Introducing a MSc program ‚Biodiversity in Caucasian forests'

University of Applied Sciences Erfurt (FHE), Ilia State University (ISU)

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Contact information of the submitting institution:

Prof. Dr. Frank Bohlander
Fachhochschule Erfurt
Berufungsgebiet Waldschutz und Ökologie
Leipziger Straße 77
D-99085 Erfurt, Germany
Phone: 0361 6700-4273
Fax: 0361 6700-4263
e-mail: frank.bohlander@fh-erfurt.de

Ökologischer Exkurs auf Deutsch: Georgien befindet sich am östlichen Rand Europas und war während der Eiszeit ein Refugium für viele europäische Tier- und Pflanzenarten, die sich dort stetig an die Klimaveränderungen anpassen konnten. Heute weist das Land zwei Regionen auf, die als globale ‘Biodiversität-Hotspots’ bezeichnet werden (Olson & Dinerstein 1998). Georgien hat sich 2015 im Klimaschutz-Übereinkommen von Paris verpflichtet, die Fläche von Schutzgebieten von 0.5 auf 1.3 Millionen ha zu erhöhen (UNECE 2018). Wirtschaftswald soll multifunktional bewirtschaftet werden. Vorrangige Ziele sind Brennholzversorgung, Trinkwasserbereitstellung und Schutzwald gegen Überschwemmung und Erosion. In den vergangenen drei Jahrzehnten haben Korruption und illegale Holznutzungen einen Teil der Wälder bereits degradiert (UNECE 2019). Umso wichtiger sind jetzt der Erhalt der Schutzgebiete und die Demonstration nachhaltiger naturnaher Waldbewirtschaftung (z.B. in der Nähe von Nationalparks und Siedlungen oder in Landschaftsschutzgebieten).

Initial situation

DAAD, GIZ and several other German stakeholders (NGOs) endeavor for nature and biodiversity protection as well as for a sustainable forest management in Georgia. The establishment of a Master study with a Forest study block at Ilia State University (ISU) by DAAD let to the contact between ISU and Fachhochschule Erfurt (FHE) “Studiengang Forstwirtschaft und Ökosystemmanagement”, and leading to a cooperation agreement in 2019. Prof. Dr. Frank Bohlander is teaching since 2018 in the existing forest study block at ISU. Between him and the German DAAD longtime lecturer Prof. Dr. Lars Drössler arouse the plan to improve, and extend the existing study block to a full master program bridging biodiversity (assessment and protection) and sustainable forest management. By analyzing differences between managed forests and nature reserves, students will see the effects of human interventions. They should be able to evaluate them and to use methods to reduce the impact of forest utilization to a minimum.

Problem and justification in terms of development policy

Sustainable land-use includes protected areas and landscape restoration in rural landscapes in order to conserve biodiversity and protect remnants of natural forests and semi-natural ecosystems of genetically highly divers animal, plant and fungi species adaptive to changing climate and growth conditions. In the Caucasus, the Emerald network of protected areas outside the EU (following the Bern Convention, and equivalent to Natura 2000 areas within the EU) includes new established National parks, protected landscapes and other protected areas like large-scale eco-corridors across three countries: Georgia, Armenia and Azerbaijan. The Georgian government has ambitious plans to conserve biodiversity by an increase of the area of protected forests from 10 to 50% (UNECE 2018) which will also increase unsustainable management practices like illegal harvesting in managed forests and protected areas. The current demand for firewood is already very high and the main reason for illegal cutting (Garforth 2016).

The situation hampers an introduction of an internationally required National biodiversity monitoring systems (NBMS) and sustainable forest management (SFM) which has been largely supported by the German government and other stakeholders for several years. In Georgia and worldwide the protection of biodiversity inside forest land can only be achieved by a combination of reserves and a sustainable close to nature forest utilization but academics with a broad knowledge in protecting biodiversity and forest management with practical experience in both fields are lacking. The proper implementation is crucial to maintain and promote biodiversity in the long-run while rural areas and product-chains can develop in line with the sustainable development goals of the 2030 Agenda to reach the following biodiversity goals, if possible:

- Intended Nationally Determined Contributions (INDC)– Expanding protected areas system to 1.3 million ha comprising at least 1 million ha of forest;
- National Biodiversity Strategy and Action Plan of Georgia 2016-2020 (NBSAP) – Improving management of natural habitats and protection of forest biodiversity through best practices of sustainable forest management;
- National Environmental Action Plan 2017-2021 (NEAP) – Promotion of sustainable management of biodiversity, protection and prevention of the loss of species and habitats, expansion of protected areas network and management practices;

- Agriculture and Rural Development Strategy and Action Plan of Georgia 2021-2027 – Sustainable use of natural resources, conservation of ecosystems and adaptation to climate change;
- Ecoregional Conservation Plan 2021-2025 (ECP) – Elimination of illegal logging and sustainable management of forests taking into consideration potential impact of climate change and goals of biodiversity conservation.

