

Scientific Report

Fellowship Project:

Comparative analysis of forest management in Brandenburg (Germany) and Moldova through sharing experiences: with focus on Forest Restoration as an appropriate NbS approach to future landscapes



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Introduction

This fellowship is part of the DAAD-funded project "Fields of Conflict – A Discourse on Socio-Ecological Forest Restoration in Times of War and Multiple Crises" aimed to help experts connect the insights from the respective region/country to examples from Germany, in order to allow a synthesis and new insights. More specifically, it focused on a comparative and interdisciplinary analysis of – forest ecosystems and forestry sectors managing these ecosystems – with a focus on forest restoration experiences and techniques that involve NbS using natural processes. It is very much linked to the provision of ecosystem services (ES) that can help to address environmental challenges such as climate change, global warming, species migration, ecosystem adaptation, human-forest relationships etc.

Any area of hidden forest-human conflict along with best solutions to address them were to be worked out through enriched knowledge and impressions or other useful information taken from Germany. The knowledge and other information or experience received or exchanged during the stay will be put in full to transformation processes and planned [restoration] projects in Moldova.

Methodology and area of work

The duration of the fellowship was only one month (7 Nov – 5 Dec 2024), implying physical presence at the HNEE in Germany as well as presuming desk work and site visits along with colleagues or other experts and forest practitioners from HNEE and outside.

The method of work included (see below the breakdown):

- Desk analysis (Literature review)
- Meetings with interested parties
- Site visits (observations on the ground)
- Analytical work (through comparison)
- Communication and knowledge sharing

The area of work covered the Brandenburg¹ Federal District, a state in northeastern Germany, with focus on forest management and nature conservation (protected areas) – all through a comparison with the whole area of the Republic of Moldova. It also included forests in both protected areas (less managed or not-managed at all) and outside protected areas (managed).

The desk analysis presumed not only a literature review involving gathering, analyzing and synthesizing of existing scientific information (articles, various academic sources), but also a wider range of sources (technical reports, policy documents, media articles, sites) in a more practical or applied context.

Meetings with relevant experts/professionals and visiting various locations were important source of information and experience sharing. The full list of people/experts met and discussed with is presented in the Annex 1.

Visiting sites was of critical importance. Although there are differences in natural conditions and species assemblages in both countries, some species' distribution patterns and human-forest interrelationships look very similar due to same global challenges. The full list of sites and their description along with notes taken during field observations are presented in Annex 2.

Data and information were also communicated during two events, where I had two PPT presentations:

- Moldovan forests and forestry sector on the way towards EU integration: current state and challenges / Thursday 28 Nov, 2024, 16:30-17:30, Forest Campus, House 11 room 001

¹ Brandenburg (<https://en.wikipedia.org/wiki/Brandenburg>).

- The Political Ecology of the Russian Aggression in the Eastern Partnership Countries and beyond / MONTAG, 02.12.2024, 19 UHR Aula, Haus 6 Schicklerstr. 5, Eberswalde

Results and Discussions

This chapter presents the key findings and discusses their possible implications, from science to practice, in Moldova and in the region or elsewhere possible. All results are organized according to the topics and their significance to my own research, all through a comparison with previous research done in Central and Eastern Europe (Germany, Czech Republic, Romania, Moldova etc.).

Defining NbS and Restoration in forests

The two terms are often treated as similar and used interchangeably, but there may be some differences. Nature-based Solutions (NbS) involve using natural processes in ecosystems to ensure multiple benefits (water catchment, flood prevention, carbon sequestration, societal health, recreation etc.) in a broader range of possible implications from urban to native ecosystems. Forest restoration is more specific and implies the (re)creating and (re)planting [native] woodlands to enhance their functionality and biodiversity, which also contributes to sustaining ecosystem services and associated benefits. The linkage between the two concepts is also seen as a continuum where interventions can shift over time on the same arena (e.g., Waylen et al., 2024).

Both approaches, NbS and Forest Restoration, are almost interchangeably used and can be very important to addressing environmental challenges. One of the best examples is to restore degraded forests with native species in a large wetland type ecosystem context, which combines the two of them for the same ultimate purpose. This can be the case of the Biosphere Reserve Lower Prut or National Park Lower Dniester in Moldova.

Forest resources: comparing two different situations

In Germany, forests cover 32% of the country's total area, which round up for approximately 11,4 million ha and 2.9 billion m³ of standing timber². Forests are mixed, coniferous and broad-leaved, not being dominated by a single species and species composition is diverse (mainly oaks, beech, spruce, pine etc.). The timber growth rate is 11,2 m³/ha/year, totaling for an annual increment of 121,6 million m³. Forest production has a significant economic aspect with 76 million m³ of timber produced/harvested annually³.

According to Federal Forest Inventory (2022), the forest area of Brandenburg covers 1,128 million ha (38%), being the federal state with the 4th largest forest area. Dead wood in 2022 is 17 m³/ha (6 m³/ha more dead wood than in 2012), with more diversified forest structure and composition.

