

THE INTERRELATION OF WOOD REQUIREMENTS OF THE AUSTRIAN NAVY AND THE SHAPING OF THE CULTURAL LANDSCAPE IN THE NORTHERN ADRIATIC REGION

MEĐUSOBNA POVEZANOST POTREBA ZA DRVOM AUSTRIJSKE RATNE MORNARICE I OBLIKOVANJA KULTURNOG KRAJOLIKA NA PODRUČJU SJEVERNOG JADRANA

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Summary

The Austrian Navy dates back to the 16th century and expanded in the first decades of the 19th century. Before the beginning of World War II it had its peak and ranged on the 6th place in the world. The end of the Austro-Hungarian Monarchy also concerned the destiny of the navy as it was dissolved in 1918. Only some warships remained controlling parts of the river Danube, finishing their service in 2006. The most important harbours were Trieste (today Italy), Pula (today Croatia), Rijeka (today Croatia) and Venice (today Italy). The paper deals with the procurement of timber for the supply of the Austrian navy in the first half of the 19th century. It investigates the effects of the increasing demand on the shaping of the cultural landscape of the Northern Adriatic region. In particular forest management taking into account socio-economic and socio-ecologic aspects and working plans for the re-cultivation of the Karst region are discussed. Although the importance of timber for shipbuilding has vanished today, the shape of the wooded landscape in the hinterland of Trieste, Rijeka and Senj, and Istria is a vivid witness of the historical interdependencies of sea and land.

Keywords: deforestation, timber, forest degradation, afforesting, shipyard

Ključne riječi: deforestacija, drvo, degradacija šuma, pošumljavanje, brodogradilište

1. INTRODUCTION

Since 1382, Austria had access to the Mediterranean when the municipality of the city of Trieste put itself under protection of the Habsburg Duke Leopold III to defend itself against the mighty cities of Venice and Aquileia. The Croatian-Dalmatian coast was part of Hungary, when after the death of the Hungarian King Louis in the Battle of Mohacs against the Turks 1526 Hungary and Bohemia – and thus the coastal areas fell to Austria due to previous agreements. For the first time warships were equipped in Trieste. They wore the flag of the Holy Roman Empire of the German Nation.

The Austrian Navy has its origin in the fleet on the river Danube established in the 16th century. After two failed attempts the fleet in the Mediterranean Sea was finally established in 1786 by Emperor Josef II. Till 1867 it was called *Österreichische Kriegsmarine* (Austrian Navy), from 1867 to 1918 (after the treaty between the Austrian Empire and the Kingdom of Hungary) *K. and K. Kriegsmarine* (K. and K. Navy).

Thus, the adequate supply of wood was of great importance and became increasingly difficult, due to the demand of the competing various branches of economy. In contrast to England and France, whose

navies could cover their demands from their oversea colonies, Austria had to rely on the resources of its domestic forests. Because of the lack of foreign currency the import of timber could not be taken into account. This was the reason why Austrian foresters were forced to manage the forests dedicated to the supply of the navy in a sustainable way. The study aims to look at the status of the timber supply of the Austrian Navy after 1814 when it started to expand in the Mediterranean. It wants to examine the regions where the demanded timber came from and how changing political frame condition influenced the market. Thus, the paper also intends to illustrate the historical interdependencies of sea and land and the development of the wooded landscape in the coastal region after the replacement of wood by iron in shipbuilding technologies. Thus, the reforestation of the wasteland in the context of time and space will be addressed.

2. STUDY AREA AND MATERIAL

2.1. Study area

The hinterland of the coastal area of the North Adriatic Sea being suitable to cover the demands of the navy consisted of three extended regions which differed very much with regard to history as well as management systems and ownership rights. On the one hand it was the region called Veneto being the Terra Firma of the Venetian Republic, on the other hand it was Istria, the so-called Austrian coastal territory, today situated in Croatia and Italy. The third region was the Croatian coastal area, particularly the hinterland of Rijeka (Fiume) and Senj (Zengg).

The Venetian Republic with its capital Venice held the most powerful navy in the NW of the Adriatic Sea from the 8th century till 1797, when, after the peace of Campo Formio, it became part of the Austrian Empire. However, in 1805 after the defeat of the Austrian Empire in the war against Napoleon Venice was taken over by Napoleon's troops. In 1815 after the Viennese Congress the Austrian Empire once more took control and finally it became part of Italy after the 3rd Independence War in 1866. The forest cover of this area varied due to orography, topography and microclimate conditions and included coniferous forests of spruce, fir, larch, Alpine stone pine and of subalpine shrubland (Swiss mountain pine, rhododendron, alder, various types of pioneer willows) as well as broadleaved forests of different types of oak and beech, elm and maple.

The Austrian coastal territory »*Österreichisches Küstenland*« (*Littorale, Littorale Austriaco*) which belonged to the Austrian Empire till 1918 consisted of three different territories and had become part of the Habsburg Empire at different times. They were part of the Illyrian Kingdom which had been established after the end of Napoleon's occupation which lasted till 1848. It consisted of the Counties Gorizia and Gradisca (1500 – 1918 under the Habsburg Regime), the County of Istria (400 years under Venetian Regime, from 1797 to 1918 part of the Austrian Empire) and the City of Trieste (1382 – 1918 under the Habsburg Regime). These three territories had their own administration but were under the supervision of the administration of the City of Trieste. Trieste was the capital of the Crownland »*Österreichisches Küstenland*« and of high economic importance for the Austrian Empire. In 1918 the territory passed to Italy, after World War II (without Gorizia and Trieste) to Yugoslavia. Today it is part of Croatia. In Istria the forest cover varied due to the different conditions of geology, soil, and climate. There were mixed forests of fir, spruce, and beech in the interior, the Sub-Mediterranean vegetation consisting of broadleaved forests (*Quercus pubescens*, *Quercus ilex*), the woodland of the Coastal zones and the islands with pine woods and green macchia (holm oak, strawberry trees). The main important naval ports were Trieste (today Italy) and Pula (today Croatia).

The Croatian coastal region was the third area that was used for wood supply already at the time of the Venetian rule. It was the borderland between the Ottoman and Habsburg empires, that existed since the 16th century as the so-called Croatian Military Borderland (»*Vojna Krajina*«). The Military Border was gradually expanded within 200 years and in 1848 it became a separate crown land. Joined with the territory of the Slavonian Military Border it became the Kingdom of Croatia and Slavonia in

1872. Generally, the year 1522 is assumed as the beginning of the Military Border, when the Croatian nobility requested Habsburg Ferdinand I to support Croatia in its defensive efforts against the Turks. While »Civil-Croatia« (*Zivilkroatien*) remained under the Hungarian government, Vienna retained the direct administration of »Military Croatia« (*Hrvatska vojna krajina*) itself. The Habsburgs granted the conscript farmers unusual freedoms: land ownership, own jurisdiction, freedom from levies and taxes, as well as the undisturbed practice of their orthodox religion. In return, the resident frontier farmers had to perform a lifelong military service and to be constantly ready to swap the plough with the sword. The peasants' property consisted of their individually owned land (garden, vineyard, field, meadow) and the common rights of use on pasture land and forest. Owner was the Zadruga, a life and property community of members of the clan, often also including the past and future generations. In the course of the 18th century, land ownership formal legal became a military fief. But in fact, not much changed as long as the farmers remained on their land. From 1850, the military fief was formally converted into ownership. When the first settlers arrived, the throughout mountainous area was still forested. The main tree species in the interior were high forests of beech, fir, spruce, partly pure, partly mixed deciduous and coniferous stands. In addition, there were other tree species such as sycamore, rowan, buckthorn, ash, yew, field elm, hornbeam, pine, pendulate and sessile oak. In the area sloping down to the sea there were pubescent oak, European hop-hornbeam and South European flowering ash.¹

2.2. Sources

The study relies first of all on primary sources. On the one hand they consist of a collection of papers and documents being the output of the correspondence of Joseph Ressel, a marine-forester, who was responsible for the timber supply of the shipyard in Venice (purchase and transport) in the first half of the 19th century (1837 – 1857) with the administration in Vienna. It is also based on a study written by Josef Ressel himself in 1855, tackling the history of the forests dedicated by law to the supply of the Navy.² The drafts of these documents are stored in the Technical museum in Vienna; the original documents were destroyed within the past 150 years.³ These documents illustrate the demand and supply of the Austrian navy in times when ships were constructed out of wood.

