and Cybina rivers, letting the inhabitants enjoy a view

on the landscaped park. At the crossroads of Nowa Małachowskiego-Wincentego-Armii Poznań and the new section of Prymasa A.Hlonda street, a recreation and sports centre has been planned, with swimming pools and a water park. Biologically clean the area should constitute

Area number 2 has been planed as a residential area - Nowy Ostrów designed from classic urban blocks, adapted to the landscape course of Cybina and Warta rivers. This height of the structures has been subordinated to the dominant feature of the Poznań Cathedral steeples. The height of the buildings is envisaged to be for floors, and five floors around the New Market. The built-up area will be approximately 25%. Biologically clean area will be about 50%. The rest should be taken by public areas, such as squares and streets. Traffic is envisaged in the circular way. A tramway crosses the Ostrów Tumski (Sacrum) bringing its passengers to the Cathedral, goes through the Gates of Time above the railway line, and via the transit route enters Nowy Ostrów (Profanum), goes across the New Market, and further on to Kopiec Piastów, then returns along the Prymasa A.Hlonda street and Thousand Year Promenade to the Old Town.

Area number 4 is situated in the space of the left bank from the Dolna Wilda towards the river. The entire area this only a partly organised part of the city, has a landscape value, but is also very little used by the city inhabitants (except for allotments). Apart from the proposed construction of the sanctuary, it is proposed for the Górna and Dolna Wilda , partly built up with urbanised wedges, come closer to the river. Some public utility buildings are planned, pavilions which would encourage better contact of the inhabitants with this part of the city, situated right along the riverbank. The construction line must be subordinated to the quite clear and dominating position of the Sanctuary and the road leading from it towards Ostrów Tumski. The biologically active area could be 35% of the area.

Area number 8 contains the envisaged river harbour and dynamic residential and services development around it. Creating a waterfront and completing the building development is planned in this area.

The middle part of the Warta river has the best spatial values and construction development potential. Ostrów, Śródka, Chwaliszewo are the heritage of the past. In those parts of the city, the project envisages (within reasonable possibilities to the spatial solutions based on the best cultural and historical patterns of the past, returning to the urban matrix or its logic which, from the point of view of construction, prefers the language of cultural patterns in their contemporary interpretation, and which assumes the logic of living within the richness of its forms. According to us, at this phase of debating the problem of transformation for this part of Poznań, it is our obligation to indicate everything which could form general and crucial values. The graphic recording explains the main assumptions of this proposal.

In designing Śródka, we will also envisage not interfering with the present values. Completion of the architectural development is also planned in the areas which highlight the historical values of precious buildings and the urban tissue. This is why two bridges are envisaged as logical and better connections with Ostrów

Tumski. In the southern part of Śródka, an urban block is proposed at the Warta river in the style of sculpting architecture being a new dominant feature, and building upon the bus depot. The new dominating future is not competitive for the Cathedral. Between this building, and Jana Pawła II street, it is suggested to implement an investment programme according to the regulatory system which highlights the directions of architectural development of pedestrian axes directed towards the Cathedral. The Heat Generating Plant building is going to be rebuilt as a Gallery of Art and Theatres.

In the middle of the quarter there is an observation and restaurants Gas Plant Chimney. It can become a more general attraction and a symbol of Poznań known outside the city limits. The traditional form of a chimney is woven by a modern, light structure - a metal and glass construction. Inside there are lifts transporting tourists to restaurants on the chimney, or to the observation point at the altitude of about 60 m.

Conclusions:

Creating public spaces along the river in the form of squares, harbours, embankments and boulevards. Vitruvius claimed that squares at the water were the highest form of public space and for generations have attracted people and encouraged them to relate with nature and water.

Squares and public areas are connected via the river by bridges designed according to individual designs as works of art, not only the art of engineering. The bridges would fulfil communication functions, but also be sightseeing points, and play the role of stages during the Malta Theatre Festival. The Aquatorium at the fork f the Old Warta Riverbed and by-channel floodway would play the role of the Water Theatre of the city of Poznań. The audience would be seated at the Water Market, Monumental Stairs, Berdychowski Bridge, Czartoria Footbridge, Ewangielicki Bridge at the Boulevard and the river embankments.

The Warta River and River Navigation Museum and the City Aquarium has been planned at the Museum Square, embracing the functions of city promotion and conferences.

7.1.4. The course of river bank boulevards and bridges

It is envisaged to ensure adequate numbers of bridges, both for pedestrians and cyclists. The spatial form should be flat without any dominating construction features in order not to cover the urban fronts of the islands. The islands and boulevards elevations would be a compositional setting for the urban floor, consisting in the water surface and bridge floors. Such treatment is aimed at securing very attractive spatial conditions both for the inhabitants and guests. This is how in Poznań new, aquatoria-squares might be built for the benefit of the general public – "*pro publico bono*".

Boulevards along the river should be the main factor of urban structure of the city. Classic boulevards are planned with a two-level walking routes, planted along with trees. The lower boulevard provides contact with the water, connected at many points with a top level by stairs or ramps. The boulevards should be built from light coloured sandstone blocks. The floor should be paved with regular granite blocks. The trees should be planted at even spaces, creating shady areas and protection against winds for people walking along the river. In specific spots along the boulevard there should be groups of stone benches. The bottom boulevard, in the dugout Warta bed, can be partly grassy with designated footpaths. The bottom boulevard is should be made into kinds of *eslpanadas* and *piacettas* for the passers-by. The area would be even more attractive due to mooring bollards for barges, motorboats and boats at the river banks. In front of the Water Square and Eagle Wing Square traditional barges should be converted into restaurants or museums. Monumental stairs would secure access to those barges, they might always play the role of meeting spots or places from which one could contemplate river views.
Two-level boulevards had been planned in the following points:

The Eagle Wings as an interior closely connected to the Cathedral place as a *forum* at the crossroads of the Thousand Year Route and the boulevard around the Ostrów Tumski. This boulevard, as symbolic "Eagle Wings" is a very attractive landscaping and sculpting task, connecting the urban floor, the landscape and the surface of the lake.

1. Bulwar Akademicki situated along the University of Technology buildings from the Królowej Jadwigi bridge to the place where the river Cybina flows into the canal.
2. Bulwar Chwaliszewski positioned around the island, and on the northern side connecting with the Thousand Year Promenade.
3. Bulwar Portowy along with embankments remaining after the old river harbour, then transforming into Bulwar Szelągowski.
4. Bulwar Szelągowski , also on two levels. In order to retain the view on the river valley, this boulevard should be clear from a wild greenery and, in its place, planted greenery should be introduced.
5. Bulwar Staromiejski beginning at the Św.Rocha Bridge, and going across the Water Market, along the Old City, and connecting with the Thousand Year Promenade.
6. The entire Middle Island is a square from which one can watch a 360° panorama at the fork of the Old Warta Riverbed, the Main Riverbed and the First Flood Canal.
7. Along the Second Flood Canal boulevards are planned - an extension of the Eagle Wings on the Ostrów Tumski Island, and a landscape boulevard on the Art Gallery Island.
8. In the New Residential District, located in the northern part of the Ostrów Tumski, it is envisaged to build landscape boulevards, picturesquely composed into the river banks and embankments, along the banks of the Warta and Cybina rivers.

9. The Blvd at the First Canal has been planned as a scenic route, using the existing embankments.
10. Śródka, as a peninsula, should be surrounded by a scenic boulevard running along the Cybina river and connecting with the Thousand Year Promenade.
11. The Cybina and Główna waters constitute a Mid-river landscaped park leading to the Kopiec Pierwszych Piastów
12. South of the Królowej Jadwigi bridge , the Bulwar Ratajski is planned to be cleared from wild greenery in order to enable optical penetration of the left Warta river bank and Wilda panorama.
13. On the left bank of the Warta river, landscape boulevards are planned along the flooded areas in the form of footpaths and wooden bridges hanging over the water. Another pedestrian boulevard has been planned, regularly planted with dense trees.
14. It is proposed to re-naturalise the riverbanks by getting rid of concrete bands and, in their place, to introduce stone blocks or broken stone blocks in wire mesh baskets. Such sets of objects along the banks of the river can constitute boulevards providing immediate contact between water and land.
15. In place of the filled in Zgniła Warta on the waters of the filled in Kamionka and Stara Kamionka, water compounds are planned, highlighting the central foundation of the JPII Cultures Mausoleum. This entire park and water foundation would function as an alternative to spending leisure time for the Malta Lake.

7.1.5. Greenery wedges formation

The notion of greenery wedges took shape at the beginning of the 20th century, after the city fortifications had been demolished. After long years of treating the city is a compact, defensive structure which has full control over its inhabitants, came the time of its opening on to the river banks and nutrition terrains. The space was becoming more and more democratic, as family housing was being introduced on the open urban matrix. The planners began to think not only about the defensive function of the cities, but also about the hygienic function. The notion of city hygiene was coined. Moreover, technologies make it impossible to build on non-carrying ground.

There were worries about the river because of the danger of flooding. Therefore, some ground reserves were left as polders that could be flooded. Flood banks were built utilising the demolished fortification material. Spaces between the embankment and city terrace were filled with made, non-carrying ground.
The contemporary city, still developing, did not use those areas leaving them as partly wild.

In the project we have planned creating an urban matrix over the entire area covered by the competition. That urban matrix has been created from public spaces made available in the form of streets, squares, boulevards, promenades, canals, riverbeds, among which there are open spaces, developed spaces, generally accessible spaces and closed spaces.

Greenery wedges in the current form are not friendly to the inhabitants. They fulfil ecological and climactic functions for the existing architectural development. A choice then should be made as to what is more important?

According to the architects designing the space, greenery wedges should be organised by means of introducing an urban matrix. Area number 1, which is not adapted to human habitation, should be made available by designing a landscaped park. Area number 2 consists a continuation of Ostrów Tumski. This area has been systematically levelled up, and presently its level has risen at about 8 m above the water surface. We envisage to establish an new residential district, in direct contact with Cybina, Warta, and Canal number 2. In the area number 4, we envisage to build the JPII Cultures Mausoleum, to remember the visit of the Holy Father in Poznań right after martial law was declared in Poland. We also envisage a housing a and services development area in keeping with the architectural development line set by the composition axis running from them Mausoleum to the Cathedral. Such development connects well to the Poznań Ring, and would softly join the Wilda architectural development at Jerzy Street. Quite high cost of such and such development is a separate matter, because there are significant difficulties with the foundation. Area number 6 consists of the open spaces of the park, where it is not possible to found residential buildings, only park pavilions. In the future, it should be considered whether or not it may be possible to set up a park at river with garden compositions in the areas number 7 and 5.

7.1.6. Hydrotechnical issues

Building several hydrotechnical structures is envisaged, allowing the proper functioning of the river Warta in Poznań.

1. Building a water sill is planned in order to retain the river level constant, or at least limit the fluctuation of water levels.
2. A set of locks are planned at the Lech Bridge, which would make it possible for barges and yachts to navigate along the river.
3. According to architect designing the area, the bottom of the river bed should be protected against unnecessary architectural development. The important issue is the riverbed and the flooded polders during high waters. In the future, the waters of the Warta river should be dammed in Poznań, with the dam built in the Szeląg area. It will definitely make the city centre more attractive both from the spatial and cityscape points of view. It would amend the climactic comfort - airing, humidity, temperature fluctuation. It would be indirect allusion to European cities of similar magnitude, where river water resources are consciously managed.