In Moldova, forest vegetation covers nearly 0,47 million ha (13,8% of the country's territory), with nearly 0,45 million m³ being standing timber. Approximately 0,37 million ha (11%) are formally regarded as forest ecosystems (NBS, 2023), but the area of true forest ecosystems is less than this figure, considered the best-preserved ecosystems out of the rest types of ecosystems (Lozan, 2021).

Forest ownership: differences and ways to think forward

In Germany it is diverse and based on stronger ownership traditions, as below:

- Private (48%) ranges from individuals and families to and private companies;

² Environmental Economic Accounting. Monetary timber stock balance ([Monetary timber stock balance - German Federal Statistical Office](#)).

³ See "Forestry in Germany" site ([Forest facts - German forestry - 300 yrs of sustainability campaign](#)).

- State (29%) owned by the federal states (Länder)⁴;
- Corporate (19%) owned by municipalities, municipal associations, and similar bodies;
- Federal Government (4%).

In Brandenburg Federal District:

- Private forests: 61% (671564 ha, approximately 100000 owners)
- State forests: 26% (272500 ha)
- Municipal forests: 7%
- Forests owned by public organizations or foundations.

Private forests in Germany are smaller in size and fragmented, and together with corporates there are about 2 million owners. The largest forest owner in Germany is the Free State of Bavaria, which manages around 778000 hectares of forest.

In Moldova, forestland ownership is dominated by public forests, of which Agency Moldsilva⁵ (central authority for forestry and hunting) holds the most and best of it. The distribution of forests by land ownership is presented below:

- Public State-owned forests (80,5%) managed by Moldsilva and its network of forest units;
- Public community-owned forests (18,9%) managed by local public administrations;
- Private forests (0,6%), mainly by individual owners (black locust plantations).

All forests in Moldova are highly fragmented, more concentrated in the central hilly plateau (so-called Codrii region⁶). Private forests, almost non-exist, are subject to separate discussion as there is some interest from private landowners for building forests, but their appetite is mostly economic.

Policy and legal frame

The main legal document regulating forest management in Germany is the Federal Forest Act (Bundeswaldgesetz)⁷, established in 1975. It provides the legislative framework for forest management. It supports forest conservation and promotes a balanced forestry that meets the interests of the public and private forest owners. The Federal Forest Act is supplemented by state-level (Länder) forestry legislation, all tailored to meet ecological and social contexts of each region.

The main forest legal act in Moldova is the Forest Code (Law 887/1996) that defines basic principles of administration and management of forest and hunting grounds, abrogated now until 26.04.2025. A new Forest Code of Moldova (Law 69/2024) that replaces the old one, provides even more ground for both community and private forests (but requiring other technical norms to properly regulate relationships and motivate privates). It also describes the new categorization into two groups (compared to one in the previous act): (a) Functional Group I of special protected forests, and (b) Functional Group II of protected and production forests.

Forest management: similar intentions

Germany has classical and long history of sustainable forest management, all based on principles of sustainable forestry (see FMFA, official website). It considers economic aspects along with ecological benefits and biodiversity conservation that support socio-economic development. From own observations and desk review, significant efforts are made towards a combinative approach that considers biodiversity enhancement through promoting mixed-species in both plantations and existing

⁴ Each state (Länder) manages its forests according to their specific regulations and policies.

⁵ <https://www.moldsilva.gov.md/>.

⁶ Codru (forest) ([https://en.wikipedia.org/wiki/Codru_\(forest\)](https://en.wikipedia.org/wiki/Codru_(forest))).

⁷ Gesetz zur Erhaltung des Waldes und zur Förderung der Forstwirtschaft (Bundeswaldgesetz). (<https://www.gesetze-im-internet.de/bwaldg/BjNR010370975.html>).

forests. Many monocultured plantations, especially of Scots pine (*Pinus sylvestris*) as the most important and widespread in Germany (mostly amid private forests), are being created and/or maintained in both public/municipal or private forests. Some smaller-sized monocultures of the exotic black locust (*Robinia pseudoacacia*) on private lands were also noticed. Private landowners are mainly interested in economic gains.

Moldova's forest management relies on a high [annual] demand in wood, especially for energy purposes (Lozan et al., 2011; Spitoc et al., 2021) as nearly 90% of all harvested wood is fuelwood (Moldsilva official website), to sell and get revenues. There is a strong societal affinity too, as Moldovan domestic forests have traditionally been a livelihood source among local communities (see Popa et al., 2015, Talpa et al., 2023). Over the last several decades, Moldovan authorities turned more to close-to-nature management, fully realizing that maintaining existing scattered forests is crucial. After the WWII when forests reached one of its lowest coverages (6%), forest restoration has begun with massive planting of fast-growing exotic species, mainly black locust. Another forest extension during 2002-2009/2010 resulted in officially more than 60,000 ha of newly created forests, mainly black locust, on communal lands (more than half of those forest plantations failed from various reasons, such as inappropriate species-site selection, grazing etc.). A recent National Forest Extension and Rehabilitation Programme (NFERP) for 2023-2032 (see Lozan et al., 2022) has very ambitious goals, but its reliance on black locust (at least at the level of 2023-2024) as cheap FRM is challenging.