On the other hand, the shaping of the landscape (deforestation and afforesting of the coastal region) is documented by several studies published by foresters working in these regions in the second half of the 19th century⁴ and reports and travel books as the outcome of excursions and workshops⁵. They were published in the journal »Österreichische Vierteljahresschrift« (1865 – 1882 *Monatsschrift*) für Forstwesen⁶, published and edited by the Austrian Forest Association (Österreichischer Reichsförstverein) from 1851 onwards (110 volumes) and stored in the archive of the Austrian Forest Association in Vienna. The report of Joseph Wessely (1876)⁷, who was asked by the government to make an assessment of the Military Borderland including proposals for the improvement of the socioeconomic and ecological conditions of the environment, is included. Concerning the development of the Croatian Military Border information

¹ Wessely Joseph 1876. *Das Karstgebiet Militär-Kroatiens und seine Rettung, dann die Karstfrage überhaupt*. Albrecht & Fiedler: Agram, pp 118-124.

² Ressel Joseph 1855. *Geschichte der k.k. Marinewälder, deren Leistungen und Verwaltung für verschiedene Perioden von früher und jetzt und welche zu erwarten sind*. Technical Museum Vienna (TM). Manuscript HSS Nr. 355/20

³ Technical Museum Vienna: *Handschriften aus dem Ressel-Nachlaß: T.M. Hss Nr. 355, p 6; Hss Nr. 10. 10.355/24, p 72; Hss Nr. 10.355/11, p 11.*

⁴ Guttenberg Hermann Ritter v. 1901. *Geschichtliche Darstellung der Tätigkeit der Staatsverwaltung auf dem Gebiete der Karstaufforstung in Krain, dem Küstenland und Dalmatien*. In: *Geschichte der österr. Land- und Forstwirtschaft und ihrer Industrien 1848-1898*, 5 Bde., Supplementband. Wien, pp 163-164.

⁵ Österreichischer Reichsförstverein 1880. *Denkschrift des Österreichischen Reichsförstvereines über die in der österr.-ungar. Karstfrage vom Staat zu thuenen Schritte*. Österr. Monatschrift für Forstwesen, Jg. 1880, Bd. 30, pp 175-177.

⁶ Österreichischer Reichsförstverein (editor) 1851 – 1960. *Österreichische Vierteljahresschrift (von 1865-1882 Österreichische Monatschrift) für Forstwesen*. 110 volumes.

⁷ Wessely, J., 1876. *Das Karstgebiet*, 366 pp.

has been gathered from the studies of Karl Kaser.⁸ I have also looked personally at the results of the afforesting activities in the hinterland of Trieste and have gathered additional information by an oral interview with the head of the forest administration district of Postojna (80.000 ha), carried out in 2000. Additional information has been provided by the publication of Baron Mollinary⁹ and the report about an exhibition in Vienna in 1867.¹⁰

3. THE DEVELOPMENT OF THE AUSTRIAN NAVY

From the 16th century onwards there were only some warships on the Danube-river when Emperor Josef II established the Austrian Navy in the second half of the 18th century. However, because of financial problems it consisted of only a very few warships. This situation changed spectacularly when in 1797 after the Peace of Campo Formio the Venetian Republic and Dalmatia passed to the Austrian Empire including the Venetian fleet. This was the start of the Austrian Navy in the Mediterranean. Venice remained to be the main naval base for the Austrian Navy during the first half of the 19th century. It was the place of the most important dockyards where new ships were built and old ships were repaired. After 1866 the port and dockyards of Venice were replaced by Pula/Pola and Kotor/ Cattaro and also Rijeka/Fiume for the Hungarian Kingdom as part of the Austro-Hungarian Monarchy.

After the victorious battle of Lissa 1866 the badly equipped Austrian navy was fundamentally reorganized and received financial support to modernize the fleet. It became an important naval power in the Adriatic Sea in the second half of the 19th century. When timber became increasingly replaced by other materials such as iron the various pressures on forest management concerning forest production (curved timber, straight stems, fire wood, grazing) decreased.

At its zenith just before the beginning of World War I the K. and K. Navy ranked on the sixth place compared to all other navies in the world. After World War I the breakdown of the Austro-Hungarian Monarchy went together with the abolishment of the fleet. The ships of the Mediterranean fleet and parts of the fleet of the Danube river had to be handed over to the victors. The last two warships on the river Danube, used for control, stopped their service in 2006.

4. WOOD REQUIREMENTS AND FOREST MANAGEMENT

4.1. Wood supply in Venetian times

The core of the navel and commercial power was the so called »Arsenal«, the dockyard of Venice. For a time it was the biggest shipyard worldwide. It was the place where particular the Venetian long warships were constructed and repaired. In the 16th century it employed up to 16.000 workers. Due to the economic and political crisis of the Venetian Republic jobs decreased to 100 employees due to the devastation of the historical dockyards by Napoleon's troops in 1797. Today the abandoned Arsenal is administrated by the Italian Navy and opens to visitors.

The Venetian ships had a maximum lifespan of 50 years with a main repair every 10 year. Most ships could serve for 25 to 30 years. Ships should be made of wood that had been stored in appropriate form for at least 5 years. The system included an economical use of wood and extremely efficient shipbuilding technologies (standardized and pre-fabricated components). Size and extent of the Venetian dockyards required a considerable amount of wood reserves and a variety of different tree species.

⁸ Kaser Karl 1997. *Freier Bauer und Soldat. Die Militarisierung der agrarischen Gesellschaft an der kroatisch-slawnischen Militärgrenze 1535-1881*. Böhlau Verlag Wien Köln Weimar.

⁹ Mollinary von Monte Pastello Anton 1905. *46 Jahre im österreichisch-ungarischen Heere 1833-1879*, 2 Bde., O. Füssli.

¹⁰ Holdhaus Karl. 1867. *Die Ausstellung der k.k. Militärgrenze. In: Bericht über die von der k.k. Landwirtschafts-Gesellschaft veranstaltete land- und forstwirtschaftliche Ausstellung zu Wien im Jahre 1866*. Herausgegeben vom Ausstellungs-Comité. Wien: Selbstverlag der k.k. Landwirtschafts-Gesellschaft.

The most product in demand was curved timber which was supplied by pubescent oak growing on low mountain ranges. This oak is growing slowly, has a significant specific gravity and more rigidity and shape difference than other oak species.

Because of these characteristics it was used for the construction of the ship's bow and ribs. Boards from pendulate and sessile oak were needed for the shuttering of the ships. This wood varied with regard to the quality of the site and was divided into three categories. Friuli's was of the highest quality and was used in shipbuilding on those places that were the hardest to repair, which means the lowest levels. In the first half of the 19th century, the state forest Pannowitz near Gorizia delivered similar qualities. That of Motovun (Montona) in Istria was of the same quality as that of Friuli and was also used in shipbuilding. The oak wood from the Montello forest between Treviso and Belluno was of lesser quality and was usually only used in ships where the repairs were less difficult and the material least stressed, which means above the water level. Furthermore, elm wood from the valley forest of Motovun was used, which was of excellent quality. Beech wood of good quality came from the Cansiglio forest in the province of Belluno. This region also provided considerable quantities of fir-wood for masts and sail poles. The state forest Samadica, which was situated on the border to Trieste, also delivered boards and other assortments.

In Istria as well as in the Cadore about 50.000 hectares of forests were dedicated to the supply of the Navy (see table 1). In addition, a considerable amount of wood was also shipped from the Croatian coastal area via the harbors Rijeka (Fiume) and Senj (Zengg).



Figure 1 *Quercus pubescens* near Motovun
(Photo E. Johann 2018)

Table 1: Forests in Veneto and Istria dedicated to the supply of the Navy in the Northern Adriatic Sea*

1. Terra ferma (Veneto)		Yoke 1 yoke = 0,58 hectare
State forest	Oak forest Montello near Treviso	10.000
	Fir- and Beech Forest Cansiglio near Belluno	12.000
	Fir- and Larch-Forest in Cadore	2500
	Oak forests (54 separate forest stands)	1800
Private forests	Oak forests	3000
2. Istria	State forests	
	Oak forest Montona (Motovun)	2800
	Forests with curved timber in Montona	787
	Oak forests in Veglia (Krk)	170
Private forests	Oak forests in Istria and Veglia (Krk)	60.000

* Ressel J. 1855 *Geschichte der k.k. Marinewälder*

Forest management and forest laws before Napoleon

The Republic of Venice introduced the first forestry authority as early as in 1438, which had to make sure that Venice did not remain without construction timber and firewood.

Table 2: Legal bindings*

- 1150, 1452 Statute of the City of Trieste (ban of forest grazing of goats)
- 1467, 1475 Venetian Forest Laws (Waldordnungen) for Istria
- 1487 Ban of clearcuts without permission of the official authorities (Veneto)
- 1490 General ban of forest grazing in the Karst-region by Emperor Friedrich III

* Schindler Karl 1865. *Die Forst- und Jagdgesetze der Österreichischen Monarchie*. Braumüller: Wien.

