



LOŠINJ

ISLAND OF VITALITY



HEALING ISLAND OF
LOŠINJ

Health Tourism and Natural Healing Factors of the Island of Lošinj

Town of Mali Lošinj / Jadranka d.d. / Town of Mali Lošinj Tourism Office

KVARNER – HRVATSKA

CHRONOLOGY OF THE DEVELOPMENT OF THE HEALTH TOURISM ON LOŠINJ

1884 – Prof. A. Haračić published results of his meteorological research from 1881-1884

1885, January/February – Dr. Conrad Clar spent three weeks on Lošinj with his son who fully recovered

1885 – Dr. Leopold Schrötter visited Lošinj and supported the founding of Tourism Association

1885 – first visit by Archduke Charles Stephen to Veli Lošinj upon which he decided to build his winter residence there (visited until 1915)

1886, February – Tourism Association in Mali Lošinj founded as Austrian Tourism Association subsidiary

1886, Easter – Dr. Schrötter and a group of Viennese doctors and university professors arrived to Lošinj; they quickly recognised all benefits of the Čikat Bay and encouraged founding of Afforestation Association

1886, April – Afforestation Association of Mali Lošinj founded

1886 – Prof. A. Haračić published his well-known study on the climate of Mali Lošinj “Sul clima di Lussinpiccolo, Osservazioni e Studj”

1886, July – Dr. Conrad Clar published first of many papers on the healing factors of the climate on Lošinj

1887, March – heir to the Austro-Hungarian throne Rudolph climbed Osorščica

1887 – *Hotel Vindobona* in Mali Lošinj opened, the first hotel on the island

1888 – “Die Insel Lussin”, first tourist guide published in Mali Lošinj

1888, October – *Pension zum Erzherzogin Renata (Hotel Rudy)* opened, the first hotel in Veli Lošinj named after the Archduke Charles Stephen’s daughter

1892, June – Mali and Veli Lošinj declared health resorts

1892, September – Health Resort Ordinance published

1892-1928 – Health Resort Commission active in Mali Lošinj

1892 – *Maria-Amalya Asyl* sea health resort of the town of Vienna opened. Specialised for scrofulous girls suffering from tuberculosis

1895 – W. Riedel, a businessman from Graz, built the first villa at Čikat (*Villa Adelma*) to improve his poor health in Lošinj climate

1895 – Archduke Francis Ferdinand spent 6 weeks on Lošinj to recover from tuberculosis

1899, around – *Wienerheim* opened at Čikat, Emperor Franz Joseph’s health resort for treatment of sick Viennese students

1899 – *Villa Carolina* completed, the most beautiful and the most luxurious villa at Čikat

1902, around – *Pension Restaurant Hoffmann* opened in the most beautiful and biggest building on the Mali Lošinj waterfront (now *Hotel Apoksiomen*)

1902 – start of Čikat bathing area construction (*Seebad Cigale*) in Blatina Bay at Čikat

1903 – *Kuranstalt Sanatorium Dr. Josef Simonitsch* opened in Veli Lošinj. Institute for poorly children and adults, the first medical institution that used natural thalassotherapy factors in healing

1905, around – Health Resort House built (*Kurhaus*) on the waterfront in Mali Lošinj (destroyed in World War II). Headquarters of Health Resort Commission and main gathering place of foreigners

1906 – *Kurhaus Sanatorium Dr. Rudolf Hajós* opened at Čikat

1906, November – Merciful Sisters of St. Cross from Đakovo opened *Sanatorium Bethania* for children and adults (mostly priests)

1908, March – *Militär-Kurhaus “Weisse Kreuz”* opened at Čikat, military sanatorium of the Austrian association of the White Cross

1912 – *Hotel Alhambra* opened at Čikat, still open today

HEALING ISLAND OF LOŠINJ



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Diversity is beautiful



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INTRODUCTION



The culture of relaxation focuses on the improvement of the quality of life. How we make use of our spare time reflects the quality and our way of life. The quality of life cannot be bought, it has to be built and cherished. The modern consumerist world asks for quick solutions to all life's needs and people are forced to live in a fast lane and superficially. For each problem there seem to be *instant* solutions that have only a short-term effect. Such a way of life affects the health which we do not have time for, and with the emergence of health problems, we lose the quality of life. The last oases of a normal pace of life are the islands which attract a growing number of visitors searching for peace, meditation, health, and achieving balance of mind and body. It is precisely the island's physical separation

from the land that sets a completely different rhythm of the life which has been preserved for centuries and has kept fundamental values of people and their relationship with nature.

Croatia is a country of a thousand islands with the most indented coast in Europe. It is difficult to single out the most beautiful island because each is special. In line with that, the uniqueness of the island of Lošinj is exactly in the healing gifts of nature which not only have a beneficial effect on health and longevity of the locals, but they have been used in treatments of certain diseases and general improvement of health for almost 130 years. The island is abundant in natural healing factors that help with breathing difficulties and improve lung functions.

The health tourism of the island is developed by following closely current scientific knowledge about the impact of certain therapeutic factors on health. Modern medicine does not have answers to all questions, and pharmacotherapy has failed to resolve all the problems we encounter in treatment. Natural healing factors have been found to be useful and necessary in long-term maintenance of well-being and they are recommended for long-term treatment of certain issues related to health that pose problems in the world today.

Due to its advantageous geographical position, the island of Lošinj has unique and mild climate characteristics. The great Vrana Lake, located on the island of Cres, is a true gift. Besides this magical and pristine nature, the island has an authentic cultural heritage and a long tradition of warm hospitality. The development of health tourism is in harmony with nature and the island way of life so we strive to offer an integral and complete system of services where tourism and health services complement each other.

M. Sc. Anamarija Margan-Šulc



PREFACE



Today's health tourism on the island of Lošinj continues a long tradition of healing medicine. Natural healing factors that started the winter health tourism on Lošinj in 1885 are still present. They are used in treatment alongside different medical procedures and medicines. A question is raised on to what extent the natural healing factors in their fundamental purity and without the influence of medicines and medical procedures can affect health.

The first study, that took place in 2010, was a pilot project where we found out that the natural healing factors had a positive effect on breathing of the camp visitors without any additional medicines or medical procedures. Following that, in 2012 we started a second, larger study that included more people and a longer spirometry measurement period upon arrival and before leaving the Čikat Camp. The study was developed with the help of specialists in pulmonology, Dr. Neven Miculinić and doc. Davor Plavec with the support from the Town of Mali Lošinj Tourism Office and Čikat Camp. The results have shown that the natural healing factors have a statistically significant effect on breathing in patients with obstructive respiratory diseases. The correlation was evident – the greater the obstructions, the better the results.

The paper was presented at the 45th Scientific Pulmonary Symposium of Croatian Pulmonary Society in Split 2012. The specialists supported our efforts to use natural healing factors in treatment of patients with chronic obstructive respiratory diseases and took part in developing the lung rehabilitation programme.

Today we are united in our common goal to emphasise Lošinj's unique climatological and biological characteristics and that natural healing factors are used to improve and maintain our visitors' health.

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Opinions and recommendations of medical professionals



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Croatian Pulmonary Society of the Croatian Medical Assembly Hwholeheartedly supports the initiative to revive the health tourism and programme of lung rehabilitation on the island of Lošinj. Spending time in a mild Mediterranean climate has a beneficial effect throughout the year on appeasing respiratory difficulties in patients with different lung conditions and upper respiratory system diseases, in the first place with asthma patients, COPD patients and those suffering from allergies. A detailed programme of lung rehabilitation combined with the stay on this beautiful island with unique climatological conditions are bound to improve the lung condition of many patients. For that reason, it is no wonder that the 46th scientific symposium of Croatian pulmonologists with international participants will take place in Mali Lošinj in September 2013 with lung rehabilitation as one of the key topics.



doc. Dr. Davor Plavec
Srebrnjak children's hospital
for lung diseases, Zagreb

Lung rehabilitation is a very important in treating acute and chronic obstructive pulmonary diseases. Apart from its therapeutic benefit, it restores the lost capacity, reduced functional limitations and disabilities, and significantly

improves the quality of life. In addition to its effect on lung diseases, the lung rehabilitation positively affects the overall body condition and potential diseases. Additional beneficial effects can be achieved by implementing lung rehabilitation and kinesiotherapy in areas with a favourable climate such as Mali and Veli Lošinj (climatheraphy). This area has a hundred-year-old tradition and a proven positive effect in the treatment and rehabilitation of lung diseases, which has been recognised by the Srebrnjak Children's Hospital whose patients are recommended to engage in the lung rehabilitation and climatherapy programmes in Veli Lošinj. Asthma Camp is organised there for patients with some of the most difficult conditions. Srebrnjak Children's Hospital is Referral centre for clinical allergology in children of the Croatian Ministry of Health and European centre of excellence included in the Global Allergy and Asthma European Network – GA²LEN.



doc. Dr. Ljiljana Bulat-Kardum
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Natural therapeutic factors are factors of nature that have beneficial effects on the preservation and improvement of health, prevention and treatment of, and recovery from various diseases, and improve the quality of life.

Lošinj's climate is Mediterranean, characterized by mild spring and autumn weather and a slightly stimulating winter climate. It is these climatic characteristics that provide Lošinj and other Adriatic locations with an advantage compared to well-developed health tourism in the North Sea. In North Sea, cold seawater is used as a therapeutic factor, which implies a risk of hypothermia. In addition, it has been demonstrated that two weeks spent in a mild Adriatic climate result in increased protein and globulin levels, while albumin levels



decrease. This indicates a beneficial climatic impact on the immune system. Climate thalassotherapy in the North Sea causes an opposite reaction as regards the production of protein in the organism.

Modern global trends in health programs promote health education, healthy lifestyles that imply health diets and physical activity, as well as programs for the prevention and rehabilitation of chronic diseases for the purpose of preserving health or improving the quality of life. In line with these trends, tourism professionals on the islands of Cres and Lošinj have begun to develop a specific form of tourism and improve their health tourism offerings, and have taken a step forward. They have thoroughly prepared for the development of health tourism based on a tradition and experience of almost two years and the tourism development degree achieved so far on the islands, relying also on natural resources of therapeutic, climatic and marine factors. As of this year, they have provided therapy programs adapted to patients with problems resulting from chronic respiratory diseases and allergic conditions such as asthma, allergic rhinitis and skin allergies within the health tourism project, in adequately equipped and adapted premises. Persons involved in climate therapy programs will be under constant medical supervision throughout their stay and treatment, while preventive and rehabilitative programs will be conducted by medical professionals. The programs were designed by medical specialists experienced in health tourism on the basis of guidelines provided by the World Health Organization, the European Respiratory Society and the Croatian Pulmonary Society, which enables effective monitoring and treatment of persons with chronic conditions during their stay and climate thalassotherapy. Such thorough interdisciplinary approach to the development of health programs indicates the skills of Lošinj's tourism professionals and their commitment to setting new standards in health tourism development, but also to ensure support

from the medical profession and high quality and safety for health program users.



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Family physician, clinical
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The true scents of the sea and invigorating aromas of therapeutic plants come to me only on Lošinj. Inhaling this beautiful synergy reduces the stress in anyone who comes here. The footpaths by the sea take us back to nature and walking. These simple actions, walking and breathing the sea aerosol mixed with the richness of essential oils of herbs that grow in abundance on this island, give results at the level of each of our cells, each of our systems. All this improves our respiratory system, prevents cardiovascular diseases, and other diseases that are on the rise such as diabetes and obesity with its complications. Spending time on Lošinj is a priceless treasure for our health that we should feel with all our senses: smell, taste, sight, touch, and hearing.



prim. M. Sc. Goran Ivanišević
Rheumatic Diseases and
Rehabilitation Clinic of the
KBC Zagreb – Rebro

The island of Lošinj has plenty of climatological and marine natural healing factors. Climatological natural healing factors are: change of climate, climate elements (temperature, air pressure and humidity, wind speed), factors (air fronts) and procedures, air quality, Sun insolation, as well as special marine climatological factors. They are used in natural forms of treatment such as: arotherapy, heliotherapy, and thalassotherapy.



Marine natural healing factors are: sea climate, air quality, sea water, algae, vegetation, Sun insolation, sand, and peloid (mud). They are used in natural forms of treatment such as: climatotherapy, aerotherapy, hydrotherapy, algae therapy, aromatherapy, kinesiotherapy, heliotherapy, psamotherapy, and peloid therapy.

After Mali and Veli Lošinj were declared health resorts in 1892, they became the centres of health and treatment tourism on the island. Today Mali Lošinj is the centre of health tourism, while treatment remains in Veli Lošinj.

Based on previous experiences and results of professional application of climatological and marine natural healing factors of the island of Lošinj in patients with respiratory, skin, and other chronic non-communicable diseases, it is obvious that they have a great effect on patients' condition and are highly recommended.

Natural healing factors are useful in preserving and improving health, improving the quality of life of healthy people, as well as those with chronic non-communicable diseases so they are recommended to spend time on Lošinj and make use of the programmes of medical tourism.

prim. M. Sc. Jakov Mose

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Many patients with chronic diseases, especially those with COPD, do not enjoy good quality of life because of the effects of their diseases which then limit them in daily performance, make them feel in need of other people's help and finally lead to depression. At the same time, they consume health resources quite often which put a strain on their families.

Lung rehabilitation has been created for COPD patients and over the years it has grown into a defined multidisciplinary programme of proven effectiveness which is nowadays tailored to suit individual's needs. Lung rehabilitation enables patients to use skills and procedures on their own, it reduces the level of dyspnea, increases tolerance towards everyday physical activities, and in that way improves the patient's quality of life. It is expected that the lung rehabilitation procedures will reduce the incidence of worsening of the condition and its progress, as well as reduce the use of health resources (hospital treatment). It is also believed that the users of lung rehabilitation programme will achieve greater confidence and independence, and that they will have better work performance.

As for the technical execution of the lung rehabilitation process, it is important to define indications and contraindications. This is easily achieved before inclusion into the programme by a medical examination. The patients are placed into groups and they are monitored during the execution of the programme. Physical therapy is carried out by a kinesiologist/physical therapist according to the defined programme of training, exercising muscles of upper and lower limbs combined with exercises to improve muscular strength, followed by coughing and splattering exercises, relaxing training, and other. A motivating education of patients is essential throughout the duration of the lung rehabilitation programme, its adaption to each patient's needs and abilities, continuous evaluation of progress, as well as constant encouragement to achieve the goals. A motivated user of the lung rehabilitation programme will have the greatest benefit from it.

Today we are certain that immediate benefit of such a programme lasting two to four weeks is sufficient for achieving one-year improvement in the quality of life.



Our most populated insular town, Mali Lošinj, with the oldest tradition in lung rehabilitation has the potential to become a well-known Mediterranean centre of excellence in rehabilitation of COPD patients and those in need of rehabilitation support due to working in polluted conditions, harmful effects of smoke, fumes, and other irritating particles.

As usual, to execute the best programmes we need the best people who can easily be found in Mali Lošinj. I have personally witnessed the motivation, knowledge, energy, and enthusiasm of young people managing this beautiful tourist destination and I am convinced that the lung rehabilitation programme will come to life with them and enable European patients to discover this remarkable island, its people, and our country.





1/ HEALING ISLAND OF LOŠINJ – HISTORY OF HEALTH TOURISM

1.1 Historical overview of the beginnings of health tourism on Lošinj

Irena Dlake

Situated on the outer edge of the Kvarner Gulf and half-way between Pula, Rijeka, and Zadar, the island of Lošinj first gained fame at sea due to sailboats, and then on the land where first tourists came searching for “a warmer south” and health. The transition from seafaring to tourism happened almost 130 years ago when, thanks to scientific research performed by Ambroz Haračić, a professor in the famous Maritime School in Mali Lošinj, Austrian physicians discovered the healing powers of the climate on Lošinj. At a time when the seafaring crisis reached its peak, the seamen and shipowners of Lošinj quickly adjusted to the new situation and got involved in the development of a new economic activity – health tourism.

The key person for the beginning of the health tourism was professor Ambroz Haračić (1855-1916). After studying mathematics and natural sciences in Vienna where he attended lectures by famous scientists Jožef Stefan and Ludwig Boltzmann¹, the young scientist started teaching at Maritime School in his hometown Mali Lošinj in 1879. The same year, and continuing to develop his interest in the island's botanics², he started his own meteorological measurements to prove scientifically the causal relationship between the climate and vegetation. Disappointed with the quality of primary measurements, he asked for help of Central Meteorological Institute (*Zentralanstalt für Meteorologie und Erdmagnetismus*) in Vienna in July 1880 and quickly received instruments to set up a 2nd class weather station. On 1 August 1880 he started his measurements in the Viennese manner. He sent the tables with measurements on

a monthly basis to Central Meteorological Institute which then published them in their yearbooks. It would all remain on Haračić's own efforts if Eugen Jelčić (1854-1915) hadn't arrived. With his own interest in scientific research, he supported prof. Haračić who received many new instruments and expanded his research, the results of which were telegraphed to Vienna every day and from 1887 published in Viennese daily newspaper, as well as exhibited in the halls of Maritime School for the locals.

The first paper that Prof. Haračić published was a report on the results of his previous meteorological measurements from 1884.³ Although humble and locally unnoticed, the paper attracted attention of an Austrian balneologist who was at that time working on isometric charts of the northern Adriatic in order to find an island there that would be suitable for climatological spa and winter resort, similar to Corsica in the Tyrrhenian Sea. It was Dr. Conrad Clar (1844-1904), then a physician in the Bad Gleichenberg spa and a balneologist in Graz⁴. His son was suffering from severe scarlet fever that year and couldn't recover so his worried father decided to take him “as quickly as possible to a small island, inset deep into the sea and completely exposed to its influence”⁵. As every cloud has a silver lining, he chose the island of Lošinj and he wasn't wrong. After only three weeks on Lošinj in January and February 1885, his son fully recovered and Dr. Clar notified the academia with avid enthusiasm. Describing the life on the island he said that “living on the island is like living on a well anchored ship, there are a couple of things one must relinquish, but the trade-off is a beneficial influence of the sea air.”⁶

His passion soon attracted Dr. Leopold Schrötter von Kristelli (1837-1908), a famous specialist in internal medicine, founder of modern laryngology⁷, and professor at the Viennese medical school who was at the time researching Kvarner with a group of scientists to find the most suitable location for



setting up a winter resort because other famous sea resorts at the time (on the French riviera, Gulf of Naples, Madeira, and Balearic Islands) were too far and too expensive for people of central and eastern Europe⁸. Dr. Schrötter was enchanted by the island during his first visit and encouraged founding of Tourism Association in Mali Lošinj⁹, which was set up on 9 February 1886 as a subsidiary to Austrian Tourism Club (*Österreichische Touristenklub*).



1. Archduke Charles Stephen with his family

The love for the sea and sailing, which was a skill that celebrated the seamen of Lošinj, attracted another member of the royal family to the island – the Archduke Charles Stephen. In 1885 he sailed across the Adriatic in search of a place where he would build his winter castle, and he fell in love with Veli Lošinj so he continued to come here with his family until 1915. As expected, other members of the Habsburg family followed (emperor Franz Joseph and empress Elizabeth, Archduke Francis Ferdinand I¹⁰, and heir to the throne Rudolph), imperial courtiers and aristocrats, as well as wealthy members of the growing bourgeois class.

When Prof. Haračić published his famous paper on the climate of Mali Lošinj in 1886¹¹, which was based on his 5-year measurements, the Viennese society was in ecstasy. Soon after the publication, the leading Austrian newspapers *Die Presse* published a very favourable review¹² that also described the visit to Lošinj of a group of

professors from the Viennese medical university¹³ lead by Dr. Schrötter during Easter holidays. At the same time, the Archduke Charles Stephen was also on the island so Dr. Schrötter got a chance to present him his opinion that thanks to its mild climate, Lošinj could become top health resort. Prof. Haračić took the group on a tour around his beloved Čikat whose beautiful beaches and low coastline was immediately recognised by everybody as a great potential for the development of tourism. The only problem was the island's barrenness since its terrain was so rugged that it was unfit even for pastures.

Čikat was in need of afforestation, especially in conifers. Dr. Schrötter initiated founding of a society that would take care of it and, as the legend says, he gave Prof. Haračić a coin of 20 crowns for that purpose on their first walk¹⁴. The afforestation society of Mali Lošinj planted over 80.000 pine-trees (mostly Aleppo and white pine) during the first year of their activities, and about 500 seedlings of tamarisk, cypress, and other trees. By 1891, astounding 500.000 seedlings were planted¹⁵ on barren municipal and private land. Their goal was achieved – to have “a town cloaked in forest”¹⁶, which was a collective enterprise unmatched by any other island in the Adriatic and possibly in the Mediterranean. The pine-tree forest protected the Čikat Bay from Bora and has remained its “trademark” until today, when its first pine-trees celebrate their 130th birthday.

Along with afforestation, the Society worked on the design and creation of a great number of footpaths and walking trails all over the island, and in the places with the best view they put benches. Marketing was also intensive so the first tourist guide of Lošinj *Die Insel Lussin mit den beiden Städten Lussingrande und Lussinpiccolo* (Island of Lošinj covering Veli and Mali Lošinj) was published in 1888 which was accompanied by Eugen Jelčić's material, who was then the president of Tourism Association, a contribution



by P. Ghersa, a local GP, and preface by Dr. Schrötter.

Dr. Clar continued to visit Lošinj and write about its healing climate in medical journals. In his paper which was published in 1888 he claimed that Lošinj was not suitable for the treatment of severe tuberculosis (phthisis) because of its mild but often stormy air. However, he thought that it was “suitable primarily for reconvalescents and people with congenital or acquired weakness where it can be expected that the organism would respond to climatological stimulus and result in increasing of strength”¹⁷. He also listed other advantages of the local climate in winter: higher humidity than on the coast in dry northern winds because the effect of the sea, lower intensity of Bora due to distance from the land, small fluctuations in daytime and night-time temperatures in winter and pleasant winter evenings suitable for walks and sleeping near the open window. Finally, he labelled Lošinj “a climatological speciality” that should be investigated further and concluded that, although it shouldn’t be considered the new Madeira, one shouldn’t neglect the fact that “at only 60 miles from home (Vienna, translator’s note)”, the January air temperature is 9°C higher¹⁸. The impact of this and other papers about Lošinj by dr. Clar was greater because in 1888 he moved to Viennese medical faculty where he went on to become associate professor in 1889 teaching systematic and topographic balneology and climatology¹⁹.

During the late ‘80s of the 19th century the skyline of Veli and Mali Lošinj began to change. After the archduke Charles Stephen had bought Captain Sopranić’s villa in Veli Lošinj and decorated its beautiful gardens, other upper class members followed and bought houses from local captains and shipowners who moved to Trieste, Rijeka or the US following the seafaring crisis. They were joined by numerous entrepreneurs from Austria, Hungary, and Czech Republic, mostly hotel managers who turned old captains’ houses into hotels, inns, and spas combining their established

services in continental spas with newly organised winter spa on the island “moving together with their staff, and often with their guests too”²⁰.



2. Hotel Alhambra at Čikat, 1913

However, the first hotel on the island, *Hotel Vindobona*, was opened by Maria Rodinis, a local. The people of Lošinj have quickly adjusted to tourism, this new “economic miracle”, and it was thanks to their naval “knowledge of the world”, foreign languages, and good education that they invested their sea trading capital into adapting their homes to accommodate new guests from cold northern regions. Drinking water from the tanks was satisfactory, and there were already two pharmacies and a small hospital in Mali Lošinj. There were 5 doctors on the island, 3 in Mali Lošinj, and one in Veli Lošinj and Nerezine²¹. Lošinj was connected to Pula, Rijeka, and Trieste by Lloyd’s regular steamboat line. These ports could be easily and very comfortably reached by train from Vienna and Budapest. All this was a good foundation for a quick development of winter health tourism.

Prof. Haračić continued with his meteorological measurements in Mali Lošinj until 1897 when he was transferred to Trieste to take the position of a professor at the Merchant and Marine Academy. His results were regularly published in Viennese Central Meteorological Institute yearbooks and annual programmes of the Maritime School in



Mali Lošinj until 1897 when he was transferred to Trieste to take the position of a professor at the Merchant and Marine Academy. His results were regularly published in Viennese Central Meteorological Institute yearbooks and annual programmes of the Maritime School in Mali Lošinj. In 1892 he published his paper *Die Insel Lussin, ihr Klima und ihre Vegetation* (Island of Lošinj, its climate and vegetation) in *Deutsche Rundschau für Geographie und Statistik*. The paper inspired Prof. Julius Hann, a pioneer in climatology, to write a paper on Lošinj's climate in a prestige journal *Meteorologische Zeitschrift*, which he also edited²². And so Haračić received the highest possible praise for his work in climatology in the same year when **Veli and Mali Lošinj were declared winter health resorts**. The official proclamation in **June 1892** (image 3) was a result of scientific work by Dr. Schrötter and Dr. Clar which were based on Haračić's previous meteorological measurements.

By this Act all spa activities were placed under supervision and management of Health Resort Commission (*Kurkomission*)²³. Spa season lasted from 1 October until 31 May and all visitors who stayed in Veli and Mali Lošinj for more than 4 days were considered "spa guests" (*Kurgast*) and as such they had to pay a "health resort fee" (*Kurtaxe*). Funds raised were used to finance construction and decoration of footpaths, as well as activities of Spa Home (*Kurhaus*) in the centre of Mali Lošinj. One of the first tasks of the Health Resort Commission was to conduct and supervise municipal bans of accommodation of patients with tuberculosis in private homes²⁴ in order to protect the locals.



3. Act and Decree of 7 June, 1892



4. Mali Lošinj and Čikat tourits guide from 1912/13



The first health resort on the island was *Maria-Amalya Asyl*, sea spa of the city of Vienna for scrofulous girls suffering from tuberculosis which was founded in 1892 in Veli Lošinj by baroness Adolfine Hasslinger who left the management to Sisters of Charity of Seven Sorrows. The results of the recovery were remarkable: up to 73% of girls totally recovered, 17% recovered well, 3% started to recover, and only 2% of patients showed no improvement²⁵. At the same time, *Kaiser Josefs Kurhaus des Vereins zur Pflege kranker Studierender in Wien* (Emperor Franz Joseph's Association health resort for sick Viennese students – popularly called *Wienerheim*) opened at Čikat. In order to avoid mixing of sick and healthy guests, spa-sanatoriums were founded in the early 20th century – *Kuranstalt Sanatorium Dr. Simonitsch* in Veli Lošinj in 1903, and *Sanatorium Dr. Hajós* at Čikat in 1906.