Protected Areas: Moldova is behind

According to the Federal Nature Conservation Act (BNatSchG)⁸ of Germany, protected areas vary in size, protection purpose, objectives and restrictions on use. The most important protected area categories are: nature reserves, national parks, biosphere reserves, landscape protection areas, nature parks and smaller-sized natural areas or monuments as well as protected areas part of NATURA 2000. Many of them can spatially overlap or be congruent. According to the German conservation NGO Nationale Naturlandschaften (NNL, official website), protected areas in Germany cover nearly 33% of the country's terrestrial surface, including large categories: national parks (16 / 0,6%), wilderness areas (3 / 0,06%), nature parks (104 / 28,5%), and biosphere reserves (18 / 3,9%). Some former military training areas started to be naturalized/revitalized and got protection status, e.g. Wilderness area near Jüterbog (see Annex 2). The overall trend in Germany is to create larger PAs and improve habitat/ecosystem connectivity including through strengthened PAs.

For comparison, Moldova's protected areas cover only 5,6% of the country, classified into 12 different categories, with many overlapping. Moldova has only one Biosphere Reserve (Lower Prut), two National Parks (Orhei and Nistrul de Jos), four Nature Reserves, and three Ramsar Sites (overlapping with other protected areas). The Law 1538/1998 on state protected areas is the main legal act that defines conservation and management principles in PAs. The law is now under revision as will probably emerge as a new vision to current PA categorization. New PAs need to be created from the remaining natural ecosystems.

Forest conservation: working to benefit nature and people

Germany is making significant strides in forest restoration and conservation, both nationally and internationally. An example is The Bonn Challenge, launched by the Government of Germany and IUCN, that unites countries for landscape restoration aiming at 350 million ha of degraded landscapes by 2030 (see The Bonn Challenge website). Germany has also financial commitments by pledging significant contributions to global conservation and supporting various projects worldwide. At national level, the Government announced about doubling its contribution to forest conservation from one to

⁸ See Federal Nature Conservation Act – BNatSchG; Act on Nature Conservation and Landscape Management - Entry into force: 1st March 2010 (<https://www.bmu.de/en/law/federal-nature-conservation-act-bnatschg>).

two billion euros in the period up to 2025, and an extra billion to be made available through the Federal Ministry of Economic Cooperation and Development (see FMECD website).

Germany is one of the Republic of Moldova's key trading partners, mainly through direct investments in the country, including in nature conservation. An example is the small-scale reforestation in southern Moldova, a project funded by NaturTon Foundation & WWF Germany and implemented in cooperation with local communities of Cahul and Cantemir districts (see WWF, 2019).

Forest restoration agenda: commendable initiatives

In both countries, forest restoration is seen as a critical effort to address multiple challenges (implicitly climate change) and other societal needs. However, Moldova, as a small lower-middle-income economy and the poorest country in Europe (but making significant progress in reducing poverty and promoting inclusive growth) (see The World Bank group in Moldova, official website), it lacks forest resources and the few forestlands are continuously under human pressure exacerbated by other changes in environment or regional conflicts.

Germany hosts national forest summits to address forest dieback and develop strategies for restoration, including tackling climate change. It has committed significant funds to replant/restore and renew huge areas of forestlands, all through large public engagement and encouragement in reforestation efforts. Germany is part of the SUPERB (Systemic solutions for upscaling of urgent ecosystem restoration for forest-related biodiversity and ecosystem services) project, which aims to restore thousands of hectares of forest landscapes across Europe⁹.

Moldova lacks forest resources. Its interest now is to increase the forest cover from the current 13,8% of forest vegetation to more than 17% (through NFERP implementation) and even beyond this figure, given that according to experts at least 20%-cover would be a minimum cover requirement for national climate-hydrological security and 25%-cover (and more) is a desired optimal forest coverage to meet soil characteristic soils and continued biodiversity conservation (Lozan at Galupa, 2021).

Supported by the Presidency and the Government of Moldova (GoM), a National Forest Extension and Rehabilitation Programme (NFERP) 2023-2032 was developed through assistance from the World Bank within the EU4Environment, was approved by GD Nr 55 from 17.02.2023 (Law 55/2023). It is a very ambitious green initiative aiming at 110 thousand ha of newly afforested lands and 35 thousand ha of restored area of existing forest.

The World Bank is now assisting the GoM in developing a big GEF-funded project "Restoring Ecosystems for Marine Pollution Prevention" for 2025-2030 and intends to tackle nearly 12800 ha of public land, of which 2700 ha will be restored/rehabilitated forests and wetlands and the rest will be communal lands under silvo-pastoral management planning.