Forest management relied on legal bindings (see table 2) and was carried out in different ways depending on the ownership of the forests. Community-owned forests were reserved for the supply of the Arsenal by the Venetian Republic. A ban (reservation) for the advantage of the arsenal in Venice existed and was strictly controlled. On the one hand communities were allowed to use the timber which was not suited for shipbuilding at the time when it was cut. Harvesting took place at any time according to the demand of the shipyard in Venice. However, forest owners received particular advantages by the Venetian Republic which differed from province to province. For instance in Istria and the island of Krk (Veglia) a reduction of taxes and a reduced price for salt was launched. Also, inhabitants could earn additional income by timber transport. In other regions such as Pannovitz in Gorizia there were less advantages for the population. They only could earn additional income by timber transportation. The kind of forest management which was carried out by the Republic of Venice may be illustrated by the example of the oak forest Montello near Treviso.¹¹ The utilization was divided among 17 communities. These gathered those pieces of timber which were not suitable for the purpose of the navy plus leaf litter, grass, pannage and small diameters from thinning. In return all the villagers together were responsible for each stem which was designated for the use by the navy. Thus, the Republic exchanged the exploitation of minor forest products for the safeguarding of the major utilisation and saved the expenses for control. Venice only employed one forest officer called »Capitano del Bosco« and a technician called »Contromestro«. Both were substituted every three years. In general, the harvesting did not exceed the increment. Dead wood was left to the communities without payment.

4.2. Time of French control

From 1805 to 1814 the French forest administration system was introduced, mainly aiming at the increase of yield.

In 1810, the *French General Forest Laws for the Illyrian Provinces* were issued by the French administration which clearly emphasized the multifunctionality of the forest.¹² Thus, the forests were regarded as a source of income, which should never dry up, so that the needs of all kinds of consumers could be satisfied for now and forever. In order to make the rejuvenation of the forest areas quicker and cheaper, the recipients of servitudes should contribute to the improvement of the forests through labour assistance. In the future timber harvesting should be carried out by clear-cutting. The French Forest Law also prescribed that forest areas should not be converted into pastures, alpine pastures, meadows, vineyards, and fields. The stricter supervision, however, had little success. In the state forest of Montello for example a forestry department was established and 24 rangers became employed with the task of forest protection and control. Thus, the traditional forest rights of the villagers were abolished because these minor rights were claimed by the French authority. Nevertheless, communities neglected the new rules (chopping off high stems, cutting of young trees) to gain fuel wood which they traded to Venice.

¹¹ Lazzarini Antonio 2006. *Relationships between local communities and forest administration: the Cadore region after the Napoleonic laws*. In: Parrotta J, Agnoletti M, Johann E, editors. Cultural heritage and sustainable forest management: the role of traditional knowledge. Proceedings of the Conference 8-11 June 2006, Florence, Italy. MCPFE Liaison Unit: Warsaw, pp. 65–68.

¹² JOHANN Elisabeth 2004. *Wald und Mensch. Die Nationalparkregion Hohe Tauern (Kärnten)*. Klagenfurt: Verlag des Geschichtsvereins, pp 675-677.

The French government had an immediate high demand for timber suited to supply its navy. As anywhere else in the occupied countries it started to cut trees as much as possible even though the forest law aimed at sustainable use and reforestation. Thus, for example in Motovun/Montona, a third of the forest was cut within less than 10 years. Within the French period no afforesting activities at all took place.

4.3. Venetian dockyards under Austrian administration

From 1797 (after the Peace of Campo Formio) to 1805 Austrian legislation was introduced in the Veneto, abolished from 1805 to 1814 and implemented again when Austria took possession of this territory after the Viennese Congress. In 1848, in the time of revolution, political activities started to separate Veneto from Austria. In 1849 the region was re-conquered after the victory of Radetzky against Italian troops. However, the administration of the navy which had been moved from Venice to Trieste in times of revolution remained in Trieste. It was the time of the enlargement of the Austrian Marine (navy and merchant fleet). In 1850 an arsenal for the marine was established in Pula and only a few years later Archduke Ferdinand Maximilian became the new head of the Austrian Navy in 1854. One of the most important economic and political developments was the opening of the railroad from Vienna via Ljubljana to Trieste in 1857. Due to political transformations (1866 Venice became part of Italy, Croatia including Rijeka (Fiume) became part of the Hungarian Kingdom due to the treatment between Austria and Hungary («Ausgleich») in 1868 the mainly important docks and shipyards were Pula and Kotor till the end of the Austro-Hungarian Empire in 1918.

Sailing brought prosperity and fortune to the city of Rijeka already in the 18th century. From 1867 to 1887 the port and shipyards were significantly expanded and built up. However, it was not until 1905 that the state became actively involved in Rijeka's shipbuilding activities. The reason was the expansion plans of the *K. and K. Kriegsmarine*, (K. and K. Austrian Navy) which required large shipyard capacities. In the following years a remarkable large shipyard was established in Bergudi, which employed 2,500 workers in 1913. However, the ships were not made of wood any more. First big iron ships were built from 1838 onwards. Nevertheless, the development of this type of ship took place in slow steps, and twenty years later iron steamers and sailing ships were still rare. With improved technology, at the end of the 19th century, the material iron in shipbuilding was replaced by steel.

The demand

Till 1848 the chief administration of the Austrian navy (*Marineoberkommando*) and dockyard was located in Venice. An »*agente boschivo*« (Marineforstagent) was responsible for the management of the forests in the region of the Terra ferma as well as in Istria and the island Krk. His main tasks were to secure the wood supply of the Navy in the required size and amount. He had to select the demanded species and dimensions in the field and to buy the timber. He also had to control timber yards and had to assess the quality of the wood with regard to the intended uses (particularly curved timber). He had the comprehensive authority with regard to the conditions of the contract. However, the costs and risks of its shipping to Venice had to be taken over by the seller. The wood was paid only after its arrival in the dockyards of Venice.

Tree species required by the Austrian Navy were oak (*Quercus pubescens*, *Quercus robur*, *Quercus petenculata*), elm (*Ulmus*), beech (*Fagus*) fir (*Abies alba*), spruce (*Picea abies*), and larch (*Larix*). However, the most demanded kind of wood was curved timber provided by *Quercus pubescens* of which only small reserves were still available in Istria and Veneto in the middle of the 19th century.¹³ Because of different reasons (high demand, timber trade and others) the forest area with a growing stock of *Quercus pubescens* had decreased from about 2190 hectares of old growth stands available in Venetian times to 540 hectares of young stands.¹⁴ Joseph Ressel, who worked as an *agente boschivo* till 1857, proposed

¹³ TM. Hss.355/12/B2 Ressel

¹⁴ Ressel, Joseph 7. 3. 1857: *Vortrag zur Beantwortung der wichtigen Schiffbauholzfrage für die k.k. Kriegsmarine*. T.M. Hss

to cultivate young stands even if he knew that timber for ship ribs could only be harvested after 150 years. He made this proposal because he noticed that there was a general lack of curved timber in the Mediterranean region.¹⁵

In 1857 Ressel made an overall assessment concerning the availability of curved timber in Europe.¹⁶ In Istria it was already rather rare. *Quercus pubescens* growing in Minor Asia was reserved for the Egyptian fleet. In Bosnia the State forests were rented to the Austrian merchant Schönfeld for a 20-years harvesting. Later the contract was handed over to the entrepreneur Rothschild in Paris. Thus, the high demand of the English and French navy could be met. In Herzegovina a contract concerning the cutting of curved timber existed between the Austrian entrepreneur Kluki, who had a joint venture with the trading company Martin in Trieste. The harvesting of these forests could meet the demand of the Austrian Navy for 15 years maximum. Curved wood harvested in Romania was sold to England. France had destroyed its own woodlands during the time of the revolution and Spain had to cover the demand of its national fleet.

Forest management

When Austria came into the possession of the forests in Veneto and Istria in 1797 the forest reserve (»Marineforestreservat«) still existed, due to historical agreements between the Republic of Venice and private forest owners. However, in 1819 the traditional right to ban private forests was abolished by Emperor Franz. The reason was that there were previous failed crops (1815 and 1816) and subsequent famine in 1817. The target was to enable forest owners to sell their timber on the free market and thus earn some money to buy cereals. Due to modern sights and perception private ownership should not be restricted any more. Even if unlimited export of timber was not allowed the deforestation of the Istrian landscape became noticeable caused by an increasing timber trade.¹⁷

After the abolition of the forest reserves, also the relationship between the navy and the state forests had to be determined as well, because the forest management of the domain forests aimed to get the highest possible yield and to eliminate the influence of the navy. According to this view, the Navy was only entitled to the right of first refusal related to the purchase of timber suitable for shipbuilding. In many cases, wood from domain forests (*k.k. Cameralförste*) was sold to private customers with the designation in the bill »unusable for the Navy«.