Swimming in the sea has been a part of the therapy from the very beginning of the health tourism in Lošinj, but until the end of 19th century it meant bathing in a bath with sea water, not actual swimming in the sea. Summer sea tourism started to develop more intensively in the early 20th century, especially after the construction of *Seebad Cigale* (Čikat bathing area), a beautiful and well-equipped bathing spot in the Blatina Cove at Čikat, and arrangement of the beautiful sandy beach at the Bok Bay on the island of Susak. Summer sea tourism was compatible with winter health tourism, creating a unique year-round tourist season which could satisfy all needs and tastes of the time.



5. Dr. Hajós Sanatorium at Čikat, 1914



7. Dr. Simonitsch Spa Institute in Veli Lošinj



6. Sun bathing in Dr. Hajós Sanatorium, 1907



8. Čikat bath, around 1920



Mass tourism, which followed after the construction of the hotel complex *Sunčana uvala* in 1977, culminated in the '80s. In the post-war period, only the Sanatorium²⁶ in Veli Lošinj partially and in a slightly modified form continued the long tradition of Lošinj health tourism.

It has been 128 years since that winter when Dr. Conrad Clar, guided only by scientific work of Prof. Haračić, came to this island looking for (and finding) the place for his son's recovery. Despite all historical changes that have happened over time, the healing climate of Lošinj remained a constant.

Notes

- ¹ DADIĆ, Ž., 1981, 14
- ² In his major work *L'isola di Lussin. Il suo clima e la sua vegetazione* (Island of Lošinj, its climate and vegetation), published in 1905 in Mali Lošinj, Haračić described 939 native species of tall plants, and his herbarium of over 4000 pages still remains the greatest collection of flora ever collected on an Adriatic island.
- ³ HARAČIĆ, A., 1884
- ⁴ GRMEK, M. D., 1981, 231
- ⁵ CLAR, C., 1886, 75
- ⁶ CLAR, C., 1886, 76
- ⁷ GRMEK, M. D., 1981, 229
- ⁸ GRMEK, M. D., 1981, 228
- ⁹ KOJIĆ, B., 1981, 102
- ¹⁰ Archduke Francis Ferdinand spent 6 weeks on Lošinj in 1895 recovering from tuberculosis.
- ¹¹ HARAČIĆ, A., 1886
- ¹² PRESSE, 1886, 11
- ¹³ Among them were surgeon Josef Weinlechner, hygienist Max Gruber, and dermatologist Eduard Lang. (see: GRMEK, M.D., 1981, 232).
- ¹⁴ KOJIĆ, B., 1981, 102
- ¹⁵ KOJIĆ, B., 1981, 103
- ¹⁶ BOŽIČEVIĆ, M., 1981, 110
- ¹⁷ CLAR, C., 1888, 786
- ¹⁸ CLAR, C., 1888, 788
- ¹⁹ GRMEK, M. D., 1981, 232
- ²⁰ DLAKA, I., GOVIĆ, V., 2012, 15
- ²¹ GRMEK, M. D., 1981, 230
- ²² PENZAR, I., 1981, 85
- ²³ More about the work of the Health Resort Commission

in the translation of the Act and Decree with Health Resort Ordinance from 26 September 1892 can be found in the Appendices.

²⁴ GRMEK, M. D., 1981, 234-235

²⁵ DLAKA, I., GOVIĆ, V., 2012, 37

²⁶ By this name we mean activities of primarily Children's hospital and climatological sanatorium for adults (1946 – 1965), followed by Children's hospital for treatment of allergic diseases with adults' ward (1967-1993).

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1.2 Children's hospital for treatment of allergic diseases in Veli Lošinj as the pinnacle of the latest treatments doc. Dr. Ljiljana Bulat-Kardum

In its most prolific period, the Hospital had on average almost 400 patients a day and employed 190 people. From 1968 to 1990 the highest number of patients, both children and adults, received treatment in Veli Lošinj under a contract with the Ministry of Health of the Democratic Republic of Germany.

Spanning over four and a half decades – from the end of World War II to Croatian independence, the Sanatorium underwent several phases. In the technical, developmental, and financial terms, it peaked in the '70s and '80s of the last century. It was the period of prosperity, in which the Hospital was one of the most important economic factors on Lošinj, that is, in the former municipality of Cres-Lošinj.

This period is marked by doc. Dr. Branko Vukelić, who took over the management in 1967 from prim. Dr. Pero Samardžija. The hospital changed its name from Hospital for allergic diseases of respiratory organs to Children's hospital for allergic diseases with adults' ward. Until his retirement on 1 August 1992, doc. Dr. Branko Vukelić, a pediatric pulmonologist, was the director of the Hospital and the head of Children's ward.

When Dr. Vukelić took over, there were only 19 employees. The following year, in 1968, and through Croatian Ministry of Health, then Secretariat of Public Health of Federal Republic of Croatia, in cooperation with Generalturist, an agreement was signed with Ministry of Health of then Democratic Republic of Germany and patients from Eastern Germany started to arrive. This engagement was a turning point in the functioning of the Hospital, meaning that it brought security and financial stability which resulted in expansion of businesses, investments

in equipment and facilities, and increase in the number of employees. The average daily occupancy was 386 patients who were in the hands of 106 employees. The Hospital primarily treated patients with allergic diseases of the airways, and psoriasis and neurodermatitis patients on the skin ward. The first half of the '80s brought new investments – a new hospital tract with inhalation department was built in 1983, and a new hospital building with 97 beds of high B category built with their own funds was opened in 1985. At that time, the Hospital had 145.000 hospital days per year and it was open year-round, closed only during collective holidays at the end of December and in the first half of January. At the height of its power, the Hospital employed 190 people – physicians, nurses, medical technicians, physical therapists, laboratory technicians, teachers, pharmacists, X-ray technicians, and various non-medical staff. It is needless to say what this number of employees meant for total employment on the island, and especially in Veli Lošinj. Nearly every family in Veli Lošinj had at least one member working at the Hospital.





A number of other physicians worked alongside doc. Dr. Branko Vukelić during those years – his deputy prim. M. Sc. Predrag Stojanović, Dr. Vojko Rožmanić, Dr. Jasna Rožmanić, Dr. Ante Božin, Dr. Mladen Komadina, Dr. Branka Stanić, Dr. Ivo Gagro, Dr. Srđan Banac, and Dr. Ljiljana Bulat-Kardum. Several of them achieved significant technical and scientific results by working in larger medical centres after leaving Veli Lošinj (Prof. Dr. Vojko Rožmanić and Prof. Dr. Srđan Banac at the Children’s hospital in Kantrida, part of KBC Rijeka, and doc. Dr. Ljiljana Bulat-Kardum at the Department of Pulmonology, Internal Clinic of the KBC Rijeka).

The end of this great era happened almost overnight. With the fall of GDR, that is, unification of the two German states in 1990 discontinued the treatment of German patients. The loss of a great number of patients was too much for the Hospital. Soon after parliamentary elections in 1990 and democratic changes, the war broke out in Croatia, followed by worsening of the economic situation which consequently lead to limitations and complete halt in the treatment of patients with the financing from the Croatian Health Fund. By new legislation, the Primorje-Gorski kotar County became the founder and owner of Children’s hospital for treatment of allergic diseases. The Hospital lost its status in 1993 because it did not meet the requirements of the Health Act and became a health sanatorium that had to concentrate on surviving in the market.



Doc. Dr. Branko Vukelić

The golden period of Children’s hospital for treatment of allergic diseases is inextricably linked

to doc. Dr. Branko Vukelić who was its head for 25 years, from 1967 to 1992. Dr. Branko Vukelić was born in 1927 in Topusko. He graduated from Medical Faculty in Zagreb in 1953. He worked as a physician in Laslovo, Slavonska Orahovica, and Našice for several years.

He became a specialist in pediatrics after passing the exam in 1964 in Zagreb, and earned a doctorate in medical sciences in 1978 at the Medical Faculty of the University of Rijeka with his doctoral thesis “The significance of thalassotherapy in obstructive bronchopulmonary diseases in children”. He was head doctor, and he was elected assistant professor at the Medical Faculty in Rijeka in 1980. He was one of the founders of Croatian Society of Pediatric Pulmonology with the Croatian Medical Assembly where he acted as its first president until 1992.

He published over one hundred scientific papers both in the country and abroad. He is the author of several books on bronchial asthma. For his contribution to health services and medical science he received several national and international awards. He retired on 1 August 1992. He lives in Veli Lošinj.





2 / HEALING ISLAND OF LOŠINJ – NATURAL HEALING FACTORS

Contribution to the development of health tourism

M. Sc. Anamarija Margan-Šulc

2.1 Geographic position

The island of Lošinj is a part of Cres-Lošinj archipelago and constitutes the western part of the islands in the Bay of Kvarner. It stretches from the northwest towards southeast for 99 km with a total area of 513 km², accounting for almost 16% of total area of the Adriatic islands. The islands of this archipelago penetrate the most deeply into the European continent in the Mediterranean. The archipelago consists of the islands of Cres, Lošinj, Unije, Ilovik, Susak, and Vele Srakane, as well as a number of small uninhabited islands.

The islands have been an important part of a trade route since the Ancient times and a natural bridge between Istria and Dalmatia. The archipelago is positioned in the middle of the northern hemisphere at 45 degrees north latitude, mostly in subtropical zone of the southern half of the northern hemisphere. Its geographical position is crucial to a whole range of natural healing factors which define it as a health resort. Lošinj is 33 km long but quite narrow. Its width varies from 4.5 km in its central and northern parts, to only 25 m at the entrance to the town of Mali Lošinj. The island's coast is indented, with plenty of natural

harbours protected from the wind, and natural pebbled beaches.

2.2 Climate

The climate on Lošinj is mild Mediterranean with 2631 hours of sunshine per year. On average the island enjoys about 7.2 hours of sunshine per day. The land is far enough so the continental climate has no impact on the island's microclimate. The mean annual temperature is 15.6°C. Temperatures below zero almost never occur. The warm sea current on the both sides of the island¹ acts as a natural regulator of the temperatures and conditions small daily fluctuations between maximal and minimal air temperature, which is lowest in winter in December (4.2°C), and highest in summer in July (8.1°C).

This warm sea current comes from the Mediterranean and flows along the eastern coast of the Adriatic but splits two-ways on the southern part of Lošinj: on the east it flows along the coast of Lošinj towards the island of Krk, while its western part continues towards Istria. It heats Lošinj on both sides and determines a mild subtropical climate that is suitable for growing oranges, lemons, tangerines, myrtle, Jacaranda, Bougainvillea, and palm trees. Myrtle trees are the northernmost indigenous trees on our coast. The island is always like an opulent, green winter garden with a controlled climate. Warm sea current heats the sea in winter and therefore heats up the air around the island so the lowest annual mean temperature (7.7°C) is in February. On the other hand, in summer the sea is colder than the hot air



¹ ŠTEFIĆ, R., RISTIĆ, J., 2001



and it cools it down at night-time, maintaining a pleasant average temperature of 24.8°C even during July, the warmest month in the year.

The annual average rainfall is 928 mm, the highest in October (about 117 mm), and the lowest in July (about 29 mm). November has the greatest number of days with rainfall (about 10). Mean annual relative humidity is rather high with 71%, which is because the values are very consistent during the year and can range from 64% in July to 75% in January. Common winds Bora (north-east) and Sirocco (south) are rarely strong or very strong and they occur mostly during morning or evening in winter, while during the day the winds from the western quadrant blow (*tramuntana* in winter, *maestral* in summer).

According to bioclimatic characteristics, the winter evenings and mornings on Lošinj are cold, while the afternoons are usually fresh and pleasant for walking or sports activities. In spring and autumn, mornings and evenings are fresh while the afternoons are pleasant, which particularly suits people with poor health or the elderly. The most pleasant months on Lošinj are May, June, September, and October.

A study on climate and bioclimate of the island of Lošinj based on detailed meteorological measurements from 1981 to 2010 prepared by Hydrological and Meteorological Services of Croatia can be found in Appendices.

2.3 Sea

The sea around the island of Lošinj is of top quality due to its clearness and absence of toxic substances. The temperatures range from 11.8°C in February to 23.6°C in August. It has beneficial effects on the human body as it relaxes it and soothes. Swimming is possible along the entire coast of Lošinj and the beaches Veli žal, Punta, and Poljana have been awarded with Blue flag.

This international ecological reward demonstrates top quality of our sea and acknowledges the fact that we manage the environment successfully and invest in environmental education too thus caring for safety of our people and our guests.



2.3.1 Seawater quality

Department of Health and Environment of the Teaching Institute for Public Health of the Primorje-Gorski kotar County is responsible for regular measurements of the seawater quality in this area. The measurement is performed according to the Regulations on the quality of bathing water (Official Gazette NN 73/08) which prescribes limit values for microbiological parameters (intestinal enterococci and *Escherichia coli*). The Regulations are compliant with European Directive on the management of bathing water quality (Directive 2006/7/EC of the European Parliament and Council), and the results of the seawater quality in Croatia can be compared to those of the Mediterranean and European in general and are available on the official website of the European Environmental Agency (eg. Eye on Earth search engine) and on the website of the Environmental Protection Agency of Croatian Ministry of Environmental and Nature Protection (<http://www.izor.hr/kakvoca>).



The measurements were performed from 15 May to 30 September by 10 sampling every fortnight. The evaluation was done individually for every measurement on an annual basis and for a period of 3 seasons and the current year (“final evaluation”), and marks were awarded for the quality: excellent, good, satisfactory, and unsatisfactory quality.

In the waters of the island of Lošinj the measurements are performed at 31 points: 6 points at Sunčana uvala (Sunny Bay), 6 points at Čikat, 4 points in Mali Lošinj, 5 points in Veli Lošinj, and 10 points from Bučanje Bay near Sv. Jakov to the lighthouse in Osor.

From 2009 to 2012, the seawater quality at all points of measurement was marked “excellent” (with less than 60 noc/100 ml for intestinal enterococci according to HRN EN ISO 7899-1 or HRN EN ISO 7899-2 test method, and less than 100 noc/100 ml for *Escherichia coli* according to HRN EN ISO 9308-1 or HRN EN ISO 9308-3 test method), which means that the sea on Lošinj is very clean and great for swimming.

(prepared by: Irena Dlaka)

2.4 Drinking water

The island of Lošinj gets water from the Vrana Lake on the island of Cres. The water is top quality and rich in minerals. The lake is 5.5 km long and 1.5 km wide. Its total area is 5.5 km². The lake is absolute crypto-depression where its depth is 61 m below sea level but its surface lies about 13 m above it. It contains 220 million m³ of fresh water. The lake is very clear and there is no decay in it. The water that supplies all our islands is a pure glass of health and an important resource of both islands. The floods from the slopes of dolomite rocks towards the lake are filtered on the pebbled coast.





2.4.1 Water quality – the Vrana Lake

M. Sc. Karlo Jurica

Today, when many countries are facing problems with drinking water and are trying in different ways to turn that water into something that is safe for human intake, we are conducting research on water samples from the Vrana Lake on the islands of Cres and Lošinj. An analytical report on the water samples from the lake indicates that the water is ready for immediate consumption without prior conditioning. Naturally, after the disinfection processes (chlorination), the water is absolutely healthy and safe for drinking.

Many would argue that this is a default. However, some countries that are not abundant in water resources actually condition for example, seawater or wastewater to use it for irrigation or in household, while bottled water is used for drinking, so we need to realise the full potential of the capital that we have.

The capital, the welfare of the islands of Cres and Lošinj, is exactly the drinking water because many islands do not have water sources, or the water shortage problems are not properly handled so their water is of medium quality. In addition, this is top quality water according to its mineral structure and physical and chemical properties. It is not contaminated with heavy metals or pesticides. The reason for this is that the Vrana Lake, like the islands of Cres and Lošinj, is a place of pristine nature.

This is indeed a true capital that is binding to the generations to come, but also because of the tourists and visitors that will be coming to the islands.

2.4.2 Water quality measurements

Department of Health and Environment of the Teaching Institute for Public Health of the County regularly controls the safety of drinking water

in the water supply system of Cres and Lošinj. Testing programme complies with the Regulations on the safety of drinking water (Official Gazette N.N. 47/08) which defines the scope of testing, its frequency, and number of samples per water supply system, as well as maximal permitted concentrations for testing indicators (MKD-MPC). The test results, which are based on 10 samples per month, are regularly published on the Institute's website (<http://www.zzjzpgz.hr/vode/cres-losinj>).

Water from the Vrana Lake is suitable for drinking at its very source, which was proven by measurements carried out by the Teaching Institute for Public Health in 2012 through all four hydrological periods. Based on the data analysis, M. Sc. Sanja Živković, dipl. san. ing. from the Teaching Institute for Public Health concluded the following:

“The basic physical and chemical parameters that were tested were favourable in all four tests. The water of the Vrana Lake was colourless, odourless, clear (turbidity ranged from 0.93 to 2.40 NTU), of favourable temperature from 7.0 to 10.0°C. The pH value of the water is optimal, slightly alkaline (8.23 - 8.36), and suitable for drinking. The basic mineral composition is dominated by calcium and magnesium bicarbonates. By its total water hardness, the Vrana Lake belongs to moderately hard waters (9.8°Nj to 10.3°Nj) with slightly higher concentrations of chlorides ranging from 54.6 – 59.8 mg/L. Concentrations of highly oxidable organic matter that were monitored via parameters of dissolution of KMnO_4 were low throughout the year with values ranging from 0.42 to 1.22 mgO_2/l , which is a characteristic of very pure water in nature. The tested concentrations of total organic carbon which is used to determine total organic matter were also low and didn't vary during the year (1.6 mg/L). Compounds of nitrogen and phosphorous which are nutrients were detected in low concentrations. The presence of the following chemically hazardous and toxic substances were analysed in the Vrana Lake: heavy metals, mineral



oils, phenols, detergents, volatile halogenated hydrocarbons, pesticides, and polycyclic aromatic hydrocarbons. The detected levels of metals were very low. Concentrations of tested organic matters were below detection limit of methods applied or very low, but still significantly lower than specified in the Book of Regulations. Bacteriological characteristics of the water in the Vrana Lake are favourable. On one occasion only the presence of faecal bacteria was detected. According to the results of four tests from 2012, the water of the Vrana Lake can be used for drinking with an appropriate prior disinfection”.

(prepared by: Irena Dlaka)

2.5 Air

The oxygen we breathe is the basic element of life because all the cells in our body need it for normal functioning. We need 10 times more air than food and water. The quality of oxygen and air affect our health and all metabolic processes in our body.

Rapid urbanization and industrialization have led to air pollution with particles produced by plants, but those that were brought by wind. There are about 70.000 different particles that can pollute the air. One of the major sources of air pollution are industrial plants such as oil refineries and coal power plants, but the biggest source of pollution in Europe is road transport. Exhaust gases contain sulphur dioxide, carbon monoxide, volatile organic and non-metallic materials.

It is less known that the air in the offices we work is often very polluted, especially in buildings that are air-conditioned without natural ventilation. Poor air quality leads to fatigue, dry skin and mucous membranes, cough, sore and watery eyes, lack of concentration, breathing problems, headaches, and psychiatric disorders, the most common being depression. This combination of ailments is often called “sick building syndrome”. Living in big cities affects the increase in the

number of patients with breathing problems such as allergic asthma, chronic obstructive bronchitis, and chronic obstructive pulmonary disease.

Clean air has become a synonym of the quality of life. The air on the island of Lošinj is of excellent quality, ideal humidity, and temperature. Particles in the air are found only in trace, as well as mixtures of sulphur dioxide and carbon monoxide. Air quality has improved in the last fifteen years since toughening controls of the biggest pollutants on the land followed by the introduction of unleaded petrol. Currents of air and winds together with large amounts of rainfall clean the air. Besides that, the air is enriched with sea aerosol and dissipated drops of aromatic plant essential oils. Inhalation of this fragrant clean air refreshes lungs, facilitates breathing, and creates the feeling of comfort and well-being.





2.5.1 Air quality measurement

Since the air on the islands of Cres and Lošinj is generally considered clean, the only monitoring station that has regularly been measuring the air quality since 1986 is located near the Vrana Lake, primarily to control the potential influence of the air on the water quality at the source.

The first measurements of air quality were performed in May 1986 at the request of the former Children's hospital in Veli Lošinj due to concerns over consequences of acid rain. Over a period of 6 years (until 1992), average daily concentrations of sulphur dioxide (SO₂) and smoke, total sediment (especially lead and cadmium), and acidity of rainfall (pH) were measured. The results showed low concentrations of SO₂ and smoke, as well as small amounts of total sediment with sediments of lead and cadmium which officially classified the air in Veli Lošinj in the first category. As for acidity of rainfall, during this period they were generally not acid due to the influence of sea aerosol that neutralised it.

Air quality measurements in Veli Lošinj in 2007 were performed at the request of the Veli Lošinj Sanatorium for marketing purposes. They lasted one year (until January 2008) and confirmed and exceeded the expected results. Namely, the concentration of SO₂ was 2-7 times lower and smoke concentration was 50-100% lower compared to the results from 15 years ago, all due to improvements in the quality of petrol and reduction of the share of fuel range transport on air pollution. Total sediment was at the same level of results from the '80s, however, the contents of lead and cadmium in sediments dropped dramatically (10-17 times for lead and 3-11 times for cadmium) due to transition to unleaded petrol at the end of the '90s. The acidity (pH of rainfall) decreased further which proves the efficiency of local and global measures to reduce pollution in recent decades.

Measurements were done for Veli Lošinj but it is reasonable to expect similar results for a wider area of the Lošinj archipelago. The air on the island is clean with a tendency to become even cleaner, as demonstrated in the aforementioned research.

(prepared by: Irena Dlaka)

2.6 Natural healing aerosol

The air on the island of Lošinj is top quality. It is characterised by optimal humidity, ideal average annual temperature so mixed with dissipated drops of medicinal plants' essential oils and sea salt particles, it becomes natural healing aerosol. The definition of healing aerosol includes moistening respiratory tract mucosa, expanding of airways, and softening thick bronchial secretion to facilitate expectoration by applying different pharmacologic agents and antibiotics.

The unique healing mixture that is found in the air of Lošinj has a calming effect on the bronchial tree, it reduces inflammation, expands the bronchi, dissolves bronchial mucus, facilitates expectoration, cleans the lungs thus enabling **healing and recovery without the use of medicines**. Essential oils in the air help appease mucosal inflammation, expand the airways, and soften thick bronchial secretion. Sea salt particles mixed with magnesium, phosphorous, and iodine trigger bronchial cilia, small brushes that clean airways from inflammatory secretions, while at the same time the sea salt softens bronchial secretion and cleans the airways.





Lošinj has a long tradition of treatment of respiratory diseases with natural healing factors, which were first described by Hippocrates in the 5th century BC in his work “On airs, waters, and places” where he concluded that life by the sea is healthier because of effects that the air, climate, and environment have on human health.

Latest spirometry measurements of lung functions performed on visitors of Lošinj and the scientific analysis of the results proved that a stay of only 11 days on the island improves breathing. Natural healing factors take some time to have effect on health. The best results were seen in people who spent three weeks on the island.

Numerous toxins are excreted from the body through oxidative processes that require oxygen. If there's not enough oxygen due to breathing disorders, smoking, alcohol intake or stress, toxins accumulate which can result in worsening of the disease. Spending time in a healthy environment with healing aerosol improves breathing and allows the organism to take enough oxygen. Under such conditions the body recovers more easily, the level of immunity is increased, and there is a long-lasting feeling of comfort.

2.7 Pine-tree forest and medicinal plants

According to prof. Haračić's research, there are about 1.100 herbal species on the island, 939 of which are indigenous. As many as 230 species are medicinal plants, and about 80 of them, mostly exotic, were brought by island's famous captains and sailors who planted them in their gardens so numerous plants grow here: agaves, Mexican cactus, palm trees, magnolias, mimosa, Indian figs, lemon, oranges, tangerines, Japanese medlar, eucalyptus, dawn redwoods, bougainvillea, etc.

The vegetation on Lošinj not only contributes to the island's appearance but it effects the microclimate and quality of the aerosol. Thanks to



Bougainvillea



Cactus and Indian fig

systematic afforestation from the late 19th century, Lošinj is proud to have two protected park-forests: Podjavori (39 ha) in Veli Lošinj and Čikat (236 ha) near Mali Lošinj. These beautiful ancient pine-tree forests effect the local climate in several ways: by emitting great amounts of oxygen, they aromatise the aerosol, protect the footpaths from excessive insolation and wind, protect the soil from erosion, and maintain layer of water below the soil surface. The thick, dark green arch of tree tops that covers the footpaths which meet the deep blue offers an esthetic experience that complements the pleasure of walking by the sea. The recovery in pinewoods was especially recommended to patients with lung problems. Pine-tree oil for the treatment of lung diseases is made from pine needles and used since the times of Egyptians and Babylon. The needles contain lots of vitamin C. Pine-tree essential oil is obtained



by water distillation of fresh young shoots. The most important ingredients are monocyclic monoterpenes and bicyclic monoterpenes where camphor is predominant. Pliny the Elder described the healing properties of pine-tree in his book "Naturalis Historiae" dating from 1st century AD. The beneficial effects of pine-trees on respiratory organs have also been scientifically proven². Besides pine-trees, there are other trees along the footpaths on Lošinj such as tamarisk, evergreen trees with delicate light-green needles and reddish bark, whose juice soothes coughs.

immortelle which are used by the locals to treat many diseases so they are very often found in gardens.



