

Society of Irish Foresters
76th Annual Study Tour
The Federation of Bosnia and Herzegovina

24th – 28th September 2019

On the afternoon of Tuesday, 24th September, 42 Society members departed Dublin Airport to begin our first study tour to Bosnia and Herzegovina (BiH) and arrived late that night in Split, Croatia.

Bosnia and Herzegovina is about 70% of the size of the Republic of Ireland. It has a population of 3.7 million which is much lower than before the Balkan War as a result of large scale population displacement. It has 63% forest cover (3.2 million ha). However, almost 400,000 ha of its forests cannot be accessed because of suspected landmines. Approximately 68% of the forests are publicly owned and 32% are privately held. During the war years in the 1990s it lost over 2,500 ha of forest annually through illegal felling. The dominant species are beech (41%), fir (19%), spruce 15%, oak (6%), pines (6%) and other species (13%). While it has almost four times greater forest cover than Ireland, its annual timber harvest is about the same as Ireland's. The main reasons for this low harvest are difficult access, extremely steep terrain, poor road infrastructure and a low level of investment in harvesting technology.

Except for a narrow (20 km wide) coastal strip which gives it access to the Adriatic Sea, the country is landlocked. It is bordered by Croatia to the north, west and south, by Serbia to the east and by Montenegro to the southeast. In the central and eastern interior of the country the topography is mountainous; in the northwest it is moderately hilly while the northeast is predominantly flatland. Like its neighbours from the former Republic of Yugoslavia, Bosnia and Herzegovina was ruled by the Romans, Venetians and Habsburgs, and spent much of the 20th century under communist rule. All of these regimes have left their legacies on this interesting and diverse country.

Although it is a relatively small country, there are three distinct climatic zones. It has a Mediterranean climate along its narrow coastal strip, a more mountainous climate in the hilly and mountainous west-central area (mainly because of elevation), while it is continental, with cold winters and hot summers, on the northern plains. Virgin forest is found in many areas of the country especially in the inaccessible ravines of the central mountains.

For this tour we were very fortunate to have Ratko Matošević as our tour guide. Ratko is a senior officer with the Croatian Forest Service in Zagreb and has extensive

experience and knowledge of forestry practices in the Balkan countries. He did an excellent job in guiding us through the byzantine complexities of Balkan economics, geography, geology, history, people, religions, politics, soils and, of course, forestry. Regular tour attendees will remember Ratko as our guide in Croatia in 2009.

Overnight: Hotel Bellevue, Split, Croatia

John Mc Loughlin, Tour Leader

Wednesday 25th September

After an excellent breakfast in the Hotel Bellevue, followed by a stroll around the pleasant city of Split, we travelled south towards the border crossing into Bosnia and Herzegovina. As we left the forests of the Marjan Hill behind us, our tour guide, Ratko Matošević, impressed upon us the vulnerability of Europe's forests to insect pest and disease damage. The previous year Cyclone Friederike had caused havoc in Europe levelling some 17 million m³ of timber in Germany, together with a further 10 million m³ in Austria, France, Benelux and northern Italy. The situation was exacerbated by a prolonged drought, followed by bark beetle infestation of an estimated 10 million m³ of timber. The forest of Marjan has been infested with bark beetles for more than two years. Unlike other European countries that can harvest damaged forests within months of an outbreak, the authorities in Croatia struggle to meet the challenge of felling and replanting the infected forest. It is estimated that one third of Croatian forest trees will need to be removed after destruction by two spruce bark beetles, *Ips typographus* and *Pityogenes chalcographus*.

We travelled onwards towards Highway E65 and then headed southeast, keeping the Dinaric Mountain range with its largely karst limestone terrain to our left. Typical of all karst limestone areas, it has very poor water retention and, judging by the impoverished tree cover, it is an inhospitable environment for forestry. Imagine Ireland's Burren National Park, but much more extensive. In contrast however, the Croatian karst has a greater tree cover, but these species are unproductive. Much of the erosion in this area is manmade – the result of centuries of over exploitation for charcoal production which was once a major fuel source here. In addition, large scale felling by the Venetians accelerated its deterioration to almost naked karst.

