

**FORESTRY AND WOOD TECHNOLOGY RESEARCH AND EDUCATION NETWORK
FOR CLIMATE CHANGE ADAPTATION STRATEGIES AND ASFORCLIC–
HORIZON 2020 PROJECT**

**MREŽA ZA RAZISKAVE IN IZOBRAŽEVANJE NA PODROČJU GOZDARSTVA IN LESNE
TEHNOLOGIJE ZA STRATEGIJE PRILAGAJANJA PODNEBNIM SPREMENBAM IN
PROJEKT ASFORCLIC–HORIZON 2020**

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Abstract / Izvleček

Abstract: Seven European universities and research institutions from four countries agreed to collaborate on the ASFORCLIC–HORIZON 2020 project to support the ambitious goals of raising the leading institution’s MENDELU research profile and strengthening its research excellence in the highly demanding field of assessing the impact of global climate change on forests and the bio-based sector. The ASFORCLIC consortium evaluates possible risk factors, predicts their evolution, and develops adaptation strategies for future applications to monitor the impact of global climate change on central European forestry, particularly Czech forestry. Facing the unprecedented challenge of implementing a mobility project during the COVID-19 pandemic, the consortium used strategic approaches and augmented offerings, including successful literature seminars, writing workshops, and advanced data evaluation training largely realized through virtual platforms.

Keywords: Forest–Wood value chain; Climate change; lesson learned; COVID-19; networking; capacity building

Izvleček: Sedem evropskih univerz in raziskovalnih ustanov iz štirih držav se je dogovorilo o sodelovanju pri projektu ASFORCLIC–HORIZON 2020, da bi podprli ambiciozne cilje za dvig raziskovalnega profila vodilne institucije Mendelove univerze v Brnu (MENDELU) in krepitev njene raziskovalne odličnosti na zelo zahtevnem področju vpliva globalnih podnebnih sprememb na gozdove in sektor bioloških surovin. Konzorcij ASFORCLIC ocenjuje možne dejavnike tveganja, napoveduje njihov razvoj in razvija prilagoditvene strategije za prihodnje uporabe za spremljanje vpliva globalnih podnebnih sprememb na srednjeevropsko, zlasti češko gozdarstvo. Ker se je konzorcij soočil z izzivom brez primere, tj. z izvajanjem projekta mobilnosti med pandemijo COVID-19, je uporabil strateške pristope in povečal ponudbo, vključno z uspešnimi literarno-znanstvenimi seminarji, delavnicami pisanja in naprednim usposabljanjem za vrednotenje podatkov, ki je bilo v veliki meri izvedeno prek virtualnih platform.

Ključne besede: vrednostna veriga gozd–les; podnebne spremembe; pridobljene izkušnje; COVID-19; mreženje; krepitev zmogljivosti

1 INTRODUCTION

1 UVOD

Climate change poses new challenges for forestry research and education. In the pursuit of

addressing these challenges, MENDELU–Mendel University in Brno, Czech Republic (coordinator) joined forces with seven European universities and research institutions (AIT–Austrian Institute

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of Technology GmbH; LWF–Bavarian Ministry of Food, Agriculture and Forestry; THUENEN–Johann Heinrich von Thünen Institute–Federal Research Institute for Rural Areas, Forestry and Fisheries; SLU–Swedish University of Agricultural Sciences; TUM–Technical University of Munich; BOKU–University of Natural Resources and Life Sciences, Vienna; and UL–University of Ljubljana) specializing in forestry and wood sciences, under the EU-funded HORIZON 2020 project “ASFORCLIC–Adaptation Strategies in Forestry Under Global Climate Change Impact” with a duration from January 1, 2021 – December 31, 2023. This collaboration, part of the EU “Twinning” programme, primarily aimed at fostering networking and raising academic excellence at Mendel University in Brno. The seven partner universities and research institutions contributed to the strengthening of the partner network through tangible initiatives and, in turn, refined its research methodologies through the insights gained from this collaborative endeavour.

In the Czech Republic, research and education grounded in science within the field of forestry and wood sciences are primarily anchored at two institutions: the University of Life Sciences in Prague and MENDELU in Brno. In 2019, enrolment at these

universities included 1,898 and 1,414 students, respectively, including doctoral candidates, with a third of this demographic being female at both institutions. The consequences of climate change have a significant influence over forestry in the Czech Republic, necessitating comprehensive adaptations across the forestry and timber sectors. In light of this, the ASFORCLIC project has embraced a holistic methodology, delving into climate change adaptation strategies pertinent to forest ecosystems and forestry, wood utilization and its diverse applications, as well as the prevailing political frameworks. This integrative approach serves to forge connections in forestry research among the Czech Republic, Germany, Austria, Sweden, and Slovenia.