Because neither the French nor the Austrian forest administration had carried out afforestation activities in the first half of the 19th century, the forest declined dramatically. The natural regeneration was impossible due to intensive grazing particularly of goats. When Josef Ressel assessed the oak forest of Motovun in 1846, he documented that the remaining stems were of bad quality and useless for the demand of the Navy (i.e. bark beetle, various damages on stems, heart rot, rotten plots on stems). According to Ressel, each stem had one or several damages.¹⁸

The abolishment of the reservation right had not shown the desired effect. In Istria one of the reasons for the immense food shortage was the degradation of the landscape. As long as the area had been forested, there had been bad harvests every 7 year on average. Around the middle of the 19th century these crop failures occurred within a much shorter period due to the lack of rain caused by extended logging operations in the mountain region. Thus, the repeating famine forced the farmers to sell the remaining old trees, which had provided food for the livestock, to timber merchants. Now the peasants had neither money nor wood, but only barren pastures. When the demand for fire wood increased the remaining woodland was converted from high forests to coppice forests with a rotation period of 8 to 12 years.

10.355/24, p 15 ff.

¹⁵ JOHANN Elisabeth 1994. *Der Forstmann Josef Ressel*. News of Forest History, IUFRO Subj. Gr. S 6.07 und ÖFV Arbeitsgr. FG (eds) Wien: pp 33-45.

¹⁶ Ressel, J. 1857: *Vortrag zur Beantwortung*, p 15 ff.

¹⁷ Ressel Joseph: *Abhandlung über die Holzausfuhrfrage*. TM H/R 355/11, 1. 7. 1850, p 71 ff.

¹⁸ Ressel Joseph 1855: *Geschichtliche Darstellung der für die k.k. Kriegsmarine reservierten Wälder* TM Hss. 10.355/20/III/10, pp 49 ff.

Problems also increased due to the »German classical school of forestry« which was developed in Germany by Cotta and Hartig from the 1820ies onwards and influenced forest management in many European countries. It aimed at the highest volume of timber mainly of spruce or pine, dense stands to avoid branches, and the breeding of straight trunks. These aims were quite opposite to the demand of the Navy, which needed only 10% straight stems but 90% curved wood with healthy branches which could only grow in scattered stands with a low density of stocking. Ressel considered the suggested rotation period for broadleaved stands of 100 years as too short and voted for flexibility and adaptation of silvicultural measures according to the demands of the Navy. His recommended method of managing the domain forests in the Istrian area was the traditional selection felling which was most suitable to produce curved wood. However, he could not prevail with his proposals to the administration in Vienna.¹⁹

A special case was the timber import from the Croatian Military Borderland. Local farmers did not have any written entitlement to individual or common rights to forest use. However, as the farmers were the only ones living near the forests, they were the only ones who benefited from the forests and used them at their own decision. Because the villagers could hardly live on the harvest of their small plots of land they were forced to look for additional income, either by clearing the forests to obtain pasture land or by selling wood as the only raw material available. In the second half of the 17th century, the forests in the coastal area of the military administration district Karlovac (*Karlstädter Generalat*) were still in good order. About a century later, most of the former woodland was degraded because of the high population increase in the coastal region, which had occurred in 1700 caused by warlike conflicts with the Ottoman Empire.²⁰

Felling and selling of wood should set up a new livelihood. In the past the residents of the Military borderland had always been allowed to cut wood for their own domestic uses but not for sale. As the extent of logging could not be controlled, the tradesmen of Senj soon made profitable deals through buying the wood from the farmers and selling it secretly to the dockyard in Venice. The farmers rarely received cash for the wood but were paid in the natural resource they most needed, grain. In many cases, the grain was given to the farmers in advance. Thus, they became dependent from the businessmen in Senj who stipulated at their will the quantity of wood which had to be brought for the advanced grain. The situation worsened as there was no more wood available near the harbour but could only be found further away. Thus, the farmers cut the wood secretly in the almost impassable mountains and had to carry it to Senj with oxen over long distances.²¹ There was also a traditional firewood trade practised between all Croatian coastal towns and the opposite islands as well as the adjacent Dalmatian mainland. Even very bad qualities and roots came for sale, which women and children carried to the sea either on their backs or led it down on donkeys. The earnings were very small, the payment took place only after the loading of the barques. If it was previously confiscated by the authority, the sellers had the disadvantage. Probably to solve illegal logging and wood theft the administration started to set up wood depositories along the coastline in Jablanac and St. Georgen.²² To facilitate the transportation of wood also a road of 20 km length was built in 1774. Now each inhabitant could deliver wood to the stores at fixed prices. Beforehand he had to ask the forest staff for permission and had to pay a forest tax, then the forester had to mark the stems which could be harvested. However, the wood depositories almost gave advance to forest degradation, as business had to be kept running by the forestry administration. Because of the impassability of the backwoods the ongoing business could happen only by the continuing marking of trees in the coastal area. This fact contributed to the further deforestation of the slopes of the Velebit mountains. However, the population gained some income by the transport of the logs and by wood processing into boards, shingles, staves, water dishes, bowls and plates. In 1780 already 451

¹⁹ Ressel J 1857: *Vortrag zur Beantwortung*: p. 15 ff.

²⁰ Kaser K., p 216

²¹ KASER K., p 217

²² RUCHENWALD Stefan v. 1896. *Die Plitwitzer Seen und ihr Vorland*. A. Reinhard's Verlag: Fiume. pp 30-31

local farmers were involved and the government made a profit of about 4950 gulden from the timber business.²³

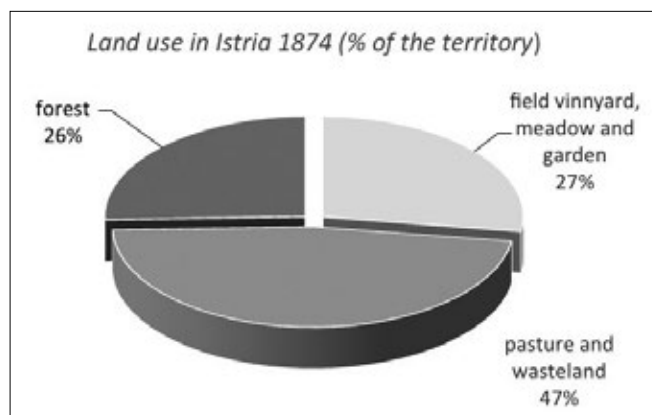
The deforested areas became exposed to the Bora, a strong north wind, and in consequence the unprotected soil eroded and turned into barren rocks. Hermann v. Guttenberg described the situation in 1901: »In winter the notorious Bora roars through these tracts of land, especially at Trieste, Fiume and the Velebit mountain sloping down to the sea, by their force preventing the tree growth.«²⁴

5. THE RE-SHAPING OF THE CULTURAL LANDSCAPE IN THE NORTHERN ADRIATIC REGION

The harvesting of timber and fuel wood, forest fire, unrestricted forest grazing, controversies with regard to forest ownership and forest rights and inadequate forest management methods had resulted in forest degradation and the development of wasteland of an area of 150.000 ha in the region of Carniola, Gorizia, Gradisca, and Trieste in the 1850ies.²⁵ According to a general assessment and inventory carried out by Josef Ressel in 1854 several reasons were responsible for the increasing forest degradation. In Veneto for instance concerning curved wood the growing stock had decreased by 97% from 1797 to 1855 in Montello (between Treviso und Belluno) due to the failing regeneration caused by litter harvesting and the lack of acorns. Only artificial regeneration would have been successful but it was not practiced because of its high expenses. In the beech-, fir-, and spruce-forests of Cansiglio (east of Belluno) forest degradation was caused by the competitive selective cutting of beech of high quality for the demand of the Navy and sieve makers. In addition, because of the difficult transportation the production of charcoal was favored instead that of masts which were highly demanded by the Navy. Transportation could only be carried out by oxen and sledges on small paths in winter time. Also, the following transport on the river Piave via Belluno to Venice was restricted. From October till May no work was possible. However, timber for the production of rudders, boards, and pales could be transported on the top of these rafts

The abolishment of the forest reserves had a long-lasting and noticeable impact on the national economy of Istria. Caused by the increasing timber trade mountain slopes were deforested and the grazing of sheep and goats followed. At the beginning no afforesting activities took place. Former woodland was also transformed into fields and poor pastures (see figures 2 and 3). Wherever the shrubbery or the high-grade forest were cleared, grazing took place throughout the year. Thus, many areas became unproductive in the 19th century and this was especially true for the land of the commons.²⁶

Figure 2*



* N.N. 1876. *Die Ziege als Waldverwüsterin*. In: Österreichische Monatsschrift für Forstwesen 26. Jg. November 1876, pp 610-611.

²³ WESSELY J. 1876. Das Karstgebiet, pp 56-60.

²⁴ Guttenberg H. 1901: *Geschichtliche Darstellung*, pp 163-164.