Restoring burnt sites: climate change driven uncertainties

An area in Treuenbrietzen near Potsdam was visited, hit in by a large forest fire back in 2018 and then in 2022 (likely intentionally). Another area near Beelitz, where forest fire started in June 2022, was visited along a mix team of scientists and forest workers (for planting). A wilderness area near Jüterbog, a property of the Wildnis Stiftung (Private Wilderness Foundation), has been affected by forest fires since last years more frequently than before, and it is now left for natural recovery without direct human intervention. Before fire, most forestlands were mainly a monoculture-type based on pine, which is susceptible to vegetation fires. Restoring these burned sites back to monoculture becomes challenging, as there are floating uncertainties with regard to what species to plant that best adapt to coming climate change and, probably, drier climate and more fires in the future. From what I

⁹ SUPERB: Upscaling Forest Restoration (<https://forest-restoration.eu/>).

have seen and discussed on-site with foresters, they are applying a mix intervention to create a mosaic forestland – from one hand, natural succession is occurring (birch is pioneering, common oak or other species are coming spread by birds or wind); and, from other hand, some other species are being planted (pine, red oak etc.).

However, private foresters are still relying on exotic species (red oak, black locust) and are ‘still adepts’ of monocultures, in hoping these will bring quick economic yields in the future. They do not seem to take future prognoses for the area into account, when warming waves are believed to hit harder than now and winds to become more dangerous in spreading fires. Eventually, the main concern remains unaddressed and highly risky.

Climate change shapes up future forests

More anticipated global warming hits will steer forests development in the future as species/habitat as production changes. Forestry sectors seem to have more interest now in assisted species migration, which is a not-forced (but rather supportive) colonization or managed and intentional (by humans) relocation of certain key-species to new geographic locations to help them cope with changing environmental conditions. It involves more interdisciplinary and transboundary-oriented research to track suitable habitats and ensure the survival of species that might not be able to migrate or adapt on their own. However, this needs proper assessment of investments against site/species correlation.

Monocultures: vulnerable legacy teaches us a lesson

In Germany, monocultures (pine, spruce) were rapidly created to pay reparations for WWII, which are now rapidly dying because of combined forest fires pest outbreaks under new climate change realities. Although in Brandenburg state forestlands monocultures are not allowed anymore (instead, diversified forests are promoted), this is not the case of federal and private forests. The less hospitable to native biodiversity monocultures have made green light to some extremely dangerous pests, e.g. bark beetles (*Ips* spp., *Pityogenes* spp.) or caterpillars (*Lymantria monacha*, *Bupalus piniaria*, *Panolis flammea*), that successfully entered into the forests. Combating them in such conditions of increased tree susceptibility to climate change-linked stresses like drought becomes extremely difficult.

In contrast, Moldova has only black locust monocultured plantations, recently created to meet environmental and social-economic needs (rapid wood/timber and soil erosion). With recent droughts and prolonged dry seasons, vegetation fires have increased in intensity and impact to forests.

As the black locust young monocultures, preliminary site ecological assessments were not undertaken and the whole plantation efforts have shown signs of failures and diebacks. **The main problem around the ‘doubled-side sword’ black locust in Moldova is not the undisputable tree qualities and socio-economic benefits, but rather the disregard of the site/species correlation in afforestation operations.**

From nearly 60000 ha of newly afforested lands in Moldova during 2002-2010 based mainly on black locust and multiples expected benefits¹⁰, at least half of them did not meet expected results and are either lost/failed or highly degraded. **If appropriate site assessments had been done prior afforestation to select the best soil/site matched conditions, many failures would have been avoided.**

¹⁰ See here (<https://www.worldbank.org/ro/results/2013/08/08/moldova-more-trees-means-more-food>).

Species used in forestry

Reliance on native species

Moldova relies on its oak-type (+other species) forests and does not have naturally-coniferous species, except for plantations created mainly during Soviet times; however, some coniferous species, such as black pine (*Pinus nigra*) is of interest for the forestry sector for its adaptability (can tolerate a wide range of environmental conditions, including urban), growth rate (rather fast grower) and longevity.

Such broad-leaved species as European beech (*Fagus sylvatica*) and oaks (*Quercus robur*, *Q. petraea*) are significant species in both Germany and Moldova. While beech occurs almost all over Germany (e.g., Von Wühlisch et Muhs, 2011), in Moldova it is at its eastern limit of the range (Nedealcov et al., 2020). These 'edge populations', survived mainly within a few protected areas in the central hilly Codrii region, are of huge importance for both biodiversity conservation and social-cultural affinity of local communities (e.g., local "Beech Festivals" organized each late spring in May)¹¹.