2 CZECH FORESTRY IN CLIMATE CHANGE

2 ČEŠKO GOZDARSTVO IN PODNEBNE SPREMEMBE

The Czech Republic stands as a major wood-producing nation within Europe, with forests covering one-third (33.9%) of the country’s landscape, predominantly characterized by Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*). Analogous to the situation in Europe in gener-



Figure 1. Research–educational activities and the ASFORCLIC logo, designed by MENDELU design student Filip Dočkal.

Slika 1. Raziskovalno-izobraževalne dejavnosti in logotip ASFORCLIC, ki ga je oblikoval študent oblikovanja na MENDELU Filip Dočkal.

al, climate change with rising average temperatures and extreme weather events is exerting substantial influence on Czech forestry. Owing to the vast quantities of damaged wood derived from salvage logging, logging activities have witnessed a twofold increase – escalating from nearly 16 million m³ in 2015 to 32.5 million m³ in 2019, of which a good 31 million m³ is attributed to softwoods.

Reforestation of areas afflicted by natural disasters necessitates the adaptation of silvicultural concepts. Post disturbances induced by storms, droughts, and bark beetles in numerous sites pose challenges for regeneration, given the substantial changes in temperature and moisture regimes, subsequently affecting soils and microclimates. Pioneer tree species are the first to pave the way for climate-adapted mixed stands, creating the requisite microclimate for the introduction of both native and alternative tree species, aligned with the long-term projections of climate change.

The requisite modifications in silviculture signify substantial transformations for the Czech wood industry, coupled with a considerable need for investment in novel technologies, wood processing, and product development. Most of all, alterations in forest structure necessitate comprehensive communication with the public, and initiatives to amend the legislation governing forests and forestry are essential in this regard. Desirable measures include a redefinition of the term 'clearcutting', a reduction of bureaucracy, government support of less prevalent silvicultural techniques, and a revision of the maximum stand age for regeneration cuts.

3 CAPACITY-BUILDING FOR FORESTRY RESEARCH AT MENDEL UNIVERSITY

3 KREPITEV ZMOGLJIVOSTI ZA GOZDARSKE RAZISKAVE NA UNIVERZI MENDEL

Within the ASFORCLIC project, LWF – which was leading the WP4 – coordinated capacity-building activities aimed at fostering the development of early-stage researchers and employees in science management at Mendel University in Brno. To this end, the ASFORCLIC initiated and designed a diverse array of workshops, seminars, research stays, training sessions, summer schools, and conferences, actively participating in their execution.

This included, for instance, training courses on data management and protection, as well as writing scientific articles or project proposals. Moreover, a mentoring system was instituted for PhD students and postdoctoral researchers at MENDELU in Brno, in which senior researchers from partner institutions extended their support to young and early-stage researchers. The online literature seminar, designed to cultivate scientific discourse and facilitate professional exchange with mentors, was also met with considerable acclaim.

However, forestry research is not only about scientific progress but also practical fieldwork in forests, with wood and people, as well as the forging of interpersonal relationships. To this end, the following three working groups (WGs) were established in the project, with all partner institutions playing active roles in these:

Forest productivity: The impacts of climate change on tree species range, forest health and growth, with special attention to the role of soils

Wood properties and applications: Changes in wood assortments and properties, development of new wood and wood-based materials and applications, analysis of their potential in the bioeconomy

Bioeconomy and policy: Framework conditions for sustainable wood production and improved value creation of forests under climate change

4 NETWORKING CREATES INNOVATION

4 MREŽENJE USTVARJA INOVACIJE

The close collaboration within the WGs of the ASFORCLIC led to joint initiatives. Particularly noteworthy is the WG focused on forest productivity, which, guided by an experimental concept developed by the Chair of Forest Growth and Yield Science in Munich, instituted experimental plots in each partner country. A so-called A-B-C series was established at two meticulously selected sites per country, where 'A' denotes an even-aged mono-specific stand, 'B' is an even-aged mixed stand, and 'C' is an uneven-aged, species-rich, mixed stand. These plots, ranging between a stand age of 50 and 100 years, encapsulate a diverse spectrum of site conditions. The A-B-C series facilitates a comprehensive evaluation of varied silvicultural practices concerning a multitude of ecosystem ser-

vices, spanning climate smartness and stress tolerance to timber quality and stability.