Sage fields



Ancient pine-trees



Sage



Aleppo pine

Lošinj aerosol contains droplets of aromatic plants essential oils that grow along footpaths, rocky coast, and rugged glades. We will mention just some whose essential oils facilitate breathing and appease inflammation of airways. The most common species are sage, rosemary, lavender, laurel, myrtle, thyme, wild thyme, oregano, and

First records about the beneficial properties of sage date back to 2000 BC. This plant is used for cough and inflammation preparations. It widens the contracted lung airways, facilitates expectoration, and it can also be inhaled. In the Middle Ages a sage bush planted near the house was a sign of well-being, and Charles V ordered by law that sage should be grown in monastery gardens. Sage honey is the most popular on the island because it prevents many illnesses, and by its quality it is among the best in the world³. Rosemary grows in gardens and as a wild plant across the island. Its essential oils facilitate breathing and it is believed that they also have a calming effect and improve memory. Lavender is a bushy plant with purple scented flowers. It can be found all over the island because it is grown

² ROŠA, J., AJHNER, G., 2004
³ RADOVIĆ, E., ŠTIGLIĆ, V., 2008



as a decorative plant but also used for its healing properties known since the Ancient times. Its name is derived from Latin *lavare* which means to wash. It is believed that lavender essential oils were used in Roman spa. During the plague in the 18th century in England people believed that putting a bunch of dried lavender under one's nose could protect from the disease. It is useful for fighting infections and for inhalation. Its dried flowers can be used to make tea.



Rosemary



Lavender

Laurel is very common on the island and in some places the trees grow so thick that they form evergreen forests. Its leaves are used as spice, while its essential oil facilitates breathing and appeases cough so it is often used in inhalation. Myrtle is an evergreen bushy tree with small, fragrant leaves. Its bloom is white and gives fruit in winter. In Greek mythology, this beautiful plant

was dedicated to the goddess Aphrodite. Myrtle essential oil has a calming effect on airways, similar to eucalyptus oil. In winter, local women collect its dark berries to make liqueur and to use it as spice.



Laurel



Mirta

Thyme is a low bushy plant with gentle flowers. Its flower and needle-like leaves have a distinctive strong scent and contain essential oils, thymol and tannin. They are used to make tea and in inhalation (mostly against cough and respiratory catarrh), but also as spice. Wild thyme is a small bushy plant with gentle pink flowers that grows near rocky coast. The Romans believed that this plant protected their houses against evil. Dried wild thyme is used to make "chest" tea, for inhalation, and expectoration. It is also a popular spice, and also used as disinfectant and repellent. Oregano is a low shrub with garlands of white or pink flowers. It grows on dry and sunny rocky



areas. In the ancient times, the people believed that oregano could cast demons from the house. The plant has many medicinal benefits, and it has been used as asthma medicine. Nowadays it is mostly used as spice, for preparation of liqueurs, salads, soups, and stews. Oregano essential oil is used to treat breathing disorders. Immortelle is a low shrub usually found on hillsides and rocky coastline. Besides decoration, its scented yellow flowers are used to appease cough and to dissolve bronchial mucus. Its use in the cosmetic industry is widely known.



Thyme



Immortelle

Due to high-altitude winds that clear the air, it contains a very small number of pollution particles. Aromatic aerosol combined with particles of sea salt has a calming effect on the respiratory system. The sea salt particles contain a number of minerals that have beneficial effect on bronchial epithelia and chronic inflammation of the upper respiratory tract and sinuses. Natural healing factors have a beneficial effect on many conditions, stress, and especially on lung diseases.

Two to three weeks on Lošinj at least once a year can result in long-term control of chronic lung diseases with long periods without recurrence and with less complications in winter. People who work in closed, air-conditioned offices without natural ventilation, in industry, and generally people from big cities could benefit from spending time on Lošinj which would also bring them total mind and body recovery and a long-term investment in their health.



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3 / HEALING ISLAND OF LOŠINJ – SCIENTIFIC RESEARCH ON THE IMPACT ON HEALTH

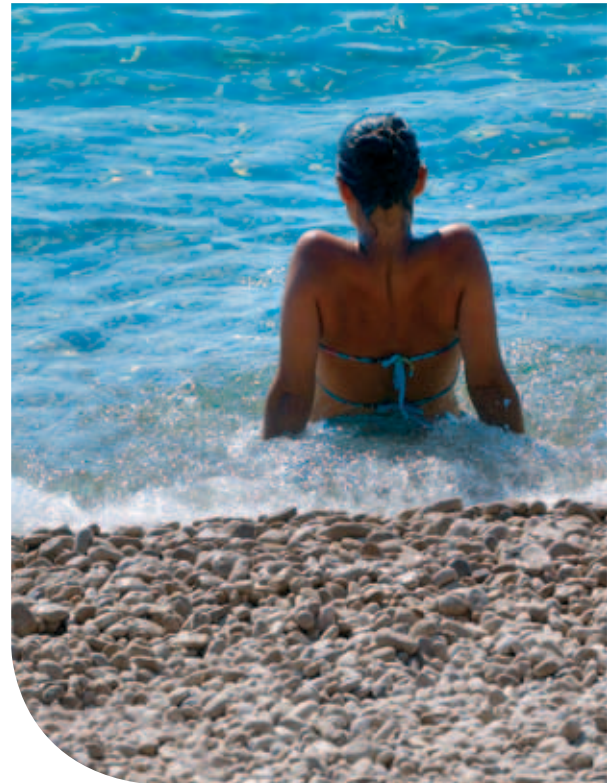
3.1 Overview of scientific research in Children's hospital/Sanatorium in Veli Lošinj from 1969-1999

Irena Dlaka

Children's hospital for treatment of allergic diseases with adults' ward, managed by doc. Dr. Branko Vukelić, a pediatric pulmonologist, was active in Veli Lošinj from 1967 to 1992. The hospital treated primarily children with obstructive bronchopulmonary diseases, but adults too, mostly suffering from psoriasis. Parallel to treatments, scientific research was undertaken there with Dr. Vukelić as their leader, as well as collection of data and their analysis which were later published. In 1978, he received his doctorate degree from Medical Faculty in Rijeka by defending his dissertation "The significance of thalassotherapy in obstructive bronchopulmonary diseases in children".

One of the first studies performed in the Children's hospital was associated with heliomarinotherapy, a method to treat skin diseases with abnormal keratinisation, such as psoriasis and neurodermatitis. Heliomarinotherapy combines treatment with sunbathing and swimming in the sea because UV radiation (UV-B) in psoriasis primarily act as cytostatic that slows down excessive multiplication of cells, while seawater, which is rich in sodium chloride and iodide, has a positive effect on pathological changes in the skin. In addition, sunbathing and swimming have a favourable effect on total mental relaxation of patients and thus relieve the symptoms of psoriasis, which is in fact a psychosomatic illness.

Research in the hospital in Veli Lošinj was conducted over five years (1969-1973) on a



sample of 1450 psoriasis patients, 81% of which had generalised or very advanced state of the disease. Patients were treated during summer (June, July, and August), spending at least 3 to 5 weeks on the island. Therapy included controlled swimming in the sea and sunbathing, with the length of sun exposure gradually being extended to a few hours a day. The results were exceptional: 32% of patients left the hospital without psoriatic skin changes, in 55% the state improved significantly, while only 0.9% patients' condition worsened. Remission lasted on average 6 to 9 months and only 9% of patients experienced a remission shorter than 2 months. Since similar results were achieved in later studies, the expert recommendation was to make heliomarinotherapy, a very successful method for treatment of psoriasis with no contraindications, mandatory and an integral part of the treatment.

Parallel to the research of the efficiency of the island's natural healing factors on psoriasis



treatment, Dr. Vukelić started his long research on climatological treatment of lung diseases in children. His starting point was the climate on Lošinj as the main therapeutic factor due to its beneficial and well-balanced hygrothermal, photoactinic, and chemical properties: mild air temperature and humidity cooled by wind in the warmest months, clean and saturated sea aerosol with high concentrations of chloride, and a fairly balanced aerial plankton (pollen and spores of plant origin). Research was conducted on a sample of 1058 patients – children of different ages with obstructive bronchopulmonary diseases. The results showed a very high success rate of treatment, from 71.36% to 89.07%, depending on the age group. Success rate was even higher with patients with mild conditions, and the repetition of treatments, that is, their regularity is the key to success. The conclusion is that the climate on Lošinj protects the mucous membranes of the respiratory organs, primarily restoring functional ability to adapt, while low levels of air pollution and absence of allergens help in the rehabilitation of acquired or congenital damaged mucosa.



The lengthiest and the most detailed research at Children's hospital in Veli Lošinj was conducted from 1985 to 1990 as a constitutive part of the scientific cooperation programme between the former German Democratic Republic and SFR Yugoslavia and resulted in study "Impact of environmental factors on the evolution of bronchial asthma in children".

The research was inspired by the fact that the development of modern medicine, and especially of pharmacotherapy, was introducing more and more other methods of treatment such as climato-thalassotherapy partly because they were previously poorly represented in pediatric literature, thereby creating an increasing gap between everyday empiricism and scientifically proven theories. The research included 4629 children from German DR (who had been coming to Veli Lošinj since 1968) and from all parts of former SFRY aged 7-15 diagnosed with bronchial asthma: severe (20%), moderate (32%) and mild forms of the disease (48%). The children were treated on average 24 days (SFRY) to 42 days (GDR), and the course of the disease was monitored by means of "daily lists". In addition, during the same period other environmental data important for the treatment were followed: from meteorological measurements and observations (hospital's own weather station and cooperation with Meteorological and Hydrological Services from Zagreb), over measurements of air pollution (Institute for Public Health from Rijeka), to calendar of pollen and spores (Department of Botany, Faculty of Science in Zagreb).

A comparison of certain types of weather in the colder part of the year (from October to April) and warmer (from May to September) with relative frequency of typical obstructions in patients has shown that obstructions are more frequent in winter during cyclones with strong Bora and Sirocco, during summer nights and winter days, and during winter days following the passing of a cold front, while in summer they occur mostly the



day before and during the front. Obstructions during winter nights are related to the “cooling sensation” (lower heat and air humidity, strong currents), while in summer it is related to elevated “thermal comfort”. However, they are less noticeable in summer.

2-4 weeks are needed for the organism to adapt to changes, when stronger obstructions could occur, which depends on the sensitivity of a patient, remembering that a similar, but much weaker reaction could occur when patients return to their homes. Some children experienced disturbances after treatment but remission was longer and their intensity was weaker as treatments were longer and more frequent.

The results of these comprehensive five-year research show that the following factors are essential for the greatest efficiency of climatotherapy:

1. Treat only clinically examined patients in an early stage of the disease while taking into account all potential contraindications.
2. Avoid treatments in summer, particularly in young children.
3. Undergo treatment for at least 2 months, and if not possible, repeat it until satisfactory remission/recovery.
4. No interruptions but customise the treatment that was started before thalassotherapy.
5. Upon returning home the patients must visit their doctors.
6. Ensure equipment and staff to fill specialised institutions.

Only such an approach to treatment and care of children with chronic nonspecific lung diseases can result in, if not complete recovery, then at least maintaining solid remission periods that would allow a quality life without greater restrictions.

After a period of stagnation in the early '90s of the



20th century in which the Children's hospital for treatment of allergic diseases with adults' ward lost its hospital status and became Sanatorium, scientific research based on examination of patients continued, albeit on a smaller scale. One of the incentives for continuing the research was a significant increase in bronchial asthma in recent decades, both in children and adults, which has become not only a medical but a social problem of modern society because this chronic disease, apart from reducing the quality of personal and family life, significantly reduces productivity at work of patients and parents of sick children. Although there are many satisfactory and effective medicines available, they are implemented inadequately and irregularly. A doctor's knowledge of treatment possibilities is not sufficient but the patients and their families should actively participate in all phases of treatment and in maintaining satisfactory health conditions, which can be achieved only by a new approach in their education.

Wanting to evaluate the success of the former treatment and care of children with bronchial asthma, a group of physicians (Dr. M. Kabalin – specialist in children's medicine, Dr. Lj. Postolović and emeritus Prof. Dr. B. Vukelić) collected



and analysed data obtained on a sample of 91 children who were treated in Sanatorium from April to September 1999. Children were on average 6 years old and spent two weeks in the Sanatorium. They analysed the data from the medical history, the previous data of the clinical course of the disease, results of the performed tests and therapies, or prophylaxis of diseases. The results led to the following conclusions: diagnostic possibilities (such as measurement of lung function) are insufficiently used during diagnosis in daily practice, during treatment the term “asthma” is unnecessarily avoided thereby masking the severity of the disease, education of sick children and their parents is poor and insufficient, and all this is reflected in the success of the treatment.

Their research stressed once again that it was necessary to establish a programme of systematic education based on universally accepted guidelines where a tailored programme for each patient would be determined at the very beginning of the treatment. During the treatment the arranged procedures need to be repeated and controlled, followed by a constant check of the efficiency of previous treatment to make any necessary changes and adaptations. In the implementation of the education programme, attending “asthma school” could help further, as it allows an exchange of experiences and discussion about the disease among students. Systematic education of parents and asthmatic children should become an integral part of health tourism offer in Veli Lošinj.

Although the long tradition of treatment with natural healing factors in Veli Lošinj suffered many institutional changes over the last 40 years, all previous scientific research have shown excellent results in treatment of some specific skin and respiratory conditions, such as psoriasis and bronchial asthma respectively, provided that the patients spend at least 2-3 weeks in treatment which should be regularly repeated

until satisfactory remission that would restore the patients’ quality of life.





3.2 Lošinj schools of natural healing factors 2000-2013

prim. M. Sc. Goran Ivanišević

Introduction

A link between the nature and its healing factors with people has existed since the beginning of time. Human settlements in prehistoric times were located near sources of mineral waters and coastline. In Roman times, places located near mineral water springs, curative mud, and coastline were very valuable. These were locations of numerous spas where Roman soldiers, the rich and the common people rested, recovered, and underwent treatments.

The natural healing factors weren't used much during the Middle Ages, but their use saw a revival from mid 18th century which continued until today. Natural sciences that studied the therapeutic factors of land, sea, and atmosphere such as balneology, thalassology, and climatology emerged at that time and they were applied in treatments to improve health and enable recovery.

Natural healing factors have a positive effect on maintaining and improving health, improving the quality of life, and preventing, treatment, recovery, and rehabilitation from various diseases. According to their nature they are divided in climatologicak, marine, and spa (balneological) factors.

Natural healing factors of Lošinj

The first settlement on the Lošinj archipelago dates from 1280 when twelve Croatian families arrived to the south part of the island. Over time the island gained a reputation among its locals as an island with a healthy climate. This was recognised by both Austrian and Croatian doctors towards the end of the 19th century. Thanks to meteorological measurements by Ambroz Haračić in Mali Lošinj and Melchiado Budinić in

Veli Lošinj, as well as expert medical opinions of Dr. Conrad Clar, Professor Leopold von Schrötter, Dr. Josip Fon, and Dr. C. H. Brunner, Mali Lošinj and Veli Lošinj were declared Austro-Hungarian health resorts in 1892.



The island of Lošinj is abundant in climatological and marine natural healing factors. Climatological natural healing factors are: change of climate, climate elements (temperature, air pressure and humidity, wind speed), factors (air fronts) and procedures, air quality, Sun insolation, as well as special marine climatological factors. They are used in natural forms of treatment such as: aerotherapy, heliotherapy, and thalassotherapy. Marine natural healing factors are: sea climate, air quality, sea water, algae, vegetation, Sun insolation, sand, and peloid (mud). They are used in natural forms of treatment such as: climatotherapy, aerotherapy, hydrotherapy, algae therapy, aromatherapy, kinesiotherapy, heliotherapy, psamotherapy, and peloid therapy.



After Mali and Veli Lošinj were declared health resorts in 1892, they became the centres of health and treatment tourism on the island. Today Mali Lošinj is the centre of health tourism, while treatment remains in Veli Lošinj.

Health tourism is a medical and tourist activity used by healthy individuals. It promotes a healthy lifestyle where natural healing factors and/or methods of physical medicine and rehabilitation are used in a professional and controlled environment to preserve and improve health and/or improve the quality of life. The user is a tourist either in a hotel, a camp and/or in a private accommodation who has a certain lifestyle and devotes a part of his/her day to the application of the aforementioned factors and procedures. Apart from people without any health conditions, the users are also guests with mild chronic disorders of the respiratory, circulatory, and other systems, and skin conditions. With numerous programmes, health tourism offers its users a beneficial effect on their health.

Medical tourism is a branch of healthcare and tourism activities that is used by patients. It promotes a certain lifestyle, healthy habits, natural healing factors and/or methods of physical medicine and rehabilitation which are used in a professional and controlled environment to prevent, treat, extend treatment, and recover from various diseases and conditions.

Lošinj schools of natural healing factors 2000-2013

Health Tourism Board has been active with the Croatian Academy of Medical Sciences since 1994. The reason for its initiation was to preserve balneological and climatological activities in Croatia and preserve the activities of its central Institute in Demetrova Street in Zagreb. In addition, its task was to preserve activities of Croatian natural health resorts and improve the use of natural healing factors in Croatian medical

tourism. In 1996 the Board appointed prim. Goran Ivanišević as the coordinator of the revitalisation of Veli Lošinj Sanatorium, a position he has kept until today. In 1999 prim. Ivanišević became the head of Health Tourism and Natural Healing Factors Board at the Croatian Academy of Medical Sciences. Since 2000, the Board, in association with Town of Mali Lošinj Tourism Office and Veli Lošinj Sanatorium organise Lošinj schools of natural healing factors which take place every year during the first weekend in September.



The promotion of the island of Lošinj as Croatian and Mediterranean centre of health tourism, as well as better use of climatological and marine natural healing factors on Lošinj and in Croatia, remains the aim of the school. So far, 13 schools have been held and Proceedings are regularly published. On 2767 pages these books contain 404 papers, 70 of which are dedicated to the island of Lošinj.

Lošinj schools are dedicated to: marine and climatological natural healing factors, health tourism, natural healing factors and their evaluation, nutrition, physical activity and environmental protection, methods and programmes of health



tourism, health – the quality of life, health resorts, health, stress, hydrotherapy, aromatherapy, health resorts in Croatia, health and tourism.

Lošinj schools have repeatedly come to the following conclusions:

1. It is crucial to give greater personal and social attention to health, the fundamental determinant of the quality of life.
2. It is necessary to use natural climatological and marine factors in the protection and improvement of health.
3. An appropriate regulation to protect the sites, composition and measurement of effects, as well as the use of natural healing factors in Croatia must be adopted urgently.
4. The operation of the central Institute for Balneology, Climatology, and Medicine in Zagreb and its structure as a reference centre of the Ministry of Health and Social Welfare is essential.
5. Regularly organise Lošinj schools of natural healing factors once a year in September.

Books-proceedings of Lošinj schools from 2000-2012

Morski ljekoviti činitelji u Hrvatskoj (Marine Natural Healing Factors in Croatia). Zagreb: AMZH. 2000:1-156.

Zdravstveni turizam u Hrvatskoj (Health Tourism in Croatia). Zagreb: AMZH. 2001:1-372.

Zdravstveni turizam i vrednovanje prirodnih ljekovitih činitelja u Hrvatskoj (Health Tourism and Evaluation of Natural Healing Factors in Croatia). Zagreb: AMZH. 2002:1-330.

Zdravstveni turizam i prirodni ljekoviti činitelji u Hrvatskoj (Health Tourism and Natural Healing Factors in Croatia). Zagreb: AMZH. 2003:1-207.

Zdravstveni turizam, prehrana, kretanje i zaštita okoliša u Hrvatskoj (Health Tourism, Nutrition, Physical Activity, and Environmental Protection in

Croatia). Zagreb: AMZH. 2004:1-229.

Zdravstveni i lječilišni turizam - metode i programi (Methods and Programmes of Medical Tourism). Zagreb: AMZH. 2005:1-208.

Zdravlje - kvaliteta života (Health – Quality of Life). Zagreb: AMZH. 2006:1-172.

Lječilišta, zdravlje, stres (Resorts, Health, and Stress). Zagreb: AMZH. 2007:1-197.

Lječilišna medicina, hidroterapija, aromaterapija (Treatment, Hydrotherapy, Aromatherapy). Zagreb: AMZH. 2008:1-171.

Prirodna lječilišta - hrvatski brand (Natural Resorts – Croatian Brand). Zagreb: AMZH. 2009:1-231.

Lječilišna medicina i turizam (Medicine and Tourism). Zagreb: AMZH. 2010:1-148.

Zdravstveno-lječilišne destinacije u Hrvatskoj (Health Resort Destinations in Croatia). Zagreb: AMZH. 2011:1-199.

Zdravlje i turizam u Hrvatskoj (Health and Tourism in Croatia). Zagreb: AMZH. 2012:1-147.

Based on experiences and previous results of professional application of climatological and marine natural healing factors of the island of Lošinj on patients with respiratory, skin, and other chronic non-communicable diseases, it is evident that they have a beneficial effect on patients' condition, thus they are recommended.

Natural healing factors are useful in preserving and improving health and quality of life in healthy individuals, as well as those with chronic non-communicable diseases, therefore, spending time on Lošinj and making use of programmes of health tourism is recommended.



3.3 The impact of climate and natural aerosol on the island of Lošinj on lung function 2010-2012

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Abstract

Due to the island's particular microclimate, in the year 1892, the Island of Lošinj was declared an efficacious climatic health resort with curative properties in improving respiratory functions. This was the outcome of documented findings from the 1880's by Viennese pulmonologist Dr. L. Schrötter and balneologist Dr. C. Clar. These medical reports had greatly facilitated the development of the hospitality industry on the island as a lung health resort destination in the Austro-Hungarian Empire. At that time, the continental visitors' season on the island habitually stretched from October until the end of May. "The Golden Era" of Lošinj's respiratory health curative facilities lasted until World War I; upon that there ensued a long period of stagnation in this particular respect.

AIM: The aim of our study was to examine the possible impact of the island's climate and endemic aerosol on the lung function of vacationers spending time on the island nowadays, that is, almost 130 years later, in rather different circumstances.

METHODS: A random population study comprised registered Čikat Camp vacationers in Mali Lošinj. We used spirometry to measure lung function parameters at subjects' arrival and departure time. The control measurement at departure was on average 11 days apart. The study comprises 93 cases with verified control measurements.

RESULTS: FVC and FEV₁ were significantly improved between the two measurements. This improvement was noted in the sub-group with the initial FVC of <100 % predicted although these subjects did not use any relevant therapy and/or undertook any other behavioural changes in order

to improve their lung function. The improvements in lung function parameters was not significantly associated with age, sex, height and weight, the smoking habits of study subjects, or the time between measurements.

CONCLUSIONS: The study results indicate that a sojourn on the Island of Lošinj may have a beneficial impact on the lung function of visitors with respiratory problems.

Purpose of research

Our research is the continuation of the research of Dr. Clar and Prof. Schrötter, prim. Samardžija and other colleagues that worked in Lošinj. The initial assumption is that their observations are accurate and that the natural curative factors in Lošinj may positively impact the lung functions of visitors coming to the island. Although today there are numerous places in which climatotherapy is performed, our opinion is that Lošinj is still special and that its uniqueness is not sufficiently valorised.

Subjects and methods of measurements

Subjects were randomly selected as registered guests of the Čikat Camp, located in a small protected bay on the south side of the island of Lošinj. We had a total of 93 persons between the ages of 14 and 84. There were 44 women subjects (47.3%). There were 39 (41.9%) smokers. These were mostly entire families. Such a sample represents the camp's average guests. Lung parameters in subjects were measured upon their arrival to the island and immediately before their departure, in an average interval of 11 days. Having been informed about the purpose of the research upon their arrival at the camp, the subjects voluntarily decided about their participation in the research. The camp's receptionist registered all voluntary subjects for whom the initial spirometry measurement was immediately organized. Medical technician Mladen Kovačević conducted the field spirometry measurements upon the call



from the camp receptionist. Transport by the camp's special vehicle was immediately arranged for the subjects and the measurement. Such organization enabled the conduction of the initial measurement immediately upon the subjects' arrival.



The portable spirometer of the English manufacturer MicroMedical-MicroLab MK8 was used. It memorizes up to 2.000 measurements. The spirometer was equipped with a battery, so we were not depending on electrical outlets. This enabled us to be mobile enough to move around the camp. Thus, we avoided waiting for the subject to appear at the place of measurement and could arrive directly to each individual subject and conduct the measurement. Prior to measuring, its technique was explained and shown to the subjects in detail in order to avoid technical errors when conducting the test.

After the measurements, all subjects received a written finding of their spirometry, while the digital recording of the measurement was stored in the memory of the spirometer that can be connected to a computer.

Prior to the subjects' departure from the camp, a second measurement was conducted. The majority of the subjects were without any therapy, while those who used therapy between the measurements neither introduced any new medication nor changed their current ones. 11 lung parameters were measured during each spirometry measurement: FEV1, FEV6, FVC, PEF, FEV/FEV6, FEV1/FVC, FEF 25, FEF 50, FEF 75, FEV 25-75, FET. Each finding contained data on the subject's sex, age, height, weight, BMI and smoking habits.

Statistical data analysis was done by doc. Davor Plavec, Head of Science and Research Department of the Srebrnjak Children's Hospital. Statistical data analysis was done by the statistical software package Statistica version 7.1 (StatSoft, Inc. Tulsa, OK). Numeric data is presented by arithmetic means (AS) and standard deviation (SD), while the data of aggregate indicators is presented by a number and portion in percentages. The normality of numerical data distribution was tested by the Kolmogorov-Smirnov test. The difference between the two measurements was compared by a t-test for dependent (even) samples and between the sub-groups by using the Student's t-test. The results were also analysed in sub-groups according to the value of the initial lung function measurement. The correlation of individual variables was identified by using regression analysis and is presented as Pearson's correlation coefficient. The results of comparisons and correlation with a significance level of $p < 0.05$ were deemed statistically significant.



Table 1.

Descriptive statistics for the entire sample and comparison of measurements (N=93).