Fig. 7.1. The basic display panel (designed by R.A., 2006)

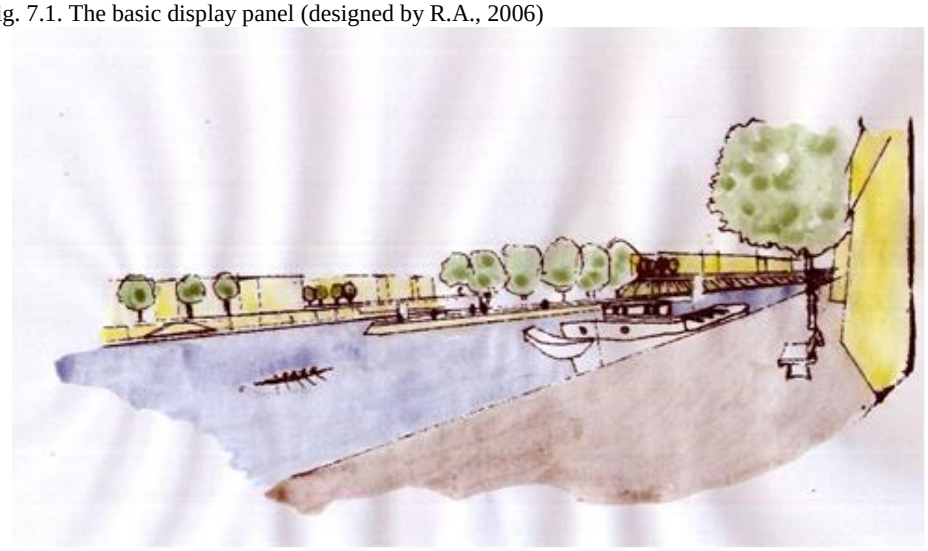


Fig. 7.2. A view of Ostrów Tumski from Akademicki Boulevard (R.A., 2006)

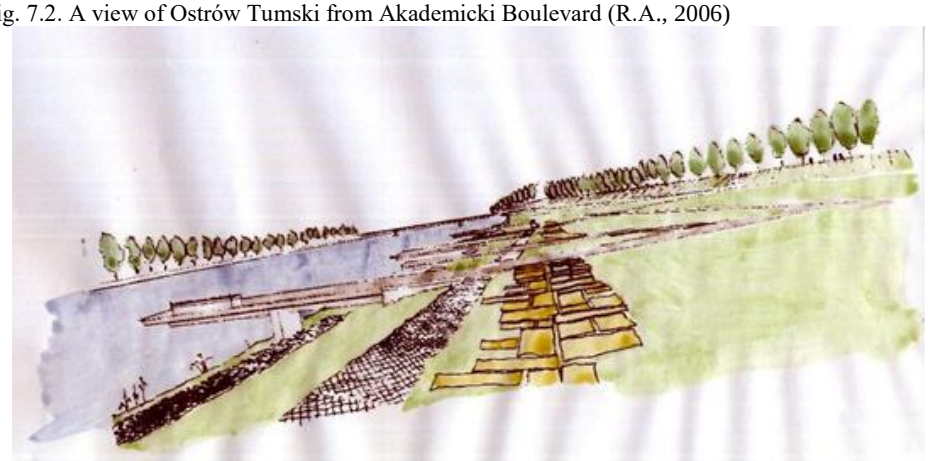


Fig. 7.3. A view from Krajobrazowy Boulevard at Hetmański Bridge towards Królowej Jadwigi Bridge. Renaturalization of riverbanks is visible (R.A., 2006)

Fig. 7. 4. A view from St. Bridge towards Ostrów Tumski. In the Warta river perspective, there is Teatralna Island with Art Galleries, theatre and opera halls. (R.A., 2006)

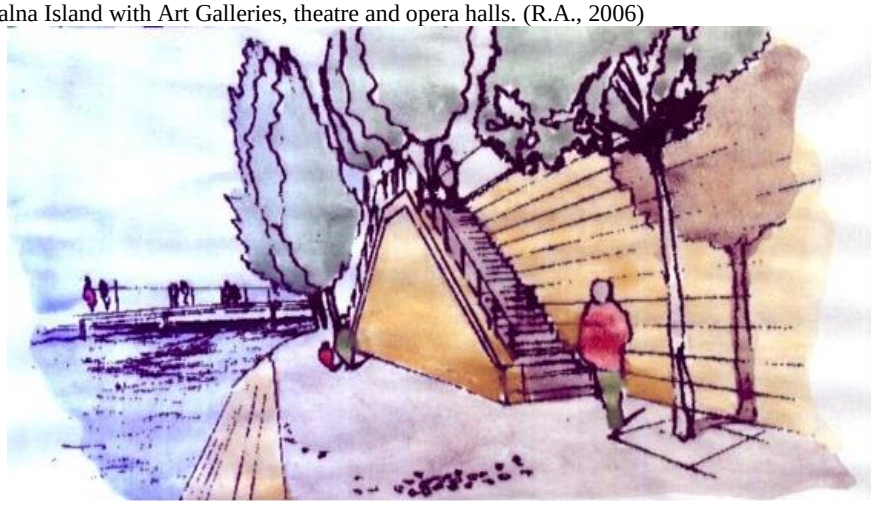


Fig. 7.5. Chwaliszewski Boulevard– stairs between the lower and upper levels. (R.A., 2006)

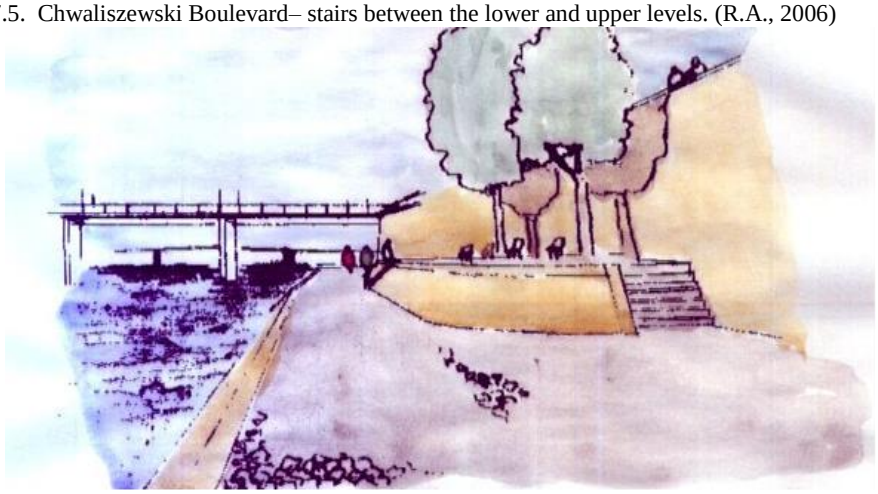


Fig. 7.6. .Akademicki Boulevard – a detail. (R.A., 2006)

Fig. 7. 7. Teatralny Boulevard – a detail. (R.A., 2006)

Fig. 7. 8. Islands: Chwaliszewo, Artystów, Ostrów Tumski, Teatralna, Śródka Peninsula from a bird's eye view. A view At the southern part of Ostrów Tumski – Sacrum and the northern part – Profanum. Śródka, Ostrów Tumski and Chwaliszewo, as well as the Old City and St. Adalbert's Hill, connected by the Tysiąclecia Promenade. The East-West transit planned in the seam between housing estates, integrated with the railway circular line. (designed by R.A., 2006)

Fig. 7. 9. Staromiejski Boulevard in the restored Warta River meander (R.A., 2006)

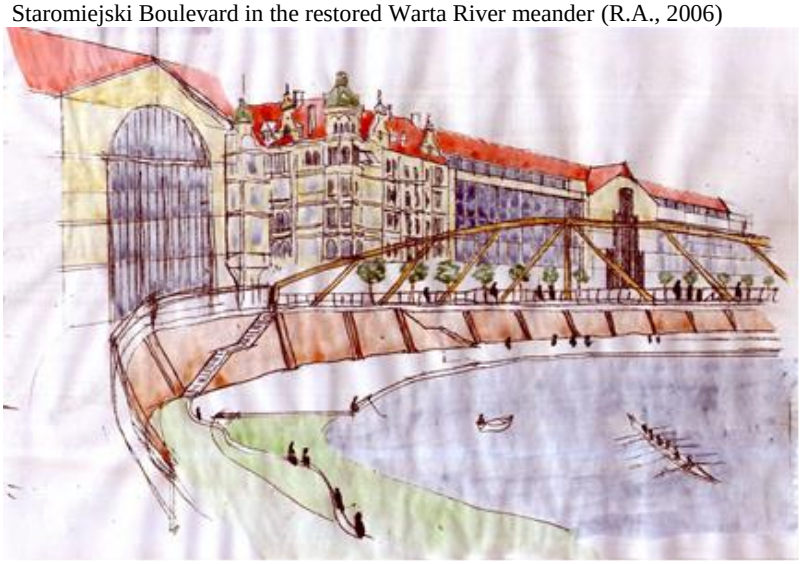


Fig. 7. 10. A view At the Wielki Bridge and Staromiejski Boulevard from the Ewangelicki Boulevard (R.A., 2006)

Fig. 7. 11. A view from Chwaliszewo at the restored Old City Waterfront (R.A., 2006)

Fig. 7. 12. A view at Chwaliszewo with a two-level Chwaliszewo Boulevard (R.A., 2006)

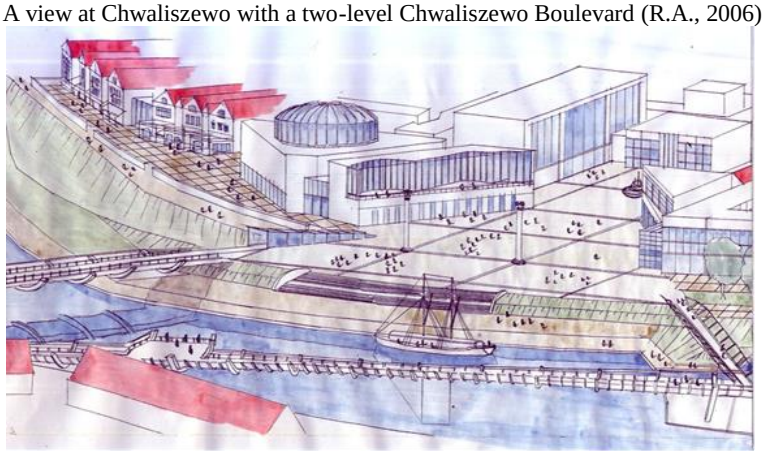


Fig. 7. 13. The Water Market, a new elegant public space of the city (R.A., 2006)

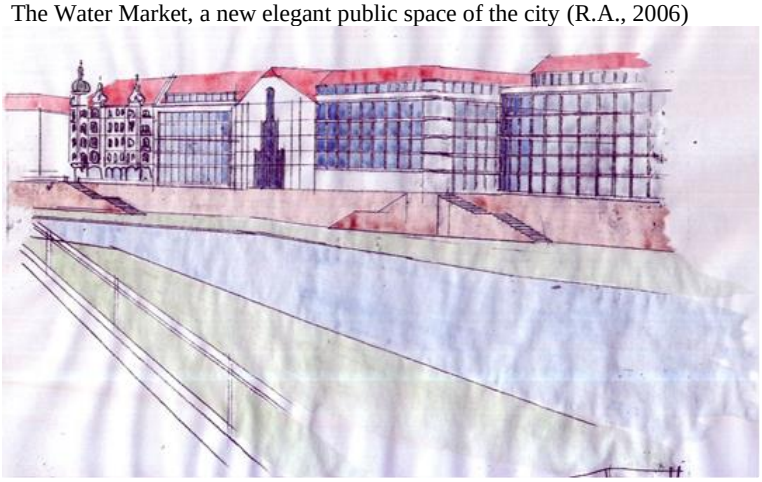


Fig. 7. 14. Staromiejski Boulevard, a view from the Chwaliszewski Boulevard (R.A., 2006)

Fig. 7.15. Ewangelicki Boulevard and old Gas-works buildings (R.A., 2006)

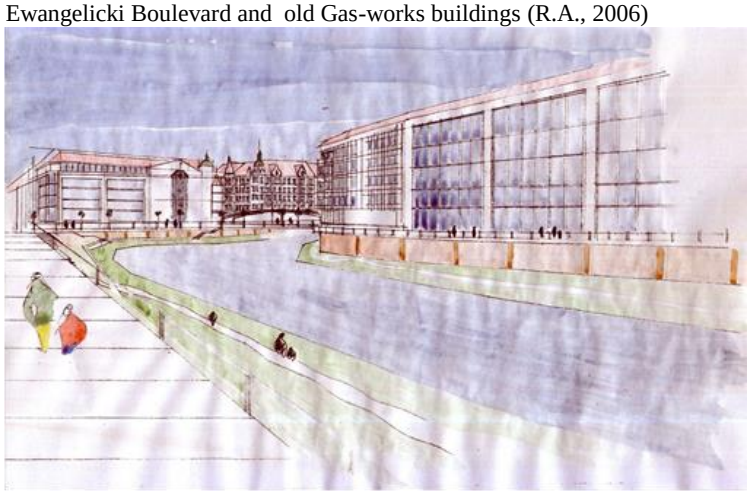


Fig. 7. 16. Boulevards: Ewangelicki and Chwaliszewski (R.A., 2006)

