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Editorial

Forests for a Better Future: Sustainability, Innovation and Interdisciplinarity

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Forests offer a solution to climate change through carbon storage and providing ecosystem services and sustainable products. While reducing greenhouse gas emissions are required to address the climate change crisis, restoring and expanding forests increase terrestrial carbon sinks. Therefore, it is critical to manage our forests sustainably. This requires innovative and interdisciplinary research and practices. To address this topical and critical issue, we organized the first International Electronic Conference on Forests (IECF) held in November 2020 under the theme of 'Forests for a Better Future: Sustainability, Innovation, Interdisciplinarity'. The main topics of the Conference included Forest Ecology, Management and Restoration, Forest Genetics, Ecophysiology and Biology, Forests and Urban Forests Sustainability, Forest Inventory, Quantitative Methods and Remote Sensing, Wood Science, Production Chain and Fuelwood, Forest Opertaions and Engineering, and Fire Risks and Other Natural hazards.

While face-to-face conferences provide opportunties to meet, network and socialise, the IECF first edition provided the chance to share recent work when the global pandemic prevented travel and large gatherings. Online conferences have the added benefit of being climate friendly and accessible to all. Participation in the event was free of charge so it was an excellent opportunity for research students and early career scientists to build their connections and profiles with exposure that would otherwise not have been possible in 2020. We thank all contributors for taking part at the confernce. Conference materials are available at the conference website https://iecf2020.sciforum.net/conference/IECF2020 (accessed on 24 May 2022).

A Special Issue was developed and has been published consisting of 20 selected papers presented at the conference. We are delighted to present this book which is a compilation of these selected published articles. The authors are from many countries (Argentina, Germany, Greece, Italy, Japan, Korea, Poland, Portugal, Russia, Serbia, and Spain), from both universities and reseach intitutions. The articles covered many forest trees species (*Abies sachalinensis*, *Alnus hirsuta*, *Betula ermanii*, *Fraxinus mandshurica*, *Lomatia hirsuta*, *Picea abies*, *Picea glehnii*, *Picea jezoensis* var. *microsperma*, *Pinus pumila*, *Pinus sylvestris*, *Populus* spp., *Prunus laurocerasus*, *Quercus serrata*, *Robinia pseudoacacia*, *Salix* spp., *Thuja occidentalis*, *Ulmus davidiana* var. *japonica* and *Triplochiton scleroxylon*).

The articles present research results addressing a wide range of topics relevant to improving forestry practices and sustainability, including forest ecology biocontrol, wood treatments, urban forests, mapping of fire spread and harvesting and logging practices. The articles present topical examples of world-class research activities.

Here, we outline key research activities and highlights of the publications included in this book. Forests were studied as urban ecosystems aimed at recreation, therapy and health for humans [1,2] but also as natural environments placed in urban contexts frequented

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by wild animals. Urbanization has led to severe habitat fragmentation and loss, and has brought humans and wildlife in close proximity, affecting both [3]. The stand dynamics of natural forests associated with the mortality of trees was investigated, estimating survival probabilities using non-parametric methods [4]. Computer vision on forest composition [5] was used to assess the tree types and distribution, helping improve timber stock calculation. Sentinel-2 satellite images from the European Space Agency and modelling allowed the assessment of cumulative risks posed to habitats and were also used in monitoring high-ignition-risk areas, starting from the concept that firefighting success depends on both fire ignition prevention and early ignition detection [6]. Changes in the temperature regime of post-fire and post-technogenic cryogenic soils of Central Siberia were investigated using remote sensing data and numerical simulation results [7]. The pollution stress in Scots pine stands, assessed dendrochronologically, was quantified as disturbances of incremental dynamics and long-term strong reduction in growth [8]. The environmental impact generated by the production of thermal energy was assessed for a poplar short-rotation coppice, considering the entire life cycle [9]. Kühn et al. [10] evaluated the possibility of improving quality wood production in coppice stands of *Lomatia hirsute*. Identification of early bark beetle infestation (e.g., *Ips typographus* and *Pityogenes chalcographus*) was performed by drone-based monoterpene detection testing semiconductor gas sensor arrays under artificial and real-life field conditions [11]. *Robinia pseudoacacia* plantations for the rehabilitation of post-mining lignite areas in northwestern Greece were evaluated in terms of above-ground biomass and deadwood, indicating low biomass accumulation in bruised trees and deadwood, due to their young age (5–30 years) [12]. Blanco and Blanco [13] developed simple volume equations for hybrid poplar plantations in the Órbigo river basin (NW Spain), providing a simple but acceptably accurate tool to empower aging rural owners when estimating standing volume by themselves. The feasibility of a harvesting system for small-diameter trees as forest biomass was investigated in Japan [14]. Environmental sustainability was emphasized by both environmentally friendly forest products for disease control [15] and modified wood with low environmental impact [16]. *Pinus sylvestris* bark represents a rich source of active compounds for products with high added value, such as those that have antifungal, antibacterial, and antioxidant properties. Karličić et al. [15] estimated the antifungal potential of *P. sylvestris* bark through its chemical (water extracts) and biological components (*Trichoderma* spp. isolated from the bark). A reliable prediction of the proportion of standing Scots pine bark is therefore also important in this sense but also for classical use (estimating timber volume without bark) [17]. The influence of log crookedness and taper on stack volume was simulated using a 3D model, which provided compelling results for buyers who can estimate the log content more efficiently than a quick visual assessment [18]. The delivery of forest products from the forest or plantation to the final processing sites can be one of the most cost-effective operations in the forest sector. Finally, Trzciński and Tymendorf [19] and Sperandio et al. [20] deal, respectively, in the transport of large-sized pine log to the sawmill and of biomass products to small-scale plants for energy production.

In summary, the articles included in this book highlight the ecological and economic importance of forests and new technologies for conserving, monitoring and improving forest services and value.

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