However, there are gaps between National biodiversity strategies and nature management practice to promote biodiversity values at landscape and stand level. The vast majority of forests (globally, and in Georgia) are neither strictly protected nor intensively managed for wood production (Lindenmayer et al. 2012, Freer-Smith et al. 2019 with case study Georgia) while forest management decisions affect biodiversity and ecosystem services (Felton et al. 2017). Both, applied conservation science and forest sciences including modern forest and nature conservation practice would benefit from bridging these two scientific fields (see also Roberge et al. 2013).

Georgia faces the same problems: the academic education offers studies in the field of nature conservation / biodiversity assessment, etc. and forest management. As pointed out, up to now a serious attempt to overcome this disadvantage is lacking in Georgia. Moreover, since the collapse of the Soviet Union, the forest studies in Georgia are by far to theoretically to match the demands for practice oriented and trained higher forest staff. By bridging biodiversity conservation and forest management, the proposed MSc. program can overcome this disadvantage. By introducing practice-experienced teachers, field trips and internships, the study program will give the graduates broad scientific knowledge and practical training. The students will be in close contact with practitioners who are familiar with the local context where they are working. Addressing sustainable development goals like SDG 4 (Quality Education) and SDG 15 (Life on Land), the EU commission highlighted the importance of sustainable forest management (hereafter SFM) on scientific foundation (EUCom 2019). There is no doubt that climate change and biodiversity conservation are global challenges that have to be addressed by alliances between different stakeholders to create robust knowledge for ecosystem managers who will be capable of identifying the best land-use alternatives for the well-being of people while advocating for nature and biodiversity values (Spathelf 2009).

The University of Applied Sciences Erfurt (FHE) has the competence in teaching applied forest ecosystem management practices. Therefore, the professors have gathered practical forest management experiences before their appointment and/or introduce practitioners to their classes or visit them in the forests to demonstrate the gap between theoretical and practical solutions. Over decades practical training is an important part in the education of higher service forest staff. The knowledge of the scientific background and it´s practical limitation enables and promotes the absolvents to mediate between different opinions and groups because they have received a broad academic and social education. In 2020, FHE introduced the dual Bachelor study program ‘Forstwirtschaft und Ökosystemmanagement’ in collaboration with the state forest administration ThüringenForst, HessenForst and the federal forest service to fulfill the demands of the largest public forest owners in Germany. Students will be employed by the state forest service and receive a monthly payment. They are obliged to work for the state forest service during vacations. This gives them a practical on the job training from the beginning of their academic career.

At Ilia State University (ISU) in Tbilisi, the Master program ‘Nature protection and forestry’ was re-accredited in summer 2020. The program was initiated by DAAD in 2012 to teach nature resources management with adequate biodiversity monitoring and ecological field methods under the unique landscape settings of the Caucasus. Since then, the University of Göttingen (UGOE) and FHE were involved in annual teacher and student exchange to develop higher forest and environmental education. FHE and UGOE have signed up-to-date Memoranda of Understanding with ISU and collaborate closely.

Still the graduates of various study programs at the School of Natural Sciences and Medicine at ISU, particularly at the Institute of Ecology are educated quite theoretically, so they often lack practical skills to evaluate e.g. the forwarded strong reservations of both sides because they face a lack of

practical nature conservation as well as of forest management. Therefore, FHE and ISU aim to increase their teaching capacity by joint courses and practitioners with the competence to manage biodiversity and forest ecosystems in locally assigned training and assessment areas as illustrated in Figure 3 below. The project is supported by relevant agencies of protected areas and forest management bodies in Georgia and Thuringia, and will extend the existing collaborations with UGOE and Batumi Shota Rustaveli State University in Adjara.

Direct target groups are the Adjara Forest Agency (AFA), the Agency of Protected Areas (APA), the Georgian Ministry of Environmental protection (MEPA), the Georgian National Forest Agency NFA, Tbilisi municipality forest, and the German development agency GIZ.

Project objectives

1. **Accredited MSc study program Biodiversity in Caucasian forests** with aligned internships and online courses to study, protect and manage forest ecosystems for more efficient biodiversity conservation and sustainable land-use
2. Establishment of **6 permanent biodiversity research plots** for training, research and long-term monitoring

The proposed project will provide the development of a full-scale MSc program in Forest sciences. ISU will offer exclusively an applied master study focusing on biodiversity and forestry. Moreover, it will assure the smooth transition from the current DAAD long-term docentship (2017-2022) towards the envisaged coordination by Georgian scientists, still with support by German universities. Three central topics will guide the project activities: 1) Evaluation of scientific biodiversity differences between unmanaged and managed forests, buffer zones and eco-corridors to advance local knowledge about main drivers of biodiversity losses, 2) Rehabilitation measures to regain biodiversity in exploited forests due to local demands for fire wood incl. possible strategies to set up forest utilization schemes fulfilling the local demands and nature preservation, and 3) Development of up-to-date strategies to evaluate potential utilization strategies for managed forests.