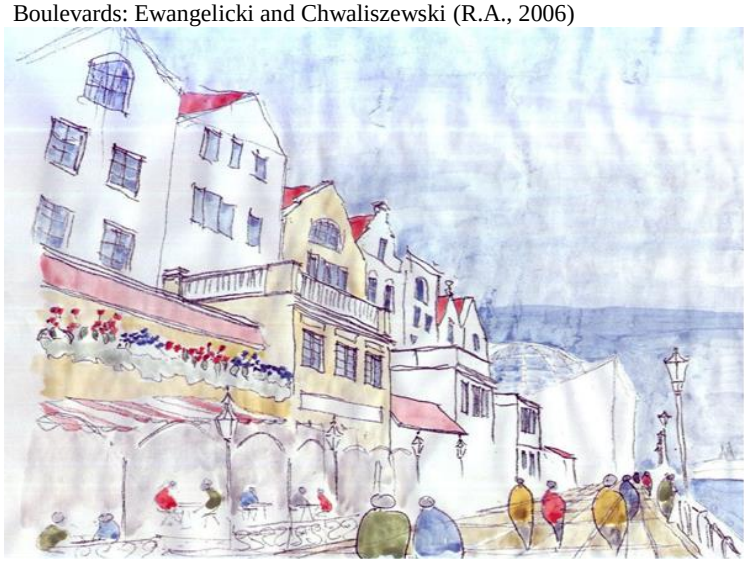


Fig. 7. 17. A boulevard at the Water Market (R.A., 2006)

Fig. 7. 18. A boulevard at the Water Market (R.A., 2006)

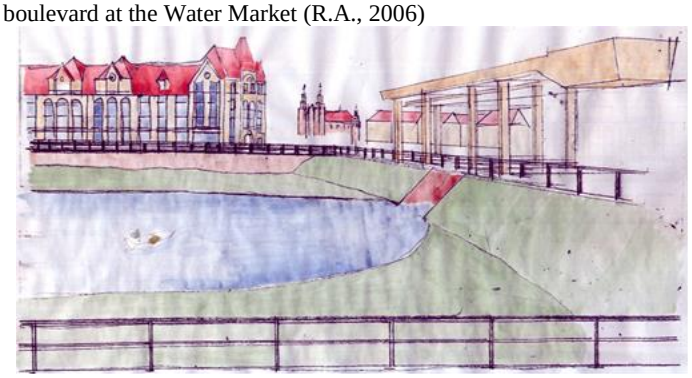


Fig. 7. 19. Old Warta Riverbed weir, a “Working class house”, and the Cathedral in the background (R.A., 2006)

Fig. 7. 20. A view at the Wielki Bridge and Chwaliszewo from the Staromiejski Boulevard (R.A., 2006)

Fig. 7. 21. The Skrzydła Orła Boulevard In front of the Cathedral - Sacrum (R.A., 2006)

Fig. 7. 22. The New Ostrów Tumski - Profanum (R.A., 2006)

Fig. 7.23. The Śródka Peninsula with the Mieszko Bridge and Cybina Dam (R.A., 2006)

Fig. 7. 24. The Theatre Island - Gallery Theatre, the Estkowskiego Route transformed into the Tysiąclecia Boulevard (R.A., 2006)

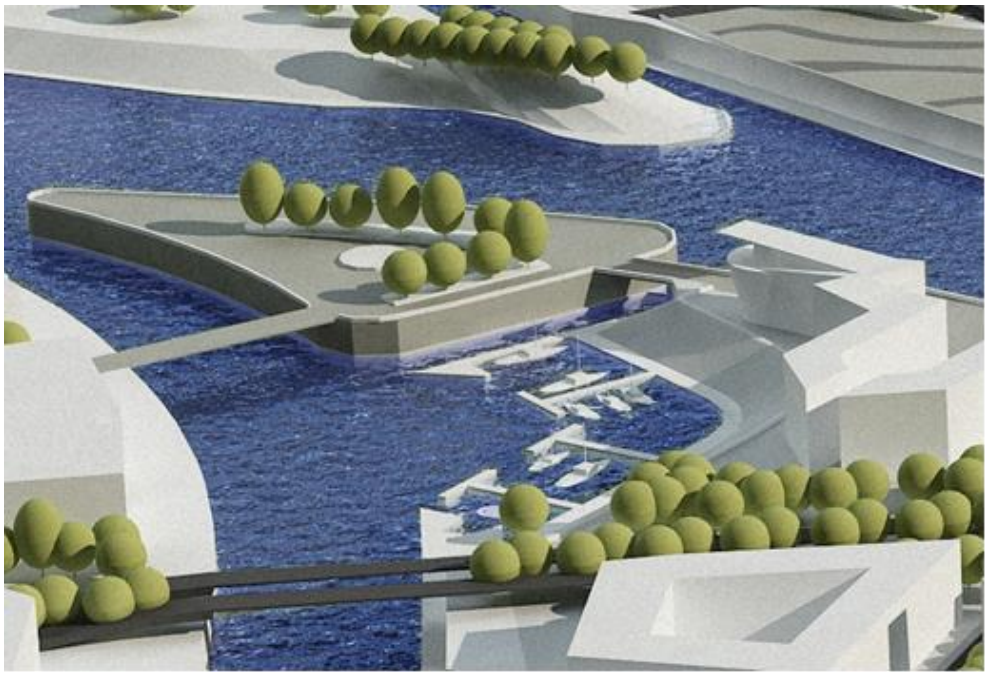


Fig. 7. 25. The Zadumy Island and yacht marina between the Tysiąclecia Boulevard and the footpath (R.A., 2006)

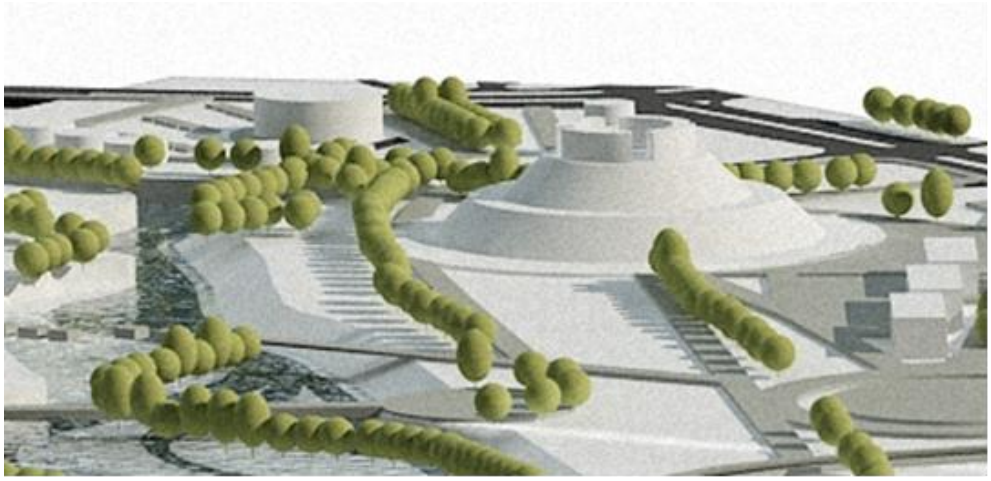


Fig. 7. 26. The Piastów Hill on the Międzyrzecze Island (R.A., 2006)

Fig. 7. 27. Buildings at the Archbishop Hlond Alley and a transit street (R.A., 2006)

Fig. 7. 28. The Water Market (R.A., 2006)

8. WATER AND AIR – FACTORS SPECIFIC FOR „MARINE" URBAN SYSTEMS[1]

8.1. Harbours in chosen cities – examples

8.1.1. Shipping, tourism, yachting

Water and air - two elements which scientists have been researching for centuries, for example the theory of wind for the sailing and urban purposes, the theory of waves for the purposes of navigation and shore protection, *sante per air* or SPA for the purpose of existential comfort and other.

In the marine context, the relationship between the human being and the sea elements was obvious in the lack of water and sailing competitions in ancient Olympics. Rowing was considered to be an activity fit for slaves, and using sales on the open sea depended on the grace of the gods, embodied in the Greek mythology into winds taking different directions and force. Sailing competitions were understood to be independent from the effort of man wishing to become equal to gods and, as such, not deserving the Olympic laurel wreath.

Regarding the urban planning in ancient Rome, Vitruvius in the first century after Christ wrote: "After the city has been surrounded by walls, within walls the architects begin to design squares, main streets and side streets, depending on the cardinal directions. Those streets will have the right course if they are covered from wind. Cold winds are biting, warm winds bring diseases, and humid twins are harmful." "Diagonals between spheres of two winds should be, it seems to me, the main factors showing the directions of main and side streets." "After the main and side streets have been planned, one should start choosing building sites for temples, *fora*, and other public utility sites, taking into consideration comfort and public benefit. If the city is situated at the seaside, the site located closest to the harbour should be chosen for building the *forum*...."

Intuitively and quite contrarily, the fauna was categorised into humans, animals and sailors whose fate was dependent on the elements and gods, and who worked and lived in incredibly hard conditions. Nevertheless, overcoming many obstacles, people for centuries used water and wind to transport goods and ideas because, ac-

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[1] *Authors: Robert Ast, Professor of Architecture and Civil Engineering at the Poznań Univertity of Arts. A Consultant at IAiPP WSG in Bydgoszcz.*

Edwardo de Lemos, Professor of Architecture and Civil Engineering at the Viseu Catholic University, Portugal.

cording to the ancient Romans, *navigare necesse est, vivere non est necesse*. They sailed in spite of the roaring storms and numerous casualties.

It was the Dutch who made a breakthrough in sailing technology, whose revolutionary breakthrough in sailing against the wind consisted in introducing a drop keel. They copied the idea from South American Indians who had been using planks lowered below the bottom of a raft or boat for a long time. The Dutch hull had proper rigging top mast, hinged rudder, oblique sails) and the tall ship, since the 16th century, could navigate (tack) against the wind.

Symbolic and real approach to the shoreline occurred from two directions - from the direction of the open sea by sailing boats which looked for a safe harbour at the shore and from the direction of land by means of urban and engineering construction work. The seashore evoked fear in the inhabitants of the continent of the unknown and limitless element of the sea (*horror vacui*).

Nevertheless, since in end of the 19th century, popularising the idea of tourism resulted in a massive influx of tourists to fast growing sea resorts.

On the other hand, the development of shipping - in other words transportation of goods by water in ever bigger sea faring vessels resulted in a violent development of commercial harbours, and city-creating transformations on the shore.

8.1.2. Presentation of selected harbour and urban sites

Fig. 8.1. Faleron Bay is a contemporary, developed urban grid of Pireus. The existing marinas: Zea, Mikrolimano, Faliro, S.E.F., Flisvos, Delta (built on site of the demolished Tsitsifion Kaliteas harbour before the 2004 Olympics) are tightly packed with yachts owned by the locals. The commercial harbour in Pireus (a fragment can be seen on the left) is one of the largest in the world.

Fig. 8.2. The Zea Marina, just like other marinas, is designated only for Greek yacht owners. (R.A. 2011)

Fig. 8.3. Pireus waterfront, the third-largest Greek city. (R.A. 2011)

Fig. 8.4. Praia - the capital city of Cape Verde. Clearly well-planned urban grid of the historical city built on the hill above the beach by the Portuguese. Despite a very good location the city does not have a yacht marina or a large sea harbour.

Fig. 8.5. The view from the old city onto the main Praia Beach and two devastated piers. (R.A. 2009)

Fig. 8.6. The main Praia Square with characteristic colonial buildings. (R.A. 2009)

Fig. 8.7. Palmas de Gran Canaria - the capital city of Canary Islands and, at the same time, the largest Spanish harbour. Thanks to modern spatial and transportation solutions a high degree of organisation has been achieved, with simultaneous tourist and recreational comfort.

Fig. 8.8. A view of Isleta from the end of 19th-century shows the phenomenon of the beach, presently densely built-up from the north by a promenade, and from the south by the harbour complex.

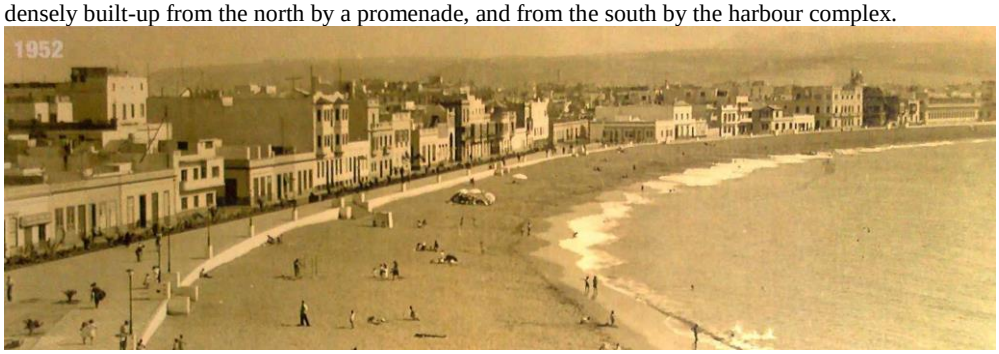

Fig. 8.9. A view from Isleta onto the promenade in 1952.

Fig. 8.10. The present view of the buildings erected above the Las Palmas promenade. (R.A. 2010)

Fig. 8.11. An architectural design of the Hoya Plata estate in Las Palmas de Grand Canaria. An example of architectural management of the island. Designed by Ast F.,Spychała J. sem.6. Universidade de Las Palmas 2010.