Exotic taxa: between benefit or detriment

Both risks and opportunities are associated with exotic/alien introduced taxa. Many experts suggest the global warming may benefit some of them (e.g., Nadal-Sala et al., 2019; etc.). In Moldova, some exotic invasive species became largely used in forestry for livelihood interests, e.g. black locust (*Robinia pseudoacacia*) (an [almost] naturalized species across Europe), while others as red oak (*Quercus rubra*) is used both in forestry (but less than black locust) and urban landscape planning. Such species as boxelder maple (*Acer negundo*) or tree of heaven (*Ailanthus altissima*) are aggressive and seem to pose serious threats to native biota (especially oak-type forests), but difficult to eradicate.

All these mentioned species are present in Germany too, and were noticed near forests and within cities too (inside Berlin, especially around it, and in Eberswalde municipality too). Red oak is present for centuries, it is well established and regenerates successfully. Though considered a fascinating alternative to common oak¹², it still poses questions on how leaves produced in large quantities will break down and affect the soil? As an easy-to-handle species (rapid acorns yields¹³, rather fast grower, good regeneration), it is preferred by foresters in afforestation or reforestation. Douglas firs (*Pseudotsuga menziesii*), planted for presumed benefits (impressive growth on various sites, excellent timber properties, now look more vulnerable to climate warming and pest infestations especially after droughts of 2018).

Species of the future forests?

Forestry sectors seem to be looking into the future through the spectrum of species that will possibly form next forest ecosystems. The Forestry Institute Eberswalde (LFE) has already drawn such a list of tree species for the Brandenburg Federal District, with their preliminary prioritization (1 to 3) for all forest ownership. Similarly, there is such a list in Moldova and a legal frame (Law 44/2022) on forest reproduction material including recommended species, but not prioritized. Certain concern about future forest development, given climate change and socio-economic interest, remains as **there is no magic species (or technology) that can best address it.**

Wildlife troubles forest regeneration

Animals are key to restoring forest ecosystems by dispersing seeds and rapidly reestablishing plant diversity in degraded/destroyed forests, but wildlife's overpopulations can have a negative effect on

¹¹ See the online article "Moldovan reservation hosts sixth issue of beech celebration" (2018). (<https://www.moldpres.md/en/news/2018/05/27/18004422>).

¹² <https://feelwood.at/en/the-red-oak-is-a-fascinating-alternative-to-the-european-oak/>.

¹³ It is 2 years in red oak and 5-7 years in common oak.

forest regeneration too (impacting structure and functioning through overconsumption or damage to young forest). During site visits, many experts claimed both roe deer (*Capreolus capreolus*) and red deer (*Cervus elaphus*)¹⁴ can, when in excess, disrupt forest regeneration by wiping out the coming generations of trees. In absence of top predators and an unfollowed hunting regime by humans (as top predation), this remains a serious challenge not only in Germany, but elsewhere including Moldova. As for Moldova, the two species – red deer (*C. elaphus*) and the introduced Sika deer (*C. nippon*) and the numerous hybridized offspring, are mainly concentrated in protected area where they have exceeded 5-6 times the recommended optimal density, all leading to a compromised native forest which is of high conservation value and part of the PA system¹⁵. If a hunting regime or selective regulation of their number is not conducted up to a desired populational level, then forest regeneration can face unprecedented consequences and incur economic-ecologic loss.

Useful observation notes based on comparison

All field visits and meetings with various practitioners in nature-related disciplines, have heled me underline a number of very useful notes that I am sharing in the below subchapters (see also Annex 2).

Forest management trends

Close-to-nature forest management seems to be now on the ‘roof’ of forestry sectors in many countries, compared to initial economic purposes of forestry sectors. This is driven by multiple reasons, especially related to sustainability and adaptation to climate change. Private forest owners in Germany struggle for quick gains from their forest properties, which may be misleading under new realities. In Moldova, after a Soviet-induced era of intensive forest exploitation and decimation, close-to-nature vision finally receives recognition, yet to be implemented as forest/wood theft is still a common practice proven by high levels of wood consumption from uncountable illegally-sourced wood (see Lozan et al., 2011). Though illegal logging and hunting are not common in Brandenburg area (and in Germany per whole), communities [and population] seem to be very sensitive and accountable by immediately informing enforcement bodies about any infringements.

Reverting to mixed forest ecosystems, as contrasted to monocultures (pine, spruce, exotics), is now being largely recognized by many. Diversified forests in terms of composition and age structure or of multiple [functional] ecological niches mean more stable and healthy forests, with stronger potential for regeneration and self-sustenance.

Forest restoration practices

On burned sites in Brandenburg, the main approach to forest restoration looks more an assisted species recovery based on natural processes with promoted key species of interest including through climate change adaptation. Forest owners and forest practitioners still look for balanced interest between economic gains and minimalized risks of investments. From field observations, foresters (led by experts from HNEE or LFE) are experimenting various restoration techniques and species, from promoting native assemblages, such as oaks with beech and/or larch, to combining with exotics, such as black locust or red oak or sweet chestnut.