We soon arrived at the border crossing into Bosnia and Herzegovina at Gornji Vinjani where we waited patiently as our passports were checked. Passports are checked on both sides of the border, but happily the queues moved fast and we entered Bosnia and Herzegovina. This mountainous country is dominated by the Dinaric Alps. It has only 27% arable land and 63% forest cover. Although Bosnia and Herzegovina has an area of 51,197 ha – about size of Munster, Leinster and Galway – it boasts 3.2 million ha of forested land, more than four times the forest area of Ireland. Yet, its annual harvested production (3.9 million m³) is about the same as Ireland's. The

reasons it harvests just a little over a quarter of its annual increment of 14 million m³ include difficulties with access, a poor forest road infrastructure and under investment in harvesting technology, as well as having a high percentage of low-yielding or non-productive forests.

The timber processing and manufacturing sectors are fragmented and outdated, but a 2015 FAO report notes that increased export revenue from higher added-value subsectors such as furniture, prefabricated houses and other wood products “is especially encouraging”. Bosnia and Herzegovina does not have a central forestry policy-making body as the country is still divided socially and politically.

Our first stop of the day was just a short distance from the border at a beech (*Fagus sylvatica* L.) forest located in West Herzegovina Canton. We were welcomed by the local state company foresters, including director Ante Begić and forester Andrija Bušić. They provided an overview of forestry in the country and in their district. Harvesting operations are “motor-manual” and rely on horse or tractor extraction. Forest management could best be classified as “light touch” with continuous cover forestry (CCF) the favoured silvicultural practice as clear-cuts have been banned since 1971. Although CCF may present challenges in plantation forests, it is well suited to many of Bosnia and Herzegovina’s forests, especially its coppiced beech woods. Director Ante outlined plans for his district. It has an annual income of BAM400,000 (€200,000) which appears low but he pointed out that 85% of the district is unproductive shrub and understocked or cleared forests. The remainder comprised coppiced beech forest as well as small areas of natural pine including Bosnian pine (*Pinus heldreichii* var. *leucodermis* (Ant.) Markg. Ex Fitch.), which is a protected species.

Coppicing was the silvicultural system employed in this beech forest whose management dated back to the 15th century. While it had been exploited in the past and suffered overcutting and overgrazing, it has since been carefully restored and is now well stocked and in places, probably overstocked. The average age of the trees is between 35 - 50 years. In all, there are 3,500 ha of coppiced beech in Ante’s district carrying an average standing volume of 100 m³ ha⁻¹. The annual yield is 4.7 m³ ha⁻¹ or 16,440 m³ for the total coppiced beech forest, but the annual allowable cut is only 3,300 m³ or 0.9 m³ ha⁻¹. Most of the beech thinnings are used for firewood, though some are converted to wood pellets.

Beech is a major broadleaved species in Bosnia and Herzegovina. Foresters in Ireland now have limited experience of beech coppicing and management, although for a time beech was the most widely-planted hardwood in Ireland, forming 7% of the annual afforestation programmes during the 1940s, resulting in 10,000 ha of beech woods in Ireland.

Our next stop was in Blidinje Nature Park, where we visited the Franciscan’s Saint Elijah’s Church and monastery complex which has a retreat house and an art gallery.

Blidinje Nature Park (36,000 ha) is located on a high plateau area with an average elevation of 1,200 m. There karst forest merges with mountain forest and changes from natural beech stands in the lower areas to pine in the uplands. The park contains approximately 200 ha of preserved Bosnian pine which the group discussed along with other pines in the area, including Aleppo pine (*Pinus halepensis* Miller), Austrian or black pine (*P. nigra* subsp. *nigra* Arnold) and the pine with the widest distribution in Europe – Scots pine (*P. sylvestris* L.).