8.1.3. The Polish Baltic shore - Puck on the Gdańsk Bay

The principal aim of the project is to create a complex solution, satisfying both the needs of the Puck municipality, the Puck community centre for culture, sports and recreation, and the inhabitants of the city. A design is created on the basis of a clear-cut need for providing architectural and urban solutions for further developments of the existing yacht marina.

Due to the fact that the project assumes the development on the area covered by "Nature 2000" program, the main assumption of the development of the harbour was the care for natural environment.

In order for the harbour to become ecological and environmentally friendly, the following solutions have been suggested:

- A self-sufficiency assumption. Energy generated by quiet revolution turbine windmills and solar panels positioned on the roofs of the designed buildings. The vertical system of a windmill is a much greater benefit, compared to the classical solution, because that type of windmill can be distributed close to the shoreline. In such conditions, wind interference and wave disturbances do not hinder the work of the windmills, and their operation is quiet enough to be able to locate them in the areas designated for temporary stay of people.
- In all possible solutions it is suggested to choose electrical motors rather than diesel engines - it pertains mainly to transportation inside the harbour and, in the future, electrically driven water transport.
- Recovery of rainwater for further use
- Appropriate construction and location of breakwaters and buildings will help the water retain its national circulation. During the future work on the foundation, a closer location of a wastewater plant should be envisaged.

In the functional and special programme the area has been divided into three main parts:
the western part - a tourist harbour
the central part- a regatta marina
the eastern part- the motor boat marina (the existing yacht marina)

In the urban arrangement, a route will be created consisting of a beach and square complex. From the western side: the area of a future camp site - a passageway above the area of the future hotel - a square adjacent to the future administration building – a passageway by the fishing harbour - a square near the cathedral - a passageway with the designed Sailor Street - a square by the harbour buildings - the municipal beach - the motor boat harbour- the municipal beach.
The central part is the heart, of the entire foundation. A shopping centre will be located there, as well as the conference hotel. Thanks to this kind of arrangement the harbour will be a centre operating all year round, not only in the summer season. At the same time, during the regatta, the entire central part square can be sep-

arated from the rest of the foundation and serve only the need of events.

At the Polish Baltic shoreline, equally dynamic transformations of waterfronts of cities situated on the sea are taking place. What was in the past loading areas, recreation areas, once boasting with their development, is now transformed into areas arranged on the basis of connecting elegant boulevards and yacht marinas, currently playing tourist and sports functions. The new value is being created at the Polish shoreline, namely yacht marinas - well woven into the urban structure of an old city.

The need of building the marinas is this the result of the development of yachting sports in connection with the "beach culture".

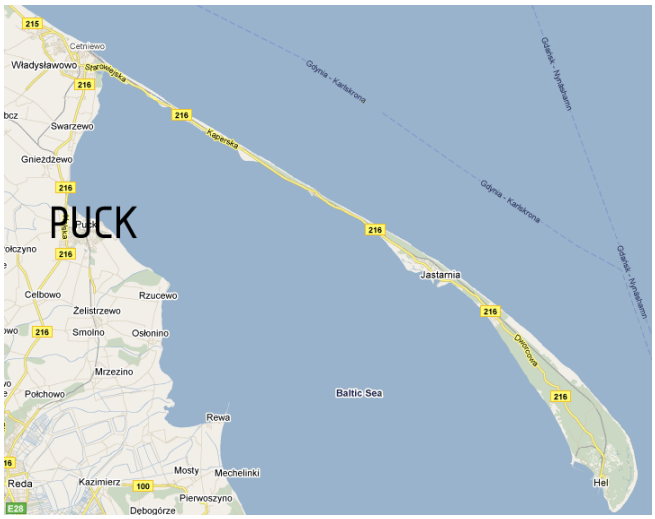

Fig. 8.12. Location of Puck on the Gdańsk Bay

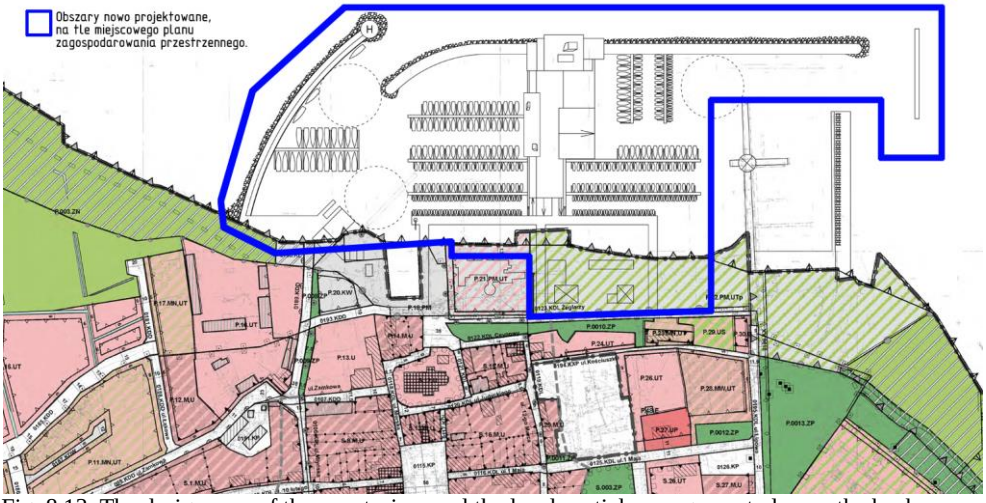

Fig. 8.13. The design area of the aquatorium and the local spatial management plan on the background of the town structure.
(in the drawing: Recently designed spaces on the background of the local spatial management plan.)

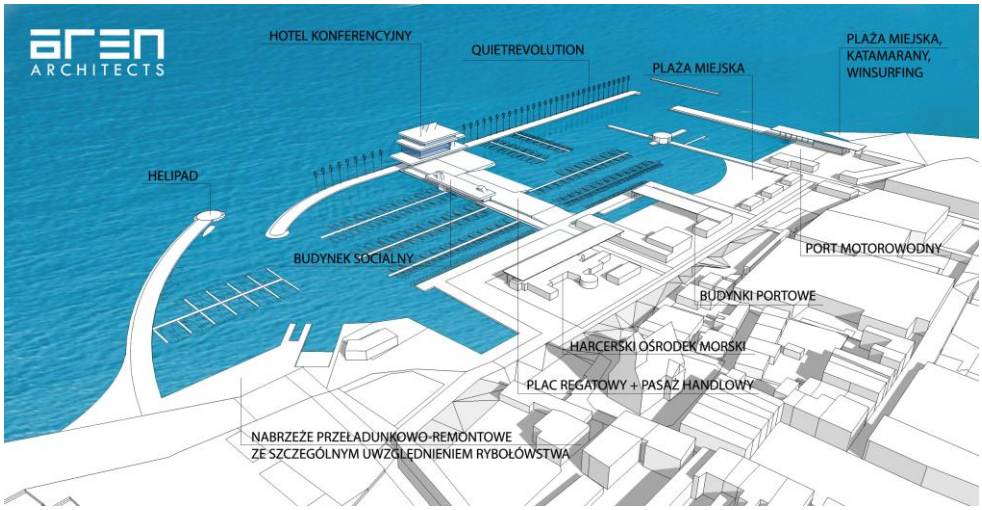

Fig. 8.14. A proposal of a design of the harbour area in Puck. Designed by: Szymankiewicz, Bilski, Ast 2009.

An example of that can be municipalities of Puck and Frombork which were determined to initiate the process of building yacht marinas. The building of breakwaters is carried out with the approval of the maritime office, and the architectural management of the aquatorium id done in consultation with experience sailors, ,whereas the architectural structure on the territory and waterfront architecture is drawn by urban planners and architects, ensuring the proper ties with the town structure. Modern wind collectors with vertical quiet running rotors are used on breakwaters.

8.1.4. Frombork on the Vistula Lagoon

Fig. 8.15. Location of Frombork on the Vistula Lagoon

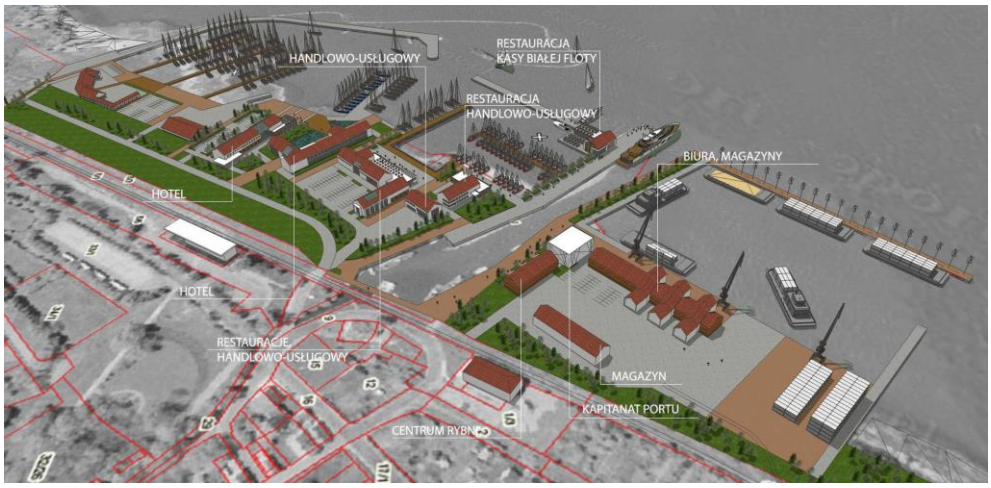

Fig. 8.16. Architectural management design of the harbour area in Frombork. Szymankiewicz, Bilski, Ast. 2010

8.2. Sea resorts in Portugal - the development of trends and residential forms in 1860-1974. Selected urban structures (Eduardo de Lemos [4 from additional bibliography])

8.2.1. Methodology

The research work covers coming into being and formation of sea spa-type agglomerations in Portugal, and is aimed at defining the relationship between the major European continental resorts and their urban structure, basing on selected examples.

The first European seaside resorts have been analysed and compared over the period of 1860 to 1974. The intention was to define the relationship between the history of people and ideas which gave origin to those resorts, and architectural phenomena which gave them the final form.

Firstly, geographical and natural analysis of those sites where the resorts have been founded is presented trying, in particular, to answer the following questions:

- where and why a given resort was built?
- which factors were decisive about selecting a given fragment of the seashore?
- what were the indispensable factors for a given result to take shape?

Secondly, the structures which were erected are analysed from the viewpoint of a specific character of a given resort. Which buildings are typical for a given city? How are they situated within the city network? In what relationships are they with respect to one another? What services do they provide, and what background do they require?

Then, the town plans are analysed and, every time when it is possible, the oldest documents and maps, descriptions and photographs are dug out. The plans of towns situated at the seaside are compared with plans of other such centres, for example Bath in England. Further on, seaside resorts in Portugal are analysed within the period covered by this research project, reaching for architectural work published in Portugal.

Basing on the cross of information between the historical description and existing facts about a given seaside resort since the beginning of the 20th century, a hypothetical development model is worked out. The identified pattern is not a commonly used model. There is an ideal model and its variations. Nevertheless, all towns and city agglomerations taken into account, however not in all their forms, have characteristic and convergent architectural and urban features so far that they can be categorised into a single group. Manifestations of differences only enrich the model. They originate from transpositions and national adaptations, regional and local differences specific for given countries and regions where they developed, from small differences being a result of a period when given centres were formed and built, from interpretations which each culture casts on the model, adapting it to customs, climate and geographical conditions of the region.

Therefore, the identified model gives a positive reaction to the grand question of the contemporary times, that is whether there is a shared Europe with its own conceptual spirit? The identified pattern makes it possible to reply to the positive. It confirms what is intuitively conceived. There are wealthy and poor countries, more or less inhabited countries, those in the North and South, those at the Atlantic Ocean, and those which do not have access to the sea; there is a great geographical, climactic, and topographical variety. Nevertheless, the entire variety is unanimous in its form of existence and operation, in its anxieties and ambitions, indeed in being and feeling. If there are differences, they need to be searched in people who make them, and not in peoples inhabited Europe, otherwise we may mistake a part for the whole.

8.2.2. A seaside resort model at the beginning of the 20th century

Having developed the model, knowing its origins and typological differences, it is possible to arrive at a pattern of a continental European seaside resort from the turn of the 19th and 20th centuries.

Location: we are looking at a harbour, in a bay or at the open sea - a natural place for landing. It occupies a specific fragment of the seashore. What is important is the surrounding (landscape). It is a place with great landscape values (nature and the sea). As a rule, it has a specific geographical highlight.
Structure: The structure is focused on the geographical highlight, it is often initiated by fishery, which had given rise to this site of a larger or lesser importance.