Variables	AS	SD	Raspon		AS	SD	Raspon		t	p
AGE (god)	55.49	14.74	14.00	84.00			-		-	-
HEIGHT (cm)	173.01	9.78	152.00	198.00			-		-	-
WEIGHT (kg)	78.95	18.44	45.00	140.00			-		-	-
Women (%)	44 (47.3)						-		-	-
Smokers (%)	39 (41.9)						-		-	-
Days between measur.	11.75	6.06	7.00	15.00			-		-	-
FEV ₁ (L)	2.86	0.77	0.78	4.95	2.90	0.75	1.01	5.18	-1.416	0.1600
FEV ₁ (%)	94.02	18.99	35.00	158.00	95.13	18.09	45.00	156.00	-1.577	0.1183
FVC	3.75	0.93	1.43	6.41	3.83	0.88	1.94	6.23	-2.545	0.0126
FVC (%)	100.91	18.81	51.00	157.00	103.06	17.37	72.00	157.00	-2.611	0.0105
PEF	435.72	122.11	108.00	698.00	447.14	123.01	134.00	723.00	-2.049	0.0433
PEF (%)	95.60	19.90	31.00	140.00	97.98	19.83	38.00	149.00	-1.880	0.0633
FEV ₁ /FVC (%)	76.19	7.91	48.00	91.00	75.52	8.52	46.00	93.00	1.134	0.2597
FEF ₂₅	5.82	1.98	0.88	11.22	5.86	2.01	1.06	10.71	-0.424	0.6724
FEF ₂₅ (%)	87.66	26.19	17.00	151.00	88.39	27.32	20.00	168.00	-0.545	0.5872
FEF ₅₀	2.99	1.17	0.49	6.40	3.03	1.21	0.57	5.69	-0.626	0.5330
FEF ₅₀ (%)	69.99	25.87	13.00	140.00	70.73	27.15	16.00	154.00	-0.529	0.5981
FEF ₇₅	1.03	0.48	0.25	2.52	1.03	0.52	0.25	3.00	0.131	0.8957
FEF ₇₅ (%)	61.87	23.72	18.00	149.00	61.86	26.12	17.00	137.00	0.005	0.9959
FEF ₂₅₋₇₅	2.41	0.97	0.45	5.67	2.41	0.96	0.51	5.42	0.139	0.8895
FEF ₂₅₋₇₅ (%)	70.17	24.76	15.00	134.00	70.20	24.83	17.00	133.00	-0.022	0.9822

Table 1 shows that the study included 93 persons between the ages of 14 and 84 (AS±SD; 55.49±14.74 years), of which 44 (47.3%) were women and 39 (41.9%) smokers. Between the initial and final measurement, an average of 11.75 (SD 6.06) days passed (7-15 days). Of the total number, 7 subjects had asthma, 4 COPD,

and 6 of them other diagnoses (cough, acute bronchitis, asbestosis, status following lung embolism, status following pneumonia and myocarditis, status following sepsis, pleurisy, angina pectoris and stent). Between the initial and final visit, the subjects used no therapy or changed their current chronic therapy.



Thirteen subjects (14.0%) had obstructive ventilatory disorders ($FEV_1/FVC < 70\%$) at initial visit and 14 (15.1%) subjects had restrictive ventilatory disorders ($FVC < 80\%$). Table 1 shows that a statistically significant improvement was identified only for 2 variables, more specifically for FVC as absolute value and as % of the expected value (3.75 ± 0.93 L in relation to 3.83 ± 0.88 L; $t = -2.545$; $p = 0.0126$; 100.91 ± 18.81 in relation to 103.06 ± 17.37 ; $t = -2.611$; $p = 0.0105$) and for PEF as absolute value (435.72 ± 122.11 L/min in relation to 447.14 ± 123.01 L/min; $t = -2.049$; $p = 0.0433$). For other variables no statistically significant changes were identified between the initial and final measurements.

Table 2.

Comparison of initial measurement based on sex.

	Women (n=44)		Men (n=49)		Statistics	
	AS	SD	AS	SD	t	P
FEV₁ (%)	99.05	19.79	89.51	17.21	2.485	0.0148
FVC (%)	108.73	18.92	93.90	15.86	4.110	0.0001
PEF (%)	93.91	19.52	97.12	20.32	-0.776	0.4399
FEV₁/FVC (%)	77.34	9.11	75.16	6.57	1.331	0.1865
FEF₂₅ (%)	89.41	26.56	86.08	26.02	0.610	0.5436
FEF₅₀ (%)	74.11	28.61	66.29	22.80	1.466	0.1461
FEF₇₅ (%)	67.64	26.73	56.69	19.50	2.271	0.0255
FEF₂₅₋₇₅ (%)	72.45	27.04	68.12	22.61	0.841	0.4025

Table 2 shows that men at initial visit had on average statistically significantly lower values FEV₁ ($99.05 \pm 19.79\%$ in relation to $89.51 \pm 17.21\%$; $t = 2.485$; $p = 0.0148$); FVC ($108.73 \pm 18.92\%$ in relation to $93.90 \pm 15.86\%$; $t = 4.110$; $p = 0.0001$) and FEF₇₅ ($67.64 \pm 26.73\%$ in relation to $56.69 \pm 19.50\%$; $t = 2.271$; $p = 0.0255$).

Table 3.

Comparison of initial measurement based on smoking habits.

	Non-smokers (n=54)		Smokers (n=39)		Statistics	
	AS	SD	AS	SD	t	p
FEV₁ (%)	96.80	18.70	90.18	18.95	1.675	0.0975
FVC (%)	102.87	19.47	98.21	17.75	1.183	0.2400
PEF (%)	95.81	20.67	95.31	19.05	0.121	0.9043
FEV₁/FVC (%)	77.52	7.26	74.36	8.48	1.929	0.0569
FEF₂₅ (%)	89.39	26.95	85.26	25.24	0.749	0.4557
FEF₅₀ (%)	71.94	26.50	67.28	25.06	0.856	0.3940
FEF₇₅ (%)	65.87	25.71	56.33	19.65	1.942	0.0552
FEF₂₅₋₇₅ (%)	72.74	24.89	66.62	24.46	1.180	0.2412

Table 3 shows that although smokers at initial visit had lower values for all parameters than non-smokers, that difference has not reached statistical significance for any of the measuring parameters ($p > 0.05$ for all). Change of lung function parameter values between the first and second visit was not statistically significantly correlated to age, sex, height and weight, smoking status or the number of days between measurements ($p > 0.17$ for all).

Statistically significant inversely proportional (lower initial value was correlated to a bigger positive change) correlation was identified between the values of initial measurements and the values of individual measuring parameter changes between the two measurements (Table 4, Figure 1). Therefore the comparison of initial and final measurements in sub-groups with $FVC \geq 100\%$ and $< 100\%$ of expected value (Tables 5 and 6) was conducted.



Table 4.

Correlations of initial measurements with the change of lung function parameters (N=93).

	FEV ₁ R	FEV ₁ %R	FVCR	FVC%R	PEFR	PEF%R	FEV ₁ /FVCR	FEF ₂₅ R	FEF ₂₅ %R
FEV ₁ (%)	-0.3307	-0.3077	-0.3492	-0.2860	-0.1189	-0.1020	0.0336	-0.0676	-0.0578
	p=0.001	p=0.003	p=0.001	p=0.005	p=0.256	p=0.331	p=0.749	p=0.519	p=0.582
FVC (%)	-0.3320	-0.3041	-0.4541	-0.3854	-0.1103	-0.1030	0.1551	-0.0754	-0.0695
	p=0.001	p=0.003	p=0.000	p=0.000	p=0.292	p=0.326	p=0.138	p=0.473	p=0.508
PEF (%)	-0.3424	-0.3524	-0.3571	-0.3500	-0.3414	-0.3122	0.0225	-0.2069	-0.1965
	p=0.001	p=0.001	p=0.000	p=0.001	p=0.001	p=0.002	p=0.831	p=0.047	p=0.059
FEV ₁ /FVC (%)	-0.1282	-0.1327	0.0822	0.0720	-0.0542	-0.0330	-0.2540	0.0016	0.0082
	p=0.221	p=0.205	p=0.433	p=0.493	p=0.606	p=0.754	p=0.014	p=0.988	p=0.938
FEF ₂₅ (%)	-0.2870	-0.2754	-0.3158	-0.2748	-0.1438	-0.1162	0.0152	-0.1682	-0.1575
	p=0.005	p=0.008	p=0.002	p=0.008	p=0.169	p=0.267	p=0.885	p=0.107	p=0.132
FEF ₅₀ (%)	-0.2137	-0.2083	-0.1937	-0.1677	-0.0463	-0.0373	-0.0143	0.0264	0.0279
	p=0.040	p=0.045	p=0.063	p=0.108	p=0.660	p=0.723	p=0.891	p=0.802	p=0.791
FEF ₇₅ (%)	-0.1231	-0.0910	0.0424	0.0991	-0.0311	-0.0032	-0.2029	0.0066	0.0213
	p=0.240	p=0.386	p=0.687	p=0.345	p=0.767	p=0.976	p=0.051	p=0.950	p=0.839
FEF ₂₅₋₇₅ (%)	-0.2197	-0.2135	-0.1071	-0.0777	-0.0687	-0.0555	-0.1290	-0.0229	-0.0194
	p=0.034	p=0.040	p=0.307	p=0.459	p=0.513	p=0.597	p=0.218	p=0.828	p=0.854

Figure 1.

Dispersion graph for the correlation of FVC value (% of expected value) at initial visit and FVC changes at final visit (in relation to initial measurement).

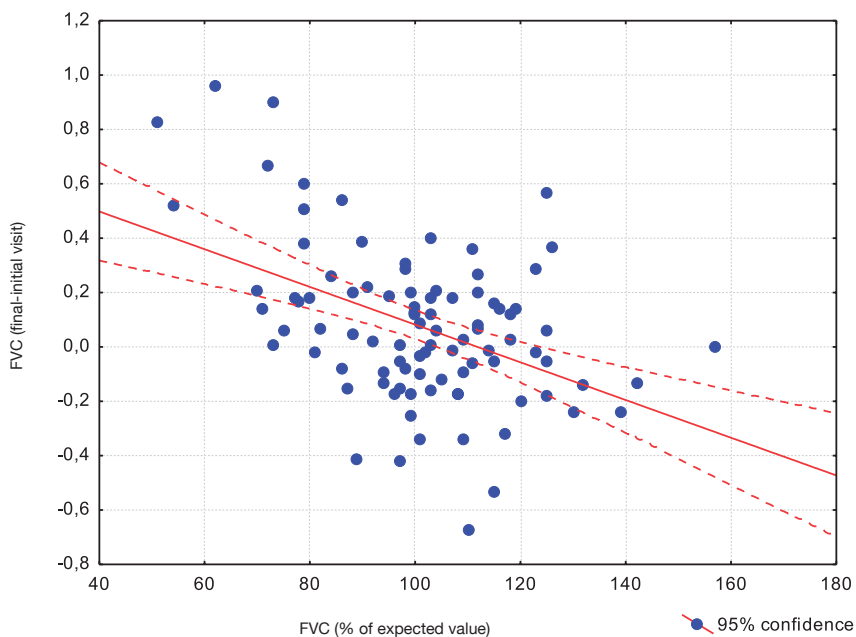




Table 5 shows that in the group with FVC $\geq 100\%$ of expected value (n=52) almost no difference was identified between the initial and final measurements for all measuring parameters ($p > 0.29$ for all). On the other hand, as shown in Table 6, in the group with FVC $< 100\%$ of expected

value, a statistically significant improvement was identified in the final measurement (in relation to the initial) for FEV₁ and FVC (as absolute values) and as % of expected value (FEV₁, $p = 0.0131$; $p = 0.0074$; FVC. $p = 0.0022$; $p = 0.0021$).

Table 5.

Comparison of initial and final measurement in the group with FVC $\geq 100\%$ of expected value (n=52).

Variables	AS	SD	Range		AS	SD	Range		t	p
Days between measur.	11.98	7.88	7.00	15.00	-				-	-
FEV ₁ (L)	3.15	0.78	1.38	4.95	3.13	0.78	1.30	5.18	0.828	0.4113
FEV ₁ (%)	105.31	14.59	62.00	158.00	104.90	15.97	59.00	156.00	0.457	0.6494
FVC	4.09	0.91	2.48	6.41	4.09	0.90	2.57	6.23	-0.091	0.9276
FVC (%)	113.65	11.98	100.00	157.00	114.04	13.75	92.00	157.00	-0.395	0.6945
PEF	454.88	118.05	214.00	698.00	462.37	125.95	155.00	678.00	-1.060	0.2942
PEF (%)	102.63	16.85	66.00	140.00	104.08	18.98	43.00	149.00	-0.835	0.4077
FEV ₁ /FVC (%)	76.71	8.03	48.00	91.00	76.23	8.87	46.00	88.00	0.621	0.5370
FEF ₂₅	6.32	1.88	1.46	11.22	6.25	2.02	1.29	9.98	0.628	0.5325
FEF ₂₅ (%)	97.87	22.49	28.00	151.00	96.94	26.84	25.00	168.00	0.490	0.6262
FEF ₅₀	3.38	1.19	0.75	6.40	3.32	1.24	0.78	5.69	0.852	0.3985
FEF ₅₀ (%)	79.85	24.71	21.00	126.00	78.35	26.41	22.00	132.00	0.827	0.4124
FEF ₇₅	1.15	0.53	0.25	2.52	1.16	0.59	0.31	3.00	-0.179	0.8587
FEF ₇₅ (%)	69.38	25.90	18.00	149.00	69.83	26.66	23.00	137.00	-0.140	0.8891
FEF ₂₅₋₇₅	2.71	1.06	0.57	5.67	2.67	1.02	0.52	5.42	0.646	0.5214
FEF ₂₅₋₇₅ (%)	78.58	25.58	19.00	134.00	77.69	24.32	18.00	133.00	0.434	0.6661



Table 6.

Comparison of initial and final measurement in the group with FVC <100% of expected value (n=41).

Variables	AS	SD	Range		AS	SD	Range		t	p
Days between measur.	11.46	2.24	7.00	15.00	-				-	-
FEV ₁ (L)	2.51	0.61	0.78	3.79	2.60	0.59	1.01	3.91	-2.598	0.0131
FEV ₁ (%)	79.71	13.50	35.00	105.00	82.73	12.06	45.00	101.00	-2.823	0.0074
FVC	3.32	0.76	1.43	5.12	3.49	0.74	1.94	5.03	-3.280	0.0022
FVC (%)	84.76	12.35	51.00	99.00	89.15	9.91	72.00	111.00	-3.289	0.0021
PEF	411.41	124.27	108.00	654.00	427.83	117.87	134.00	723.00	-1.832	0.0744
PEF (%)	86.68	20.08	31.00	132.00	90.24	18.31	38.00	128.00	-1.917	0.0624
FEV ₁ /FVC (%)	75.54	7.80	55.00	90.00	74.61	8.07	52.00	93.00	0.982	0.3320
FEF ₂₅	5.18	1.94	0.88	9.80	5.36	1.92	1.06	10.71	-1.298	0.2019
FEF ₂₅ (%)	74.71	24.99	17.00	141.00	77.54	24.13	20.00	131.00	-1.520	0.1364
FEF ₅₀	2.49	0.93	0.49	4.92	2.66	1.09	0.57	5.39	-1.756	0.0867
FEF ₅₀ (%)	57.49	21.77	13.00	140.00	61.07	25.21	16.00	154.00	-1.677	0.1014
FEF ₇₅	0.88	0.34	0.29	1.56	0.86	0.36	0.25	1.51	0.486	0.6296
FEF ₇₅ (%)	52.34	16.49	21.00	89.00	51.76	21.81	17.00	112.00	0.225	0.8228
FEF ₂₅₋₇₅	2.04	0.70	0.45	3.29	2.08	0.78	0.51	3.68	-0.523	0.6041
FEF ₂₅₋₇₅ (%)	59.51	19.18	15.00	117.00	60.71	22.32	17.00	131.00	-0.590	0.5585

Discussion

In 2010, a pilot research was conducted in which we tried to determine whether there is any impact of natural curative factors on the lung functions of Čikat Camp visitors in Mali Lošinj. At that time, we had less subjects, 38 in total. All subjects were non-smokers. There were 42% women and the average age was 42.2. 22 or 68% subjects had normal initial spirometry, while 12 or 32% had a respiratory disorder. In the stated measurement, the FVC was better in 5 patients (41%) with initial obstructive disorders after a ten-day stay in Lošinj. In patients who initially had regular spirometry, the FVC was no different in the second measurement. The FEV₁ was better in 7 subjects (58%) that had initial obstructive disorders at the initial measurement. The Spirolab II MIR (Medical International Research) spirometer was used.

After the first pilot research we decided to continue detecting the possible correlation

of climatologic factors and lung functions of Lošinj's visitors, and obtained consistent results supporting our primary assumption that Lošinj's climatologic factors could positively impact lung functions, primarily of those visitors who have a restrictive or obstructive respiratory disorder. In current testing, the second measurement proved to be statistically significantly better for the two parameters, more specifically for the FVC that was better in absolute values and in the percentage of expected values, and for the PEF that was significantly better in absolute values. In the subgroup of subjects with a FVC lower than 100% in the initial measurement, a statistically significantly better finding was measured in the final spirometry for parameters FVC and PEF1 both in absolute values and as the percentage of expected values. Our results were also supported by the observations of other colleagues.



By comparing our results for the group of subjects who have obstructive respiratory disorders with the data published by Dr. Ivan Klarić and collaborators in their testing of the impact of marine curative factors on the course of asthma since 1992 to 2001 in Thalassotherapy in Crikvenica, we can say that our results are similar. Dr. Klarić and collaborators measured via spirometry the improvement of FEV1 in 45% of asthmatics in the observed period, while we measured the improvement in 58% of subjects in the group with mild obstruction. Our subjects were not asthmatics, but they had a ventilation disorder, which explains a higher percentage of improvements in our subjects. The FVC was improved in 44% patients in the testing of Dr. Klarić and collaborators and in 42% subjects in our testing. We believe that this difference exists due to the fact that our observation period was shorter and there was not sufficient time for the further improvement of lung functions. Although the optimum stay in a health spa is 4 to 6 weeks, it was observed in our subjects that even ten days of sojourn in Lošinj led to lung function improvement.

In 1954, prim. Dr. Leo Trauner, a Croatian balneologist, researched the impact of climatologic factors on patients hospitalized in the Veli Lošinj Health Spa Centre and identified improvement in 80-90% asthmatics. He also observed the impact of Lošinj's climate on a series of other diseases.

In 1966, prim. Dr. Samardžija published the results of monitoring the treatment of 2.223 patients hospitalized during 1965 in the Veli Lošinj Health Spa Centre. During that year, out of a total of 165 treated asthmatics, the improvement was recorded in 160 patients after an average treatment of 6-8 weeks. In patients with chronic bronchitis and bronchiectases, the recovery was recorded in all patients, as well as in other patients with a respiratory disorder. Prim. Dr. Samardžija also observed improvement in a series of other diseases such as chronic sinusitis, psoriasis,

neurodermatitis, scleroderma, asthenia, anaemia, and allergic rhinitis.

Dr. Ljubiša Postolović has been in the Veli Lošinj Health Spa Centre for a long time and supports the use of maritime natural curative factors in the treatment of asthmatics. For thirteen years now, prim. Goran Ivanišević has been organizing the Lošinj School of natural curative factors, thus also contributing to the preservation of the climatologic treatment tradition of the island.

For years, the hospital for lung diseases on the Island of Rab has used maritime curative factors for the recovery of obstructive lung disease patients. The thalassotherapy department operated there from 1955 to 1994 and had 60 beds for asthmatics. 250 patients were treated at that department annually.

The climate in Lošinj is moderately warm with warm and dry summers and mild and rainy winters. The annual average temperature on the island is 15.6°C, atmospheric pressure 1009.9 hPa, relative air humidity 71%, and annual amount of rainfall is on average 928 mm.

Natural curative factors are produced by a mild climate, sun radiation that is measured at an average of 2.631 sunny hours, sea water that is constantly controlled and immaculately clean, sea salt aerosol with enough sea salt dispersed in the air, algae in the Lošinj maritime zone (265 species), vegetation, air clearness, in summer months pollen, oils, pine pollen, blueberry and the pollen of various aromatic plants, and sea peloid. Vegetation in Lošinj is subtropical. **Lošinj is still the most favourable climatologic place on the Adriatic based on climatologic features.** The advantage of Lošinj lies in the fact that the coast is washed by the warm Mediterranean Sea current coming from the southern Mediterranean. On the south side of the island, the current is divided and passes the western and eastern side of the island, contributing to the cleanliness of the sea.



The warm current leads to the reduced impact of the continental climate and makes Lošinj meteorologically isolated much like an incubator. Favourable winds and altitude air currents clean the air that is thus without pollution. The air temperature is optimal with very small winter and summer oscillations and relative humidity, which is the advantage in relation to inland areas that are exposed to very low temperatures in winter and very warm and dry summer months (9.15). The air on the coast has a lot of dispersed drops of sea aerosol containing iodine, sodium chloride, calcium and other particles, as well as drops of essential oils of medicinal plants. The Lošinj air has no industrial pollution, no soot, and the air quality is of the 1st category.



The way in which natural aerosol impacts respiration has not been accurately determined, but there are many hypotheses about this. Halotherapy or salt therapy has been used for the treatment of asthma and other respiratory tract diseases since the 19th century. The impact of salt aerosol has been documented on the rheological properties of bronchial secretion that becomes more liquid. The impact of negative salt ions has also been confirmed on mildly positive bronchial epithelium and bronchial cilia that are activated by inhaling salt aerosol and that become more mobile. This is how better expectoration and the cleansing of the bronchial tree are explained.

The third characteristic of salt aerosol is its anti-inflammatory action that soothes the inflammation of the bronchial wall. The aerosol in the Lošinj air also contains particles of aromatic herbs with anti-inflammatory effects.

In addition to the favourable climate and the beneficial aerosol, the stay in nature also has relaxing effects. There is no industry on the island and the visitor is not additionally affected by stress. On the island one takes care of noise control, control of light pollution in the night air, the cleanliness of beaches and walkways that are cleaned twice a day, control of sea water quality, control of potable water quality from Lake Vransko. The fact that it is an island has enabled the control of all additional significant parameters making healthy life possible. Meteorological parameters are still measured on a daily basis and since not long ago can be read on a meteorological pillar in the town.

Conclusion

Results of the research lead to the conclusion that Lošinj could be useful to persons with a respiratory disorder, who could, by planning their vacation on the island outside the summer season, and especially in autumn and spring months, prolong their status of remission. The sojourn in Lošinj could lead to long-term remission by improving expectoration and reducing cough, alleviated breathing due to staying in immaculately clean air, favourable temperature and humidity, as well as rich in beneficial aerosol. Obstructive lung diseases and asthma are on the increase in Europe and Croatia. Natural treatment and recovery could help in the better control of chronic lung diseases, reduce the consumption of medication and its side effects, prolong remissions and reduce acute inflammatory disease complications in winter. In order to learn more about the benefits of such a recovery, about the indications and contraindications for individual patient groups, research should be continued in collaboration with Croatian pulmonologists.



4 / HEALING ISLAND OF LOŠINJ – MEDICAL SERVICES

4.1 Medical institutions

Healthcare Center Dr. Dinko Kozulić

Priko 69, Mali Lošinj, 51550

tel./fax: + 385 51 231 804

+ 385 51 237 098

(tourist clinic in Nerezine)

+ 385 51 235 684

(tourist clinic in Punta Križa)

e-mail: dom.zdravlja.mali.losinj.1@ri.t-com.hr

www.dz-mali-losinj.com

- emergency service, acute-observation beds (infirmary with 14 beds) for observation and treatment of patients, dental care, laboratory services, x-rays and ultrasound diagnostics
- specialist/advisory healthcare: surgeon, anesthesiologist, gynecologist, internist, physical therapist and dermatologist
- visiting specialists: ophthalmologist, ENT specialist, psychiatrist, orthopedist
- tourist clinics (Mali Lošinj, Nerezine, Punta Križa)

Dialysis Centre Mali Lošinj

Healthcare Center Dr. Dinko Kozulić

Priko 69, 51550 Mali Lošinj

tel/fax: +385 51 238 008

e-mail: dom-zdravlja.kozulic.dijaliza@ri.t-com.hr

- open all year round, dialysis unit has 7 dialysis spots (High-flux and low-flux hemodialyzers of the Fresenius FX series)
- choice between classical hemodialysis and on-line hemodiafiltration
- medical supervision by a specialist internist

and another physician with nurses specially trained in dialysis care; complications are handled by KBC Rijeka

Private Internal Medicine office Margan

M. Sc. Anamarija Margan-Šulc

Ulica G. Garibaldi 35, Mali Lošinj 51550

tel./fax: + 385 51 571 184

e-mail: anamarija.margan@ri.t-com.hr

- full internal examination, blood pressure, ECG, laboratory tests with cardiac risk assessment, *Cardio fit* programme for the prevention of coronary diseases
- clinical examinations of the lungs and upper respiratory tract, functional lung tests using spirometry and lung status assessment, *Lungo Mare* programme for the prevention of respiratory diseases
- diagnostic services using ultrasound techniques and including preventive examinations of the thyroid gland, hormone control, kidney, liver, gall bladder, pancreas, urinary bladder and prostate examinations, full laboratory tests
- other services necessary to maintain health and to follow up on tourists' condition during their stay on the island in a controlled manner, including the possibility of communicating with physicians from our patients' home countries (communication languages: Croatian, English, Italian, and German)

Veli Lošinj Health Resort

Podjavori 27, 51551 Veli Lošinj

tel.: + 385 51 236 111

fax: + 385 51 236 224

e-mail: info@ljeciliste-veli-losinj.hr

www.ljeciliste-veli-losinj.hr

- medical rehabilitation services
- specialist/advisory healthcare: a physical



medicine and rehabilitation specialist and a dermatology and venereology specialist, as well as medical team: physical therapists, nurses, lab technicians, pharmacologists, and aromatherapist

- an examination by physical therapy and rehabilitation specialist; physical therapy, medical massage, aromatherapy, breathing exercises, an examination by dermatology specialist, medical cosmetology services, allergy testing, treatment of psoriasis and other skin diseases

4.2 Health services in Jadranka Group

4.2.1 Lung rehabilitation programme on Lošinj for children and adults

The programme is based on scientifically proven clinical and diagnostic methods which are combined with natural healing factors and healing aerosol of the island of Lošinj while in harmony with hundred-year-old tradition of treatment. It is meant for people with mild obstructive breathing disorders. The programme was developed after a study on the effect of natural aerosol of Lošinj on the breathing functions which proved its efficiency without the use of medicines. The research was presented to the academic community at the Pulmonological Symposium in Split in 2012. After scientifically proving the positive effect of the aerosol of Lošinj on breathing in patients with obstructive breathing disorders, experts in pulmonology supported the efforts to implement the programme of lung rehabilitation on Lošinj. This is the result of an interdisciplinary group of experts which included pulmonologists, hotel staff, nutritionists, hospitality employees, nurses, and physiotherapists.