¹⁴ The two deer species have slightly different feeding strategies – roe deer feeds on young plants/trees/shrubs and graze some species (e.g., birch, beech) and leave others (e.g., pine), while red deer can swipe all the area when/if overpopulated.

¹⁵ See journalistic material about deer invading Moldovan forests (<https://noi.md/md/societate/cerbii-patati-au-invadat-rezervatia-codrii-moldovei>).

Important linkage between forests and water

This connection looks much stronger and interdependent than probably believed. Water becomes an issue in many regions, including Germany and especially in Moldova. The Forestry Research Centre Eberswalde (LFE)¹⁶ seems to be quite interested in research that promotes sustainable forest management practices to enhance water-based ecosystem services.

An example for Moldova's future lowland PAs in both Prut and Dniester rivers can be the Spreewald Biosphere Reserve, which is very much relying on regulated/maintained water regime and, at the same time, undertaking restoration/rewetting operations.

Protected areas opportunities

Conservation is not ideal in all protected areas I have ever visited, but it is better to have PAs than not having them. The total area of PAs in Germany is impressive and its categorization looks reasonable from connectivity point of view, which is commendable and worth to apply in Moldova¹⁷ with its PA's 5,6% coverage and cumbersome categorization. There are clear opportunities for more Biosphere Reserves and Natural Parks and maybe National Parks (in central Codrii region, along Prut and Nistru rivers) than Moldova has now.

Key Take-Home Lessons

Forestry & Forest Restoration

Combinative approach – promoting native key-species and testing established (=adapted) exotics of socio-economic interests – makes sense in a diversified forest landscape, but only under thorough monitoring (e.g., forest fires or pest outbreaks).

Monocultures still pose questions and keep split spirits among stakeholders, but recent forest fires and associated pest outbreaks (and continuous penetration of new ones) in both Brandenburg area and Moldova show there is a need to revise quick-economic interests seen in monocultures.

Wildlife Management

To avoid overpopulation of deer species and not to compromise natural forest regeneration, no additional feeding or watering (part of 'biotechnology' in forestlands) should be allowed. Game should be controlled and managed according to conservation purposes.

Nature Conservation & Protected Areas

There is interest from Michael Succow Foundation to establish more Biosphere Reserve(s) in Moldova (based on a preliminary analysis of the potential for PAs). A meeting and discussions took place.

Make recommendations to environmental authorities (Ministry of Environment, Moldsilva, NGOs) on re-classification of PA categories (e.g., EU rules of 10% of all forests should stay natural, National Parks highest level with 50% core areas, Biosphere Reserves 3% core areas and Natural Parks even lower).

¹⁶ Landeskompetenzzentrum Forst Eberswalde (LFE) (<https://forst.brandenburg.de/lfb/de/ueber-uns/landeskompetenzzentrum-lfe/>).

¹⁷ The main PA related Law in Moldova (1538/1998) is now under thorough revision undertaken by the Ministry of Environment in cooperation with NGO community and international organizations.

Where to apply knowledge and experience gained?

All gathered data and information, based on-site visits and meetings with experts or practitioners, will be used for the following:

- A meeting with the Ministry of Environment of Moldova, including subordinated institutions (Agency Moldsilva) and NGO representatives (specifically to help design the new Law on protected areas, on reforming forestry sector, improved game management and nature conservation in protected areas).
- Considered for developing GEF/WB ReMaP restoration project to prevent marine pollution.
- Will be largely discussed with the implementers of the NFERP governmental initiative.
- Proposals will be made to the MoE to amend the existing Law 44/2022 on forest reproductive material (specifically regarding list of species used in forestry or afforestation, to be prioritized and split into native and exotics).

Overall conclusion

Despite differences in forest resources and climatic conditions, Brandenburg area (Germany) and Moldova share common challenges and interests in sustainable forest management through adapting to coming global warming and undertaking respective mitigation actions.

Meeting with dedicated professionals who shared their experiences and also transported me to sites/areas where they work or test practices on the ground was the best achievement of this fellowship.

For developing future forests under new climatic realities, either on the level of forest management or at site-specific actions while reforesting/afforesting degraded areas, I share my own thoughts and suggest the following:

- 1) **Reliance on existing natural forests (and processes in forests) considered more adapted through genetic memory interlinked with ecological plasticity (NB: existing natural forests are much more important than any newly created plantations).**
- 2) **Do not [intentionally] force exotic species into existing natural forests unnecessarily (once exotics are recorded, monitor them for invasiveness and possible socio-economic impacts along with testing their ability to perform as good as natives: and let nature do the rest of the job).**
- 3) **Avoid monocultures in both natives and exotics** as associated risks are much higher than thought (NB: monocultures are much more susceptible to forest fires and pests, which are 'close friends' acting and synchronizing perfectly under disturbance conditions).
- 4) **In managed forests promote diversity as species as age structure** (including through innovative treatments, e.g. progressive, or niche/habitat-friendly) and adopt close-to-nature management (NB: nature is the best engineer, stay closer to nature).
- 5) **Utilize existing vegetation or do enrichment planting as much as possible by adding seedlings of both native or site-adapted species in order to create more diverse and resilient ecosystems (NB. this can avoid excessive evapotranspiration and provide shelter to young trees).**