Physically separated although close, grows a district which fulfils the role of a resort. It is formed by buildings serving the purpose of relaxation, such as: swimming pools, hotels, bed and breakfasts, freestanding residences. An area designated for walking connects the structure with the beach. Its centre may be, for example, a hotel, public baths, swimming pools, a casino. Those buildings may stand around a square or not. The beach background operates near these buildings and sites. If the place does not have a sea harbour, a pier appears where ships can cast anchor.
Another important axis of the structure is a road connecting such an area with a railway station.

8.2.3. A concept of the beach

Born in the context of the Portuguese resurrection, the projection of a human being onto the search for something unknown and completely new, becomes part of the movement of research and geographical discoveries.
For the Portuguese, and each is a place of exit and arrival. It is here where the initial conviction about new colonies is going to be formed, and here where a new type of square will be created, namely a waterfront square, an administrative centre, a social and economic centre, national and cultural.

The selection of the location is connected, both in the seaside model, a port model in a bay or at the open sea, with a natural site of landing of a boat on the beach. It occupies a specific fragment of the seashore, what is important is the surrounding (the landscape). It is a spot with important scenic values (the nature and the sea). It generally has a specific geographical highlight. The reason is mode of transportation of the period, namely a barge, which had still been the main means of transportation used in the 19th century before it was replaced by a train, and then a car and a plain.

In the 19th century the English or, to the specific, the English aristocracy[2], assumed a concept of the beach and developed it from the cultural point of view, cre-

[2] *Is tourism a British concept?*
The English Industrial Revolution (the 18th century) was a complex phenomenon which led to enormous social and political changes in England. One of those changes, which is interesting for us, is the increase in population. Another is migration of the village inhabitants to the cities. New kinds of activities and growth of the middle-class gave rise to economical transformation. The traditional significance of landowners became less important, alongside with its diminishing economic powers, the significance of farming and landowning became less important. The English aristocracy, which did not participate in the management of the country, and resigning from participation in its economic development due to the principles which were so important, and regarding trade and commerce is stimulating activities, became isolated by their own choice. The aristocracy and land owners

ating a romantic foundation for what was to become tourism. In England, they developed a model focused on new urban features, which was a cross between a square and a pier, and a cross between a pier and a promenade. It is said to be their own model, variations of which appeared on the continent[3], and in that model the majority of objects and buildings serving the beach and social life are constructed at the open sea, on a loading platform.

Fig. 8.17. Geographical location of a seaside resort is a rule in this spot, where characteristic formation of the seashore occurs. In this case, we use an example of the location of Figueira da Foz, the town situated between two straight sections of the seashore (EdL 2002)

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were still wealthy enough to live in luxury, finding ways of spending time which, according to them, were becoming. New entertainments and the place of leisure in the form of spending time was invented. Sports appeared. Golf, soccer, rugby, became popular, as well as badminton and Nordic skiing, mountain climbing developed, new rules of boxing were established, there was a rowing, ice skating and tennis. The level of cultural erudition grew, clubs, scientific and artistic societies were established, the "Grand Tour" was introduced, and all that was organised as a form of life and custom of landowners and aristocracy.

[3] *Trouville in France.*

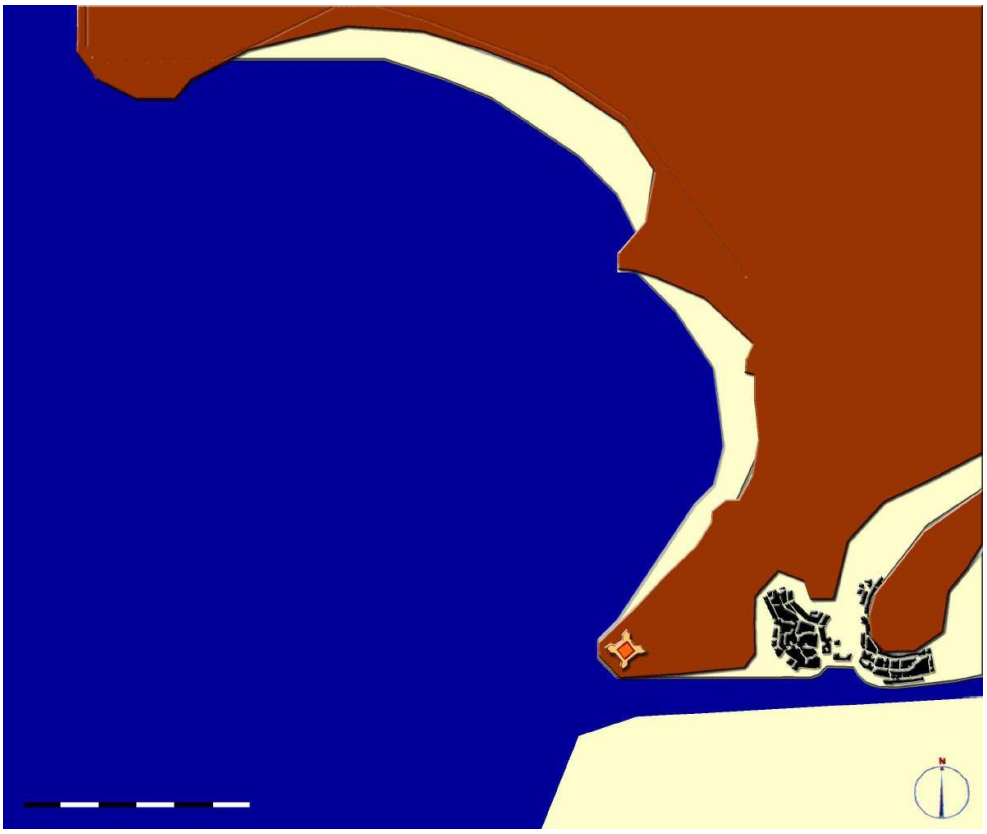

Fig. 8.18. A bay before development, open towards the south, with a good south-westerly exposition, the beach is divided by a rock headland into sub-spaces: northern and southern, not far from the Figueira River estuary there is a small fishing village. (EdL 2002)

8.2.4. Looking for a site

Regardless of the place and peoples who gave origin to the beach culture, there is a founding idea which focuses on the search of new space.
The new space is found on the empty seashore[4] as a nature's borderline, a mythical and scary space because of the dangers and the unknown symbolised by the ocean. The sphere of constant change, pestered by snowstorms and sea storms is also a desert area, principally uninhabited and unurbanised. In this empty seaside space there are areas with strong topography, ravines, and cliffs adjacent to peaceful beaches. In this lovely landscape, quite often not far from the river estuary or a lake, the first resorts for European aristocracy of the 18th century will be founded.

[4] *see:. Corbin Alain.*

This kind of European "wild West"[5] is not a total desert. Apart from fortified cities and sea harbours, there are small fishing villages, often only seasonally inhabited, dispersed along the seashore. In the vicinity of those centres, the first spas and sanatoria will be built.

This movement is also a reaction to the phenomenon of urbanisation. It is more a moment of relief from chaotic, industrialised city, an escape from the crowds. A wish for return to nature leads to a search for a natural space in Europe, and to surfacing of an exotic architecture which brings back images of wild tropical world and of Asia, praising the benefits of a clear-cut, unknown landscape.

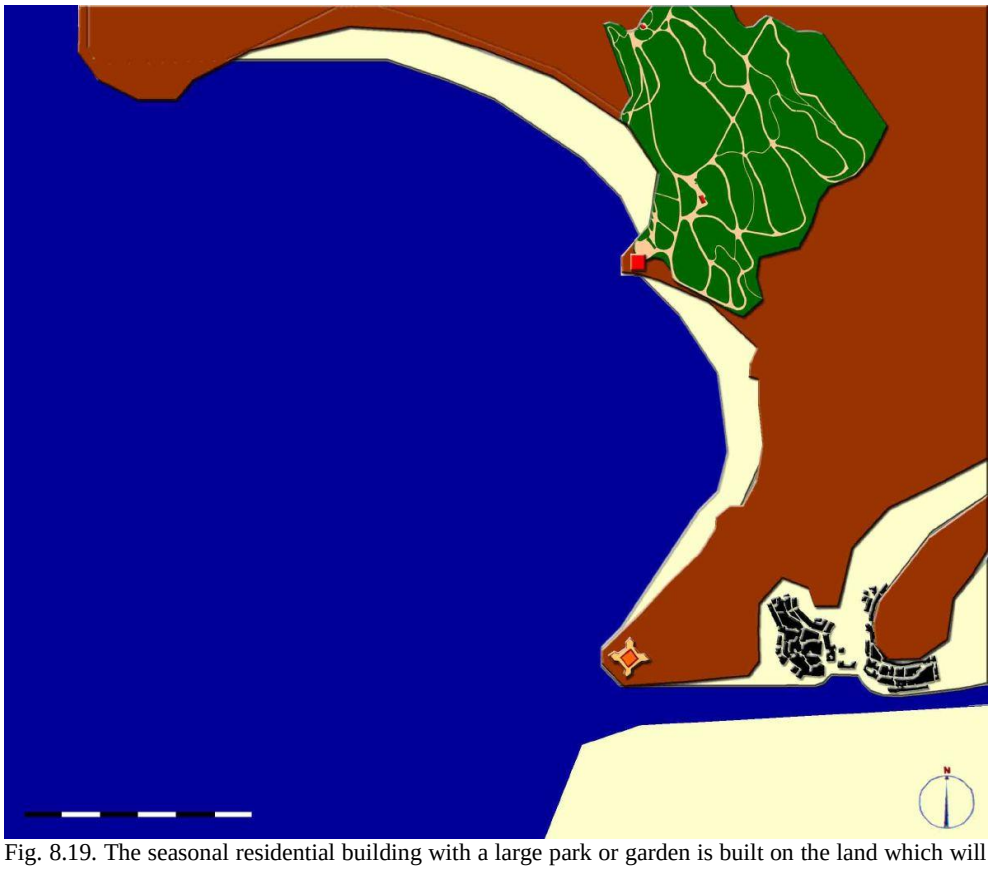

Fig. 8.19. The seasonal residential building with a large park or garden is built on the land which will be transformed. The figure of the future and the figure. The figure of the Grand Hotel.

[5] *The expression " wild West à la française" is used by Claude Prélorenzo and René Borruey with regard to an unhealthy area of Languehedoc - Rousillon in the south of France where, in the 60s - 80s, a grand scale operation of urbanisation of the seashore was carried out, including the construction of new tourist agglomerations. See: Prélorenzo Claude.*

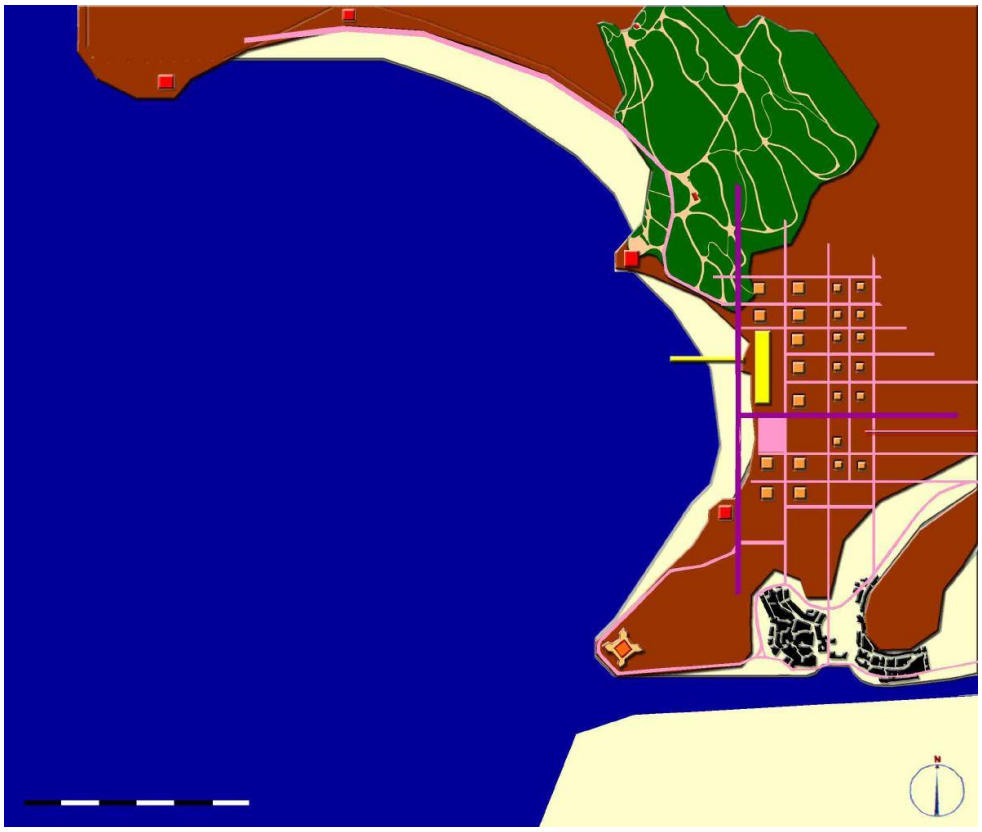

Fig. 8.20. In other characteristic spots other seasonal residences are built. The most important element is the urban grid, planned by an urban planner on land which will be divided into plots, and development of residential areas in the planned resort.