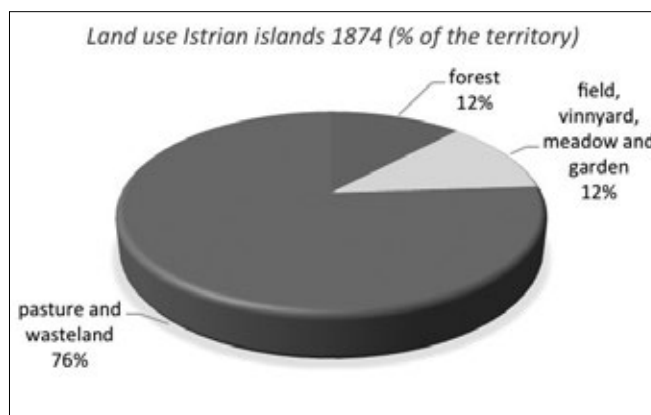
²⁵ JOHANN Elisabeth 2001. *Zur Geschichte des Natur- und Landschaftsschutzes in Österreich. Historische »Ödflächen« und ihre Wiederbewaldung*. In: Faszination Forstgeschichte. Norbert Weigl (ed.). Schriftenreihe des Instituts für Soziökonomik der Forst- und Holzwirtschaft, Bd. 42. Wien 2001, pp 46-47.

²⁶ RESSEL J. 1855 *Geschichte der k.k. Marinewälder*

Because of climate change (lack of rain, dryness) crop failures increased. A travel book from about 1870 described the situation in Istria: »It is a waste and hopeless region without vegetation beside some grass, shrubs, single trees and some fields with cereals«. ²⁷ In the hinterland of Trieste for example the percentage of forest area had decreased to 5 – 10% in 1850 (see figure 4).

The deforested landscape did not only contribute to the impoverishment of the farmers (soil erosion, extreme climate) but also affected Trieste as commercial and naval port. Expensive safety buildings were necessary to protect the railroads from Vienna to Ljubljana – Trieste and Ljubljana – Rijeka/Fiume) against the impact of wind- and snowstorms particularly in winter time. When the importance of the public and welfare functions of the forest was perceived not only by those being concerned directly but by the whole society afforesting activities were implemented.

Figure 3*



* N.N. 1876. *Die Ziege als Waldverwüsterin*. In: Österreichische Monatsschrift für Forstwesen 26. Jg. November 1876, pp 610-611.



Figure 4 Railroad station Herpelje around 1870 (Source: Department of Forest administration, Postojna)

5.1. The re-cultivation of the wasteland

Already in 1822 the forester Josef Ressel, at this time working in Lower Carniola and Motovun, started first investigations and in 1837 he continued with practical experiences concerning the reforestation of the island of Krk (Veglia), however at this time without much success. In 1842 he worked out a long-term plan concerning the reforestation of the commons in Istria and in a second study he addressed the city council of Trieste and made proposals for the karst-region of Trieste and Gorizia. He was mainly driven by the

idea to improve the timber supply of the navy but also the environmental conditions. Due to the initiative of Rosei, a citizen of Trieste, in 1842 experiments in the high Karst (hinterland of Trieste) were introduced by the city of Trieste. That year can be considered to be the starting point for the implementation of the reforestation plan of the waste common land in Istria. ²⁸ However, even these trials failed because of the lack of experience and knowledge. They were successfully repeated in 1857 when the city council

²⁷ N.N. 1873. *Istria. Ein Wegweiser längs der Küste für Pola und das innere des Landes*. Triest.

²⁸ Guttenberg, H. 1901: *Geschichtliche Darstellung*, p 163-164.

set up nurseries to breed adequate seedlings. It is reasonable to suppose that the initiative for the city of Trieste's cultivation plans and the methodology applied were based on the relevant suggestions of Ressel. The reforestation plans aimed at the formation of high forests by the planting of black pine and hardwood in the mountainous area and by scattered planting of hardwood and fruit trees in the flat area in the neighbourhood of the villages, so that the latter could continue to serve as pasture.²⁹

Afforesting activities in the Austrian coastal territory and Istria

Already in 1841, the forest administration of Gorizia in Studeniz and in 1861 the forest administration in Motovun increasingly started the propagation of cuttings in nurseries. In the lowlands of the district of Gorizia it was mainly sweet chestnut, in the low mountain ranges walnut. It seems that also here the reforestation plans largely took into account the reforestation plans drawn up by Ressel. In order to improve fruit tree cultivation easily readable leaflets were distributed, which were also used as reading books at schools. Furthermore, sample plots were established in Sezana, Prosecco and Gorizia, and each district was asked to send appropriate people to learn the technique of fruit tree cultivation in three to five days. For their expenses they received a heating subsidy. The successes were satisfactory and the motivation of the rural population for afforesting activities gradually increased in all communities. The reforestation took place, as Ressel had suggested, on the one hand by means of seeds, which were distributed to the population by the government, including pear, ash, maple, linden, stone pine, apricot, chestnut, peach and larch, on the other hand by seedlings such as Ailanthus, acacia, elm and wild cherry. The communities provided acorns and chestnuts (sweet and wild). In some places, plants were raised by teachers and provided for afforesting. In some districts tree and nursery schools were established and other tree species such as willow and poplar were cultivated. In addition, seeds of black pine were distributed, as well as seedlings of wild fruit trees, mulberry trees, sea-side pines, black pines, wild cherries and wild pear trees. In the 1860ies priorities of reforestation were Castelnuovo, Sezana, Comen, Capodistria and Gradisca.³⁰

The work was carried out by men who had previously proven an interest and skill in reforestation. They were hired by the communities. The afforesting was financed by the city, beyond that there were hardly any other public funds available. However, foresters hoped that the successful reforestation activities would arouse the interest of the local farmers and lure them out of their passivity. It was necessary to give the karst forest a safe basis, as in the general public the dismal situation of the population due to the increasing climate deterioration was hardly perceived beyond the region.³¹

In this regard the local Karst afforesting commission expected an adequate support from the visit of the recently established Austrian Forest Association (*Österreichischer Reichsforstverein*). At this time the reforestation of the karst-region was still generally ridiculed as an unworkable project. For this reason, the excursion of the Austrian Forest Association in 1865 was met with great expectations both by the peasants in the country side and the citizens of Trieste. This excursion for the first time drew the public's attention to the situation that had become unbearable for the population. By visiting the karstification near Sezana the participants were acquainted with the problem and visiting the high oak forests of the k. k. stud farm Lippizza they became aware of the capability of the soil. The subsequent visit of the participants to reforestation activities near Postojna, Prestranek and Sezana, which had been started by communities and individuals, clearly showed the problems that precluded the reforestation of these waste areas. On the basis of these examples, it was discussed, that the most necessary preconditions for forest growth were in place and that appropriate framework conditions were necessary in order to achieve a remarkable success. It was agreed that the karst area had to be differentiated into three categories with regard to the measures to be taken. On the one hand, there were areas that were nothing

²⁹ Koller Josep, 1866: *Der Karst und seine Wiederbewaldung*. Österr. Monatsschrift für Forstwesen, Wien, pp 15-27.

³⁰ WEYSSELY Joseph (ed) 1866: *Administrative Karstkulturmaßregeln der Stadt Triest*. Österreichische Monatsschrift für Forstwesen, 16. Bd. Wien, pp 221-231; *Neuester Fortschritt der Küstenländischen Karstbewaldung*. Österreichische Monatsschrift für Forstwesen 16. Bd., Wien, pp 618-619.

³¹ Johann Elisabeth 2002. *Zukunft hat Vergangenheit*. Österreichischer Forstverein (ed), Bösmüller Wien, pp 62-72.

but devastated forests which only needed fencing against grazing in order to become forests again by themselves. However, there were also regions that had to be artificially reforested, but still had enough soil, so that no special efforts were necessary. The third category concerned the barren stony wasteland without soil. The proposals concerned the separation of forest and pasture on the common land and the implementation of reforestation activities carried out by adequate well-trained foresters. With its official report related to the findings gained on occasion of the field trip and subsequent conference, the Forest Association attracted a great deal of attention and interest not only from the public but also from the government. It was the triggering moment for the state to launch the debate about the re-cultivation of the karst region.

According to a report of Hempel afforesting activities started on a supra-regional level in Carniola, promoted by the employment of a professional forester from 1871 onwards³². Single tree felling and natural as well as artificial regeneration became the norm. However, because of the trend of »modern forestry« some degraded former broadleaved woodlands were transformed to coniferous forests. Nurseries were established in Postojna, Senozec, Ljubljana and other places. By carrying out several activities the government tried to motivate the population to take part in afforesting activities. The grant for successful afforesting programs, the award of medals and state subsidies as well as exemptions from taxes were included. Apart from financial incentives a stronger environmental awareness of the population should be stimulated. Thereby the promotion of people's awareness concerning the importance of forests in the household of nature played an important role. Therefore, teaching had to start at the level of primary schools and had to be continued later by adult education and publications. Comprehensive public relation was planned which should already start with children particularly in the rural area. The future farmer should not only receive a professional education but also get an emotional relationship to the forest by adequate activities (installation of seed beds in the elementary school gardens, establishing of tree days, planting activities and others).³³

Afforestation activities were based on legal bindings which are summarized in table 3.