Moreover, the study should recruit more international students for ISU. German students i.e. will have the opportunity to study and carry out research in order to help to protect biodiversity in developing countries. They will bring new ideas, opinions and attitudes towards forestry to Georgia that will give Georgian students a possibility and need to deal with these. FHE can offer their students (1) a possibility to visit forests close-to-nature and gain an insight view in biodiversity research as well as (2) studying some time in Georgia bringing back new ideas for biodiversity protection to Germany. At ISU, international student exchange with the neighboring countries Armenia and Azerbaijan facing similar problems is also a high priority. ISU administration would fully support this project.

A new Forest Code was recently adopted and will be in place from January 2021, requiring adequate certificates of forest education to manage forests sustainably (Figure 1). The obtained MSc. degree in ‘Nature resources’ and the current study block ‘Forest sciences’ is not sufficient to work as forest manager or specialist in managed forests. Therefore, ISU and FHE want to further develop existing forest relevant courses and new courses by the proposed project. Based on biodiversity monitoring required in Georgia (Figure 1) and larger training areas (Figure 3) biodiversity protection will be part of teaching ecologically sustainable forest management which requires not only ambitious policy papers but especially the knowledge and management skills of advanced silviculture, of modern forest planning tools, and considering the current and future possibilities to identify endangered species and important habitats. Also, FHE students and teachers can learn and imagine how European forest biodiversity was developing in evolutionary time scales during this project, for example from the ongoing Barcoding of Life in Georgia and Armenia (BMBF infrastructure project CaBoL 2020-2022 led by ISU). We also want to improve silvicultural methods by pioneering trials to manage uneven-aged and mixed forests with higher proportions of habitat trees and coarse woody debris (Drössler 2015).