The ASFORCLIC project recognizes that there is also an abundance of tree species in European forests, a great many of which are more adapted than others to changing climate conditions such as drought, extreme temperatures, or floods. Many industrially unfavourable tree species have been reduced or even eliminated as a result of forest management and silviculture, resulting in less stable and resilient forest systems. Man-made monoculture forests, in particular, are currently suffering greatly from the effects of a changing climate, which leads to decreased productivity and increased exposure to disease, disaster, or fire, thus endangering the sustainability of high productivity in many cases. Many lesser-used wood species (LUWS) exhibit an environmental optimum that is, partially now or in the future, considerably more adapted to the projected climatic and site condition scenarios, which may develop as a result of climate change processes. In the list of the suggested LUWS, the ASFORCLIC project includes alder, hornbeam, ash, poplar, mountain ash, and some other *Sorbus* species, or species originating outside the range of our natural forests, such as *Robinia*, European chestnut, walnut, *Platanus*, and several cherry or oak species. The suggested additional and supported enclosure of these LUWS can assist in maintaining the forest environment and bio-based sector, allowing for continued CO₂ fixation and a potential reduction in global warming.

Through the ASFORCLIC project, new doors have also opened for the partners. For example, the exchange of data and knowledge with the participating research institutes has facilitated a Europe-wide evaluation of forest inventories focusing on the growth of beech provenances (Engel et al., 2023). ASFORCLIC has also instigated new impulses within the field of forest policy, exploring how political framework conditions, markets, and the decision-making behaviours of forest owners and managers influence the identification and implementation of suitable adaptation strategies. Important preconditions for forest conversion in both Bavaria and the Czech Republic, assessing aspects relevant to forestry within the European Green Deal, have been analysed, which is another example of the network benefits of this project. The

comparative analysis between countries showed that property rights within the legal framework affecting forest management provide higher decision-making power in Bavaria compared to the Czech Republic. However, due to the evolution of national and European regulations, conditions have exhibited convergence since the mid-1990s, rendering the analysis of forest-relevant objectives and policy instruments related to the European Green Deal significant for both countries (Böhling, 2023; Nichiforel et al., 2020).

5 CONCLUSIONS: LESSONS LEARNED

5 ZAKLJUČKI: KAJ SMO SE NAUČILI

The EU-funded HORIZON 2020 project, ASFORCLIC, has successfully met its set objectives. MENDELU, along with the other participating institutions, have successfully and sustainably forged connections among themselves. The project started amid challenging circumstances during the COVID-19 pandemic, where workshops, meetings, and mutual visits were largely constrained to virtual platforms. Despite the myriad possibilities presented by digital communication, the depth of interpersonal relationships cultivated through direct interaction remains irreplaceable. However, since early-stage researchers were afforded limited exposure to the scientific community beyond their university until the latter half of the project, the project partners employed strategic approaches and augmented offerings, incorporating literature seminars, writing workshops, and advanced training on data evaluation. Navigating deviations from the original work plan in EU projects is inherently challenging. For example, the EU Twinning programme, underpinning ASFORCLIC, does not cover expenses for collaborative field research – a realm where the exchange is most enriching.

Nonetheless, ASFORCLIC's objectives were met by continuously leveraging the institutions' research profiles (i.e. growing capacity, broadening emphasis, international and multisector-oriented methods, and adoption of best practices). In addition, through newly formed research alliances, participation in European policy and trends leading events, scientific networks, and excellent publications in high-profile journals prepared in collaboration with advanced partners, the con-

sortium supported the personal scientific growth of its members (individual researchers' expertise, ability to initiate/perform and capacity to frontier research, scientometric measures, and the amount of funding awarded).

6 SUMMARY

6 POVZETEK

Za reševanje izzivov podnebnih sprememb, ki vplivajo na gozdarsko-lesarske raziskave in izobraževanje, se je MENDELU, Mendlova univerza v Brnu na Češkem (Mendel University in Brno) kot koordinatorica povezala s sedmimi evropskimi univerzami in raziskovalnimi ustanovami z uradnimi angleškimi nazivi: AIT–Austrian Institute of Technology GmbH; LWF–Bavarian Ministry of Food, Agriculture and Forestry; THUENEN–Johann Heinrich von Thünen Institute–Federal Research Institute for Rural Areas, Forestry and Fisheries; SLU–Swedish University of Agricultural Sciences; TUM–Technical University of Munich; BOKU–University of Natural Resources and Life Sciences, Vienna in UL–University of Ljubljana, ki gojijo področje gozdarstva in lesarstva. Združili so se v okviru EU projekta, HORIZON 2020 “ASFORCLIC–Adaptation Strategies in Forestry Under Global Climate Change Impact (Strategije prilagajanja v gozdarstvu pod vplivom globalnih podnebnih sprememb)” s trajanjem od 1. januarja 2021 do 31. decembra 2023. Namen sodelovanja, ki je del programa EU “Twinning”, je predvsem spodbujanje mreženja in dvig akademske odličnosti na MENDELU.