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Annexes

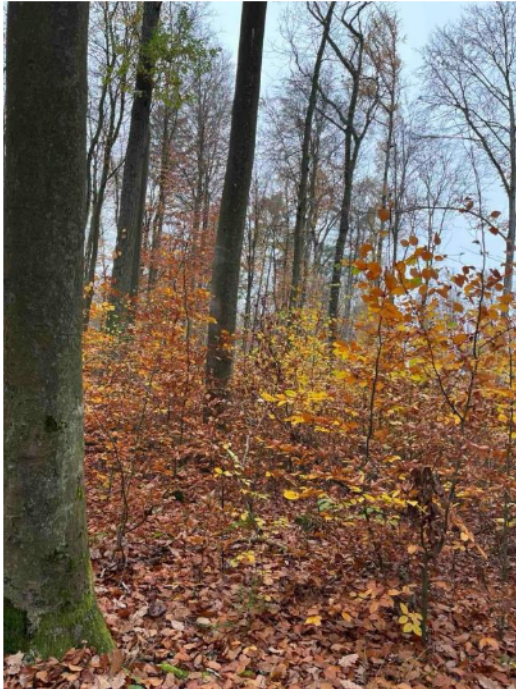
Annex 1: List of people met and discussed with (in chronological order)

n/o	Name	Position / Expertise	Organization / Contact	Dates
1.	Angela Dichte	Project Coordinator Forest Ecosystems and Biosphere Reserves	HNEE / Angela.Dichte@hnee.de	Permanent
2.	Pierre Ibisch	Professor, socio-ecological forest management / Botany / Ecology	HNEE / Pierre.Ibisch@hnee.de	Permanent, project lead
3.	Ana Filipa Ferreira	Managing Director	Biosphere Reserves Institute Eberswalde	7 th Nov, 2024
4.	Martin Pusch	Community and Ecosystem Ecology	IGB / pusch@igb-berlin.de (https://www.igb-berlin.de/en/profile/martin-pusch)	8-10 th Nov, 2024
5.	Sonja Jähnig	Head of Department Research Group Leader, Professor	IGB / sonja.jaehnig@igb-berlin.de	10 th Nov, 2024
6.	Gabriela Costea	Scientific Staff	IGB / gabriela.costea@igb-berlin.de	7-10 th Nov, 2024
7.	Dietrich Henke	Forester	Forest district of Kemnitz	13 th Nov, 2024
8.	Christoph Nowicki	Head of Department	HNEE / Christoph.Nowicki@hnee.de	13 th , 25 th Nov, 2024
9.	Valentina Garcia Escudero	Project coordinator (MSc Global Change Management)	HNEE ves485@hnee.de	Periodically, including field trip
10.	Inga Marieke Engelhardt	MSc student in Biosphere Reserve Management	HNEE Inga.Engelhardt@hnee.de	Field trip
11.	Nadine Bachstein	GIS-Analysis	HNEE Nadine.Bachstein@hnee.de	Periodically
12.	Eugen Nowak	Director	Leiter UNESCO-Biosphärenreservat Spreewald Eugen.Nowak@lfu.brandenburg.de	26 Nov 2024
13.	Nico Heitepriem	Research Officer	UNESCO-Biosphärenreservat Spreewald	26 Nov 2024 (field guide)
14.	Michael Succow	Founder	Michael Succow Foundation Michael.succow@succow-stiftung.de	27 Nov 2024
15.	Martin Lenk		Michael Succow Foundation	27 Nov 2024
16.	Ulrike Hagemann	Forestry Institute Eberswalde FA	Landeskompetenzzentrum Forst Eberswalde (LFE) ulrike.hagemann@lfb.brandenburg.de	27 Nov 2024
17.	Karolina Pietras-Couffignal	Forestry Institute Eberswalde FA	karolina.pietras-couffignal@thuenen.de	27 Nov 2024
18.	Martin Flade	Director of BR	Schorfheide-Chorin Biosphere Reserve martin.flade@lfu.brandenburg.de	28 Nov 2024
19.	Helmut Boehm	Private owner (4 ha)	Falkenhagen, Frankfurt Oder	30 Nov 2024
20.	Danica Clerc		LFE	2 Dec 2024
21.	Lilly Rohlf		LFE	2 Dec 2024
22.	Jens Schröder	Professor, Forest Ecology	HNEE / Jens.Schroeder@hnee.de	2 Dec 2024
23.	Jakob	Forester	State Brandenburg Forest Unit	2 Dec 2024
24.	Antje Bischoff	The Wilderness Foundation	Brandenburg Natural Landscapes Foundation	4 Dec 2024

Annex 2: **Sites visited & field notes or observations** (in chronological order) (most of the notes are raw material and kept at their initial written state done while out in the field)