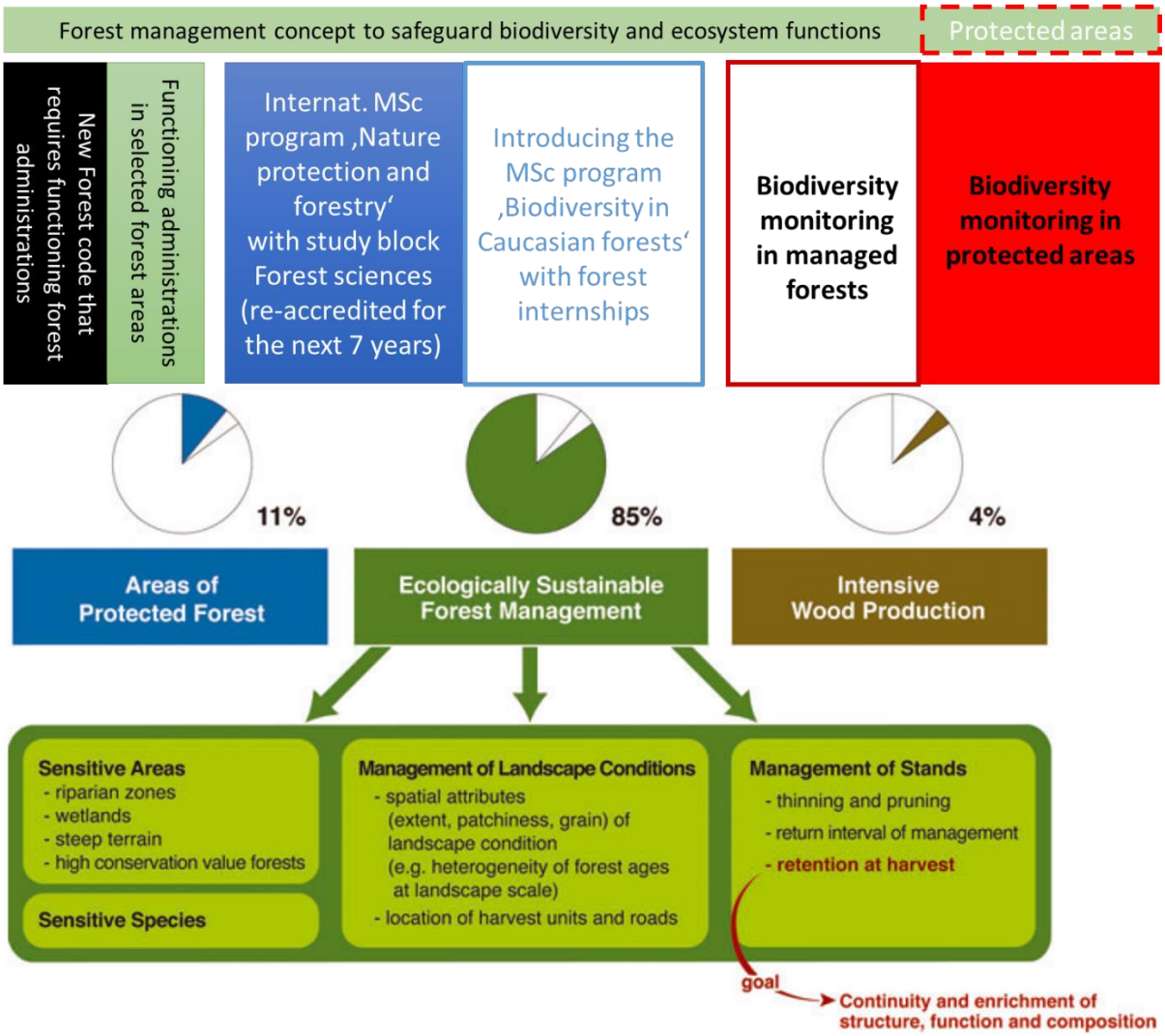

Fig. 1. Concept idea to fill the two white rectangles by teaching, monitoring and research of forest ecology and biodiversity during the proposed project. The lower part of the graphic with current global proportions of protected forest areas (11%) and forest areas for ecologically sustainable management (85%) and intensive wood production was taken from Lindenmayer et al. (2012).

To study and gain such advanced professional knowledge, it needs a large proportion of field teaching in the forests. The current efforts of the Georgian government to initiate a long-term biodiversity monitoring system anchored in the systematic grid of the currently conducted inventory of National forests provides an excellent opportunity to develop both quality teaching and the future long-term biodiversity monitoring system on a scientific foundation (designed like environmental protection programs in other countries, e.g. https://www.slu.se/en/Collaborative-Centres-and-Projects/nils/). These efforts we want to join in order to strengthen biodiversity research in higher education. To understand both the needs for sustainable forestry and such a monitoring system, young Georgian students need forest internships which will motivate them to obtain a MSc. degree in Forest sciences. Otherwise, only theoretically equipped students without practical experience will graduate from the current Georgian study program with MSc. certificate in ‘Nature resources’.

In Georgia, there is a list of available MSc. degrees, separated in fields of study like Medicine or Biology (e.g. the MSc. in ‘Forest sciences’ which is only available within the field of Agricultural sciences, while the MSc. ‘Nature resources’ is only available within the field of Biological sciences). The degree title defines the field of study and who is formally eligible to work in certain fields or sectors.