The programme was developed by the following well-known doctors, specialist of internal medicine, and pulmonologists:

- Dr. Neven Miculinić, Hospital for lung diseases,

KB Jordanovac, Zagreb

- doc. Dr. Ljiljana Bulat-Kardum, Institute for pulmonology, KBC Rijeka

- doc. Dr. Davor Plavec, Srebrnjak children's hospital, Zagreb

- prim. Dr. Jakov Mose, Department of lung diseases, KB Sestre Milosrdnice, Zagreb

- M. Sc. Anamarija Margan-Šulc, Internist office Margan, Mali Lošinj

- Tatjana Funarić, pediatrician at the Healthcare Centre Dr. Dinko Kozulić, Mali Lošinj

The programme is intended for asthma patients, people working in industry with a high level of pollution (oil industry, metal industry, construction, wood industry, chemical industry), people who live in cities with high industrial pollution or are in some way exposed to irritant fumes, smoke, or soot in their workplace, people with chronic obstructive pulmonary disease, people who work in "sick buildings", etc.

The minimum period of rehabilitation is 14 days, 3 weeks ideally. The most appropriate season for recovery is from early October to early May.



The aim of the programme is to allow users to enjoy their holiday and rehabilitation in an environment that has a positive effect on mild obstructive breathing disorders or healthy people who are exposed to pollution in their workplace or homes and are in danger of experiencing damage to the respiratory system. It is necessary to customise the rehabilitation programme to



every user. They need to be educated to use the skills and procedures individually that will ease their breathing, extend the quiet period, reduce the frequency of exacerbations, reduce the consumption of medicines during the year, improve tolerance, endurance, and stamina, improve self-confidence, and facilitate integration in the community, reduce the number of hospitalisation and shorten its duration, create a positive attitude towards rehabilitation which is pertinent to good control of the patient's chronic disease and ultimately improve the quality of life.



The programme comprises an initial medical examination by a specialist in internal medicine. During the session, the doctor is thoroughly acquainted with patient's medical history, continues with examination and diagnostic procedures which include spirometry, oximetry, and electrocardiography. Lung rehabilitation

programme is determined according to the results of the examination and customised to each patients' needs.

Rehabilitation is carried out individually or in groups. The programme includes school of breathing, education about the disease and nutrition. Physical therapy is focused on breathing exercises, exercises for loosening respiratory muscles, and drainage exercises for better expectoration. The patients are taught breathing techniques with the help of rehabilitation physiotherapist in a healing environment of a protected park-forest. Walks by the sea are an everyday activity.

The rehabilitation programme ends with another specialist examination that includes clinical examination, spirometry, and oximetry, which help evaluate the success rate of the lung rehabilitation and the benefits of such programme for a better control of the disease and better quality of life.

Lung rehabilitation programme is based on scientifically proven positive effect of the island's natural aerosol on breathing function, and on proven medical rehabilitation procedures that are conducted in the open-air. It is unique and specific because it is based on natural healing factors of the island of Lošinj whose climate in autumn and spring is beneficial for a total natural recovery of people with mild breathing problems and helps those who are exposed to air pollution to preserve good health of their respiratory system.



4.2.2 Medical services in hotels and camp

Wellness and Conference Hotel Aurora****

Sunčana uvala bb, 51550 Mali Lošinj

tel.: + 385 51 667 200

fax: + 385 51 667 222

e-mail: hotel.aurora@jadranka.t-com.hr

www.losinj-hotels.com

- natural care and deep relaxation treatments
- massages and beauty treatments with natural cosmetics (emphasis on eco essential oils and herbal oils of local manufacturers)
- special treatments with luxury eco-vegan brand *Spa Ritual*
- Finnish sauna, Turkish and Roman spa, and bio-sauna, aromatised showers with tropical effects, *Laconium* with *chrono*-therapy (unique on the Adriatic)
- *Kneipp* therapy for leg circulation, ice therapy, sea salt therapy
- four indoor swimming pools with hydromassage and outdoor pool, all with heated seawater
- cardiovascular, stretching, and active programmes in the open

Vitality Hotel Punta****

Šestavine bb, 51551 Veli Lošinj

tel.: + 385 51 662 000

fax: + 385 51 236 301

e-mail: hotel-punta@jadranka.t-com.hr

www.losinj-hotels.com

- PBS Centre for sports excellence – active holiday programmes under professional guidance by body-technique instructors
- Laurus – aromatherapy studio with island's plants, aromatherapy products workshops
- Luvena – beauty studio with top quality natural

cosmetics and holistic approach

- Infirmaria and Dental Studio – physician and dentist
- Relax Zone – complex of facilities for relaxing, indoor and outdoor swimming pool with heated seawater, sun deck, Turkish bath and Finnish sauna, jacuzzi and *relax* room

Hotel Bellevue***

Čikat bb, 51550 Mali Lošinj

tel.: + 385 51 231 222

fax: + 385 51 231 268

e-mail: hotel.bellevue@jadranka.t-com.hr

www.losinj-hotels.com

- indoor swimming pool with heated seawater and hydromassage
- sauna
- massage and kinesiotherapy studio
- fitness
- doctor's office

Čikat Kamp***

Čikat 6a, 51550 Mali Lošinj

tel.: +385 51 231 708

fax: +385 51 231 708

e-mail: info@camp-cikat.com

www.camps-cres-losinj.com

- organised morning walks along the Footpath of vitality with exercises for proper breathing (part of animation programme)
- solar yoga
- massage and kinesiotherapy studio



4.3 Other medical services on the island

4.3.1 Dental offices

Healthcare Center Dr. Dinko Kozulić

Priko 69, 51550 Mali Lošinj

Dental Clinic - Dario Šimunović

tel./fax: + 385 51 233 731

e-mail: dom.zdravlja.zubna@ri.t-com.hr

Dental Clinic - Vera Lovrić-Buljat

tel./fax: + 385 51 233 732

e-mail:

lovric-buljat.vera.stomatoloska.ord@ri.t-com.hr

Dental Clinic - Marko Pilaš

tel.: + 385 51 232 119

Private dental offices

Dental Office – Dolores Gagro

Zagrebačka 56 A, 51550 Mali Lošinj

tel./fax: + 385 51 231 360

e-mail: stomatolog-d.gagro@ri.t-com.hr

Dental Office - Svebor Bival

Šestavine bb (Hotel Punta), Veli Lošinj

tel./fax: + 385 51 236 386

e-mail: info@punta-dentist.com

4.3.2 Cosmetic and therapeutic services

"Bella" beauty salon – Đurđica Manzoni

Lošinjskih pomoraca 40

51550 Mali Lošinj

tel.: + 385 51 233 394,

GSM: 098 72 45 32

e-mail: durdicamanzoni@gmail.com

- complete face and body care, use of local aromatic plants

- face and neck *myolifting*, microdermoabrasion, laser

- medical massage therapy, medical pedicure

- *aquadetox* and UV-free tanning

"Katarina" beauty and massage salon – Rahela Tomljenović Bojić

Malin 46, 51550 Mali Lošinj

tel./fax: + 385 51 233 043

GSM: 091 211 5771

e-mail: rahela.tomljenovic.bojic@gmail.com

- facial treatments, manicure, waxing, *deluxe* massages (hot-stone, warm chocolate, gold massage)

- in cooperation with the Garden of Fine Scents: anti-stress massages with local essential oils, massages, and exfoliation with scented salts and island essential oils, pedicure with scented bath or scented salts

"Vita" massage and health improvement salon – Ana Banić

Dinka Kozulića 1, 51550 Mali Lošinj

tel.: + 385 51 238 276

GSM: 098 962 5057

e-mail: anabanic16@gmail.com

- health preservation and improvement programmes

- medical massage and lymphatic drainage with local essential oils

- pilates, yoga, exercises for pregnant women, corrective exercises for children – small groups of up to 6 people for an individual approach

- team: senior physical therapist Ana Banić, certified pilates and yoga instructors



5 / HEALING ISLAND OF LOŠINJ – DEVELOPMENT PROGRAMMES

5.1 Lošinj – Island of vitality

Town of Mali Lošinj – Gari Cappelli, Mayor

In a number of developmental documents, the Town of Mali Lošinj has, either on local or county level, decided to set a strategic policy towards sustainable development and sustainable tourism while at the same time respecting the exquisite beauty, preservation of nature and cultural heritage, as well as the level we have reached in the development of tourism.

If we take the characteristics of the islands and the needs and expectations of the “new guest” that cherishes ecology and culture as a starting point, we will see that the Tourism Office of the Town of Mali Lošinj in cooperation with the Town of Mali Lošinj has been systematically building the destination brand “Lošinj – Island of Vitality” for several years, a project that is rooted in the idea of sustainability. Taking into account a long tradition of a health resort, exceptional climatological characteristics, preserved natural factors, and contemporary social trends that indicate a growing interest in health prevention and a healthy life in general, it is indisputable that the Town of Mali Lošinj has the potential for further orientation towards medical services, and in that context towards medical tourism.

For this reason, the Institute for Tourism was entrusted with developing the Programme for Sustainable Development of Tourism for the Town of Mali Lošinj. The main projects derived from the Programme relate to the protection of natural, social, and cultural resources, and projects of economic sustainability, while the backbone for our future development is the health tourism.

This kind of tourism is of strategic importance for further economic growth of our Town because

while providing services to our guests combined with natural and infrastructural resources, we are actually working on improvement of our own healthcare system.



5.2 Walking trails and footpaths

Town of Mali Lošinj Tourism Office - Đurđica Šimičić, director

Walking and hiking across the Lošinj archipelago that stretches over five islands and with over 220 kilometres of walking paths is possible throughout the year. The trails cover areas of the islands of Cres (Punta Križa), Lošinj, Ilovik, Susak, and Unije. They vary from simple paths for people who are not in great physical shape, over mid-level difficulty paths to very difficult. The Osorščica mountain (Nerezine) and St. John's hill (Sveti Ivan, Veli Lošinj) are very attractive for anyone who loves hiking. The walking trails stretch along the coast and they are ideal for long walks and relaxation.



Footpath of vitality (Mali Lošinj – Veli Lošinj)

Along the three kilometres of the Mali Lošinj – Veli Lošinj Footpath of vitality that stretches along the coast, hidden in a hundred-year-old pine forest, educational panels have been put up that provide the hikers with information on the importance of proper posture and breathing, as well as help them become aware of their movements and processes during their walks. The panels are on permanent display and thanks to them, the the walkers can maximise the benefits of nature. There are about 10.000 steps in both ways, recommended to be taken every day according to the World Health Organisation standards. Active walkers can do both directions in 45 minutes, while recreational and slower walkers will need about an hour and a half. The guests can walk along the footpath on their own but there are also guided walks with instructors from the PBS Studio at the Vitality Hotel Punta.



Footpath of health (Čikat)

The Footpath of health stretches along the coast

from Sunčana uvala to Srebrna uvala in Mali Lošinj, and it is also covered by a hundred-year-old pine forest. Educational panels accompany this footpath too and they will help the walkers learn about proper posture and breathing, as well as processes that occur in their bodies on their walks.

5.3 Development plan of Veli Lošinj Sanatorium Centre

Veli Lošinj Health Resort - Renata Žugić, director

Programme development basis of the Sanatorium Centre in Veli Lošinj will form the backbone of architectural and urban design of the entire complex, including a part of Podjavori park-forest. Development vision is conceived through four stages whose implementation depends primarily on securing the funds from different investors. Its guidelines are:

1. Restoration of the existing buildings in the Health Resort with reducing the number of beds from 220 to 150-180 and increasing the standard of medical services and accommodation (the finalisation of this stage is expected by the 2016 season).
2. Construction of facilities for new therapeutic and accompanying services.
3. Arranging of external therapeutic and recreational facilities.
4. Construction of new accommodation facilities with 4*, 50-100 beds.

In general, the complex should cover an area of about 5 ha. The final realisation of the programme is planned before 2020.

The first stage has already begun. Park I and its external infrastructure is being redecorated. Opening of the new Park I facility is planned for the second half of June 2013.



The Sanatorium Centre will implement the following treatment programmes: airways and asthma, allergies, skin diseases and improvement of skin condition through dermatology and medical cosmetology, psoriasis treatments, cardiovascular diseases prevention programmes, rehabilitation programmes for post-operative conditions of the locomotor system, treatments to reduce the stress impact. In addition, many programmes focusing on improving resilience and body regeneration will be implemented, as well as programmes to adopt healthy lifestyle, and elderly vitality programmes.

The users of the treatment programmes will be: children and adults suffering from asthma and other chronic obstructive pulmonary diseases, children and adults with psoriasis and other skin diseases, people with impaired locomotor system, elderly people, users of other complementary rehabilitation and revitalisation programmes.



5.4 Development of Winter Health Tourism Jadranka Group - Sanjin Šolić, CEO

A stay on Lošinj is proper recuperation for the body and soul! This was discovered and confirmed by the pioneers of health tourism on Lošinj – Dr. Clar and Dr. Schrötter. The results of their research prompted Emperor Franz Joseph to declare Mali and Veli Lošinj natural climatic health resorts in Budapest, 1892, by a special act. Arrivals of aristocracy and wealthy members of the bourgeois class from the entire Austro-Hungarian Monarchy ensued, as well as the construction of several sanatoriums, villas, and hotels, of which many are today preserved in their original spirit. Today, after almost 130 years of health tourism tradition on the island, Lošinj is investing effort into the development and revitalization of this important part of Lošinj tourism that has been a bit neglected after the war in the '90s.

The island of Lošinj has remained, despite



the development of the entire destination in the economic and social sense, a virgin oasis in the very heart of Europe. Its development was always geared towards self-sustainability and preservation of local and native values. Surrounded by the clear Adriatic Sea with a mild Mediterranean climate and an abundance of sunshine, with centuries-old pines of the park-forests Čikat and Podjavori, a rich flora and fauna, and preserved nature with 220 km of maintained walking trails, Lošinj is indeed a remarkable island with respect to all other islands in the Mediterranean.



To be healed by unique natural healing factors and rest and enjoy oneself at the same time is uniqueness that Lošinj is able to provide its guests. A holiday on Lošinj provides a holistic health experience, clean and pristine nature, food and drink to enjoy, quality drinking water from a natural lake on the neighbouring island, medicinal plants and peace and quiet with constant control

and supervision of professionally trained medical staff. Aside from all that, Lošinj has many cultural and historical monuments and offers many different events and exhibitions.



The quality of accommodation on Lošinj is guaranteed in three 4* hotels of the company Jadranka and in the winter camp Čikat, offering a total of 1000 available rooms and 3000 campsites. Tourist zones, in which the hotels and camp are situated, stretch through island areas where sea touches the centuries-old pine forest, and abound in sports facilities. The objects are fully equipped for all kinds of MICE events of up to 400 participants and have a wide wellness & spa offer (seawater pools, based on local natural factors: salt, aerosol, aromatherapy, medicinal plants, and sand. Nutrition is based on Croatian and local, healthy and organic ingredients, and light Mediterranean food, which can be adapted to suit the needs of specific diet types: macrobiotic, vegetarian, and vegan. Physical therapists and kinesiologists trained for, among other things,



specific pilates and yoga exercises, provide their services. Introduction of pulmonology programmes for people with compromised respiratory function and rehabilitation is under way, as is the opening of breathing and exercise schools, certified according to the rules of the pulmonology profession. A general practitioner physician will be available in the objects, along with nutritional counselling.

Apart from the above, all objects of Jadranka Group have an established quality control and environment management system. Investments in renewable energy sources are also noticeable and models of green technologies, water saving and recycling as the result of systematic care for environment protection are being worked on.



In the period leading up to 2015, the transformation of Čikat, the last and also the largest and most valuable zone, into a health zone is planned. Known precisely for its villas where the Emperor Franz Joseph stayed himself, Čikat is a zone which

started health tourism on Lošinj. A concept for the Thalasso Hotel Helios 4+* with physical therapy and rehabilitation, and polyclinic Villa Bianca with specialist, mainly allergist and pulmonology offices, are already being worked on. Along with those objects, the zone will have two boutique hotels, Hotel Čikat and the 5* Hotel Alhambra, as well as Hotel Bellevue with a high ranking of 4* with a specific wellness & spa zone. This zone will, through the realization of the projects listed above, become the heart of year-round tourism on the island of Lošinj, as it once was. Design of *sun* and *health gardens* within Čikat Camp with pools, an agricultural, and a wellness & spa complex, adapted to providing health services even during the winter tourism season is under way.

Interest groups on Lošinj with a public and private goal, as well as locals, believe in the success of the island's already historically verified model of development – winter health tourism. This is why all intense activities today are geared towards renewing Lošinj's image as a confirmed and successful health resort destination.

Come and experience the healing qualities of Lošinj yourself!



AFTERWORD

Enjoy in the richness of the Lošinj archipelago

Town of Mali Lošinj Tourism Office
- Đurđica Šimičić, director

Lošinj, the birthplace of health tourism in Croatia, takes pride in all advantages which are its characteristic. This is why we wanted to gather all scientific parameters, experts' recommendations, and personal reflections about Lošinj. We understand the importance and responsibility that we have towards our guests and we care about their and our locals' health so we live and work on the foundations of sustainable development and responsible tourism. Our rich, diverse archipelago binds us – our beautiful necklace of towns and islands that jealously hides its pearls, starting from Veli Lošinj, where the health tourism originated, though Mali Lošinj, Ćunski, Artatore, Sv. Jakov, Nerezine, Osor, Punta Križa, Belej, and Ustrine, to isolated islands of Susak, Ilovik, Unije, Vele and Male Srakane.

Health and vitality are everywhere on our archipelago. On your walks by the sea, you can enjoy the open-air aromatherapy, and have great culinary experiences in our numerous restaurants that successfully combine local cuisine with new trends and healthy diet. Workshops, training, and education about health will help you improve and preserve your health, while aromatherapy courses with essential oils of local plants will take you to another level of relaxation and pleasure.

Our famous captains and shipbuilders from the 19th century have testified about the island's healthy climate, and our intelligent, committed, and hard-working people. The people of Lošinj haven't changed. Their hospitality and kindness are an added value that keeps the trust and ensures the return of our guests.

A mix of traditional and modern approach is

an additional challenge for our guests. Culture tourism on Lošinj offers cultural and historical sights, and a particularly important and valuable global discovery that is Apoxyomenos (2nd-1st century BC), an antique bronze statue of an athlete. It was found in the waters of the island of Lošinj, near Vele Orjule inlet and until today it remains the only large bronze statue found on the eastern coast of the Adriatic. We are preparing a special place for it in the Kvarner Palace in Mali Lošinj.

As an Affiliate Member of the World Tourism Organisation and with the support from Croatian National Tourist Board, Ministry of Tourism, Croatian Chamber of Commerce, Kvarner County Tourism Office, and many guests of our islands, the Town of Mali Lošinj Tourism Office invites you with full responsibility and pleasure to see, enjoy, and surrender to a new quality of life that our archipelago offers you.

Welcome to the Lošinj archipelago!





APPENDICES

1. Dr. Conrad Clar, Drei Winterwochen auf der Insel Lussin, in: *Österreichische Badezeitung – Organ für die Interessen der europäischen Kurorte und des Kurpublikums*, Nr. 9 (13. Juni 1886), Wien, 1886



Three winter weeks on the island of Lošinj (Conrad Clar)

At the beginning of last year my son recovered from scarlet fever diphtheria (*Scharlachdiphtherie*) and I decided to take him to the coast, not only in the fastest possible way, but also in the shortest possible amount of time, preferably to a small island, inset deep into the sea and completely exposed to its influence. My choice was the island of Lošinj in the Kvarner Gulf, of whose climate and social conditions I had found sufficient information in various literature, and on which I

would be taken care of as far as accommodation and food was concerned, thanks to the friendly mediation of an acquaintance.

I find the Kvarner Gulf's warmth in the winter half of the year to be especially favourable. The coast of Rijeka already has a mean January temperature of 6°C. The islands exhibit a further rise in temperature, which, according to the meteorological observations of professor Haračić from the Maritime School in Mali Lošinj, which he is now conducting for the fifth consecutive year, amounts to one and a half degrees in Mali Lošinj. On such a narrow island far from the coast, minimal temperature oscillations can be expected not necessarily only by calm weather, and one can hope for the much longed diminishing of occasional gusts of the Bora, which lose their intensity at an extremely rapid rate as one ventures further away from the mainland.

It was on 17 January 1885 that we left Graz on the noon fast train, stayed the night in St. Peter (Šempeter, translator's note), a place that indeed justified its renown for windy weather, and reached Rijeka the next day, greeted by the loveliest of weather. The view of the sun-bathed surface of the Kvarner Gulf's sea surface as well as its islands immediately after leaving the barren snow-covered fields of the Karst Plateau is surprisingly beautiful. The greenery of the bay groves of Volosko and Opatija makes for a lovely contrast against the dark colour scheme of the coast of Istria dominated by the snow-covered Učka Mountain. The afternoon was dedicated to visiting these beautiful parts which have, however, not offered enough room for play to my playful convalescent, which made for a rather short stay. Despite the oncoming Bora, we set off to sea on the next morning. As is already known, due to its uneven and forceful effect, this unpleasant northern wind raises the sea surface to a much lesser extent than its competitor, the Sirocco with its uniform southeastern airwave. This allowed for a smooth ending of a seemingly bold undertaking that was the journey to the island. Of the islands



Krk, Cres and Lošinj, the latter is the last and most protruded one. After the steamship had passed both, it docked in the port of Mali Lošinj at 4 o'clock in the afternoon.

The elongated island with its towns of Veli and Mali Lošinj spreads parallel to the Croatian coast located 5 geographical miles away in the length of 4 miles from the northwest to the southeast point. Its narrow rocky landmass ends in the north with the 600 m high sharp silhouette of Osoršćica and closes into a lovely long harbour almost in the middle of its longitudinal axis. This harbour communicates with the open sea to the southwest only through two narrow passages, the *Bocca grande* and the *Bocca falsa*, with a small rocky island of Koludarc rising between them. Only the *Bocca grande* is navigable exclusively for small barges, which receive shelter from the spacious harbour.

Mali Lošinj with its 7000 inhabitants has far outdone the older neighbouring city of Veli Lošinj on the eastern shore of the island that is located half an hour away. Rising in the manner of an amphitheatre, it nuzzles the sharp angle that marks the terminus of the southern part of its harbour, occupying two seafronts – one facing the southwest and another facing the northeast.

The first seafront, where we reserved a private apartment, as there are no inns on the poorly visited and patriarchal island, was chosen as the place of winter accommodation due to it being sheltered from the wind.

Despite that (the lack of inns, translator's note), Mali Lošinj has its most representative structures on the sunniest part of the seafront, where affluent and educated people engage in branched out commerce with overseas countries, and where a foreigner will encounter friendly reception and a solid selection of magazines at the well organized citizen casino (*Bürgercasino*). Frequent steam boat connections with three points on the mainland – Pula, Rijeka and Zadar facilitate

supply. The only thing that one must forgo here, as is the case in Venice, is fresh spring water because there are few wells on the island with the inhabitants making do with water cisterns. Living on the island is like living on a well anchored ship, there are a couple of things one must relinquish, but the trade-off is a beneficial influence of the sea air.

In the first couple of days of our stay we have learned to appreciate the significance of the nearby rise *Veli Varh* located above the houses on the seafront and overgrown with trees. The Bora was blowing with unusual strength and slamming against the coast opposite ours with full force, whereas the coast on our side was in the wind's lee. The inhabitants of Lošinj point out that this kind of gusty weather of the worst kind lasts for the third of the time it does in Trieste or Rijeka. And so it was that the air calmed down soon thereafter, allowing us to take further outings on land and sea. The possibilities of diversion were abundant – there was a spacious harbour next to the sea and the mainland had a coastal path that led from Veli to Mali Lošinj, continued alongside the harbour and extended across the larger part of the island, reaching the town of Osor on the neighbouring island of Cres. This path is not only ideally placed, but is also in excellent condition. It measures three meters in width, is covered with fine gravel and (seeing as though there are no vehicles on the island) is completely devoid of dust. Its largest portion stretches above the sea along the rocky coast with evergreen fragrant shrubs, dominated by myrtle, sprouting from its countless cracks. These main representatives of the island flora of Dalmatia are not only impossible to find on the Kvarner coast, but can also not be found on the islands of Krk and Cres. The island of Lošinj is the northernmost point of their habitat.

The intense greenery of the shrubs in lovely cornucopia and a variety of shapes and forms is a constant companion on the path leading from the northern part of the harbour to the village of Čunski located half an hour away and with a northern



position. A sail boat excursion throughout the entire length of the harbour completed by a walk to Čunski leaves one with an excellent impression.

The path between Mali and Veli Lošinj along the eastern shore, replete with coves, that offers a panoramic view of the snow-covered rocky mountain on the mainland is magnificent in its beauty. The lovely walking trail also leads to the nearby Bay of Čikat on the western shore, which owes its exceptionally lush olive groves (olive trees are generally very widespread on the island) to its sheltered position.