Table: 3 Legislation related to forest management in the North Adriatic region 18th-19th century*

- 1732 Forest Law published by Emperor Karl VI: prohibition of slash and burn activities
- 1765 forest Law for the Croatian Military Borderland (Karlstädter border): prohibition of slash and burn activities, prohibition of tree cutting without permission, establishment of forest administration
- 1771 Forest Law for the Crownland Carniola and the coastal districts
- 1787 Forest Laws for the Slavonian Military Borderland
- 1807 Improved Forest Law concerning the Slavonian Military Borderland
- 1819 Abolishment of the right to ban
- 1852 Reichsforstgesetz (Forest Law for the entire Austrian Empire)

* Schindler Karl 1865. *Die Forst- und Jagdgesetze*

Financial subsidies were provided by the State. Special commissions with clearly defined tasks were established to guide the afforesting programmes. 68% of the expenses were paid by the State, 12% by the Southern railway company and 6% came from fines. Already at the turn of the century the beneficial functions of the new established woodland were perceived, first of all along the railroad Ljubljana-Trieste and Ljubljana-Rijeka. The former snowstorms and strong wind (Bora) which had badly inhibited the traffic had been stopped (see figure 5).

³² Hempel Gustav 1899: *Das Forstkulturwesen*. In: Die Geschichte der österr. Land- und Forstwirtschaft und ihrer Industrien 1848-1898, 5 Bde, Wien. Bd. 4, pp 70-116.

³³ ÖSTERREICHISCHER REICHSFORSTVEREIN 1865. *Amtlicher Bericht über die dritte Wanderversammlung des österreichischen Reichsforstvereines auf dem Karste und in Triest, abgehalten am 4., 5. und 6. September 1865*. Österreichische Monatsschrift für Forstwesen, Jg. 1865, Bd. 15, p 616.

Until the turn of the century in average 17% of the waste land were already afforested in Carniola, Gorizia, Gradisca, Trieste and Istria. The best results could be observed in Trieste (50% of the wasteland), followed by Gorizia and Gradisca (30%) and Carniola (23%). In Istria however, very few activities happened before 1900. The afforesting programme continued till the beginning of World War II and received public interest promoted by reports in contemporary forestry journals.³⁴ In the first decade of the 20th century, between 50 and 170 ha were



Figure 5: *Herpelje Railwaystation, 2000 (Photo E. Johann)*

afforested annually in the counties of Gorizia and Gradisca, partly by means of seeds, mostly by planting. The seedlings came from nurseries run by the afforesting-commission, by the government or by state-forest district administrations but were also purchased. The Commission itself ran four nurseries (Gorizia, Schumpass, Komen, Tonovo) with a stock of almost 2 million plants. The seedlings were planted in holes, which were supposed to be prepared by the population as some kind of own contribution.

The most planted species were black pine, various other types of pine, spruce, larch, cypress, ash, alder, maple, but also fir. Every year, up to 3 million seedlings were planted and re-planted. If the planting holes were not prepared by the population, this work was carried out at the expense of the reforestation fund as not to cause conflicts with the population. The afforesting cadastre for this area showed a reforestation area of 8291 ha. From 1884 to 1910, 4059 hectares, or 74% of the area, had already been

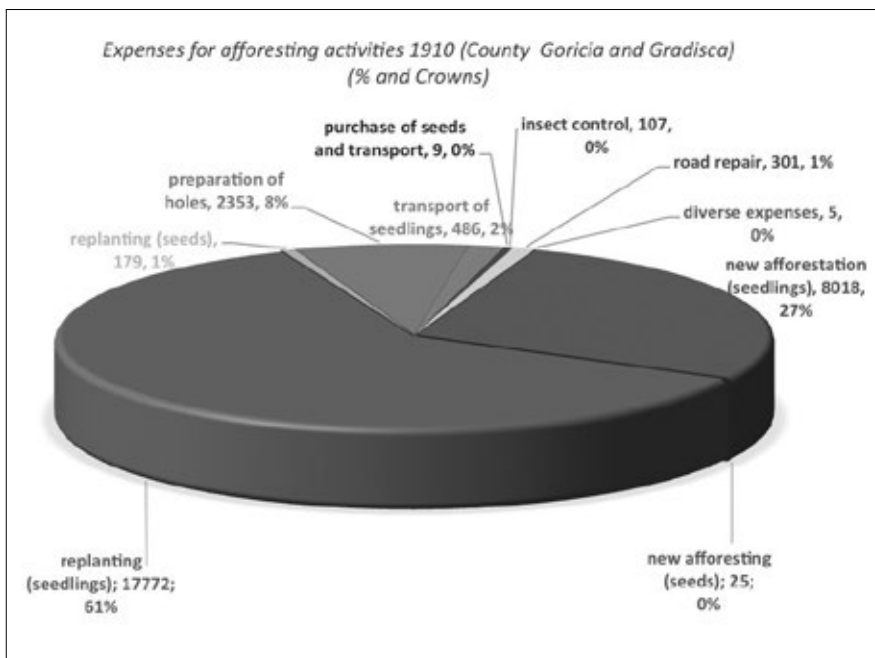


Figure 6

³⁴ Guttenberg H. 1901: *Geschichtliche Darstellung*, pp 163-164.

reforested with a total cost of 457,013 crowns.³⁵ As can be seen from Fig. 6, the highest amount of money was needed for the re-planting. The cause was partly due to the prevailing climate with a long-lasting summer drought, insect damage, fire by flying sparks from the locomotive, but partly also due to inadequate plant material.

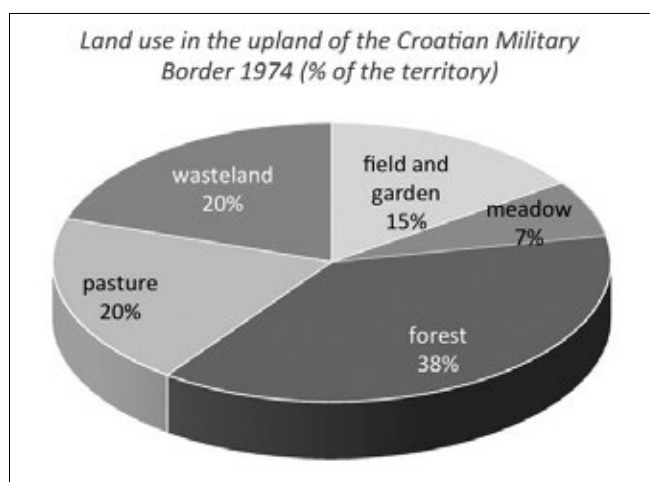
Efforts related to the re-greening of the wasteland of the Croatian Military Border

The great success of the excursion to Trieste prompted the Austrian Forest Association to return to the question of the reforestation of the karst region in 1869. The destination of the excursion was the Croatian Military Border, in fact the karst region near Senj and the upland area in the interior (see figure 7 and 8). Thus, beside the problem of re-greening the Karst region also the development of the previously unused primeval forests of the Croatian Military Borderland was discussed. The insights gained on occasion of this excursion also seemed to be of general interest because the K. and K. Ministry of War had started to use this region also economically.

The method of artificial reforestation was not new here. However, at the end of the excursion one came to the conviction *»that in a country, where everywhere livestock, including a large number of goats, were grazing entirely without any shepherds, in a country, where people had a great predilection for destruction, but not the slightest sense of protection of the forest, in a country, where the low price of wood allowed only a very small number of forest guards, nothing else remained than to fence hermetically those forests, which one really wanted to cultivate and which were in a reasonable vicinity to settlements and traffic routes«.*³⁶

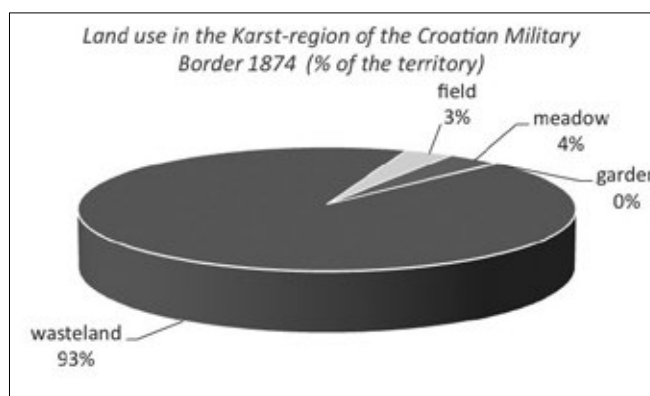
As early as in 1759, a decree had stated that no wood had to be delivered to the inhabitants of Senj in the close surrounding of their town any more, in order to safeguard the forests in this district. Forest wardens were ordered and it became an obligation for everybody to take care of the forest. The basis of forest management was the forest law, issued in 1765 for the Military district of Karlstadt (Karlovica). Thereby for the first time it came to the employment of a forest staff. The law dealt with measures against forest clearing, banned the traditional method of fire cultivation and prescribed a permit for felling trees. The free grazing of goats was rejected. Thus, goats had to

Figure 7*



* N.N. 1876. *Die Ziege* pp 608-609.