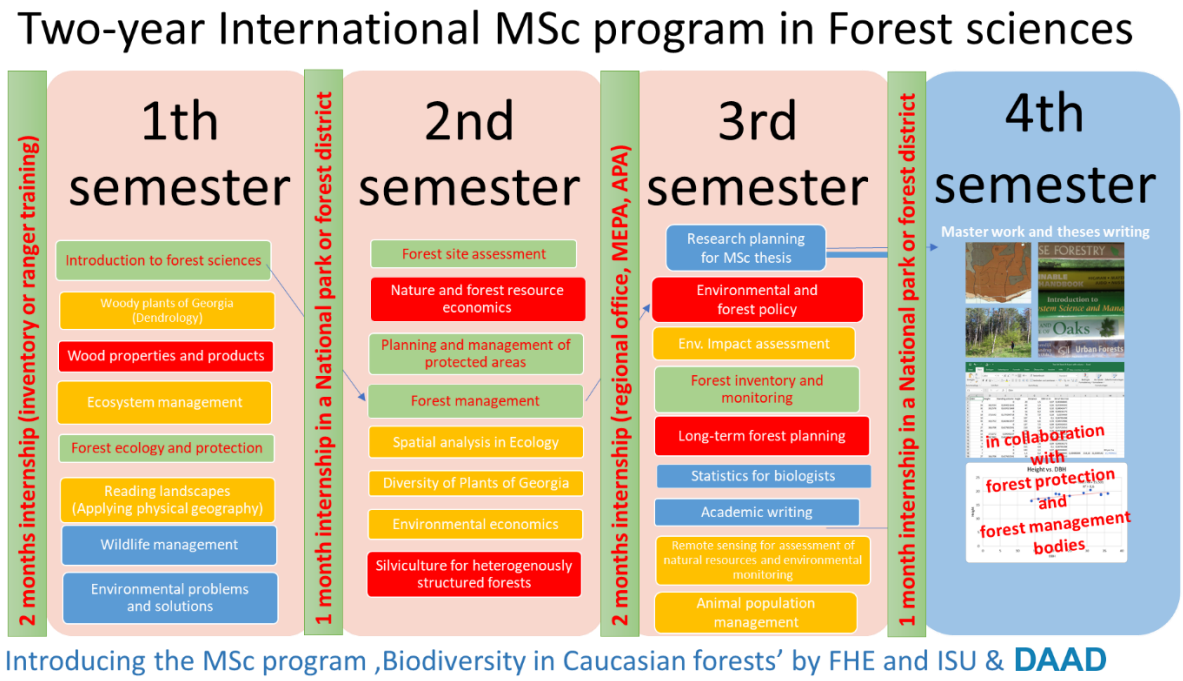

Fig. 2. Preliminary outline of a future master program with a MSc degree in 'Forest sciences' that will be developed during the proposed project. Yellow and blue are existing courses already offered within the 2-year ISU study program to obtain a MSc degree in 'Nature resources' (study direction 'Forest sciences'). Green boxes illustrate forest internships and courses with forest excursions to the training/assessment areas, and red boxes are new courses which need to be established to run a full-scale international master program 'Biodiversity in Caucasian forests'.*

Project concept

Based on the already existing program with MSc in Nature Resources, we are aiming to substantiate the existing obligatory courses within the study direction ‚Forest sciences' (Figure 2, blue courses) and develop a program curriculum that can offer a MSc degree in 'Forest sciences'. With this degree, program graduates would be eligible to work as head foresters and nature conservation specialists for forest management bodies respective governmental authorities, NGO´s with nature preserving programs in the future. The envisaged study program would require internships as ranger, forester, in National parks and head offices as well as in the ministry. Thus, program students would gain practice and motivation necessary to choose the study direction. The first semester contains joint courses with wildlife students and environmentalists, while the subsequent semesters will focus on special courses like applied forest ecology and protected area management (Figure 2). The new program will comprise a course dealing with Nature and forest resource economics, a new initiative by the proposed mobility project to BMBF 'Bridge4Forests' (Figure 3) by three female Georgian university teachers to strengthen gender-balanced forestry teaching in the Caucasus and overcome prejudices between business and environmental economics: a rural development specialist, environmental economist and forest policy teacher (employed at MEPA) under the supervision of Prof. Dr. Carola Paul (Chair of Forest economics and Sustainable land-use planning at UGOE). The course Forest ecology and protection will be a further development of an already existing course introducing practitioners from the Adjara forest agency, possible by the third DAAD short-term docentship grant to Prof. Dr. Frank Bohlander at FHE in 2020. This teaching will be combined with the taxonomic diversity mapping and inventorization of important forest insect species in the new Master program. Other courses in need to be strengthened so they can run after 2022 are courses about forest utilization, wood properties, forest policy and advanced silviculture. The final product to be delivered by program students will be their master thesis which is planned and written under supervision of a university teacher (ISU/FHE) and a qualified practitioner (APA/AFA). The thesis work will be aligned from the second semester onwards to reach the declared ultimate goal of the new MSc program in Forest sciences: to graduate responsible biodiversity and forest ecosystem managers who can implement the National and international strategy papers locally

and regionally. The early start of the thesis will allow data collection on the monitoring plots and in the training areas by the students.

Even though literature, education and research are becoming more and more internationalized, forest habitats and many wood-dwelling species are local and immobile. To meet the local context, quality teaching of applied sciences like effective nature conservation and biodiversity protection, landscape planning and restoration practices benefit strongly from more field exercises and training areas to complement the currently prevailing virtual classes and online seminars. The German assessment area in the Hainich region was selected to introduce Georgian students and teachers to the management of protected areas adjacent to uneven-aged single-tree selection forests situated in an agricultural rural landscape inside the EU, and to demonstrate German biodiversity field research and the impressive infrastructure of the National park established during the last decade. Most project partners like the forest agencies in Adjara and Akhaltsikhe are much aware about their future need to employ forest experts and reduce negative impacts on the environment. Therefore, they are ready to support the proposed project by case studies, and involve their senior staff in field teaching. On the other hand, ISU is ready to extend biodiversity research towards landscape ecology, ecosystem functioning and functional diversity.

Within the envisaged program, a healthy mix of online-teaching, independent student tasks, field exercises, and joint exams (complying with German assessment standards) as well as the visit of the biodiversity exploratory Hainich-Dün (www.biodiversity-exploratories.de/en/exploratories/hainich-duen) will motivate students to study and carry out research. If there will be enough political will of forest management bodies to implement National biodiversity monitoring systems in the future as well as to protect the forests with highest conservation values while applying sustainable forest harvest practices in other areas, the proposed project can become an example of success for international cooperation in the Caucasus region. It will benefit from a collaboration with already existing projects introducing the outcomes and integration the scientific approaches into the courses and field trips of the Master program when policy papers are underpinned by long-term training and assessment areas, and supported by already existing research networks and experimental sites in these areas (i.e., TreeDivNet, Drössler & Tabaku 2016, COST action CLIMO, Pretzsch et al. 2019). For example, the latter reference describes a pan-European study to investigate the growth of pine and oak tree in mixture and corresponding monocultures. The Georgian study plots became the first long-term mixed forest experiment in the Caucasus region which is extended now to a carbon sequestration study of forests along an altitudinal climate gradient. In two training areas, the proposed project will allow to install six climate stations in the first long-term forest biodiversity monitoring plots in managed forests.