8.2.5. A Garden City model[6]

Secondly, regional identity is searched for, as well as kinds of colour which will be characteristic of clear-cut image of what is unique about the town, there is a mention of a description grafted in the past in the meaning in which the past does not hurt. This description seems to be organised, this beautiful, brings about an image of attractiveness encouraging to share it with others and with the region. It conveys a conviction that one lives in the surrounding of truly local architecture, something nearly familial. It is a return to nature in its regional, national, local aspect, and leads to the emergence of architectural styles such as Swiss Algravian, Basque, Breton, or Norman. Harmony of a group of buildings, primarily the harmony with settled neighbourhood towards which the architecture looks, compared

[6] *Re: garden cities, see: Howard Ebenezer.*

to a chaos of the city, defines the identification of the man and the place. The image penetrates the architecture which is characteristic for that particular place.

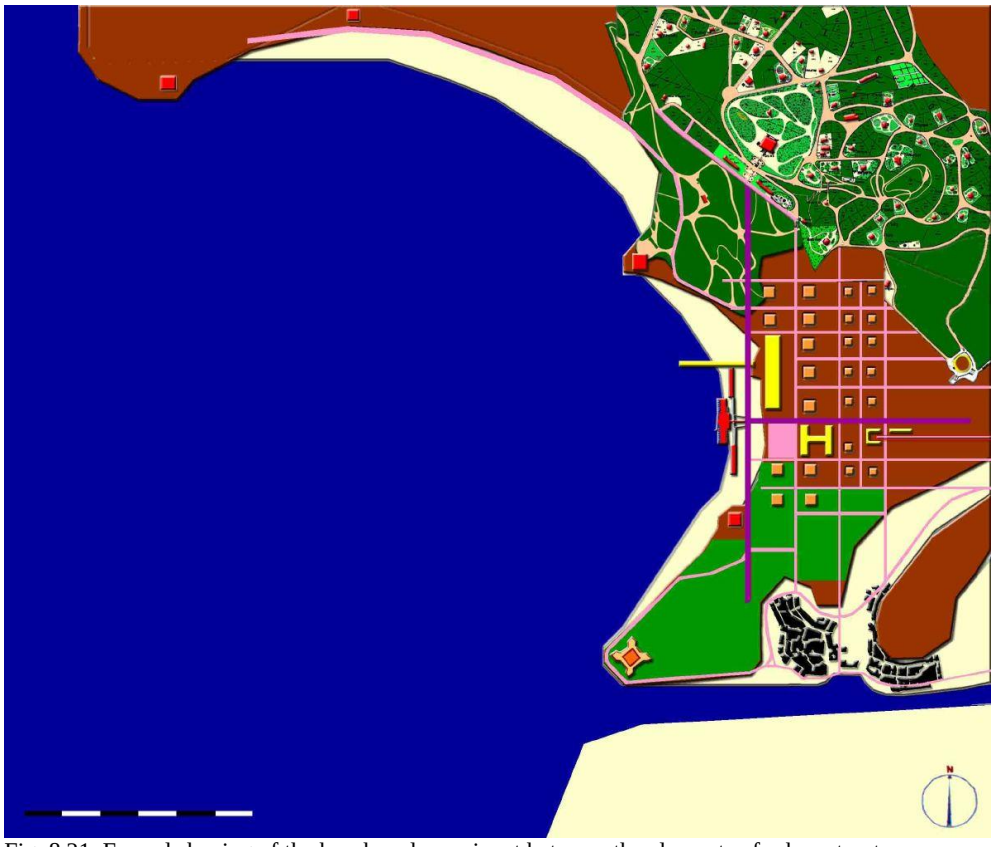

Fig. 8.21. Formal shaping of the beach and prominent between the elements of urban structure.

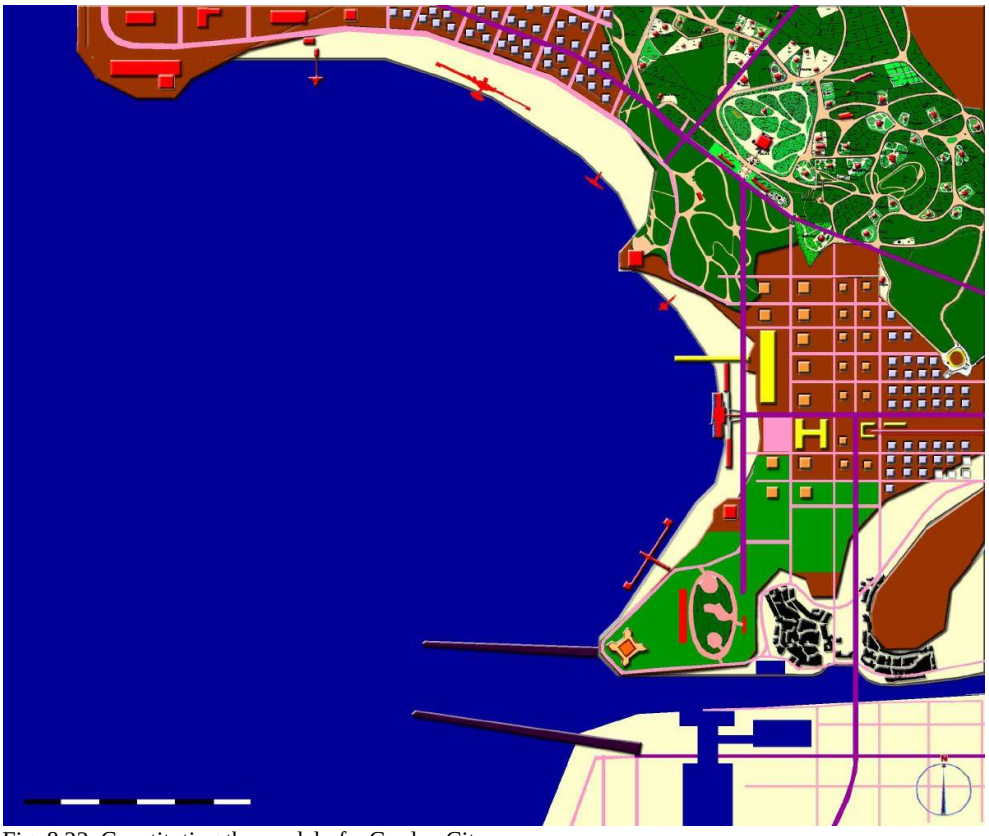

Fig. 8.22. Constituting the model of a Garden City.

8.2.6. The phenomenon of thermal baths

The concept of the beach has also a therapeutic significance. In the 18th century, slowly in the whole Europe, physicians begin to recommend sea baths and publish scientific research papers about their benefits. There is talk about transferring the model of therapy from inside the country to the seashore. Areas with beneficial climate are sought for, good for the health, primarily in the winter. In Portugal, the island of Madeira[7], and the South of France benefit from that greatly. On the other hand, the concept of "summer holidays" was completely different. New places were sought, but also nice ones. The concept of a "holiday" in the sun and heat emerges only after the Second World War.

The "hot" holiday resorts of the South, such as Cascais, Madeira Islands, Nice and Cannes became the winter destinations. The "cold" northern resorts, such as

[7] *See also the work by Smyth, 1882. The author describes main characteristic features of a climate of Madeira, comparing it to Lisbon and other regions at similar geographical latitude.*

Figueira da Foz, Granja, Santander, San Sebastian and Sopot were sought for in the summer.

8.2.7. A selection of popular bath resorts in Europe

Taking a developed study of European bath cities as a starting point, always taking into consideration the architectural facts and existing urban circumstances, as well as the morphology of the areas and economic and social history, defining geographical and political location of an agglomeration, using the analysis of natural factors, artificial factors and references to the area, synthesising the recognition and resources of the region in order to understand and define the potential, checking the emergence and growth of an agglomeration, the conclusion is drawn regarding the compact study about a set of selected bath cities, representatives of the country, based on the criteria of a choice of the city were the above mentioned movement was born, in which the author has visited, which have solid bibliography and iconography of a place. And, therefore, the following cities were selected:

Germany - Heiligendamm and Heringsdorf, as well as bath stations in the islands of Usedom, Rugen and Syltda, was the first German stations were developed.
Belgium - Ostend,
Spain - Laredo, Santander e San Sebastian.
France - at the Normandy seashore: Touquet-Paris-Plage, Dieppe, Trouville-sur-Mere, Deauville-sur-Mer; at the Atlantic seashore: Arcachon a Biarritz; at the Mediterrean seashore: Cannes and Nice.
Holland - Scheveningen.
England - Brighton.
Italy - Lido de Veneza, Lido de Ostia e Viareggio.
Poland - Swinoujscie, Kolobrzeg, Ustka, Sopot.
Portugal - Moledo, Póvoa de Varzim, Vila do conde, Porto - Foz do Douro, Espinho, Granja, Figueira da Foz, S. Pedro de Moel, Cascais, Estoril, Portimão - Praia da Rocha, Armação de Pêra and Monte Gordo.

Definition criteria: *space and time covered by the study.*

The initial idea to take into account a town as it is, in its present time, turned out to be difficult to implement because, in practice, it was impossible to reach the roots. Therefore, and because there was no significant study about the origins and evolution of Portugal Bath resorts, lesser research work was decided to be located at the beginning of balneal movement and Portugal - 1860 , the date establishing the Granja station, and to allow the insight into 1970, the date of the beginning of April revolution in Portugal. A number of transformations and data still have not been scrutinised by science.

8.2.8. Constituting the model

Going through the research, and analysis of cartographic documentation allow for identification of common factors pool, permanence which allowed for reconstruction of the image of the year in which the balneal model first appeared formally. Activities, facts, places, architectural work repeat themselves in the south and north of Europe, leading us to constituting a model of the original area, as well as the identification of actors and major interventions.

Fig. 8.23. San Sebastian (Spain) 1813.

Fig. 8.24. San Sebastian (Spain) 1870.

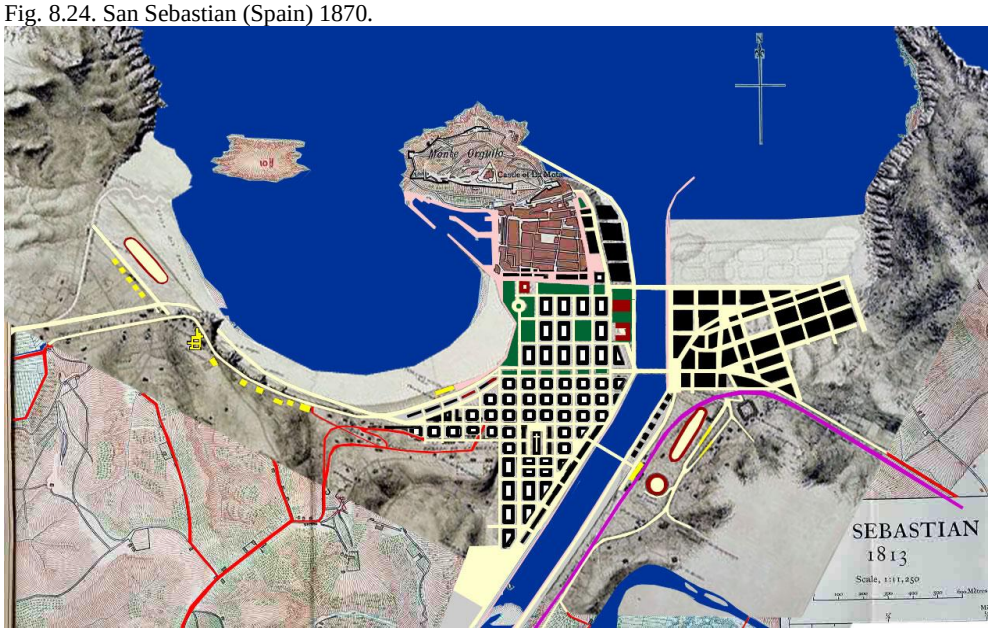

Fig. 8.25. San Sebastian (Spain) 1906.

Fig. 8.26. San Sebastian (Spain) 1926.