Figure 8*



* N.N. 1876. *Die Ziege* pp 608-609.

³⁵ N.N. *Karstaufforstung 1911*. Österreichische Vierteljahresschrift für Forstwesen, Jg. 1911, Bd. 29: pp 285-287.

³⁶ ÖSTERREICHISCHER REICHSFORSTVEREIN 1869. *Amtlicher Bericht über die vierte Wanderversammlung des österreichischen Reichsforstvereines abgehalten in der kroatischen Militärgrenze, einschließlich vom 23. bis 28. September 1869*, Österreichische Monatsschrift für Forstwesen, Jg. 1869, Bd. 19, pp 581-669.

be slaughtered or sold to neighbouring countries. However, this regulation did not have the desired result, because only 50 years later the number of goats had again increased to more than 64,000. At that time no penalties followed and forest devastation continued to increase in the course of the 19th century.³⁷

In 1850 the Laws for the entire Military Border (*Grenzgrundgesetze*) declared the forests as state property, but the local farmers were entitled to the following uses according to their old rights: free forest use for their own demands, free fattening of their livestock, free collection of acorns, beech nuts and chestnuts. The families were given full ownership of their land and the pasture land was declared a tax-free joint ownership of the community's residents. These regulations remained even after the dissolution of the Military Border. In 1860, the exploitation of the previous primeval forests came into being to a larger extent. Administration and exploitation were carried out by the administration of the Military Border. Revenues arose from the sale of timber, the collection of acorns and knobs and the criminal taxes. The profits from the forests were credited to the border funds as income from the Military Border.

However, in the 19th century, it was also clear that the sudden abolition of goats would jeopardize the existence of the inhabitants. Therefore, their reduction had to go hand in hand with improved income opportunities in other areas. The previous reforestation activities had been very poor despite the distribution of seeds to the communities and accompanying written instructions. The main reason for the disadvantage was understood in the improper execution due to a lack of adequate institutional or appropriate advisory experts. The poor staffing was also considered to be the main reason why the reforestation and implementation of afforesting and the safeguarding of the forest area could not proceed to the extent that seemed desirable, for a forest ranger had to manage and administer 25,000 to 30,000 yokes.³⁸

Members of the Austrian Forest Association having participated in the excursion and the subsequent conference 1869 developed a working plan for the reforestation of the Karst-region of the Military Border. Thus, Wessely differentiated between the local forest, which had the purpose to sustain the population, and the forest that was destined for export. For the former his recommended management was coppice with standards. The forests in the interior dedicated to export could only be managed in form of regular single tree felling in order not to expose the karst soil to erosion.³⁹ In general the necessary legal, social and technical prerequisites were tackled. A comprehensive report on the results was published in 1869, and once again put the Karst issue in the centre of public interest and gave impetus to action by the government.

The government's decision to moderately disband the Croatian-Slavonian Military Border had already been made in 1869. From 1871 onwards, the authority worked on uniting the border area with Civil-Croatia-Slavonia, which came about in 1884. For the forestry service this meant the fusion of the forest staff in 8 forest offices, the equipment of the offices with greater autonomy and a direct subordination under the General Command the state administration authority in Zagreb.⁴⁰

In 1871 a law was issued related to the detachment of the servitudes. It concerned the removal of the rights of the border residents from the state forest related to the obtaining of timber, pasture and forest products. Half of the forest area on which the communities had servitudes were transferred to their property. The second half became real state forest. Before segregation, around 17,000 hectares of mature state forest from the prospective Hungarian border woodlands were sold in favour of the entire border land. The profits should be used for investments in the border area. This should create the border investment fund, which was intended to finance the necessary investments to improve infrastructure.

At a request of the K. and K. Ministry of War, this investment fund should also provide financial support for landscape restoration of the Karst from 1871 onwards. About 8% of this fund were reserved for afforesting programs. On the initiative of the commanding general Baron v. Mollinary a comprehensive study of the Austro-Hungarian Karst was completed in 1875.⁴¹ When the government of the Military

³⁷ N.N. 1876. *Die Ziege* p 608-609.

³⁸ ÖSTERREICHISCHER REICHSFORSTVEREIN 1869. *Amtlicher Bericht* pp 581-669.

³⁹ ÖSTERREICHISCHER REICHSFORSTVEREIN 1869. *Amtlicher Bericht*: p 634.

⁴⁰ Mollinary a. 1905, pp 256-276.

⁴¹ v. Pretis-Cagnaodo Sisinio 1875. *Dalmatinisches hinsichtlich Wald und Karst. Auszug aus dem 1875er Reiseberichte des k. k.*

Border started activities related to the reforestation of the waste slopes the government of *Civil-Croatia* as well took decisive steps with regard to the karst area existing in the region around Rijeka. 2000 gulden per annum and 4000 gulden per annum from 1876 onwards were provided for afforesting purposes. A special forester was hired to guide the afforesting activities in the karst region. Also, as a result of the excursion in 1868, a law was drafted in Dalmatia in 1876, which in the future would allow and regulate the distribution of common-owned land. In some places, at the initiative of private individuals and communities, individual areas were reforested and placed in protection.

Both the technique which should be applied and the administrative procedures which were required were already well known. It was finally about putting the knowledge into practice quickly and to a greater extent. However, as such an undertaking required significant financial resources, the Austrian Forest Association was convinced that they could only be liquid if the reforestation of the Karst was not only a concern of the government but was also supported by official deputies as well as the population. Thus, sufficient social and political pressure could be generated.

In order to attract public interest or at least the interest of the parliament the Austrian Forest Association took up this topic again and ten years after the trip to the waste karst region organized an excursion in 1879. The basis of the trip was the monograph, authored by Joseph Wessely, which he had written after traveling to the karst areas on behalf of Baron Mollinary's request in 1875.⁴² This time the destinations were the coastal Karst of Carniola, namely Divazza, Rijeka and the Karst area from Senj to Krivi Put. On occasion of a subsequent session, which was held together with the Forest Associations of Croatia-Slavonia and Carniola the causes of the karstification were discoursed, and the costs of preventing desertification were discussed, with particular emphasis on past experiences.

The result of the exchange of experiences was published in a memorandum and a resolution was passed by the joint assembly of the Austrian, Croatian-Slavonian and Carniola-coastal Forest Association.⁴³ Thus, the board was requested to address the competent authorities to engage for the swift passage of special laws that would regulate the Karst problem for each country. This was enacted shortly afterwards for the individual regions, such as 1881 for Trieste, 1883 for Gorizia and Gradisca, 1885 for Carniola, 1886 for Istria, 1892 for the Islands.⁴⁴ It was concluded that high-stemmed deciduous forest could only grow in hollows or on shallow, protected plots due to the drought and bora. For the upper regions of the slopes, it was recommended to build dry-stone walls before afforesting started, to keep goats away from the cultivated area. Afforesting needed to be an agreement with the communities because of their grazing rights. The remaining deciduous forest residues should be regenerated by coppice shoots and fenced. The afforesting areas at St. Jakob and Grabarje above Jablonac were mentioned as best practise, where 1400 yokes (about 700 hectares) of degraded deciduous forest had been restored. From the upper regions one should go slowly down and afforest in strips with hop beech, flower ash, downy oak, and black pine. For the highlands the unrestricted pasture especially near villages was considered as the main cause of degradation of the forests growing on good soils. The primeval forest was still there, but its exploitation started with the construction of a steam sawmill on the edge of the forest by the Austrian company *Wiesenburg & Söhne*.

The common property was given its legal basis by two laws in 1894 and 1897. Thus, the basic community was strictly separated from the political community. The right to use the common ground was dedicated to the community residents and every house in the village had the right to take advantage of it. These basic communities remained until after the Second World War, when a law from 1947 transformed them into general national property.

In general one can draw the conclusion that the successful reforestation of the barren land in the Karst regions were based on the following facts: afforesting with conifers (mostly *Pinus nigra*), protection of

Sektionsrathes v. Pretis-Cognado. Österr. Monatsschrift für Forstwesen, Jg. 1878, Bd. 82, pp 116-136.

⁴² WESSELY J. 1876. *Das Karstgebiet*

⁴³ ÖSTERREICHISCHER REICHSFORSTVEREIN 1880. *Denkschrift*: pp 175-187.