The entire project concept is anchored by 3 training areas and 2 assessment areas in Georgia, and 1 German assessment area (Figure 3). Each area covers several thousand hectares of protected and managed forests to work at landscape and estate level, containing both representative management units as well as pioneering trials to demonstrate a wide spectrum of forest and wildlife management alternatives (Duncker et al. 2012). Also, local examples how to combine various management intensities with close-to-nature silviculture and integrate habitat trees and deadwood management plans for all decay stages will be developed. Some training areas may even become a landscape laboratory (research school for young scientists), a model forests (for regional development, https://imfn.net/model-forest/), or a second UNESCO “Man and the Biosphere” reserve in Georgia.

The grading of students during the Mid-term exam field week would comply with German grading standards (assured by independent teachers from other universities or future employers like MEPA, AFA, APA, or international consultants and guest lecturers via GIZ, IUCN, IUFRO, DAAD). The assessments would also consider selected topics addressed during student internships, and develop joint group assignments as online blog (i.e., at https://larsdrossler.wixsite.com/studytripgermany) before they meet in person during the excursions and present their final group assignment in the field. The travel to FHE and the German assessment areas will start already in 2020, possible by a DAAD study travel grant obtained by Vasil Metreveli (forester, teaching assistant, and PhD student within the German-Georgian Lehmann-Haupt graduate school at ISU and UGOE).

The project will have two major **outcomes**: Biodiversity research and development of a science-based long-term biodiversity monitoring systems, and a MSc study program ‘Biodiversity in Caucasian forests’ providing academically and practically trained employees for the administration and other employers in Georgia.

Participation in edge-cutting fundamental biological and evolutionary research at ISU is ensured by the granted BMBF infrastructure project: Georgisch-armenisch-deutsche Initiative zum Aufbau einer gemeinsamen Kaukasischen Biodiversitätsforschungsplattform (CaBOL). In the beginning of the CaBOL project in June 2020, the installation of climate stations and long-term biodiversity monitoring plots was limited to protected areas exclusively. Therefore, FHE and the forest research unit at ISU would like to join the biodiversity research by 1) complementing nine climate stations in protected areas with the installation of six additional climate stations in the two training areas Akhmeta and Akhaltsikhe, 2) the establishment of long-term observation plots on all CaBOL Barcoding of Life research sites equipped with climate stations, and 3) own studies of forest and coarse woody debris dynamics in comparison to adjacent managed plots with tree removals (like ISU lecturer Vasil Metreveli who is a potential candidate to coordinate the block ‘Forest sciences’ after 2022, carrying out his PhD about the distribution of *Castanea sativa* and the Chestnut disease in the Caucasus region since 2017).

To extend the applied research at ISU that would follow a holistic ecosystem approach including functional diversity and traits of plant and fungi species rather than the current focus on animal species inventorization, our second project outcome is at least equally important in developing countries: By the envisaged international MSc program ‘Biodiversity in Caucasian forests’ with internships and trainings to study, protect and manage forest ecosystems, we would follow the original idea of forest sciences and educate local students who can access traditional knowledge, and who are able to assess the feasibility of proposed international projects and strategies in areas where the biggest biodiversity treats occur.