8.2.9. A theoretical model

The model on which has been arrived at is confirmed by the presence of a set of factors:

1. The idea and the concept. The development of urban concepts, urban form, ideal cities and European garden cities.
2. The existence of a shared pattern of connections between architectural facts and the structure of the city in main bath resorts in continental Europe, as well as in its evolution over time.
3. The choice of a site. The geographical model.
4. The question of housing, the first manifestations, location - the choice of a site, implementation of the bath district, and archaeological typologies.
5. Equipment. Permanence of construction typology, be it in equipment or in developed projects.
6. The actor. The characteristics of the sponsor's profile and the activity of architects.

Public space. Formation of the public spaces and their conceptual evolution.

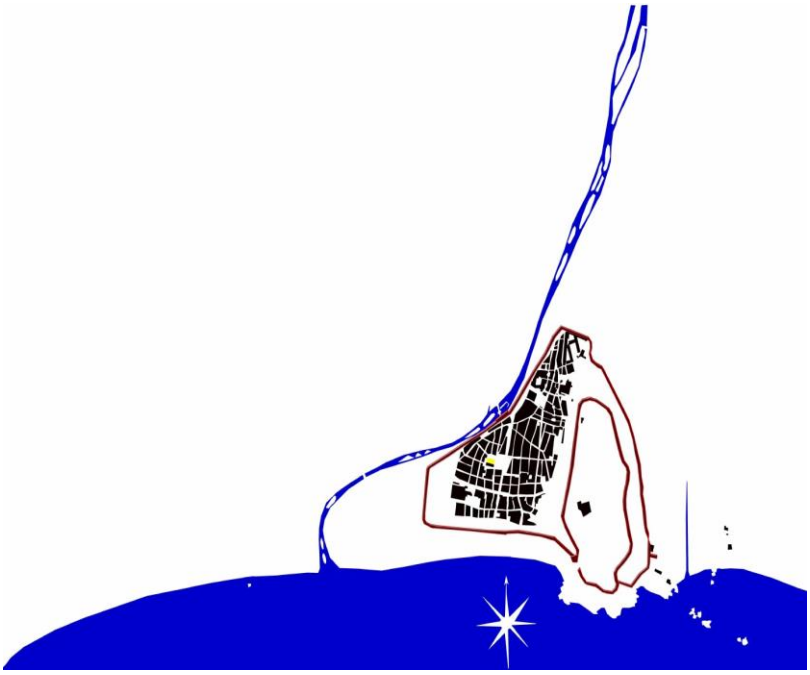

Fig. 8.27. Nice (France) The mediaeval city.

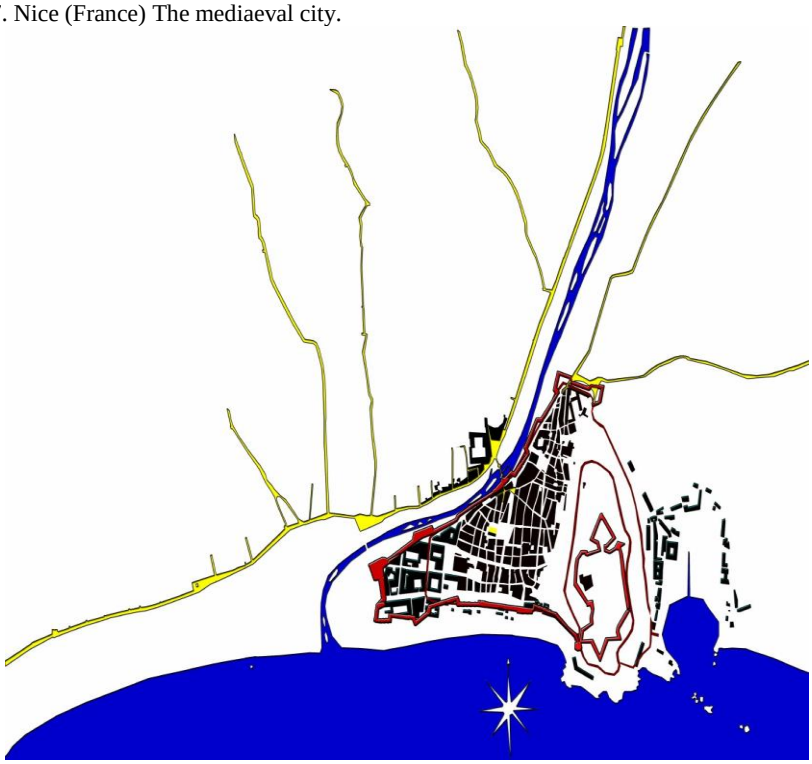

Fig. 8.28. Nice (France) Vobin's fortifications.

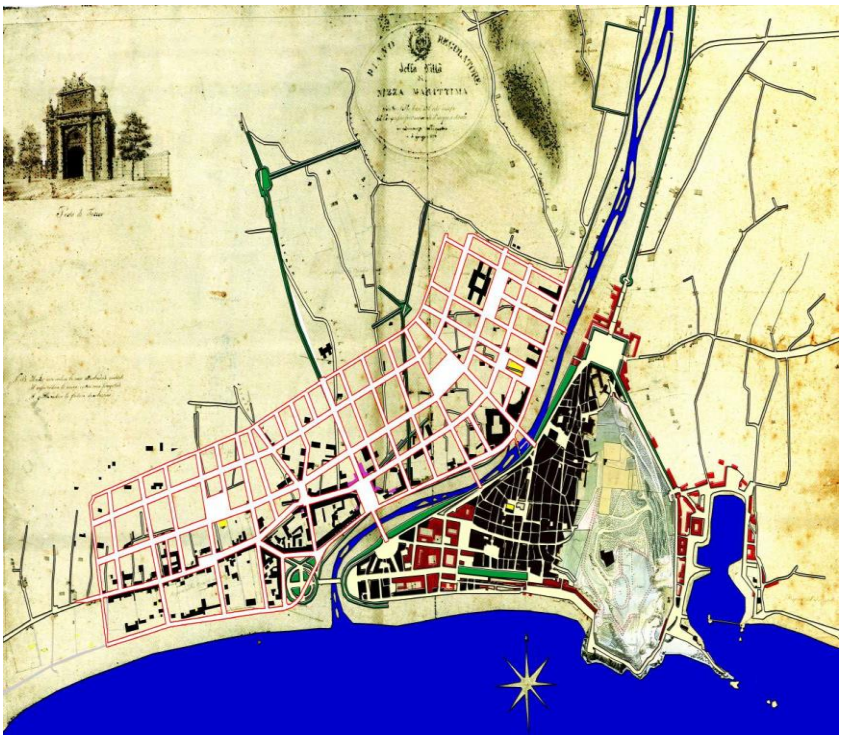

Fig. 8.29. Nice (France) The urban grid 1858.

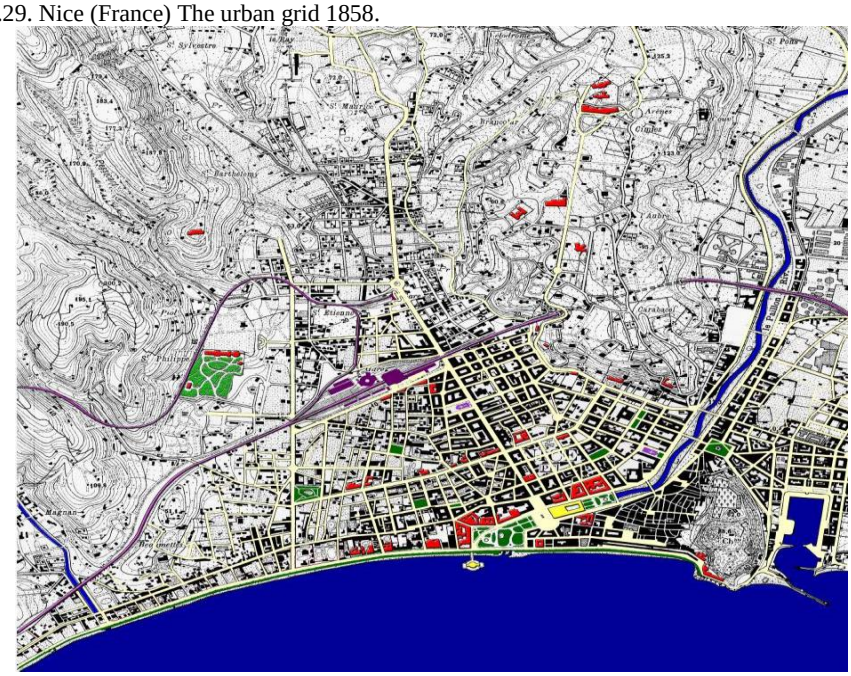

Fig. 8.30. Nice (France) 1903.

Conclusions:

The selection of those areas was not haphazard. Undeveloped areas or sought for, distant from the city agglomeration. Particularly favoured were huge plots of land where buildings could be erected in harmony with the landscape dominated by undeveloped green areas.

The first residences and palaces and villas fall into the category of the described model. Larger or smaller buildings were built in the spaces which were undeveloped but, at the same time, closer to the city agglomerations, and the areas with exceptional topographical and landscape values. Those closer to the sea were situated near a natural capes, integrated with the landscape, providing the added value.

Family residences which then appeared, are located in smaller belt settings or isolated settings, submerged in the greenery of forests and young woods.

The first building are constructed alongside with the balneal spas at the seashore, inspired by the existing model of hot spring spas, and the concept of Garden City. Now the spa city is becoming more formal thanks to the appearance of accessory architectural equipment. Building a public bath or hot baths, a hotel and a casino, a passageway which becomes visible in the public space, a square/park, parallel to the sea line develops a new axis connected with the new means of transport which will revolutionise the history of mankind and give rise to the tourist movement for the masses - the railway.

BIBLIOGRAPHY

[1] ACI, Information and service center, Croatia.

[2] **Ast R.**, Architektura w procesie inwestycyjnym. Wybrane aspekty, Poznań, Wyd. Politechniki Poznańskiej 1997.

[3] **Ast R.**, Delimitacje architektoniczno-krajobrazowe stref pobrzeży, Poznań, Wyd. Politechniki Poznańskiej 1993.

[4] **Ast R.**, Lokalizacje przywodne Pojezierza Leszczyńskiego, [w:] Materiały Ogólnopolskiej Konferencji Naukowej TWWP, Politechnika Krakowska, Politechnika Wrocławska, WSI Zielona Góra, Zielona Góra 1987.

[5] **Ast R.**, Nadodrze – region wspólnoty gospodarczej i atrakcji turystycznych, [w:] Gospodarka przestrzenią w regionie Wielkopolski, Poznań, Wyd. Politechniki Poznańskiej 1992.

[6] **Ast R.**, Questões seleccionadas sobre centros urbanos, Coimbra, ARCA-EAC 1998.

[7] **Ast R.**, Rekreacja i sport pod żaglami. Próba koreferatu do pracy dra habil. Janusza Mondalskiego, [w:] X Poznańskie Kolokwium Region–Inter-City, Katedra Urbanistyki i Planowania Przestrzennego Politechniki Poznańskiej, Komisja Badań Rozwoju Polski Północnej Oddziału PAN w Szczecinie, Poznań 1987.

[8] **Ast R.**, Sposoby budowania łodzi i kutrów rybackich a kształtowanie przystani i portów Zatoki Gdańskiej i mikroregionu helskiego, Zeszyty Naukowe Politechniki Poznańskiej, Budownictwo Lądowe, 1990, nr 33.

[9] **Ast R.**, Urządzanie struktur siedliskowych. Biomy, domostwa, zielone izby, Poznań, Wyd. Politechniki Poznańskiej 1991.

[10] **Ast R.**, **Fritsche M.**, **Führ E.**, **Holičkova L.**, **Kmet S.**, **Lehmann K.**, **Mikulaś M.**, **Zimowski L.**, Architektur – Fachwörterbuch: Englisch-Deutsch--Slowakisch-Polnisch-Russisch/Ukrainisch-Ungarisch, TU Cottbus, Fakultat 5, Lehrgebiet Bau- und Kunstgeschichte, Arbeitsgruppe Fachwörterbuch, Cottbus 1993.

[11] **Bańka A.**, Psychologiczna struktura projektowa środowiska, Poznań, Wyd. Politechniki Poznańskiej 1985.

[12] **Baranowski K.**, Praktyka oceaniczna, Gdańsk, Wyd. Morskie 1984.

[13] **Bardzińska-Bonenberg T.**, Tendencje kształtowania zabudowy śródmiejskiej w procesie rewitalizacji, Poznań, Wyd. Politechniki Poznańskiej 1998.

[14] **Briggs P.**, Men i the sea, New York, Simon & Schuster 1968.