⁴⁴ Marchet Gustav 1899. *Die forstliche Gesetzgebung*. In: Die Geschichte der österr. Land- und Forstwirtschaft und ihrer Industrien 1848-1898, 5 Bde, Wien. Bd. 4: pp 347-365.

the reforested areas against livestock grazing, safeguarding of the remaining woodland, distribution of the common land (pastures) among the farmers and regulation of forest ownership rights, fencing, ban of sheep and goats from common pastures and woodlands, participation of the local people in the afforesting programmes, further education of children and adults, and public relation for the protection of the forests. Public awareness of the improved environmental conditions forced the population to take part in the programme.

DISCUSSION

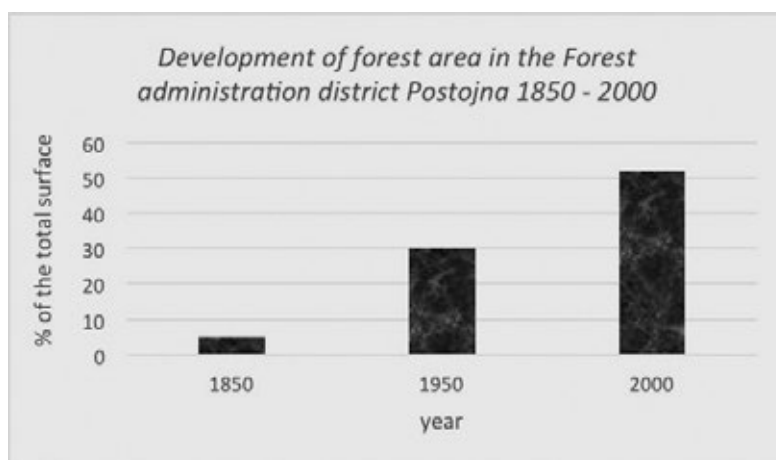
As long as the Republic of Venice was the dominant naval power in the northern Adriatic the forests were reserved (banned) for the advantage of the navy, but open for the domestic use of the farmers. Due to the decrease of the Venetian power, the lost war against Napoleon and uncertainties with regard to ownership rights and forest management methods, and the tremendous demand of the French marine the growing stock had already been reduced, when the Austrian navy started to expand after the Viennese Congress in 1815. When the forest reserve was abolished in 1817 to reduce the famine of the local people the Austrian Navy had to compete with timber merchants on an open market to get the required wood. An inventory from 1847 documented the lack of usable timber. Thus, the careful safeguarding of the remaining forests was of great importance. One option was to reforest the degraded and barren land.

In the outgoing 19th century the re-cultivation of the barren land was one of the most important tasks of that time. It was one possibility to stop the stream of migration in preserving the native country's capital for the need of the locals and to safeguard and create the means of the population's subsistence. »The homeland still has room for industrious hands and for the

promotion of domestic prosperity. The field of work has not only to be searched on the other side of the ocean«. ⁴⁵ When wasteland could be opened for cultivation it was considered as a peaceful conquest of the land with the arms of the plow. Particularly in those areas, where forest grazing of goats could be avoided, the increase of woodland was remarkable. At present Istria is the largest green oasis of the North Adriatic region: The forest cover is 35% in average, however in the hinterland of Trieste forest cover increases to 52% (see figures 9, 10, 11, 12)

In History not the individual ideas and actions have an impact on the environment, but the long-lasting and comprehensive, the institutionalized behaviour over a long period of time. The increasing demand for shipbuilding timber in the upper Adriatic region alone did not lead to extensive deforestation of the coastal regions. These took place by population increase, the practiced management, by excluding the local population from the previously practiced use and by insecure property and ownership rights. By enforcing forest protection in conflict with traditional forest uses of the locals, forest policy made them enemies of the forest. The problem was aggravated by the great poverty of the population, which had hardly any other resources besides intensive grazing.

Figure 9



⁴⁵ JOHANN Elisabeth 2001. *Zur Geschichte des Natur- und Landschaftsschutzes*, pp 41-60.

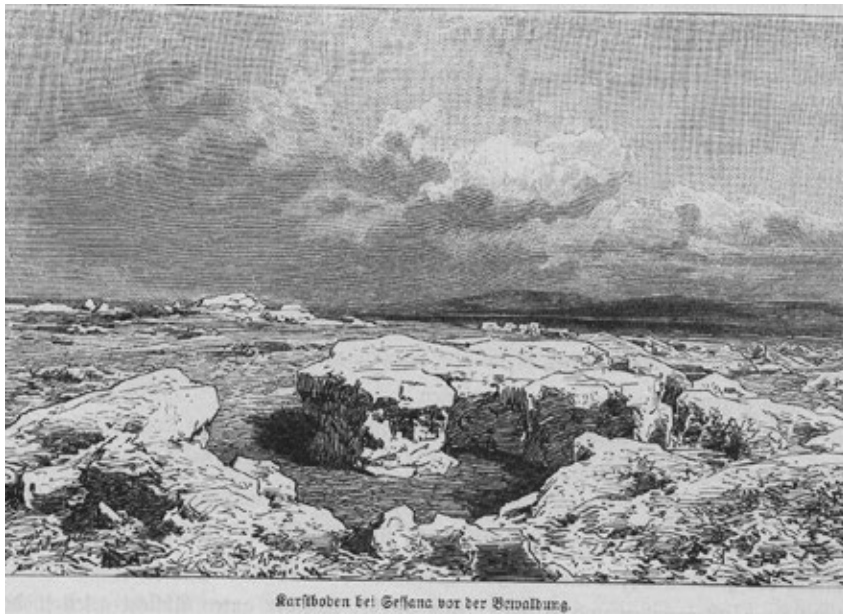


Figure 10 *Sezana 1880*
(Source: Eduard von Lichtenfels)*

* GUTTENBERG Hermann
v. 1891. *Forstwesen in
Istrien und Triest*. In. Die
Österreichisch-ungarische
Monarchie in Wort und Bild.
Das Küstenland. Wien: k.k.
Hof- und Staatsdruckerei, pp
333-362



Figure 11 *Sezana 2000*
after landscape restoration
(Photo E. Johann)

CONCLUSION

As fast as the forest can be destroyed, as laborious and tedious is its recovery. Silviculture of the Mediterranean countries has to face great difficulties as a result of the unfavourable environmental conditions (i.e. low precipitation and its unfavourable seasonal distribution, summer drought, heavy wind, soil erosion after heavy autumnal rainfall particularly on slopes). In addition, all these countries were the place of early civilizations whose populations largely took advantage of the forest resources. To make afforesting activities a success the right choice of appropriate species is necessary, the observation of suitable planting methods and a special care in the first two years, which mainly refers to tillage and artificial irrigation, an indispensable necessity.

Zednik, in his 1972 work on afforestation in Morocco, recommended that, in addition to the efforts to restore the barren land, one should primary focus on those forest areas which, with relatively modest expense, could be saved from extinction, where degraded forest stands could be improved and where

Figure 12 Greening
Istria: San Donat, up
the Mirna valley 2018
(Photo E. Johann)



the barren areas could be afforested.⁴⁶ He also noted that silvicultural measures have only sustainable successful effects if they are able to solve the grazing problem. Comparing these conclusions with those formulated in the memorandum of the Austrian Forest Association in 1880 by the representatives of science and practice, one has to give great credit to their comprehensive approach which was based on in-depth research, application of the scientific knowledge of that time but also including traditional and local experiential knowledge.

SAŽETAK

Austrijska ratna mornarica datira još iz 16. stoljeća, no proširila se u prvim desetljećima 19. stoljeća. Prije početka Drugog svjetskog rata mornarica je bila na vrhuncu i rangirana kao **šesta** na svijetu. Kraj Austrougarske monarhije značio je istovremeno i kraj njene mornarice koja je raspuštena 1918. godine. Samo su neki ratni brodovi ostali kontrolirati dijelove Dunava, a 2006. godine završili su službu. Najvažnije luke bile su Trst i Venecija (danas u Italiji), te Pula i Rijeka (danas u Hrvatskoj). Rad se bavi opskrbom drvom za potrebe austrijske mornarice u prvoj polovici 19. stoljeća, te istražuje učinke sve većih zahjeva na oblikovanju kulturnog krajolika sjevernog Jadrana. Posebno se raspravlja o gospodarstvu **šumom** uzimajući u obzir društveno-ekonomske i društveno-ekološke aspekte, te radne planove za obnovu krškog područja. Iako danas drvo nije važno za brodogradnju, oblik **šumovitog** krajolika u zaleđu Trsta, Rijeke i Senja, te Istre **živi** je svjedok povijesnih međuzavisnosti mora i kopna.

⁴⁶ Zednik Friedrich 1972. *Aufforstung in ariden Gebieten*. Mitteilungen der forstlichen Bundesversuchsanstalt Wien, Heft 99, 1972 Österr. Agrarverlag Wien, pp 2-3.

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Greening Istria: San Donat, up the Mirna valley 2018 (Photo E. Johann)

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