The pinnacle of all the outings was the one to Osor, an old remnant of a city which, due to the abundance of its Roman dig sites in the centre of town, only still peaks the interest of archaeologists. A three hour horse ride from Mali Lošinj through Čunski, Sv. Jakov and Nerezine has to bring joy to the heart of every tourist because of the beauty of the entire scenery. From Čunski the path continues at a considerable altitude, above the eastern shore through evergreen maquis shrub land swarmed by ouzels and robins, and then descends behind the cove of Sv. Jakov into the farmed fields of Nerezine below the eastern foothills of Osoščica. Finally, through the thicket of English oak and over the narrow inlet that separates Lošinj and Cres it takes us to the city gates of Osor. There is incidence of malaria in Osor during the summer because of a small swamp nearby, whereas sanitary conditions on the rest of the island are favourable even in the hot season of the year.

The mountain climb covered with chunky sharp limestone gravel does not provide a strong enough footing for the feet and is therefore quickly tiring. It is better to give up on searching for high viewpoints and satisfy oneself with the beautiful image of the town, harbour and island offered by the hill of Kalvariija rising to the south of Mali Lošinj. Its main adornment in the background is Osorščica, which rises majestically and dominates

this extraordinary detail of land mass, surrounded by an infinite surface of the sea on all sides.

During our stay, the northeastern air current transformed into the northwestern Mistral wind, a pleasant steady air current that made our many sail boat outings possible in warmer weather, and the further turning of the wind towards the southwest brought Scirocco and rain.

Small islands are not suited for the stay of patients who first and foremost need windless weather. The restless drift of island air requires a certain previously existing physical resilience which the invigorating influence of the turbulent sea air could further enhance, meaning that the organism's endurance reacts well to outside stimuli.

When on those mornings, after rowing or sailing on some isolated spot on the shore, I would eat my second breakfast, our convalescent always exhibited a good appetite. Each walk also had an equally stimulating effect, whether it was accompanied by the swooshing of the waves from the open sea or took place on the quiet shores of the harbour. It was fun watching the fishermen, among which the numerous *Chioggiotti* (people from Chioggia, translator's note) inhabited on the island especially stood out because of the skill of their sailing manoeuvres. The lively traffic of steam ships and big sailing ships also roused interest. When we finally boarded the ship to Pula to reach the mainland taking the shortest possible route, I could only throw a grateful glance on the maritime idyll in which we had spent a couple of weeks as real islanders.



2. Zakonik in Ukaznik za avstrijsko-ilirsko primorje ki obstoji iz poknežene grofije Goriške in Gradiške, mejne grofije Isterske in državno-neposrednjega mesta Trsta z njegovim obmestjem, Leto 1892., XII. izdatek, Izdan in razposlan dne 9. julija 1892., 12., Postava z dne 7. junija 1892, s katero se ustanovljajo načelne določbe v namen, da se uredi lečbinstvo in da se uvede zdravstveni red za zdraviški okraj Mali Lošinj in Veli Lošinj, Budimpešta

Act and Decree

za
concerning
the Austrian-Illyrian Littoral
including the Princely Counties Gorizia and
Gradisca, the Margravate of Istria and the City of
Trieste with their respective areas

1892 AD

EXTRACT No. XII

Made public and distributed on 09 July 1892

12

Act of 07 June 1892,
passing general provisions with the aim of
regulating health resorts and instituting the
Health Resort Ordinance for the health resort
area of Mali Lošinj and Veli Lošinj.

With the approval of the national parliament of
My Margravate of Istria, I do hereby stipulate the
following:

§ 1.

The Health Resort Ordinance for the health resort
area of Mali Lošinj and Veli Lošinj, made up of
cadastral municipalities of Mali and Veli Lošinj,
with the exception of their respective islands, is
passed by the Regency after the session of the
National Government.

§ 2.

For the Health Resort Commission to be able
to cover all the costs stemming from the health
resort activity, it is allowed to charge a health

resort fee.

§ 3.

According to the detailed provisions of the Health
Resort Ordinance, the health resort fee is paid
by guests, apart from the inhabitants of both
municipalities, which have permanent residence
in the health resort area, and their relatives. Health
resort guests are considered to be those visitors
that stay in the health resort for a longer period
of time, which is stipulated by the Health Resort
Ordinance in detail.

The Health Resort Ordinance shall stipulate
in detail which persons, and especially which
foreigners, are not subject to paying the health
resort fee.

§ 4.

For the purpose of collecting the health resort
fee, the application of forcible constabulary
collection is also allowed.

§ 5.

I hereby order My Minister of Internal Affairs to
carry out the present Act.

In Budapest, 07 June 1892

Franz Joseph I, m.p.

Taaffe, m.p.

(Minister-President, translator's note)



3. Zakonik in Ukaznik za avstrijsko-ilirsko primorje ki obstoji iz poknežene grofije Goriške in Gradiške, mejne grofije Isterske in državno-neposrednjega mesta Trsta z njegovim obmestjem, Leto 1892., XXI. izdatek, Izdan in razposlan dne 7. oktobra 1892., 28., Oznanilo c. kr. namestništvo za avstrijsko-ilirsko Primorje z dne 26. septembra 1892., šte. 16.467, glede lečbinskog reda za lečbinski okraj Mali Lošinj in Veli Lošinj, Trst



Act and Decree
concerning
the Austrian-Illyrian Littoral
including the Princely Counties Gorizia and
Gradisca, the Margravate of Istria and the City of
Trieste with their respective areas

1892 AD

EXTRACT No. XXI

Made public and distributed on 07 October of 1892

28
Promulgation of the Imperial and Royal Regency of the Austrian-Illyrian Littoral of 26 September 1892 No. 16.467, referring to the Health Resort Ordinance for the health resort area of Mali Lošinj and Veli Lošinj

Within the meaning of carrying out § 1 of the Act and Decree of 07 June 1892 (Act and Decree Concerning the Austrian-Illyrian Littoral XII, Official Gazette number 12), setting down basic rules for the health resort activity and making public the Health Resort Ordinance for the health resort area of Mali and Veli Lošinj, the following Health Resort Ordinance hereby enters into force and is made public.

Trieste, on 26 September 1892

Rinaldini, m.p.
(Regent of Trieste and National Governor,
translator's note)

Health Resort Ordinance
for the health resort area of Mali Lošinj and Veli Lošinj

§ 1.
The health resort area of Lošinj consists of the cadastral municipalities of Mali Lošinj and Veli Lošinj with the exception of their respective islands.

§ 2.
The Health Resort Commission administrates all health resort activities. Its seat is located in Mali Lošinj.

§ 3.
Lječilišnu komisiju čini trinaest članova. To su:
a) the current Municipal Mayor of the Municipality of Mali Lošinj,
b) the current Municipal Mayor of the Municipality of Veli Lošinj,
c) the imperial and royal district physician in



Lošinj,

d) the current municipal physician in Mali Lošinj,

e) the current municipal physician in Veli Lošinj,

These five members of the Health Resort Commission enter the Commission according to the criterion of their position.

f) four members that are representatives of the Municipal Board in Mali Lošinj and two members that are representatives of the Municipal Board in Veli Lošinj, elected by those having the right to vote in the above-named municipalities,

g) two representatives elected by the health resort guests paying health resort fees.

§ 4.

The Imperial and Royal District Authority in Lošinj issues a timely invitation to all participants for the purpose of electing the members of the Health Resort Commission and sets an appropriate deadline therefor. Upon expiry of the deadline, the above mentioned authority convenes all announced members and forms the Commission.

§ 5.

Members of the Health Resort Commission perform their duties free of charge as honourable tasks. They perform their duties for three years alongside their professional duties.

New members shall be elected to the positions of the members that have resigned.

§ 6.

If during their term any of the Commission members submits their resignation, by-elections shall be called according to the above-stated principles for the rest of the term's duration within one month from the day of the resignation at the latest.

These principles also apply to general elections after expiry of the members' terms.

§ 7.

The Health Resort Commission performs the following duties in particular:

- a) administrating the health resort's reserve,
- b) appointing necessary clerks and servers,
- c) overseeing all existing health resort institutes and objects of the health resort's

infrastructure,

d) creating and maintaining new facades, promenades, paths, objects, buildings, gardens etc. that promote the health resort's development,

e) fostering care for ensuring appropriate accommodations of health resort guests,

f) removing, if possible, anything that damages the good reputation of the health resort,

g) publishing all information, orders and measures, which affect the guests of the health

resort, and their wellbeing, publishing of health resort lists, procuring a book of complaints,

h) electing the Health Resort Committee,

i) drafting of the resort's own Administrative Ordinance within the framework of the Health Resort Ordinance,

j) participating in determining the amount of the fares and ship transportation fees pending approval of the Imperial and Royal District Authority in Lošinj.

§ 8.

The Imperial and Royal District Authority in Lošinj oversees the activities of the Health Resort Commission and the health resort activity. The Imperial and Royal Head of District is entitled to be present at all sessions of the Health Resort Commission or dispatch his deputy to these sessions. Neither the Head of District nor his deputy has right of vote or the right to be elected to the Commission.

The District Authority in Lošinj decides in matters concerning parties' complaints related to proscribed health resort or music fees and can object to the Health Resort Commission's measures if they were to contradict existing laws or regulations.

§ 9.

For the maintenance of the institutes and plantations that concern the Health Resort and serve only the pleasure of the health resort guests, which is neither the obligation of the respective municipalities nor their proprietors or



other persons, a health resort fund for both Mali Lošinj and Veli Lošinj shall be set up.

§ 10.

Each of the two health resort funds are run separately and administrated by the Health Resort Commission.

The health resort fund is the recipient of the health resort fees. Fees of guests that have stayed in the fiscal municipality of Mali Lošinj shall go towards the Mali Lošinj health resort fund, whereas the fees paid to the fiscal municipality of Veli Lošinj shall go towards their health resort fund. The funds are also beneficiaries of other fees meant for this purpose.

Both health resort funds have the right to independently acquire assets. Gifts that are not expressly meant for one of the funds belong to both health resort funds in equal shares.

The health resort fees are made up of health resort fees in the narrower sense, as well as contracted music fees.

§ 11.

Plantations and objects of the health resort infrastructure acquired through means of the health resort funds, as well as acquired rights, are ownership of the funds.

§ 12.

Common expenses of the health resort area which especially include administrative costs of the Health Resort Commission are settled from both health resort funds in the last administrative year within the framework of their gross incomes arising from health resort fees in the narrower sense.

The criterion for the distribution of common costs in the first year is determined based on the number of guests in the period from 1891 to 1892.

§ 13.

The Health Resort Commission must call at least one quarterly session. It is called by the Health Resort Commissioner. He also calls the session in the case when this is requested by at least five commission members or the Political District Authority.

§ 14.

A circular letter familiarizing the members of the

Imperial and Royal District Authority with the place, day and time of the session, as well as the points of order of the session shall be sent out at least two days before the session. In case of emergency, it is allowed to shorten the time set forth for calling the session.

§ 15.

The assembly has quorum if, after it has been called, there are at least five members of the Health Resort Commission with right of vote present, apart from the Health Resort Commissioner or his deputy.

Measures are voted by the majority of votes of the members present. The president casts his vote last. If the votes are split, the president's vote is the deciding vote. Votes are cast orally and in case other arrangements are made, votes can also be cast by way of secret ballots.

The right of vote can only be used in person.

As far as sessions are concerned, minutes are taken for each one, and are then read at the beginning of the next session and signed by the Commissioner and two members of the Health Resort Commission after verification.

§ 16.

Members of the Health Resort Commission elect amongst themselves a Health Resort Committee made up of the Health Resort Commissioner, Deputy Health Resort Commissioner, and Treasurer.

§ 17.

The Health Resort Commissioner, or if he is unable to perform his duties, his deputy, is the executive authority of the Health Resort Commission. Individual members of the Health Resort Commission, as well as the authorities appointed by the Health Resort Commission execute assignments given to them by the Commission under the leadership and responsibility of the Health Resort Commissioner.

The Deputy Health Resort Commissioner performs the duties of the Health Commissioner only in his absence and if the Health Commissioner explicitly orders him to do so. In the case of absence of the Deputy Health Resort Commissioner, the Health Resort Commissioner names one of the



members of the Health Resort Commission as his replacement.

§ 18.

The Health Resort Commissioner represents the Health Resort Committee and the Health Resort Commission to the outside.

Documents that conclude legal transactions of the Health Resort are signed by the Health Resort Commissioner and two members of the Health Resort Commission. For all other letters of the Health Resort Committee, i.e. Health Resort Commission, the signature of the Health Resort Commissioner is sufficient.

§ 19.

The health resort commissioner takes detailed inventory of all movable and immovable property of the health resort funds and submits reports to the Health Resort Commission at the end of each administrative period.

§ 20.

The administrative year starts on 01 January and ends on 31 December of every year. The health resort period starts on 01 October and ends on 31 May of every year.

§ 21.

A separate budget of incomes and expenses is drafted for the current administrative year for each health resort fund. The health resort commissioner proposes this budget to the Health Resort Commission in December of every year, which then discusses and decides on it.

§ 22.

The Health Resort Commissioner chooses two auditors every year that review the accounts of both health resort funds from the past year.

§ 23.

Before the end of February of each year, the Health Resort Board renders accounts regarding the Health Resort's incomes and expenses for the past administrative year to the Health Resort Commission. The Commission inspects and approves them and attaches the auditors' report to them.

§ 24.

The budget and annual account must be presented to the members of the Health Resort Commission

and the health resort guests 14 days before the session which approves them. The budget and annual account are delivered to the administrative office of the Health Resort Commission in Mali Lošinj and their transcripts to the representatives of the Health Resort Commission in Veli Lošinj (§ 31).

§ 25.

The Health Resort Commission manages the health resort's funds according to a specified budget.

§ 26.

The amounts specified in the budgets are allocated and used by the Health Resort Commissioner, who may exceed the budgets only with the permission of the Health Resort Commission.

He and the treasurer manage the accounts of the health resort funds, and the Health Resort Commission can at all times check the treasury and inspect the ledger of incomes and expenses.

§ 27.

If a health resort area's status is revoked, the immovable property of the health resort funds belongs to the cadastral municipality on whose territory the property is located.

What will happen to the movable property is determined, in the above case, by the last Health Resort Commission with the consent of the District Authority.

§ 28.

The Regency has the right to demand inspection of the accounts and business ledgers at all times, and from the Health Resort Commissioner the clarifications and justifiability of any measures taken. If necessary, the Regency can send a commissary to investigate.

The Regency has the right to disband the Health Resort Commission. It evaluates the complaints of clients or municipalities against the orders of the Health Resort Commission, as well as possible complaints of a smaller part of the Health Resort Commissions against the measures accepted by the majority.

In all cases, the Regency evaluates after the session of the National Government.



§ 29.

The health resort and possible music fee are collected from the health resort guests according to the following provisions:

- 1) All visitors of the health resort area that stay there for over 48 hours are considered health resort guests, apart from the inhabitants of both municipalities that have permanent residence in the health resort area, and their relatives.
- 2) Except for the aforementioned persons, the following are also exempt from paying the health resort and music fee: svi koji borave u lječilišnom području radi službenih i profesionalnih poslova,
 - a) everyone that stays in the health resort area for the purpose of conducting official and professional business,
 - b) domestic and foreign promoted physicians and nurses, their wives, underage sons and single daughters living in their household,
 - c) members of the imperial and royal army, imperial and royal navy, Austrian and Hungarian national defence, imperial and royal officials in the Imperial Council, all active and retired national officials that are members of the same pay grade as the above-mentioned dignified positions; persons listed under c) are obligated to pay a possible music fee,
 - d) all persons that receive daily or weekly compensation for their work, servants, apprentices, waiting staff and assistants or other persons in the service of municipal officials or persons listed in this article of the Ordinance,
 - e) the Health Resort Commission can lower the health resort fee for poorer health resort guests or free them from it if they so ask and justify their status in a credible way,
 - f) the poor,
 - g) children under the age of five,
 - h) family members of the native population of the health resort area that

are permanently settled elsewhere, but are staying in the health resort area with their immediate family (parents, brothers and sisters, cousins, § 40 and 42 of the General State Act).

The Health Resort Commission can in all cases request from each individual guest to prove the reason exempting him from paying the fee.

§ 30.

The health resort fee can only be charged in the health resort period, i.e. between 01 October and 31 May of each year.

The amount of the health resort fee, if a person is continuously staying at the health resort for a period of up to 16 weeks, is 50 pennies a week. After paying 16 weekly rates for a continued stay at the health resort, no further fees are charged in the same health resort period.

The Health Resort Commission may charge a music fee during the health resort period if regular music events are held. The amount of the music fee is 25 pennies a week per person. After paying 16 weekly rates for a continued stay at the health resort, the person is no longer obligated to pay a music fee in that health resort period.

The obligation of paying a health resort and music fee starts on the first week after the expiry of the free period set forth in § 29. Every new week of staying in the health resort is taken as the whole week.

Children between the ages of five and eleven pay half the health resort and music fee. The waiting staff pays quarter of the health resort fee, however, they are exempt from paying the music fee. Domestic teachers, governesses, secretaries, companions etc. are equated with gentlemen for the purpose of paying a health resort and music fee.

§ 31.

Health resort and music fees are collected by the Health Resort Commission in Mali Lošinj and an appointed representative in Veli Lošinj.

The representative must deliver the paid amounts, together with all documentation, to the Commission within eight days.



§ 32.

The health resort fee and possible music fee is charged by lessors of apartments or renters of rooms on the basis of determining the weekly contribution made by the office of the Health Resort Commission when the guest checked in, and they shall hand it in when the health resort guest checks out. In Mali Lošinj, the lessors pay the fee immediately to the treasury of the Health Resort Commission, and in Veli Lošinj to its representative by way of a quittance. The lessors of apartments and renters of rooms guarantee personally for the collection of the health resort and music fee for all health resort guests in their board.

§ 33.

Every lessor or room renter must give his guests the prescribed check in form, provided to him by the office of the the Health Resort Commission free of charge, upon their arrival and take care that all of its points are filled out. The check in forms that the guests fill out themselves must be handed on the next day by noon, in Mali Lošinj to the office of the Health Resort Commission and in Veli Lošinj to its representative (§ 31).

Also, every lessor or room renter must check out every guest that stayed with them within 24 hours. In this case, they sign the check out form, fill out all its points and hand it in to the office of the Health Resort Commission, i.e. its representative in Veli Lošinj.

If the health resort guests change their place of residence in the district of the health resort area, they must also be checked out and in again.

The representative in Veli Lošinj must send the check in and check out forms that were handed in to him to the Health Resort Commission immediately and without delay.

The lessor is responsible for the check out form until it has been handed in and the health resort fee and possible music fee paid.

§ 34.

If a guest is visited by family or an individual, the office of the Health Resort Commission determines the weekly amount and delivers the document regarding the contracted fee to the lessor or renter. This document also serves as

proof that the person came to visit.

§ 35.

If lessors and renters do not comply with these regulations, they must pay the health resort fee against the health resort's treasury out of their own pockets in the amount in which it had been withheld. Moreover, they can be fined by the Imperial and Royal Political District Authority with regular penalties of 2 to 20 *florins*. This amount goes towards the poor fund of the offender's place of residence.

§ 36.

Guests that were checked in are issued an identification card that gives them and their family the right to use the health resort's equipment and attend possible regular music events.

§ 37.

The above listed regulations, whose aim is a record of health resort guests and control over the health resort and music fees do not exempt lessors and inn keepers from checking in their foreign guests to the administrative authorities.

§ 38.

Amendments to this Health Resort Ordinance can be ordered by the Health Resort Commission only if there are at least nine members present, i.e. a two-thirds majority. The amendments are confirmed by the Imperial and Royal Regent after the session of the National Government.

§ 39.

Apart from the Health Resort Commission's duty to propose the health resort's physician's annual report, it must submit a general annual report concerning the health resort's affairs and activities of the Health Resort Commission, as well as a report regarding administration of the health resort's fund to the Imperial and Royal Regency.

§ 40.

The office of the Health Resort Commission is obligated to sell the Health Resort Ordinance to the guests at their request and at the price of the costs of its making.

§ 41.

This Health Resort Ordinance enters into force on the day the Act and Decree make it public.



4. Climate and bioclimate of Lošinj from 1981-2010, a study Hydrological and Meteorological Services of Croatia, Zagreb

Introduction

The weather and the climate, together with geographic position, topography, landscape, flora and fauna are natural resources of a tourist and recreational areas. In today's world, tourism has become "a competitive product" and it is important to present to potential guests as much information as possible about the area where they would like to spend their holidays. Although it is believed that the climate is the reason why tourists visit our area, the brochures mostly concentrate on accommodation, some landscape characteristics, cultural and culinary features but very little, or hardly anything is said about the climate. It is actually the climate, on the other hand, that could have a very important role in choosing the best time for holidays, which would result in extending the tourist season – something that is often highlighted as the goal of our tourism strategy. Thorough information about the climate should be an integral part of advertising material.

This study will analyse meteorological parameters of the most recent period from 1981-2010 collected by the Meteorological station in Mali Lošinj ($\phi=44^{\circ} 31'$, $\lambda=14^{\circ} 28'$, $h=53\text{m}$) which are significant for tourism industry.

The study includes an analysis of meteorological parameters based on mean monthly and decimal values with a special emphasis on thermal sensation which is defined as a meteorological value. In the final chapter of the study we will present a prospectus for climate and bioclimate which can easily help guests to visualise climatic characteristic of Mali Lošinj for better planning of their holidays. Some values will be compared to those identical for Zagreb.

Climate in general

The climate is characterised by global circulation of the atmosphere, geographical position, distance from the sea, altitude, local features, vegetation, and other factors. Croatia, as well as the island of Lošinj, are located in the circulation in temperate latitudes. Taking into account the position of Lošinj, the most important modifier of its climate is the sea which decreases the temperature differences during the day and the year, which are lower than on the mainland and even along the coast. In summer, under the influence of the Azores High that prevents penetration of cold air to the Adriatic, this area has characteristics of subtropical climate. Local winds occur in daily-periodic local circulation systems which develop during clear, stabile weather. In that way the coastal circulation, combined with the wind from the sea during the day and from the mainland at night, develops because the land heats up more rapidly than the sea during the day, and cools off more quickly at night. Night wind in coastal circulation is usually mild and stops early in the morning. The position of orographic obstacles makes the flow even more complex. Constant air flow, as a part of general circulation of the atmosphere, increases offshore wind whose direction coincides with its direction. This is common in summer with ethesia and afternoon wind from the sea whose resultant is maestral. Dominant winds in the coastal area which occur as a result of characteristic synoptic-scale weather systems and orographic complexity of the coast are bora, which descends vertically from the slopes of the coastal mountains towards the sea, and jugo – a south-eastern wind that blows parallel to the coast.

According to Köppen's classification of climate, which is one of the most widely used classification systems that acknowledges important features of mean annual air temperature and precipitation, Lošinj is characterised by x"Cfsax" climate. This is a warm rainy climate with average temperature



of the coldest month above -3°C and lower than 18°C (mark C). Extremely arid period is not common (mark fs), and the lowest precipitation is during warm periods, while during the year there are two precipitation maximums (mark "x"). The summers are hot with average temperature of the warmest month above 22°C , and more than four months a year they have a mean monthly air temperature above 10°C (a). Major climatic and bioclimatic characteristics of Mali Lošinj will be presented separately.

Sea and air temperature

Air temperature is the main indicator of thermal state of the atmosphere and one of the most important elements of the climate. It is extremely modified in Mali Lošinj under the influence of the sea. The sea heats up and cools off more slowly than the land, hence its effect on air temperature. At night and during winter the sea has a warming effect due to its accumulated heat and in this way prevents further cooling off which is common on the land. In summer and during the day the sea is colder from the land and has a cooling effect. The result are warmer winters and cooler summers than on the land at the same latitudes, as well as warmer autumn than spring. Both daily and annual air temperature amplitudes are lower, too.

The mean annual air temperature in Mali Lošinj

from 1981-2010 was 15.6°C (table 1), (11.2°C in Zagreb). The warmest month was July with mean temperature 24.8°C . The coldest was February with 7.7°C . However, January is colder than February rather often, and August is warmer than July. Mean minimal (early-morning) and maximal (afternoon) air temperature show mean daily temperature range (ampl in table 1). It is highest in summer months with 8.1°C in July, between average morning temperature of 21.1°C and afternoon 29.2°C . During cold period of the year daily temperature ranges are smaller, and the lowest are in December when the difference of 4.2°C is seen between mean minimal (7.3°C) and mean maximal air temperature (11.5°C). In continental areas where there is no cooling effect of the sea, daily temperature ranges are higher, as shown in Zagreb with 6.1°C in December to 11.8°C in July.

The highest air temperature in Mali Lošinj in the period that was analysed was recorded in August 1998 with 37.4°C . The lowest temperature of -4.4°C was recorded in December 1996, so the temperature amplitude (the difference between the highest and the lowest recorded air temperature) was 41.8°C . The cooling effect of the sea is even better noted in differences between absolute air temperature extremes of 38.5°C in August 2000 in Zagreb and 22.6°C in January 1985, with an amplitude of amazing 61.1°C .

Table 1.