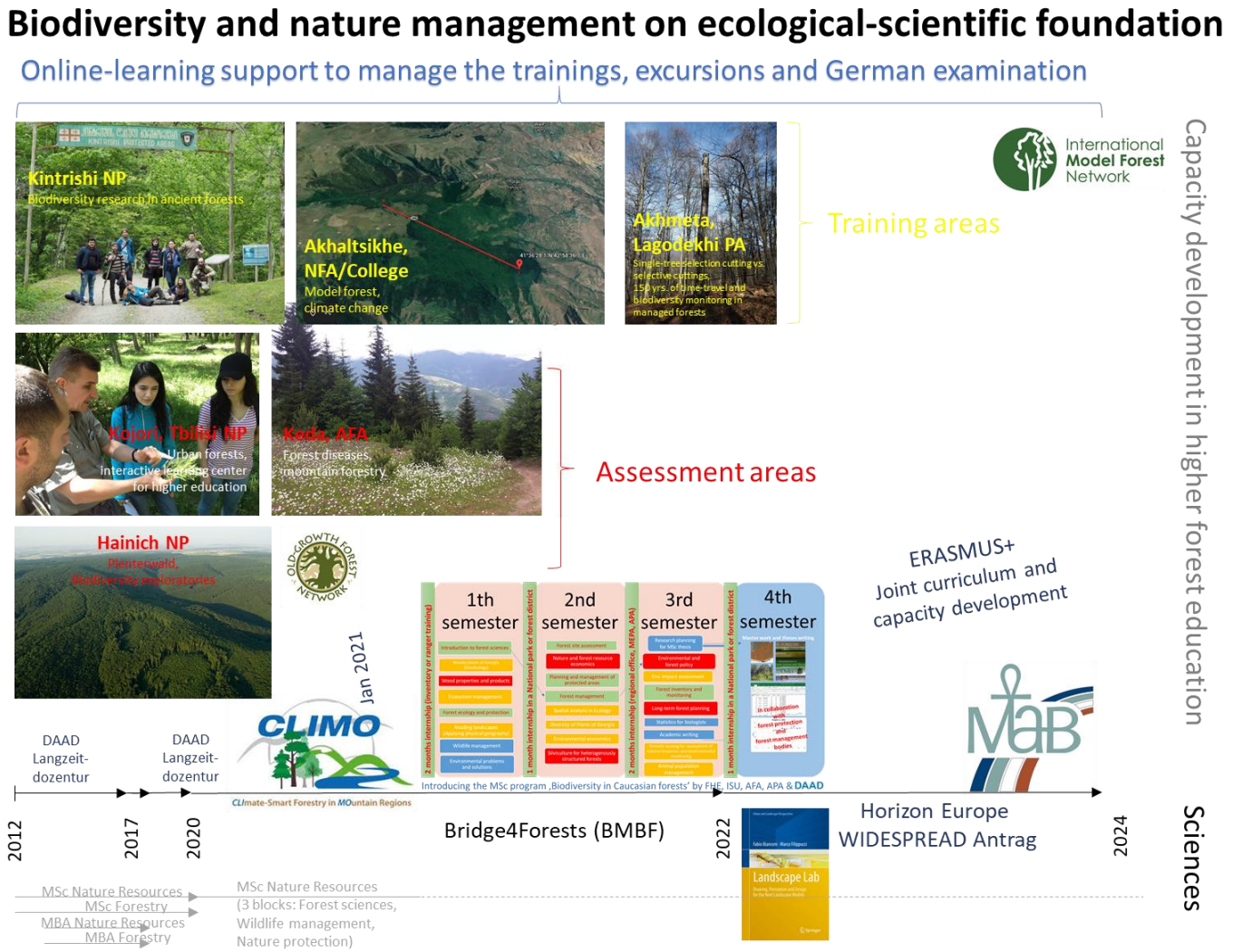

Fig. 3. Context and envisaged European projects by the proposed project “Bridge2Forests” along an time-line from 2012 to 2024, with biodiversity and forest training areas (yellow) and assessment areas (red) in the upper left.

The proposed project is colorfully illustrated in the center of Figure 3 along a time line which starts at 2012 when the first 5-year DAAD long-term lecturer initiated 2 MSc and 2 MBA study programs to recruit and teach ‘Nature and forest resources management’. The programs were competition with the flagship study program at the Institute of Ecology offering an MSc in Ecology, and fall almost apart in 2017 when no DAAD long-term lecturer was in place. With the new 5-year term of a second long-term lecturer (2017-2022), one broad MSc program with three study directions was consolidated and re-accredited this summer. Four future forest research areas have been designated and used to submit the BMBF research mobility project ‘Bridge4Forests’ (Figure 3, with no grant decision/rejection yet): 1) applied forest ecology, 2) tree conservation genetics, 3) dendrochronology and tree growth, and 4) sustainable land-use planning. This DAAD proposal at hand and ‘Bridge4Forests are part of our joint German-Georgian efforts to prepare and substantiate European Erasmus+ and Horizon Europe applications to be submitted in 2021 and 2022 in order to facilitate higher forest education and research by integrating extremely high genetic diversity, species and landscape diversity into modern and innovative land-use strategies and conservation practices (current focus at ISU is on forest ecology and research only). Figure 3 also demonstrates the five Georgian training and assessment areas in the Greater and Lesser Caucasus, and the German assessment area in the Hainich region (Thuringia).