[15] **Buszkiewicz J**., Kształtowanie przestrzeni miejskiej, [w:] Materiały IV Sympozjum Naukowego, Poznań, Instytut Architektury i Planowania Przestrzennego Politechniki Poznańskiej 1987 (materiały powiel.).
[16] **Celarek A**., Rybackie łodzie żaglowe z wybrzeży Kaszub, Gdańsk Zrzeszenie Kaszubsko-Pomorskie, Oddział Gdańsk 1987.
[17] **Cęckiewicz W**., W połowie drogi. Refleksje z pracy nad projektem, Architektura, 1983, nr 2.
[18] **Cirlic B**., Przewodnik po Jugosławii, Warszawa, Wyd. Sport i Turystyka 1974.
[19] Coastal design. A guide for builders, planners, and home owners, autorzy: O. Pilkey, Sr., W. Pilkey, O. Pilkey, Jr., W. Neal, New York, Wan Nostrand Reinhold Company (bez roku wyd.).
[20] **Czajewski J**., Locja śródlądowa i morska, Warszawa, WKŁ 1991.
[21] **Czarnecki W**., Planowanie miast i osiedli, t. 1–6, Warszawa Poznań, PWN 1964-1970.
[22] **Czerner M**., Latarnie morskie polskiego wybrzeża, Poznań, Wyd. Poznańskie 1986.
[23] **Dąbrowski L**., Planowanie regionalne, Szczecin, Wyd. Politechniki Szczecińskiej 1971.
[24] Delimitacja obszarów zurbanizowanych, praca zbiorowa, Warszawa, Komitet Przestrzennego Zagospodarowania Kraju 1970.
[25] Effectiveness of coastal defence measures, design background for coastal defence and management. A document prepared for Rijkswaterstaat and Delft Hydraulics, red. R.B. Zeidler, Gdańsk 1992.
[26] **Fernandes J.M**., Architecture, synthesis of portuguese culture, Lisbon, Imprensa Nacional – Casa Da Moede 1991, seria Commissariado Para Europália 91.
[27] **Fikus M**., Cechy procesu projektowego w działalności twórczej i realizacyjnej. Powiązanie praktyki architektonicznej z teorią i dydaktyką, Poznań, Wyd. Politechniki Poznańskiej 1992.
[28] **Fikus M**., Przestrzeń w autorskich zapisach graficznych, Poznań, Wyd. Politechniki Poznańskiej 1991.
[29] **Furmańczyk K**., **Musielak S**., Analiza zmian brzegów i prognoza zagrożeń półwyspu helskiego w świetle badań teledetekcyjnych, Inżynieria Morska i Geotechnika, 1993, nr 1.
[30] **Gałkowski A**., Architektoniczno-urbanistyczne aspekty nowych form opieki zdrowotnej nad ludnością, Zeszyty Naukowe Politechniki Poznańskiej, Budownictwo Lądowe, 1990, nr 33.
[31] **Gloger Z**., Dolinami rzek; opisy podróży wzdłuż Niemna, Wisły, Bugu i Biebrzy, Warszawa, Nakład Ferdynanda Hösicka 1903.
[32] **Głowacki W**., Dzieje żeglarstwa polskiego, Gdańsk, Wyd. Morskie 1989.
[33] **Głowacki W**., Wspaniały świat żeglarstwa, Gdańsk, Wyd. Morskie 1976.

[34] **Gulas S**., **Pevny P**., Żaglowce, Warszawa, Wyd. Sport i Turystyka 1985.
[35] **Hückel S**., Budowle morskie. T. 1. Część ogólna – falochrony, nabrzeża i pomosty, Warszawa, Wyd. Komunikacyjne 1952.
[36] Inseln im Storm, Regensburg, Institut für Stätebau, Wohnungswesen und Landesplanäung Universität Hannover, Instytut Architektury i Planowania Przestrzennego Politechniki Poznańskiej 1991.
[37] Kein Deich, Kein Land, Kein Leben, Hannover, Die Niedersächsischen Hauptdeichverbände im Wasserverbandstag Niedersachsen 1988.
[38] **Kucza-Kuczyński K**., Czwarty wymiar architektury miasta, Warszawa, Arkady 1982.
[39] **Kuliński J**., Polskie porty otwartego morza. Przewodnik dla żeglarzy, Gdańsk, Bestseller 1991.
[40] **Kwiatkowski E**., Powiązania funkcjonalne w polityce gospodarczego planowania na wybrzeżu, Gdynia 1948.
[41] **Latour S**., Miasta zachodniopomorskie po drugiej wojnie światowej, [w:] Materiały I Sympozjum Naukowego Instytutu Architektury i Planowania Przestrzennego Politechniki Poznańskiej, Poznań 1982.
[42] **Lipiński W**., Dom ekologiczny, [w:] II Sympozjum Naukowe Instytutu Architektury i Planowania Przestrzennego Politechniki Poznańskiej, Poznań, Wyd. Politechniki Poznańskiej 1984.
[43] **Lipiński W**., Mikroklimat wnętrz bioklimatycznych, [w:] Materiały III Sympozjum Naukowego Instytutu Architektury i Planowania Przestrzennego „Człowiek w mieście, na wsi, w regionie", sesja terenowa, Racot 1985.
[44] Locja Bałtyku. Część południowa, Gdynia, Biuro Hydrograficzne Marynarki Wojennej 1949, 1958, 1973, 1980.
[45] Locja Bałtyku, t. 502□506, Gdynia, Biuro Hydrologiczne Marynarki Wojennej 1980.
[46] Locja cieśnin bałtyckich: Mały Bełt, rejon między wyspami Fionia (Fyn), Aer i Langeland; Wielki Bełt, rejon między wyspami Zelandia, Lolland i Falster, Sund, Gdynia, Biuro Hydrologiczne Marynarki Wojennej 1971.
[47] Marynarka wojenna i obrona polskiego wybrzeża w dawnych wiekach, oprac. M. Krwawicz, Warszawa, MON 1961.
[48] **Mazurkiewicz B**., Konstrukcje morskie znaków nawigacyjnych, Gdańsk, Wyd. Morskie 1977.
[49] **Miciński J**., Księga statków polskich 1918-1945, t. 1, Gdańsk, Wyd. Oskar 1996.
[50] **Milewski Z**., Projektowanie i budowa jachtów żaglowych, Gdańsk, Wyd. Morskie 1970.
[51] **Miodoński J**., Rola błędnik w poczuciu i pojmowaniu przestrzeni. Wykład habilitacyjny wygłoszony w 1934 roku we Lwowie (maszynopis).
[52] Morze w malarstwie polskim, red. K. Fabijańska-Przybytko, Gdańsk, Wyd. Morskie 1990.

[53] **Niemojewski L**., Architektura i złudzenia optyczne, Warszawa, Wyd. Trzaska, Ewert i Michalski 1930.
[54] Oceany i morza. Encyklopedia geograficzna świata, t. 7, Kraków, Wyd. OPRES 1997.
[55] Operation „Pelikan". Contribution des eaux de la Tet en mer, Perpignan Departement des Pyrénées-Orientales 1983.
[56] **Orlińska H., Marzęcki W**., Zarys przebudowy londyńskich doków jako wyraz idei miasta XXI w., [w:] Wybrane problemy planowania przestrzennego w Wielkiej Brytanii, Szczecin, Politechnika Szczecińska 1992 (maszynopis).
[57] **Pawelec J.,** Locja śródlądowa, Warszawa, Wyd. Sport i Turystyka 1988.
[58] Pilot book. West coast of Spain and Portugal pilot, London, British Admiralty 1972.
[59] Polnisch-deutsche Arbeitsseminare. Niemiecko-polskie seminaria, Hannover, Institut für Städtebau, Wohnungswesen und Landesplanäung Universität Hannover, Instytut Architektury i Planowania Przestrzennego Politechniki Poznańskiej 1991.
[60] Polska na zdjęciach lotniczych i satelitarnych, red. J. Olędzki, Warszawa, PWN 1988.
[61] **Przewoźniak M**., Geokompleksy wybrzeża polskiego, Gdańsk, Wyd. Uniwersytetu Gdańskiego 1992.
[62] Przyszłość polskiego żeglarstwa. Forum dyskusyjne, red. R. Ast, Poznań, Wyd. Studioteka „Zarysy" 1999.
[63] **Ruck A**., Francja. Explorer, Warszawa, Wyd. Geo Center (bez roku wyd.).
[64] **Różański S**., Budowa miasta a jego klimat, Poznań, Wyd. Poznańskie 1965.
[65] Rzeki. Kultura, cywilizacja, historia, t. 1–7, red. J. Kołtuniak, Katowice, Wyd. Śląsk 1996-1999.
[66] **Sołtysik M**., Gdynia miasto dwudziestolecia międzywojennego. Urbanistyka i architektura, Warszawa, Wydawnictwo Naukowe PWN 1993.
[67] Stastimmeren. Rotterdam: 650 years, Rotterdam, Phoenix e den Outsen Publishers B.V. 1990.
[68] **Strzemiński W**., Teoria widzenia, Kraków, Wyd. Literackie 1974.
[69] Summer course. Rotterdam and Middelburg in the 21st century, Rotterdam, Academy of Architecture Rotterdam 1995 (album 30 □ 40).
[70] **Szeliga J**., Rozwój kartografii Wybrzeża Gdańskiego do 1772 roku, Wrocław, Ossolineum 1982.
[71] **Szmidt B**., Ład przestrzeni, Warszawa 1981.
[72] **Szopowski Z**., Małe porty Pomorza Zachodniego w okresie do drugiej wojny światowej, Warszawa□Poznań, PWN 1962.
[73] Tunezja. Przewodnik, Bielsko-Biała, Pascal 1996.
[74] Urbanistyczne instrumenty promocji inwestycji, red. L. Zimowski, Poznań, Wyd. Studioteka „Zarysy" 1996.
[75] **Urbanowicz W**., Architektura okrętów, Gdynia, Wyd. Morskie 1965.

[76] **Wejchert K**., Elementy kompozycji urbanistycznej, Warszawa, Arkady 1984.
[77] **Wenda T**., Rzut oka na warunki powstania portu w Gdyni, Gdynia, Urząd Morski 1938.
[78] **Wytwicki W**., O widzeniu przedmiotów – zasady perspektywy, Budownictwo i Architektura, 1954.
[79] **Zaremba P**., Urbanistyka miast portowych, Szczecin, PWN 1962.
[80] **Zaruski M**., Słownik żeglarski, [w:] Współczesna żegluga morska, Warszawa, Wyd. Nasza Księgarnia 1904.
[81] **Zimowski L**., Visual models of landscape for physical planning use, [w:] International Conference on the Environment – Methods and Strategy for Integrated Development, Arlon, Belgium, Federation Universitaire Luxembourgoise 1979.
[82] **Zimowski L**., Budowa i zagospodarowanie miast i osiedli. Zarys bibliografii i urbanistyki polskiej za lata 1900-1939, Poznań, Wyd. Politechniki Poznańskiej 1966.
[83] **Zimowski L**., Z dziejów polskiego przemysłu okrętowego w okresie międzywojennym, Rocznik Dziejów Społecznych i Gospodarczych, 1963, t. 24.
[84] **Żórawski J**., O budowie formy architektonicznej, Warszawa, Arkady 1962.

ADDITIONAL BIBLIOGRAPHY

[1] **Ast R., D. Mladenovic, Lewandowski J. B**., Spatial Project study of the River Warta in Poznań, including Ostrów Tumski and Sródka. First place in the competition for the development of urban areas along Warta river in Poznan. Poznan 2006
[2] **Ast R**., Architectural and landscape delimitation of littoral zones. Wyd. European Sailor's Federation. Villamoura-Curacao-Papeete 2000.
[3] **Ast R**., Architektura wybrzeża. [The seashore architecture] Wyd. Politechniki Poznańskiej. Poznań 1999.
[4] **De Lemos E**., Modele urbanistyczne w formowaniu nadmorskich miast uzdrowiskowych uzdrowiskowych Portugalii, na tle rozwiązań europejskich europejskich XIX i XX wieku. [Urban models in the formation of seaside spas in Portugal on the background of European towns solutions in the 19th and 20 centuries. A PhD theses] Rozprawa doktorska, obroniona na Wydziale Architektury Politechniki Wrocławskiej. Promotor R.Ast. Druk powiel. Wrocław 2006.
[5] **Zimowski L**., Modelowanie w teorii urbanizacji.[Modelling in urbanisation theory] Studioteka „Zarysy", WA PP, Poznań 2000.
[6] **Zimowski L**., Małe porty w Zatoce Puckiej i na Półwyspie Helskim. [Small harbours in the Puck Bay] W: „Architektura i Urbanistyka", Zeszyty Naukowe, Wydział Architektury