V okviru projekta ASFORCLIC so potekale dejavnosti za spodbujanje izobraževanja mladih raziskovalcev in znanstvenega menedžmenta na MENDELU. V ta namen so ob podpori partnerskih institucij potekale različne delavnice, seminarji, raziskovalni obiski, usposabljanja, poletne šole in konference. Sodelovanje je vključevalo na primer tečaje usposabljanja o upravljanju in varstvu podatkov ter pisanje znanstvenih člankov ali predlogov projektov. Poleg tega je bil za doktorske študente in podoktorske raziskovalce na univerzi MENDELU v Brnu vzpostavljen sistem mentorstva, v okviru katerega so izkušeni raziskovalke in raziskovalci iz partnerskih institucij nudili podporo raziskovalkam in raziskovalcem na začetku kariere. Dobro je bil sprejet tudi sklop spletnih seminarjev o literaturi,

ki je bil namenjen gojenju znanstvenega diskurza in omogočanju strokovne razprave z mentorji.

Ker delo pri gozdarskih in lesarskih raziskavah vključuje tudi praktično in terensko delo, delo z ljudmi ter oblikovanje medosebnih odnosov, so v okviru projekta potekale tri delovne skupine (WG), v katerih so aktivno sodelovale vse partnerske institucije:

1. Produktivnost gozdov: podnebne spremembe in vpliv na razširjenost drevesnih vrst, zdravje in rast gozdov, s posebnim poudarkom na vlogi tal

2. Lastnosti in raba lesa: spremembe v lesnih sortimentih in lastnostih lesa, razvoj novih lesnih materialov ter raba lesa in analiza njihovega potenciala v biogospodarstvu

3. Biogospodarstvo in politika: okviri za trajnostno predelavo lesa in rast dodane vrednosti gozdnih proizvodov v razmerah podnebnih sprememb

Projekt se je začel v zahtevnih okoliščinah med pandemijo COVID-19, ko so bile delavnice, srečanja ter medsebojni obiski večinoma omejeni na uporabo virtualnih platform. Izkazalo se je, da kljub neslutnim možnostim, ki jih ponuja digitalna komunikacija, ostajajo nenadomestljiva osebna srečanja z neposredno interakcijo med sodelujočimi. Mladi raziskovalci so bili v prvi polovici poteka projekta prikrajšani za srečanja s pripadniki znanstvenih skupnosti izven njihove matične univerze. Projektni partnerji so za blaženje pomanjkanja stikov uporabili strateške pristope in razširili ponudbo s prej omenjenimi seminarji in delavnicami, kar pa je zaradi odstopanj od prvotnega delovnega načrta predstavljalo velik izziv.

Kljub temu so bili cilji projekta ASFORCLIC doseženi s stalnim izkoriščanjem raziskovalnih profilov institucij (tj. rastoče zmogljivosti, širši poudarek, mednarodno in večsektorsko usmerjene metode ter sprejemanje najboljših praks). Poleg tega je konzorcij z novo oblikovanimi raziskovalnimi zavezniki, sodelovanjem na vodilnih dogodkih na področju evropske politike in trendov, znanstvenimi mrežami in odličnimi objavami v odmevnih revijah, pripravljenimi v sodelovanju z znanstveno odličnimi partnerji, podprl osebno znanstveno rast svojih članov (strokovno znanje posameznih raziskovalcev, sposobnost za začetek in izvedbo zahtevnih mejnih raziskav in optimalno uporabo virov v danem obsegu financiranja).

Giagli, K., Böhling, K., Mette, T., Kučera, A., Hilmers, T., & Čermák, P.: Mreža za raziskave in izobraževanje na področju gozdarstva in lesne tehnologije za strategije prilagajanja podnebnim spremembam in projekt ASFORCLIC - HORIZON 2020

Menimo, da splošne koristi projekta ASFORCLIC presegajo njegove omejitve. Projekt je spodbudil priložnosti za razširitev perspektiv v vsaj dveh temeljnih vidikih: z razumevanjem gozdarsko-lesarskega znanja in praks upravljanja v različnih državah, in z vključitvijo celotne gozdno-lesne verige, vključno s politično-socialnim okvirom. Oba vidika sta nujna za uspešno uresničevanje podnebnju prijaznih gozdnogojitvenih konceptov po vsej Evropi, kar ugodno vpliva na sedanje in prihodnje sodelovanje univerze MENDELU v projektih, ki jih financira EU. V celoti gledano je projekt znatno povečal raziskovalno odličnost univerze MENDELU in jo uveljavil kot vodilno evropsko raziskovalno središče ter vozlišče znanstvene mreže s poudarkom na posledicah podnebnih in globalnih sprememb za gozdarstvo in lesarstvo.

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