Involvement of German and international academic scholars

Following some silvicultural field research in Thuringia and scientific comparisons between natural and managed beech forests, the current DAAD long-term docent Lars Drossler who grew up in Thuringia received a grant from the state forest service ThüringenForst to continue a long-term field research in uneven-aged selection stands in the Hainich forest in 2021 and study how valuable light-demanding tree species established 200 years ago when managed by coppice with standards and how they can be promoted silviculturally today. A Georgian forester who graduated at FH Schwarzburg / FHE in 2002 worked for many years as WWF forest consultant in the entire Caucasus region before he started to collaborate with ISU sharing his experience in landscape restoration practices during field teaching and advising one PhD student who was studying floodplain forest restoration. Another German forester worked during the last 6 years in the two Georgian assessment areas which is very useful for demonstration purposes and setting up monitoring plots for the proposed project (e.g. Kojori where GIZ contributed with the project Integrated Biodiversity Management, South Caucasus). As a large proportion of the exploited forests in the Caucasus was managed by coppice in the past comparable to the uneven-aged single-tree selection forest in Thuringia, long-term forest development strategies need to be integrated into future forest management and nature conservation planning. In the proposed project, we offer “time-travel” for international forest students, biodiversity research and the knowledge transfer needed to develop uneven-aged forest management. By his networks and activities (i.e. by EU cost actions Bacarra, EuMixFor CLIMO, by SNS networks EFINORD-CCF, PRIFOR, or working groups at IUFRO 1.01.06, IUFRO 1.01.07, IUFRO 1.01.08, DVFFA Sektion Waldbau), several international scholars visited Georgia already, like the landscape ecologist Prof. Dr. Per Angelstam to write a joint H2020 WIDESPREAD proposal in 2017, the climate-dendrochronologist Prof. Dr. Igor Drobyshev who also hosted young Georgian researchers in his Swedish DendroLab and organized a joint PhD course “Nature conservation across Europe: traditions, current practices and future challenges” at SLU and ISU in 2018, and are still in the pipeline like the visit by the Heisenberg fellow Dr. Dominik Seidel (UGOE) with a terrestrial laser scanner to correlate the diversity of various species groups with forest structural complexity (postponed to next year). Together as a consortium with UGOE, FHE, SLU and other European universities, ISU plans future study and teacher exchange via Erasmus+ KA2 and KA107 (for example one junior scientist for 1 month at UGOE to learn the methods to process 200 DNA samples of *Fagus orientalis* to compare tree barcoding results of various green and dead plant tissues in 2021). The BMBF project ‘Bridge4Forests’ will set up 4 research groups with one Georgian PhD student and one German supervisor at UGOE to substantiate the envisaged WIDESPREAD proposal with SLU, UGOE and TU Munich (Prof. Dr. Hans Pretzsch, Chair of Forest growth and Yield).

Prof. Dr. Frank Bohlander and Lars Drossler met first time in southern Sweden, later when teaching Central European silviculture to Swedish students in the Hainich forests (2015-2017) and teacher exchange SLU-FHE, as well as FHE-ISU since 2017. Frank Bohlander’s practical experience as faculty dean and vice president study and teaching when the new master program was established at FHE, was extremely helpful during his DAAD short-term lecturer visits at ISU by his independent statement and constructive critique that you need minimum 3-4 persons to run a master program.

Other active forest scientists not mentioned yet but relevant for the proposed project (and employed at ISU) are Dr. Zhanna Ekhvaia (tree conservation geneticist), Dr. Zurab Javakhishvili (wildlife biologist), and Giorgi Mikeladze (GIS and remote sensing expert).

Risks to project success

The will and administrative support to develop modern forest sciences as interdisciplinary applied sciences to counteract biodiversity losses by the faculty and most administrative units at the university are immense, although financial support for a required third full-time lecturer is not possible at the moment and will depend on the number of program students in the future. While there are little risks associated during the first two project years, planning for year 2024 is difficult compared to project planning in Germany. The envisaged program to obtain a MSc in Forest sciences depends currently on

project-based funding, and there is no agreed long-term strategy to develop future biodiversity and/or forest research (beyond project terms). Despite huge administrative barriers, also the support by forest scientists from other universities, nature protection and forest management bodies was very good, so far.

Permissions to establish monitoring plots can be difficult to obtain. Sometimes, an answer of official ISU letters to the National forest agency can take several months and should be considered for the project planning. The risk that publications are rejected exists but is not higher as in Germany, because the ecosystems of the Caucasus region is poorly described in scientific literature. Also, the Institute of Ecology is starting its own open-access research journal ‘Caucasiana’ this year with distinct geographical focus on the region.

Large insecurity exists to plan and coordinate teaching by invited lecturers with honorary. Very often, they are looking for other employment opportunities or carriers. Therefore, the top-up payment of 300 EUR to an official Georgian lecturer position of 300 USD per month is fully justified. Large problems usually occur by the procurement of technical equipment and tools in Georgia. Therefore, a procurement of the equipment in Germany and transport from there to Georgia is the way to do it with the lowest risks.

FHE and ISU foresee a Steering Committee (SC) that will be in charge of all academic and administrative aspects of the project. The SC will consist of two representatives from FHE: Dr. Bohlander and Mrs Schnell (FHE Quality assurance and accreditation), 2 program lecturers Dr. Javakhishvili and Mr Metreveli, 1 chief forester Mr Jumber Abuladze (AFA), Mrs Ugrekhelidze (ISU Quality assurance), and 2 ISU program students (freshmen) Mr Giorgi Chikorashvili and Mrs Ketevan Mdinaradze. During the first two project years, the SC will be chaired by Dr. Drossler and his deputy Mr Metreveli (ISU). All main activities of the SC and major appointments during the project are listet in the enclosure Programmspezifische Anlagen "Zeitstrahl".

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