Figure 1: The wooden steeple of St. Elijah's Church at the Franciscan monastery complex in Blidinje Nature Park. This wooden structure was designed to enhance the musical tone of the church bells.

Moving onwards, we travelled west from Blidinje Nature Park past the town of Jablanica where we crossed the Neretva River or “Nera-Etva” (Divine River) as the Romans named it. We skirted the artificial Jablaničko lake, created by the Neretva, and crossed the river again at Konjic before heading northeast for Sarajevo, the country’s capital. Nowadays, there are few reminders of the catastrophic war that raged in Bosnia and Herzegovina from 1992 to 1995. Some bombed out shells of buildings remain, but for the most part, visible signs of the conflict are fading from the rural and urban landscape as towns and cities are being rebuilt and restored. Bosnia and Herzegovina applied for EU membership on 15th February 2016 and joins the queue of applicants from the Balkans.

After Bradina, we left Herzegovina-Neretva Canton and entered Canton Sarajevo, where we spent the night at Hotel Bosnia in Sarajevo.

Overnight: Hotel Bosnia, Sarajevo

Donal Magner

Thursday 26th September

Bosnia and Herzegovina is a Parliamentary Representative Democracy which has responsibility for formulating and executing all matters of foreign, economic and fiscal policy. The country is divided into two distinct entities, namely the Federation of Bosnia and Herzegovina and Republika Srpska, each of which is politically autonomous to a large extent. The population of the former comprises mainly people of Croat and Bosniak ethnic origins whilst the latter is largely of Serbian ethnic origin. Each entity has its own constitution. The Federation of Bosnia and Herzegovina is further divided into 10 cantons or municipalities, each of which has its own administration. Five of these cantons have Bosniak majorities, three have Bosnian-Croat majorities and two are ethnically mixed. As a result, there is no central authority for making forestry policy and forest management and planning are formulated at local canton level. The forest authorities report to their own canton within the Federation.

We departed Hotel Bosnia in central Sarajevo and took the western route out of the city into the surrounding mountains, the Dinaric Alps. On our journey to the mountains we passed close to Sarajevo airport. During the recent war a tunnel was excavated underneath the UN-controlled airport which linked Sarajevo with another Bosnian-held territory. This tunnel was a lifeline for the beleaguered citizens of Sarajevo as it was used to transport supplies of food, armaments and humanitarian aid into the city, which had been cut off by Serb forces. We travelled through a section of Republika Srpska on the way to the Igman and Bjelašnica mountain area where the forests are owned by the Canton of Sarajevo.

Our first stop was at a roadside carpark which overlooked the valley of Spomenik

Igmanskog Marša. A large plaque at the entrance to the carpark commemorated the deaths of a contingent of partisan fighters during World War II. Such are the extremes of temperature in this deep valley that they had all frozen to death as they attempted to cross the valley on a night when temperatures had plummeted to -49°C . The forest was 70,000 ha in extent and was sub-divided into 151 compartments. Individual management units vary greatly in size and units as large as 9,000 ha were not uncommon. On the valley's lower slopes beech was the predominant species while the forest composition changed to a mixture of beech and silver fir at approx. 1,000 m elevation, and to purely coniferous species above 1,500 m. Species such as Norway spruce (*Picea abies* (L.) H. Karst.), sycamore (*Acer pseudoplatanus* L.) and maple (*Acer* spp.) were constituents of the mixed forests while silver fir (*Abies alba* Mill.) and Norway spruce dominated the coniferous forests growing on the higher slopes of the valley. Large areas of these forests were badly damaged by a catastrophic storm in 1995 when more than 200,000 m³ were blown. It took four years to clear the blown timber. After the war illegal felling of timber became a significant issue. However, infestation by bark beetles is now the main problem.

At the next stop we were introduced to Huseinović Osman and Rizo Tabaković, both of whom work for the Forestry Department of the local canton, and also to Professor Admir Avdagic, from the Faculty of Forestry at the University of Sarajevo.