Mean monthly air temperatures (mid), mean maximal (max) and minimal (min) air temperatures and amplitudes (ampl.), and absolute maximal (MAX) and minimal (MIN) air temperatures. Period: 1981-2010. Sea temperature for periods between 1963-1997 and 1998-2006.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
mid ($^{\circ}\text{C}$)	7.8	7.7	10.0	13.3	18.0	21.9	24.8	24.6	20.5	16.8	12.4	9.2	15.6
max ($^{\circ}\text{C}$)	10.3	10.6	13.5	17.0	22.1	26.0	29.2	29.1	24.5	20.1	14.9	11.5	19.1
min ($^{\circ}\text{C}$)	5.8	5.5	7.5	10.4	14.7	18.3	21.1	21.1	17.6	14.5	10.4	7.3	12.8
ampl ($^{\circ}\text{C}$)	4.5	5.2	5.9	6.7	7.4	7.8	8.1	7.9	6.8	5.6	4.6	4.2	6.2
MAX ($^{\circ}\text{C}$)	17.4	20.4	23.3	25.9	34.5	35.6	36.3	37.4	32.4	26.9	23.1	18.9	37.4
MIN ($^{\circ}\text{C}$)	-3.7	-4.4	-3.3	2.9	8.2	9.7	14.5	10.0	10.0	5.0	1.1	-4.4	-4.4
t _{sea} ($^{\circ}\text{C}$)	12.6	11.8	12.1	14.0	17.6	21.4	23.5	24.0	22.3	20.0	17.2	14.4	17.6

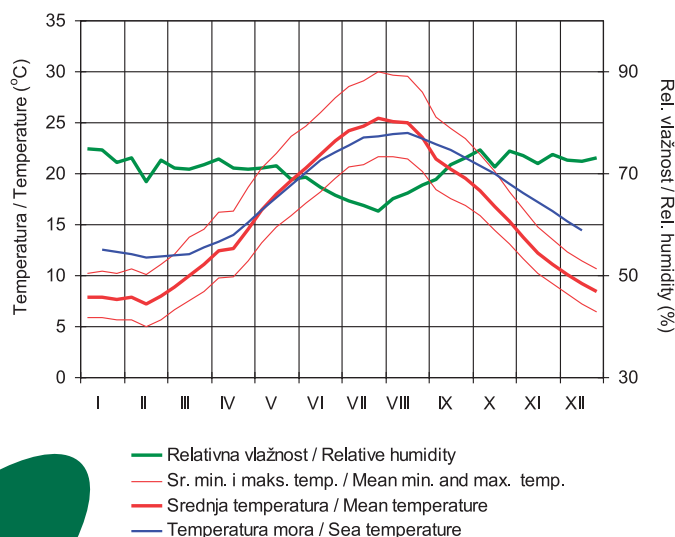


A detailed insight in temperature characteristics can be obtained through an analysis of 10-day periods, which is shown in climate-bioclimate presentation (Figure 1). The coldest 10-day period (decade) with mean temperature of 7.2°C is during February, when early-morning hours are also the coldest (mean minimal air temperature is 5.0°C). The temperature is the highest in the last decade of July with mean temperature 25.4°C, with 30.0°C in the afternoon.

Beneficial effect of the sea temperature on the climate of Mali Lošinj can be seen especially if we compare sea temperature with air temperature. From mid-October until the end of April the slow loss of the heat accumulated during summer keeps the sea temperature higher than air temperature. However, in February the sea loses the most warmth and its mean temperature is 11.8°C. It is exactly due to the warmth of the sea that the air temperature is lower for only 4.1°C. During this period, and especially due to sunny days without the wind, the pleasant winter air is suitable for walks by the sea. From May to September the sea is refreshing because its temperature is lower than air temperature. From early June until mid-October the sea is suitable for swimming since its temperature is above 20°C. The best period for swimming in the sea is from July to September when its average temperature is between 22°C and 24°C, making it a perfect refreshment from summer heat.

Figure 1.

Mean air and sea temperatures and relative humidity over decades.



A complete image of temperatures over decades, which is also important and provides information for guests, can be seen through the number of days with different temperatures, that is, days when minimal or maximal air temperature exceeds a certain level.

Table 2.

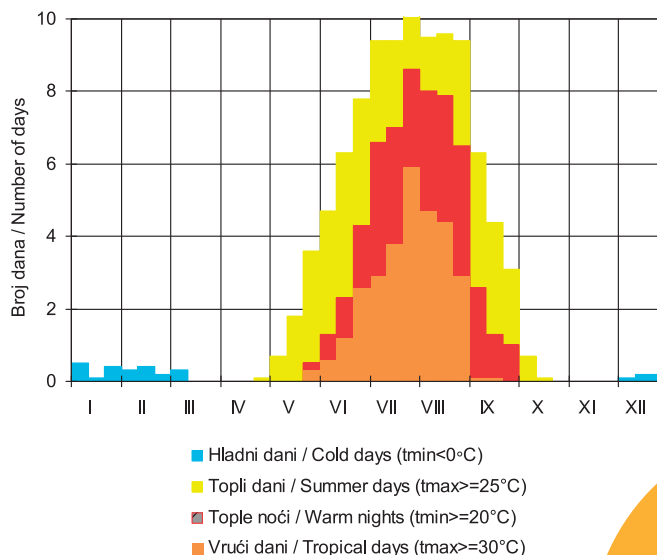
Mean number of days with different temperatures.

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
Cold days ($t_{\min} < 0^{\circ}\text{C}$)												
1.0	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.7
Warm days ($t_{\max} \geq 25^{\circ}\text{C}$)												
0.0	0.0	0.0	0.1	6.1	18.8	29.4	28.5	13.8	0.8	0.0	0.0	97.5
Hot days ($t_{\max} \geq 30^{\circ}\text{C}$)												
0.0	0.0	0.0	0.0	0.3	4.4	12.6	12.0	0.2	0.0	0.0	0.0	29.5
Days with warm nights ($t_{\min} \geq 20^{\circ}\text{C}$)												
0.0	0.0	0.0	0.0	0.5	7.9	22.2	22.4	4.9	0.0	0.0	0.0	57.9

An advantageous climate characteristic is that Mali Lošinj has a very small number of *cold days* when the lowest daily air temperature drops below 0°C, and on average it happens 2 to 3 times a year (Table 2). This can occur from December until March, and if we look at it over decades (Figure 2), they are most probable in early January, although they are rare at that time too and on average occur every two years.

Figure 2.

Mean number of days with different temperatures over decades.





Warm days with highest daily air temperature over or equal to 25°C occur as early as the last decade in April until mid-October. There are about 98 warm days a year, while in July and August in the period we analysed almost all days were warm. During hot days the highest daily air temperature reaches or exceeds 30°C. There are about 30 such days a year in Mali Lošinj. They occur from the end of May until the end of August, but mostly in July and August (on average 12 or 13 per month), especially in the last decade of July when there are about 6 such days in a decade. In June there are about 4 hot days, while in May and September they are very rare and can be expected on average once in three or five years. From the last decade of May until the end of September hot nights occur when the lowest daily air temperature does not drop below 20°C. In the warmest months of summer, in July and August they occur the most (22), while in the last decade of July there are about 8 or 9. These data show that the main tourist season is abundant in days with high heat loads. On the other hand, May and September, even October too, with regards to temperature, are far more favourable for holiday-making of elderly or people with health problems because summer heat can have a negative effect on them. The advantages of the climate on Lošinj during off-season should be promoted bearing in mind that during this period and due to sea temperatures, swimming is still pleasant.

Precipitation

Precipitation regime is characterised by the amount and frequency of precipitation. The number of days with precipitation is in a way more important in tourism than its amount because it shows how often rain can prevent or complicate the stay or activities in the open. The amount of precipitation is important for the development and maintenance of green areas and forests, which is also an important element of tourist offer.

Precipitation regime on Lošinj has characteristics

of oceanic climate with larger quantities of rainfall in colder, as opposed to warmer parts of the year, whereas the characteristic of continental precipitation regime is a greater amount of precipitation in warmer part of the year. On annual basis there are about 928 mm of precipitation in Mali Lošinj. 59% of precipitation falls from October to March, and 41% from April to September. In Zagreb the annual amount of precipitation is somewhat smaller, but in the cold part of the year 42% of total amount occurs, and 58% in the warm part of the year. The greatest amount of precipitation falls in October (about 117 mm per month), but the highest number of days with precipitation is on average in November (9.6). The driest month is July with about 29 mm of precipitation and only 3-4 days with precipitation (Table 3).

Table 3.

Mean monthly and annual amount of precipitation (R), and mean number of days with precipitation amount ≥ 1.0 mm.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
R (mm)	80.9	69.0	65.8	66.3	61.7	64.6	28.6	57.1	98.3	116.6	114.4	104.6	927.9
R ≥ 1 mm	7.6	6.5	6.7	7.6	6.7	5.8	3.5	4.8	7.1	7.8	9.6	8.9	82.6

Figure 3.

Amount of precipitation and number of days with precipitation amount ≥ 1.0 mm.

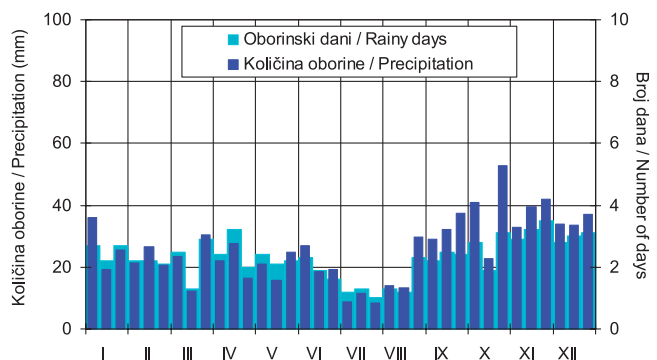


Figure 3, which is very important for tourism industry, presents an illustration of annual



difference in the amount of precipitation and number of days with precipitation in decades with at least 1 mm of precipitation. The rainiest season is from the end of October until the end of the year, where the last decade of October shows the highest amount of precipitation with 53 mm. However, even in this period there are on average no more than 4 days with precipitation per decade. There is very little precipitation in the last decade of July, which with 8.5 mm has 6 times less precipitation than the rainiest last decade of October. In summer precipitation is rare, therefore, from mid-June until mid-August there are on average less than two days with precipitation per decade, while in July and during the first two decades of August there is on average one day with precipitation. The rainfall will not significantly interfere with activities in the open in May, June and September when there are 2 or 3 days with precipitation in a decade. As far as Zagreb is concerned, there are 2-3 days with precipitation per decade in summer months.

Humidity

Relative humidity is the ratio of the partial pressure of water vapour in the air and maximal pressure of water vapour at a given temperature, that is, the pressure that would exist if the air was saturated with humidity and it is expressed in percentage. Further on, this is the number that shows to what extent the air, at a given temperature, is saturated with humidity.

Because of the vicinity of the sea the relative humidity in Mali Lošinj with its mean annual value of 71% is relatively high (Table 4), which is a consequence of constant flow and air mixing. During the year the relative humidity does not change much and mean values are between 64% in July and 74% in January. Looking at decades, it ranges from 64% in mid-July to 75% in early January (Figure 1).

Table 4.

Mean relative humidity (U in %).

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
U	74	71	71	72	71	68	64	66	71	73	73	73	71

Sunshine duration and cloudiness

With 2631 hours of insolation per year, Lošinj belongs to the sunniest areas of Croatia. Like the mid-Dalmatian islands, it has about 650 hours of insolation per year more than Zagreb. Expressed in mean values that is on average 7.2 hours of sunshine a day on annual basis (5.4 hours in Zagreb), but naturally, this changes significantly during the year because it depends on the length of the day and cloudiness as well.

Table 5.

Total and mean sunshine duration in hours (SS).

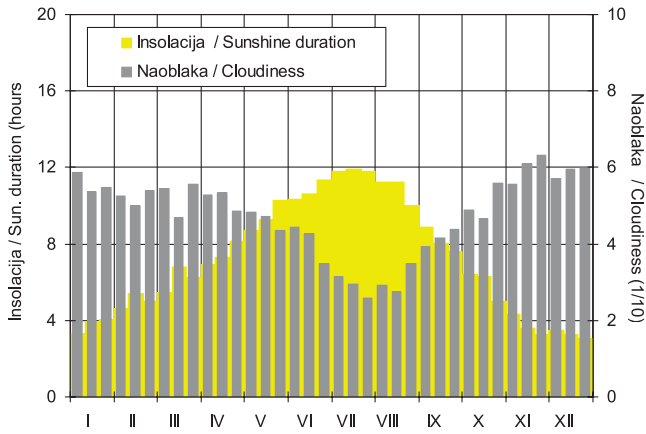
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
SS (sum)	116	142	191	224	293	323	368	334	246	182	112	101	2631
SS (mean)	3.7	5.0	6.2	7.5	9.4	10.8	11.8	10.8	8.2	5.9	3.7	3.3	7.2

The smallest amount of sunshine duration occurs in December with average 101 hours of sunshine. However, despite this being a month with the shortest day and least sunshine, there are about 3.3 hours of sunshine a day (1.5 hours in Zagreb) (Figure 4). From mid-March to mid-October there are six or more hours of sunshine per day, which, adequately presented, could result in an extended tourist season. The most sunshine occurs in July with 368 hours of sunshine (251 hours in Zagreb). From the last decade of May until the end of August there are more than 10 hours of sunshine a day, and from mid-June until mid-August 11 to 12 hours a day, while the sunniest is the second decade of July with average sunshine duration of 11.9 hours (9.4 hours in Zagreb).



Figure 4.

Mean sunshine duration and cloudiness.



The amount of cloudiness is calculated visually and estimated according to the degree of overcast with clouds, regardless of their type. It is expressed in tenths where 0 designates clear sky, while 10 marks complete coverage with clouds. Mean annual cloudiness is 4.7 tenths meaning that on average 47% of the sky is covered with clouds. Annual mean cloudiness is opposite to annual mean sunshine duration. Its maximal value is in November but during that period there is also just over one half of the sky covered with clouds (cloudiness 6.0). From the end of October until mid-April more than half of the sky is covered with clouds, while during the rest of the year the cloudiness is lower. This climate characteristic where the coverage with clouds is less than half for the most part of the year is extremely favourable for tourism industry. The cloudiness is the lowest in July and August (about 3 tenths), while in the last decade of July 2 or 3 tenths of the sky are covered with clouds.

Table 6.

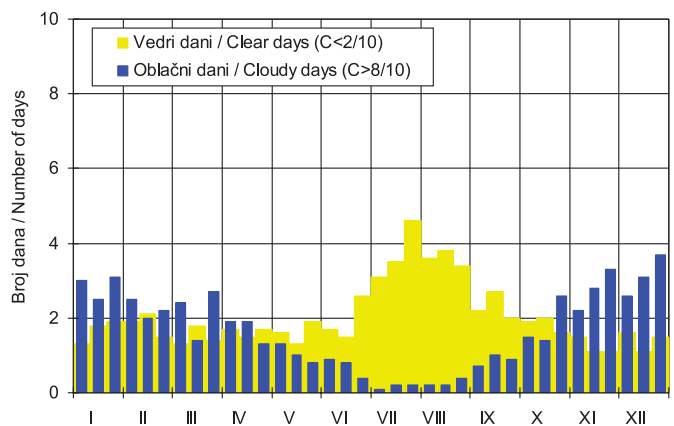
Mean cloudiness (N in tenths) and mean number of clear (v) and cloudy (o) days.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	year
N	5.6	5.2	5.2	5.2	4.6	4.1	2.9	3.1	4.2	5.0	6.0	5.9	4.7
v	5.0	5.5	4.5	4.9	4.8	5.8	11.2	10.8	6.9	5.5	3.7	4.2	72.8
o	8.6	6.7	6.5	5.1	3.1	2.1	0.5	0.8	2.6	5.5	8.3	9.4	59.2

Similar to precipitation, the information about number of clear and cloudy days is perhaps more interesting to guests as an esthetic component of the climate. A clear day is defined as a day where the mean cloudiness is lower than 2 tenths, while a cloudy day is the one where mean daily cloudiness is higher than 8 tenths.

Figure 5.

Mean number of clear and cloudy days.



The number of clear and cloudy days is in accordance with cloudiness and their annual difference is proportionally opposite. Annual numbers of clear and cloudy days show an exceptional characteristic of the climate on Lošinj – there are about 25% (75) more clear days than cloudy (59). As opposed to that, there are more cloudy than clear days on the continent, so Zagreb marks on average 107 cloudy days and only about 40 clear days. The highest number of cloudy days in Mali Lošinj occurs in December (9.4 per month), especially in its last decade with 3-4 cloudy days. Their number descends in spring and they are very rare in summer so during the sunniest part of the summer (July and August), a cloudy day occurs once or twice in 10 years. The number of cloudy days exceeds the number of clear days from the end of November and in the first decade of December with about one clear day in a decade. From the last decade of June until the end of August the number of clear



days is the highest, especially in the last decade of July (on average 4.6). June and September are also abundant in clear days which is another advantage for off-season.

Wind

Wind regime is a very important climate characteristic for many tourist activities in the coastal area and it is also very important for thermal sensation, which we will present in the following chapter.

The wind is a horizontal flow of air that arises due to different reasons. It is, above all, characterised by general atmospheric circulation, that is, the position of cyclones (low air pressure) and anticyclones (high air pressure) because the flow always moves from the area of high air pressure towards area of low air pressure. Mountain ranges and other obstacles to air flow can significantly affect and modify the direction and the strength of the wind. The difference between heating of the land and the sea greatly defines local winds in particular. This is mostly obvious in summer during clear weather. The consequences are night and morning wind from the land (land breeze) above which the air has cooled off much more at night so the air pressure is higher than above the warmer wind. During the day the situation is reverse so during clear weather around noon a wind blowing from the sea towards the land appears (sea breeze). It has an important role since during summer heat it lowers the thermal sensation by taking the excess heat from the body exactly during that time of the day when temperatures are the highest. Constant flow during stable weather, which occurs frequently in Mali Lošinj during summer, sets favourable conditions for sailing.

The wind is defined by the direction from which it is blowing or its strength. At the weather station in Mali Lošinj, the direction is set with wind rose, and its strength is determined through wind's

effect on objects in the nature by means of internationally accepted Beaufort 12-degree wind force scale. The wind has special characteristics during the day and the year so it usually gains special attention in sailing and health tourism. In that respect, this study will show a very detailed insight into the direction and strength of the wind in seasons and for the whole year, especially at 7 am, 2 pm, and 9 pm, when the station conducts measuring. The frequency of every direction and the class of strength for each term in a season is expressed in percentage.

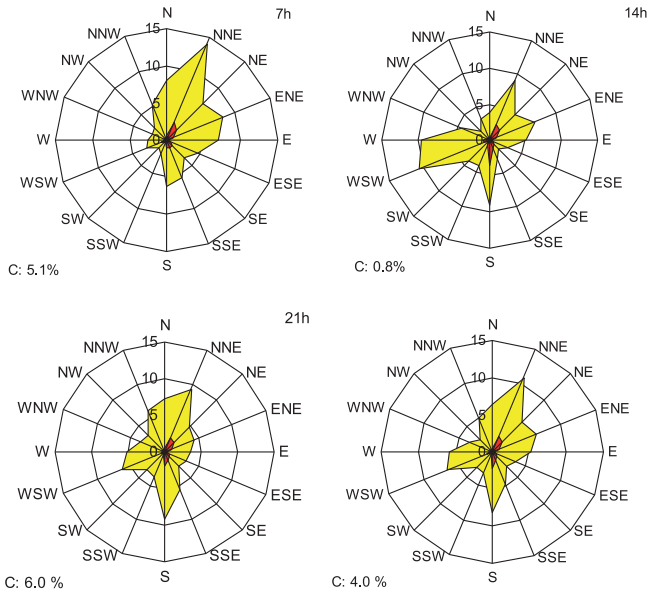
Wind regime is shown by means of wind rose where the direction according to frequency is shown in 16 directions, while their strength is split into four classes (all expressed in %):

- calm (C bottom left)
- light air, 1-3 Beauforts (yellow)
- light breeze, 4-5 Beauforts (red)
- strong breeze, 6-7 Beauforts (blue).



Figure 6.

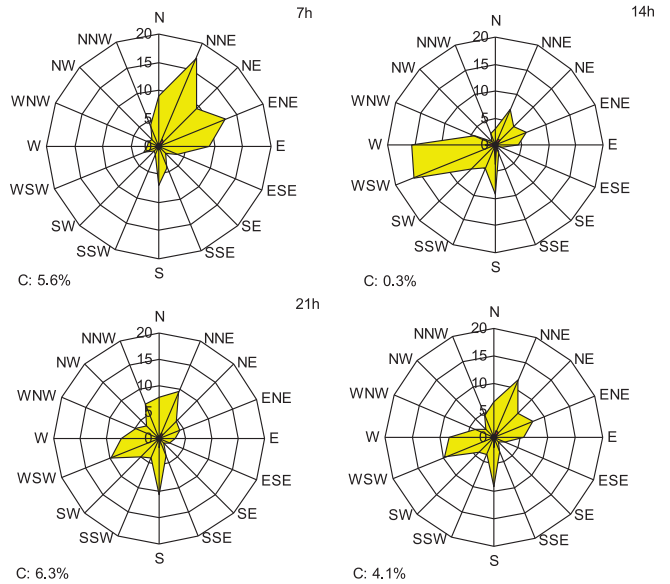
Wind roses for a year (frequency and strength), 7 am, 2 pm, 9 pm and all terms.



WIND	
light air (1-3B)	
light breeze (4-5B)	
strong breeze (6-7B)	

Figure 8.

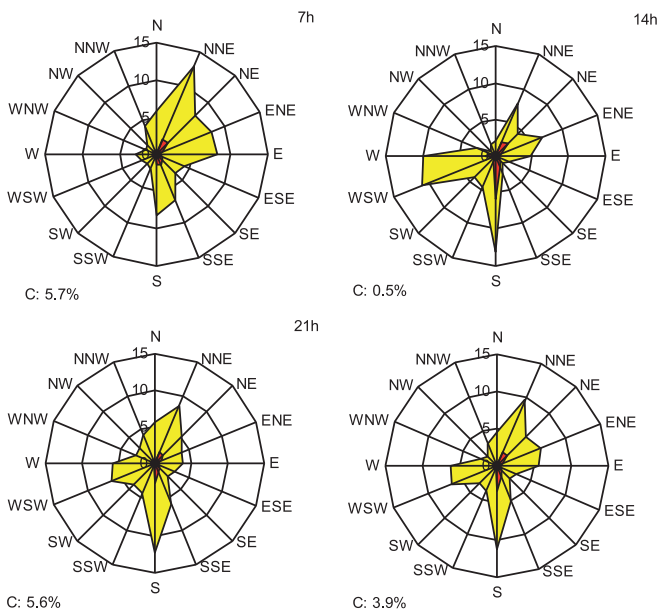
Wind roses for summer (frequency and strength), 7 am, 2 pm, 9 pm and all terms.



WIND	
light air (1-3B)	
light breeze (4-5B)	
strong breeze (6-7B)	

Figure 7.

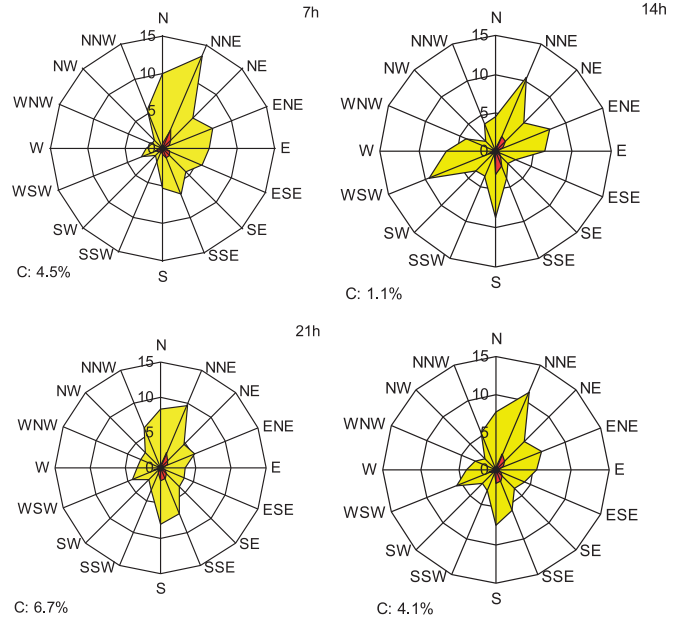
Wind roses for spring (frequency and strength), 7 am, 2 pm, 9 pm and all terms.



WIND	
light air (1-3B)	
light breeze (4-5B)	
strong breeze (6-7B)	

Figure 9.

Wind roses for autumn (frequency and strength), 7 am, 2 pm, 9 pm and all terms.

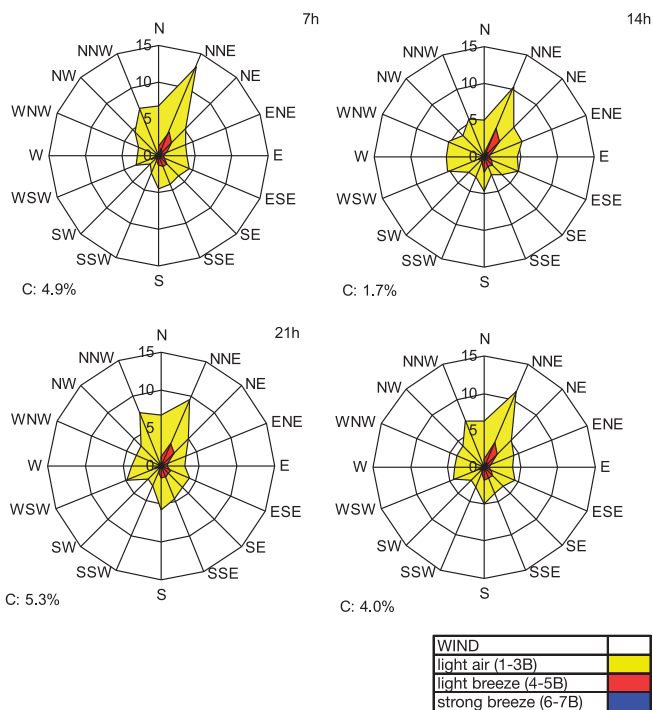


WIND	
light air (1-3B)	
light breeze (4-5B)	
strong breeze (6-7B)	



Figure 10.

Wind roses for winter (frequency and strength), 7 am, 2 pm, 9 pm and all terms.



If we look at the year as a whole and all terms (Figure 6), the most common winds blow from south-eastern quadrant (*bura*), followed by southern wind (*jugo* which cannot blow from south-east due to shelter), while all other winds blow equally frequent. Light air is the most common, light breezes are rare and solely southern and north-eastern (*jugo* and *bura* respectively), while strong winds are very rare (which is why they are not shown in the figure) and they blow usually from the south-eastern quadrant (*bura*). The figure is somewhat different through terms. In the morning and in the evening winds from north-eastern and southern quadrant prevail, while during afternoon the most common winds blow from the western quadrant which is in great part summer *maestral*. Calm periods occur in about 4% of cases, mostly in the evening (6%) and very rarely in the afternoon (0.8%).

Spring and autumn flow regimes are very alike

and do not differ greatly from the annual. In the morning and in the evening southern and north-eastern winds prevail, in the afternoon southern and western winds while the north-eastern wind is more frequent in the afternoon in autumn than in spring. Light air is the most common. Light breezes usually blow from the south and north-east, while strong breezes are extremely rare and blow from *bura* direction (north-east) and rarely from the south. Calm periods usually account 4%, mostly in the evening and in the morning, and least in the afternoon.

Wind regime in summer is not much different from the mean annual. Again we see that north-eastern and southern winds are quite frequent in the morning and in the evening, south-eastern and western winds blow in the afternoon, while *maestral* is the most frequent and in Lošinj it blows from WSW to W direction. While the frequency of wind is between 80% and 84% during the year and other seasons, in summer we see light air more often, about 88%, while light breezes (5% to 11%) are half frequent than in other seasons and strong breezes practically do not occur (0.1%). Calm periods are few, especially in the afternoon when they are very rare (0.3%).

In winter, the wind from the north-eastern quadrant prevails, while other winds arise rarely. Light air is also frequent during winter, and the frequency of light breezes (about 18%) and strong breezes (about 2%), almost always from the direction of *bura*, is higher than during other seasons.

Bioclimatic characteristics

Thermal sensation that people feel is affected by the degree of heat load, which depends on a number of meteorological and non-meteorological factors. In general people feel pleasant if the production and loss of heat are equal. If the production of energy is higher than its loss, people feel too hot, and if we lose more heat than the body can produce, we feel cold. Human organism is able to adapt to a wide range of external influences, but



if this is not enough, we protect ourselves with clothes which we, depending on the situation, either add or remove. Further on, we increase activity in the cold and engage less in activities during warm weather. This is followed by the diet, which is heavier in winter and lighter in summer. Therefore, the diet is different in different climate zones. The famous Dalmatian light diet, prepared mostly with small amounts of fat, is suitable for a warmer climate, while in colder parts, such as in the mountains, the diet is heavier with more fat. People can affect and modify these parameters according to their needs. However, meteorological parameters cannot be changed but we can adapt to them. From experience we know that thermal sensation is, besides temperature, affected by air flow, humidity and radiation. Solar radiation and surrounding objects greatly affect the thermal sensation, and it changes significantly whether a person is exposed to direct solar radiation or hidden in the shade. Air flow increases heat transfer from the body so in low temperatures the feeling of cold is higher, while it decreases in high temperatures. The influence of humidity is greater in the warmer part of the scale than in low temperatures. Perspiration to the surface of the body consumes energy and reduces the sensation of heat. If there is more water vapour in the air, the evaporation of the sweat is difficult, which contributes to the sensation of heat and swelter in high temperatures.

For a proper assessment of the thermal effect of the environment, it is necessary to take into account all parameters that affect thermal sensation, or thermal comfort. Quantitatively the thermal sensation can be set by combined biometeorological values, and the best are those that are based on the equation of thermal equilibrium between man and environment. Here we will use Physiological Equivalent Temperature (PET) expressed in °C (Höppe, 1999, Matzarakis et al., 1999) which is defined as equivalent to temperature indoors at which man feels equally comfortable as in real conditions. According to

Physiological Equivalent Temperature, thermal comfort is set according to Table 7 (Matzarakis et al., 1999).

Table 7.

Classification of thermal comfort according to Physiological Equivalent Temperature (PET in °C).

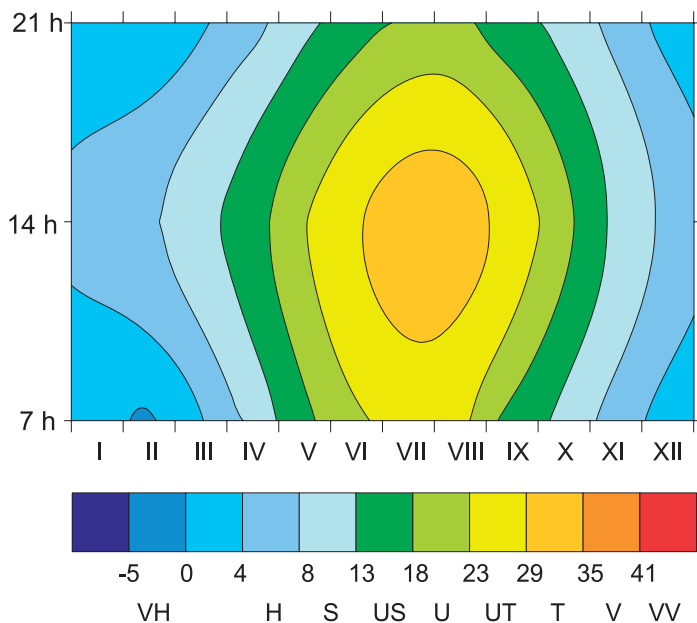
PET (°C)	Thermal comfort
-5-0	very cold (VH)
0-4	
4-8	cold (H)
8-13	fresh (S)
13-18	pleasantly fresh (US)
18-23	pleasant (U)
23-29	pleasantly warm (UT)
29-35	warm (T)
35-41	hot (V)
>41	Very hot (VV)

Annual difference of Physiological Equivalent Temperature in measuring terms at 7 am, 2 pm and 9 pm (Figure 11) shows that from mid-November until mid-March it is cold in the afternoon, while the mornings and evenings are very cold. Early spring and late autumn are fresh with cold mornings and evenings. In May, from mid-September and in October it is pleasantly fresh, while June and the first half of September are pleasant. Summer mornings and evenings are mostly pleasant, afternoons are pleasantly warm, while in the warmest part of the summer from early July until mid-August the mornings are pleasantly warm, afternoons are warm, and evenings are pleasant.



Figure 11.

Annual difference of thermal comfort at 7 am, 2 pm and 9 pm over decades.



A detailed insight into biometeorological conditions shows a probability in occurrence of different thermal sensations in the time of measuring over decades during the year (Figure 12). In winter mornings and evenings, in 60-80% of cases we see cold sensation, but it is very rare (in 10% of cases at most) that the PET values drop below -5°C . In the afternoon the very cold sensation is present in 20-40% of cases, however, the PET is rarely lower than 0°C . On the other hand, the cold sensation in winter afternoons is present in 20-30% of cases. Such conditions are suitable for engaging in physical activities or walking during holidays, so even the coldest period of the year could be promoted to guests seeking an active holiday, or even to sportsmen preparing for their competitions.

In the beginning of spring the cold sensation decreases, in the morning and evening it is often fresh, while in the afternoons it is pleasantly fresh and pleasant, which become prevailing sensations in April. Mornings and evenings are still relatively

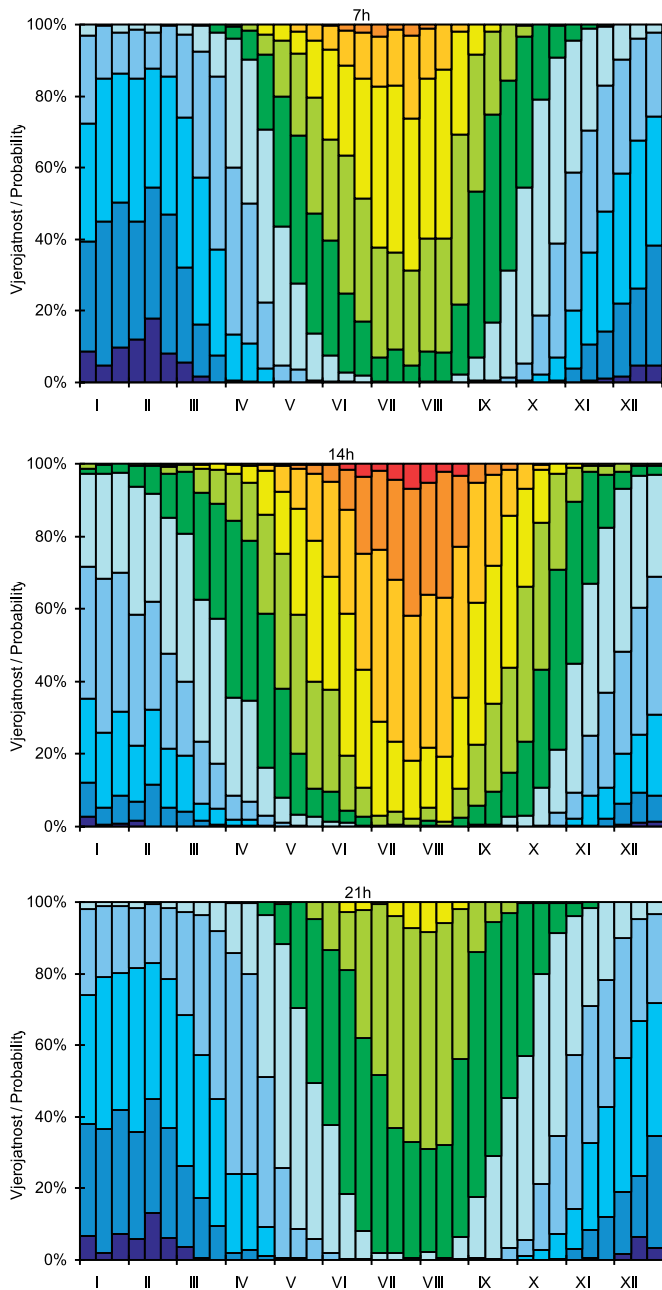
cold until the end of March, and after that they are mainly fresh. From early May when the Sun rises early, the thermal sensations in the morning and evening are similar, while the evenings after the sunset are colder. In May and June the sensation in the morning is mostly pleasant, from pleasantly fresh to pleasantly warm and the evenings are also becoming pleasant more often. This is, according to the thermal sensation, the most pleasant part of the year and can by all means be recommended to guests who enjoy outdoor activities but for whom swimming is not a must.

From the beginning of June, the afternoons are more often warmer, but it is rarely hot so this time of the year is suitable for holidays of elderly and chronic patients who do not bear summer heat well. Warm sensation is more common in July and August, while during the warmest part of the summer, from mid-July until mid-August, the afternoons are hot in 30% of cases but a favourable climate characteristic is that very hot afternoons are quite rare even then and occur in less than 10% of cases. During entire summer, the evenings are pleasant making them suitable for spending time in the open until late. In September the mornings and evenings are mostly pleasant, while the afternoons are usually pleasantly warm and warm. Bearing in mind that the sea temperature is still good enough for swimming, this part of the year too, like June, can be recommended to people who, for different reasons, do not bear the summer heat well. In October the days are mostly pleasant with mornings and evenings turning fresh. However, the cold sensation is still rare even in the morning and evening so just like May, the month of October can be suitable for people wishing to spend their holidays outdoors. In November it is predominantly fresh, while mornings and evenings turn to cold more often.



Figure 12.

Probability of occurrence of different thermal sensations at 7 am, 2 pm and 9 pm over decades.



Klima i bioklima ♦ MALI LOŠINJ (1981-2010) ♦ Climate and bioclimate

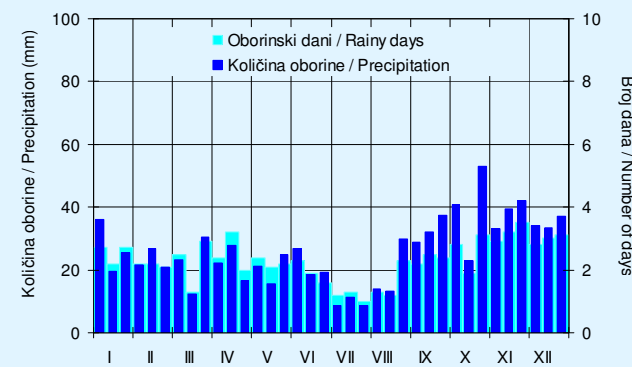
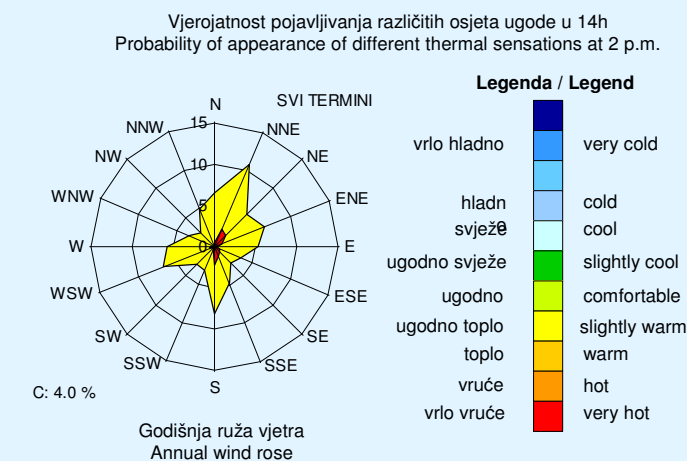
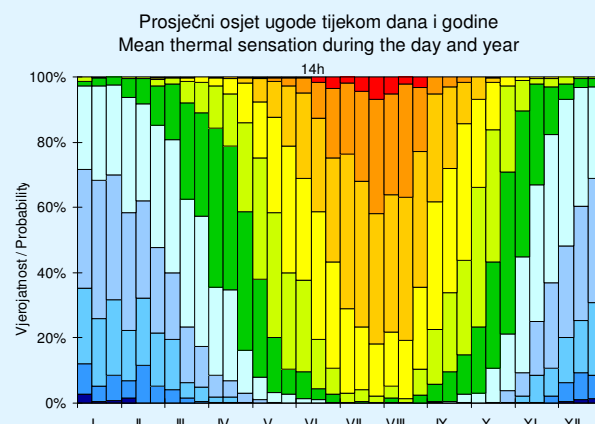
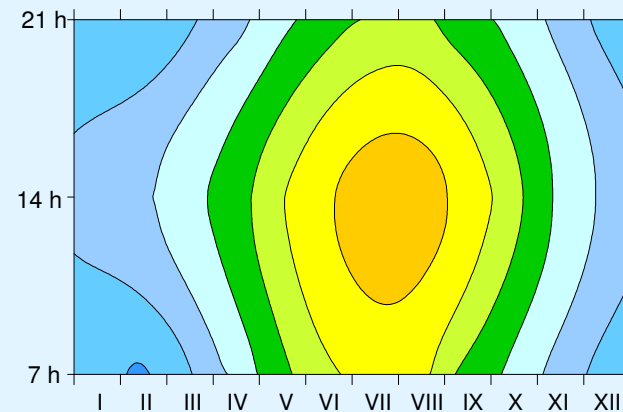
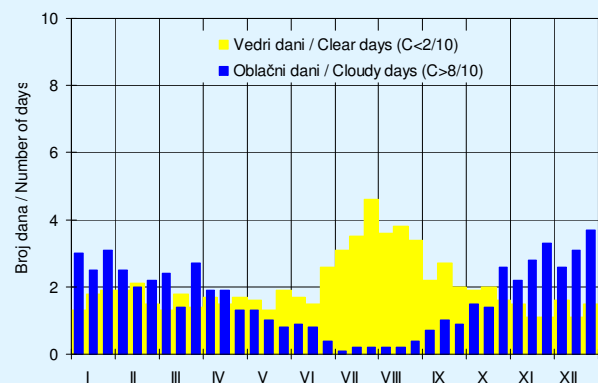
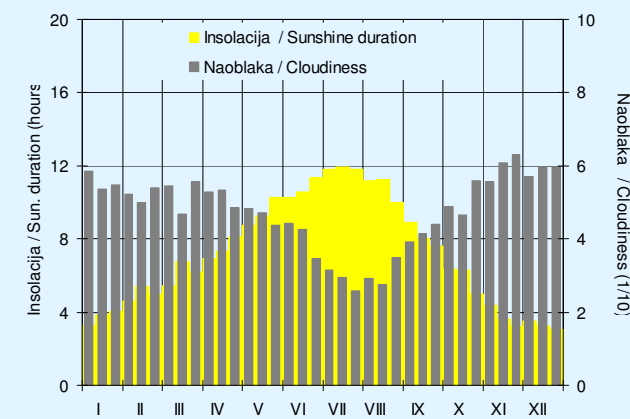
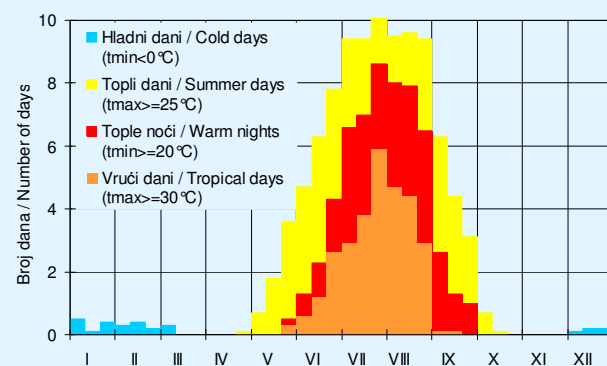
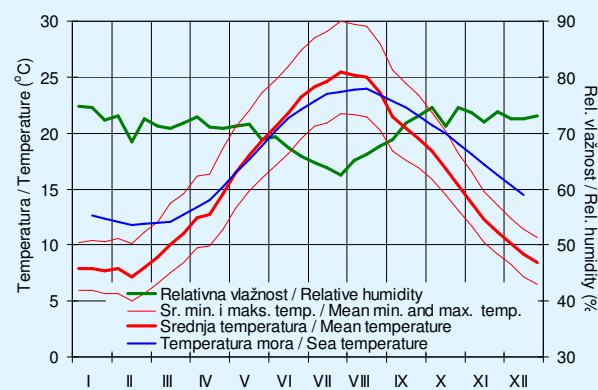
Prema Köppenovoj klasifikaciji klime Mali Lošinj ima umjereno toplu kišnu klimu s najtoplijim mjesecom srpnjem koji ima srednju temperaturu 24,5°C i najhladnijom veljačom sa 7,7°C. Srednje dnevne temperature više od 20°C mogu se očekivati od početka lipnja do kraja rujna. Temperatura mora su od sredine lipnja i do kraja rujna više od 20°C, pa je u tom razdoblju more ugodno za kupanje. Hladni dani, u kojima temperatura padne ispod 0°C vrlo u rijetki. Nasuprot tome, topli dani, s najvišom dnevnom temperaturom višom od 25°C, javljaju se od svibnja do listopada, a u srpnju i kolovozu gotovo su svi dani topli. Nerijetko ljeti najviša dnevna temperatura prijeđe i prag od 30°C (vrući dani), a u srpnju i kolovozu često niti noćna temperatura ne padne ispod 20°C (dani s toplim noćima). Srednja godišnja naoblaka manja je od 5 desetina. Naoblake je više zimi, kada je nešto više od polovice neba zastrto oblacima. U proljeće se količina naoblake smanjuje a ljeti postiže najniže vrijednosti - u srpnju i kolovozu svega je 3 desetine neba zastrto oblacima. S ukupno više od 2600 sati sa sisanjem Sunca godišnje ili prosječno oko 7 sati dnevno, Mali Lošinj spada među najsunčanija područja u Hrvatskoj. Od studenog do veljače u prosjeku ima 4-5 sunčanih sati dnevno, a u najsunčanije godišnje doba, ljeti, sunce u prosjeku sije duže od 10 sati dnevno. Vedri dana, u kojima je srednja dnevna naoblaka manja od 2 desetine, češći su od oblačnih dana, kada je više od 8 desetina neba prekriveno oblacima. Najviše vedrih dana ima ljeti, a u srpnju i kolovozu takvih je više od trećine dana u mjesecu. Najviše oblačnih dana ima od studenog do ožujka, ali ni u tim mjesecima u prosjeku nema više od 10 oblačnih dana u mjesecu.

Godišnje u Malom Lošinj padne oko 930 mm oborine. Najviše oborine padne zimi, što je obilježje maritimnog oborinskog režima. Od listopada do ožujka padne oko 59% ukupne godišnje količine oborine, a u tom razdoblju mjesečno ima oko 7 do 10 oborinskih dana. U toplom dijelu godine oborine je manje, rjeđi su i oborinski dani, i ljeti u prosjeku ima samo 3 do 5 oborinskih dana na mjesec.

U godišnjoj ruži vjetra prevladavaju slabi vjetrovi. Najčešći su vjetrovi iz sjeveroistočnog kvadranta, a sljedeći po učestalosti su vjetrovi iz južnog smjera. Ovakav vjetrovni režim karakterističan je za čitavu obalu, ukazujući na pojave bure i juga. Ljeti, sredinom dana, karakteristično je strujanje iz zapadnog kvadranta, poznati maestral, koji je međutim u ukupnoj godišnjoj ruži vjetra slabije izražen.

Interval osjeta ugone, na koji utječu temperatura, vlaga i vjetar i Sunčevo zračenje, u Malom Lošinj se, prema prosječnom osjetu, kreće od vrlo hladnog do ugodno toplog. Od sredine studenoga do sredine ožujka u prosjeku je hladno u popodnevni satima, dok su jutro i večeri vrlo hladni. Rano proljeće i kasna jesen su svježiji. U svibnju, te od polovice rujna i u listopadu je ugodno svježe, a lipanj i prva polovica rujna su ugodni. Ljetna jutro i večeri su pretežno ugodni, popodneva ugodno topla, a u najtoplijem dijelu ljeta od početka srpnja do sredine kolovoza jutro su ugodno topla, popodneva topla, a večeri ugodne.

Razdioba osjeta ugone u popodnevni satima ukazuje da je već u ožujku prevladavajući osjet svježega, a u travnju i svibnju ugodno svježe ili ugodno, pa je to doba vrlo pogodno za aktivni odmor uz šetnje i sport. Zbog prevladavajućeg osjeta ugodnog i toplog, ljeti je boravak na otvorenom moguć tijekom čitavoga dana, a osjet vrućine koji se javlja isključivo u popodnevni satima u srpnju i kolovozu, ublažit će osvježavajuće kupanje u moru.



According to Köppen's classification of climate, Mali Lošinj has a moderately warm rainy climate, with the warmest month of July with the mean temperature 24.5°C and the coldest month of February with the mean temperature 7.7°C. The daily mean temperature above 20°C can be expected from early June to late September. The swimming is convenient from early June to early October when the sea temperatures are above 20°C. Cold days with sub-zero temperatures are very rare. On the contrary, warm days with the highest daily temperature above 25 °C appear between May and October, and in July and August nearly all days are warm. During July and August the highest daily temperature often exceed 30°C (hot days), while the night temperature does not drop below 20°C (tropical nights). The mean annual cloudiness is about five tenths. There is more cloudiness in the winter when over half the sky is overcast. In the spring the amount of cloudiness decreases, and in the summer it reaches the lowest values - in July and August only three tenths of the sky are overcast. With over 2600 hours of insolation a year, or an average of about 7 hours per day, Mali Lošinj belongs to the sunniest areas of Croatia. From November to February it has an average of 4-5 hours of sunshine a day, and in the sunniest season, in the summer, the sun shines on the average over 10 hours a day. Clear days when the mean daily cloudiness is under two tenths, are more frequent than cloudy days, when over eight tenths of the sky are overcast. During July and August more than a third days in the month are clear. Most cloudy days occur between November and March, but even then there are not more than 10 cloudy days a month on average.

The mean annual precipitation in Mali Lošinj is about 930 millimetres. Most precipitation occurs in winter, which is a characteristic of the maritime precipitation regime. About 59% of the total precipitation occur between October and March, and in that period there are about 7 to 10 rainy days per month. The warm season has less precipitation and fewer rainy days, while in the summer there are only 3 to 5 rainy days per month.

In the annual wind rose mild winds prevail. The most frequent winds come from the northeast quadrant, followed by winds from the south. This winds regime is characteristic of the whole coastal area, indicating the appearances of the bora and the jugo (scirocco). In the summer, about midday, a characteristic flow comes from the west quadrant, the well-known maestral, which is insignificant in the total annual wind rose.

The average thermal sensation, influenced by the temperature, humidity wind and solar radiation, ranges from very cold to slightly warm. On average from mid-November to mid-March it is cold in the afternoon, while mornings and evenings are very cold. Early spring and late autumn are cool. In May and from mid-September and in October it is slightly cool, while June and the beginning of September are comfortable. Summer mornings and evenings are comfortable, afternoons slightly warm and in the warmest part of summer from the beginning of July to mid August mornings are slightly warm, afternoons warm and evenings comfortable.

The distribution of thermal sensation at 2 p.m. shows that the in March prevail cool afternoons, while in April and May it is slightly cool or comfortable, so this time is very convenient for the active holidays with walks and sport. Due to prevailing sensation of comfortable and warm during summer, it is possible to stay in the open all day, and in the warmest part of the day a refreshing sea bath will mitigate the feeling of warmth.

1925 – by the decision of Italian government, sick people banned from coming to island; Lošinj was exclusively a “resort for healthy guests”

1946-1967 – in the building of formerly Children’s Reconvalence Centre, the new Children’s hospital was founded and led by Dr. Ana Jakša

1947-1967 – Red Cross opened the Climate Sanatorium for Children that became Children’s hospital for lung diseases in 1962 (closed in 1967)

1947-1967 – Climate Sanatorium for Adults opened in Veli Lošinj in former Dr. Simonitsch Sanatorium (from 1955 in Archduke Charles Stephen’s villa in Podjavori), and in 1962 it became Veli Lošinj Hospital (closed 1967)

1964 – Čikat Camp founded in the Zapalj Bay (Srebrna {Silver} Bay)

1967 – Hotel *Punta* in Veli Lošinj and Hotel *Bellevue* at Čikat in Mali Lošinj opened

1967-1992 – Children’s hospital for treatment of allergic lung diseases active in Veli Lošinj with adult’s ward and led by Dr. Branko Vukelić (from 1968 visited by children from Eastern Germany)

1977 – *Sunčana uvala* (Sunny Bay) hotel complex opened with hotels *Aurora* and *Vespera*

1993-2003 – former Children’s hospital in Veli Lošinj became Sanatorium for lung and skin diseases

2000-2012 – Lošinj School of Natural Healing Factors took place every September in Veli Lošinj

2011-2012 – scientific research on the impact of the Lošinj climate and natural aerosol on lung functions of the guests of Čikat Camp





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