Figure 2: The primeval forest of Ravna vala, southeast of Sarajevo in Bosnia and Herzegovina, where silver fir and beech are the two main species.

This faculty was established in 1949 and in 2019 there were c. 300 students enrolled. We visited the nearby primeval forest of Ravna vala. En route we passed the ruins of a bombed-out hotel which had been built for the 1984 Winter Olympics in Sarajevo. However, by and large throughout Bosnia and Herzegovina, visible signs of the conflict are being erased from the landscape and the country has embarked on an ambitious programme of restoration and re-building.

The primeval forest of Ravna vala was located at an elevation of 1,375 m. Beech and silver fir were the main species while maple, sycamore and Norway spruce are significant minor species. Several long-term research studies were being conducted in this forest. In a large control plot there was no management intervention while the surrounding forest area was managed in accordance with CCF principles. However, some areas of the forest cannot be accessed because they have not yet been cleared of war-time land mines. Staff and students from the faculty of Forestry in Sarajevo monitor and record all activity in the forest. In the control plot, each tree is GPS located and is measured every five years. Biodiversity levels are also measured. Surprisingly, overall biodiversity levels are greater in the CCF area than in the untouched control plot. Clearfelling has been prohibited here since 1971 and felling coups can be no larger than the height of surrounding trees (c. 55 m). There are six other primeval forests in Bosnia and Herzegovina.



Figure 3: *A shattered stump and decaying bole of silver fir make way for beech which has moved into take over the clearing - all part of the continuous circle of life in the primeval forest of Ravna vala.*

The forest carries a very impressive stocking of $667 \text{ m}^3 \text{ ha}^{-1}$. Harvesting is carried out using motor manual labour and extraction by horse and skidder. Most timber sales are by contract agreements with sawmills, while there is also a significant local firewood market. The better quality timber is sold by auction. Approximately 75% of the timber is harvested by the state forest staff with the remainder harvested by contract workers. No timber is sold standing.

We departed for the ski resort of Bjelasnica where several competitions of the 1984 Winter Olympics were held. This resort was destroyed during the war but has now been rebuilt and is an important element of the county's efforts to rebuild its economy through tourism. A viewing point at the head of the ski run provided a panoramic view of the mountainous terrain and gave an appreciation of the extent of forest cover.

At the forest chalet restaurant in Spomenik Igmanskog Marša, a lavish *al fresco* lunch featuring local cuisine was provided by our hosts. The chalet is owned by the University of Sarajevo and is used by students and staff while working in the area. After lunch we were addressed by the President of the Bosnian Forestry Association, Refik Hodzic, and by its Secretary, Azer Jamakovic. The Bosnian Forestry Association has 1,200 members and publishes an annual gazette and a scientific journal.



Figure 4: The ski resort of Bjelasnica was an important competition venue during the 1984 Winter Olympics. On the piste - Donal Magner, Joss Lowry and Gerry Murphy wait patiently for the snow!



Figure 5: Refik Hodzic, President of the Bosnian Forestry Association, receives a presentation from Ken Bucke, President of the Society of Irish Foresters.

After lunch, we returned to Sarajevo and later that evening were brought on a walking tour of the city where there is still much evidence of war damage from the siege which lasted from April 1992 to February 1996. Many buildings there remain pockmarked by bullet and mortar holes. Our tour included a visit to the restored Markale Market Place where 111 people were killed and over 200 injured during the siege. Our final stop on this fascinating tour was at the spot where the Archduke Franz Ferdinand was assassinated on 28th June, 1914 - an event that sparked the First World War.

Overnight: Hotel Bosnia, Sarajevo

Pacelli Breathnach



Figure 6: *The upper floors of many buildings are still pock-marked with bullet holes - stark reminders of the devastation endured by the city and its residents during the four-year-long siege.*



Figure 7: The rebuilt Markale Market House which is now a national monument.

Friday, 27th September

Following a very hot afternoon spent exploring the historic city of Mostar, which straddles the River Neretva, we travelled south for several hours to cross the border back into Croatia, then through a narrow coastal strip of Bosnia and Herzegovina before returning to Croatia again to visit the arboretum at the coastal town of Trsteno. Established in the early 15th century, it is reputed to be the oldest arboretum in Europe. Our bus stopped in the shade two huge and old oriental plane trees (*Platanus orientalis* L.) which were estimated to be c. 500 years old. The arboretum is 28 ha in extent and was established by the local Gozze family in the late 15th century. This noble and wealthy family had significant shipping interests and all their ship captains were encouraged to bring back seeds and plants from their travels. The exact age of the arboretum is unknown but it was already in existence by 1492 when a 15-span aqueduct was constructed to supply it with a reliable water supply throughout the year. This aqueduct remains in use today. The arboretum has been the property of the Croatian Academy of Sciences since 1948. Unfortunately both the arboretum and the adjoining summer residence of the Gozze family were badly damaged in 1991 by gunboat and air attacks.

The arboretum has an extensive range of tree species; 31% are Mediterranean and European, 22% are Asian and 17% are American. The tallest and oldest trees (approximately 150 years old) grow close to the aqueduct at the back of the garden. These include a maidenhair tree (*Ginkgo biloba* L.), American lime trees (*Tilia americana* L.),



Figure 8: *Stari Most, the 16th century Ottoman bridge over the Neretva River was destroyed during the war in 1993. The rebuilt structure opened in July 2004. (Original artwork by Gerhardt Gallagher.)*

cedars of Lebanon (*Cedrus libani* A.Rich.), tulip trees (*Liriodendron tulipifera* L.), Himalayan cypresses (*Cupressus torulosa* D.Don ex Lamb) and oriental plane trees. Other notable species were Canarian date-palms (*Phoenix canariensis* Chabaud), Chusan palms (*Trachycarpus fortune* (Hook.) H.Wendl.), cork oak (*Quercus suber* L.), camphor trees (*Cinnamomum camphora* (L.) J.Presl.) and eucalypts.

The arboretum also includes a huge variety of ornamental and commercial plants such as lemons and oranges (*Citrus* spp.), pomegranate (*Punica granatum* L.), grape vine (*Vitis* spp.), rose (*Rosa* spp.), jasmine (*Jasminum officinale* L.), rosemary (*Salvia Rosmarinus* Spenn.), lavender (*Lavandula spica* L.) and holy flax (*Santolina rosmarinifolia* L.). A highlight of the garden is the large lily pond and fountain which is overlooked by statues of Neptune and two nymphs.

After our short visit we boarded the bus and continued our journey to Dubrovnik.

Overnight: *Hotel Croatia, Dubrovnik*

Eugene Griffin

Saturday, 28th September

We departed Dubrovnik airport mid-morning for our journey home to Dublin.



Figure 9: Tour participants gathered below the Stari Most for a final group picture.

Third Row (L to R): P.J Fitzpatrick, Enda Coates, Damian Maher, Willie McKenna, Gerry Murphy, Kieran Moloney, Gordon Knaggs, David Hobbs, John Mc Loughlin, Bob Dagg, Neil Browne and Philip Comer. **Second Row** (L to R): Declan Meehan, Ronan O'Keefe, Joe Codd, Aaron Harrington, Eugene Griffin, Michael Moran, Liam Murphy, Benny O'Brien, Gerhardt Gallagher, George Hipwell, Tom McDonald, Mark Hogan, Tim O'Regan, David Knox and Pat O'Callaghan. **Front Row** (L to R): Pacelli Breathnach, Raiko Matošević, Ken McNamara, Eugene McKenna, Ronan Finnegan, Ken Bucke, Sean Galvin, Joss Lowry, Deirdre McGuire, Tony Mannion, Michael O'Brien, Frank Nugent, Owen O'Neill, Gerry Patterson, Eileen Patterson and Donal Magner.