Date / Location	Notes / Observations (photo materials)	
Permanently		
Eberswalde University for Sustainable Development (HNEE) (focusing on forestry and environmental-related research)	Forestlands surrounding the HNEE consist of beautiful park and other well-integrated facilities including recreational ones (bikes, play grounds etc.). Both forests and park forest-vegetation seem to be rich in biodiversity, also playing important ES for local community and stakeholders (clean air, water, and recreational). <u>Forests.</u> A mix of tree species, mainly beech (<i>Fagus sylvatica</i>), which seems to be declining due to climate changes (but once a dominant species); common oak (<i>Quercus robur</i>); pine (<i>Pinus sylvestris</i>), which looks rather common species; and other species. Some exotics were also noticed, such as red oak (<i>Q. rubra</i>) and locusts¹⁸ (<i>Robinia pseudoacacia</i>, <i>R. viscosa</i>). <u>Trees in parks.</u> Many native species, such as common alder (<i>Alnus glutinosa</i>), common oak (<i>Q. robur</i>), or yew tree (<i>Taxus baccata</i>) and others. There has been noticed a number of introduced species, some rare or protected, from worldwide flora, such as the redwood (<i>Metasequoia glyptostroboides</i>) (an endangered deciduous conifer originally from China), Caucasian walnut (<i>Pterocarya fraxinifolia</i>) or American chestnut (<i>Castanea dentata</i>) etc. A true living laboratory for students and researchers, including internationally (looks very international and open to anyone).	
9th Nov 2024		
Schöneiche community surroundings (district of Oder-Spree) Private forest	Private forest under management. It seems the trees of good quality were harvested for wood, economic interest.	

¹⁸ See here the differences between various related *Robinia* species
(http://www.namethatplant.net/gallery_compari.shtml?compare=leaves%20of%20Locust%20species).

Protected area (of community level)	A small-size PA near the village, very popular among locals, who come in for walking including with dogs and children. The oaks (common) is very popular and adored by kids who love climbing.	
11 th Nov, 2024		
Wind-throw on the slope south of the HNEE forest campus (municipal forestland)		
An area south of the HNEE forest campus was ravaged by wind Xavier in 2017 and left the slope full of fallen trees, mainly of beech. The site was under progressive cutting/treatment at that time with only some trees were left after cutting, which reduced the capacity of the forest to withstand the storm. The fallen trees were harvested for wood selling. A trails has immediately appeared and people started go through the forest. A small parcel was fenced by the municipality on order to plant/replant trees including exotics (such as American chestnut or red oak) – which does not seem to be a good move as the natural regeneration is quite well, so no need for other intervention. What comes to mind is the area needs to be left for ‘no intervention’ for at least 50 years or more, given that natural regeneration of native species will do the rest of work. Also, there is no need to promote exotics because they seem to be naturally well-regenerating as well.		
13 th November		

Visiting Mr. Dietrich Henke, forest district of Kemnitz	The forester sees a number of species to be part in the future forests' composition – oaks (common and sessile), maple, linden/lime, and exotic species (red oak, black locust) in the future of southern Germany's forests. It's the beginning and it's the right direction.  High pressure from wildlife, foe deer and red deer, they destroy cover that can eventually sustain monocultured forest. Red deer eats everything, compared to more selective and smaller foe deer. Hunters should control and kill wildlife, overpopulations. Impact is high. They not counting, but monitoring and take decisions. For the exotic red oak, wood/timber is good. As its regeneration, it's important to have it in smaller areas, so noy to allow in larger areas because it regenerates rapidly. Very successful in distribution, especially by birds. More fructification than native common oak. Every 2 years, common oak every 5 years. Leaves of red oak are very tough, not easy to decompose, issues for soils. Forest trees are connected by roots, and can stand wind storms in strong groups. After lights holes birch is coming as pioneer. Common oak is coming over, supporting the new structure of future forest. Tall and qualitative trees are left in the first for seed making and distribution, which foresters follow. More diversified forest is good for the future. But little optimism for other areas. Natural processes in forests are part of the ecosystem, and should stay there and not to be altered. Classical forestry-thinking prevails, so only a small part of foresters are open-minded and turned to innovation and other approaches such as NbS. Private owners want his economy interest, no other interest In Brandenburg Federal District area only 15 percent are like this, the rest monoculture of pine - not too much optimism for the future forests. Forest regeneration is very much affected by overpopulated wildlife, namely game species (red deer, less foe deer), so if hunting regime is not induced, then wildlife will be further compromising forest regeneration.
Site1. Municipal Forest near Treuenbrietzen	Location: Rietz, 14929 Treuenbrietzen (52.072053, 12.833212) A number of species observed from the very beginning, into two types of forest – (a) monoculture of pine (with some other species coming from the edge into the forest), and (b) a mixed forest (coniferous + broad-leaved species). There is pressure from municipalities to make more money from forests, so economic interest prevails. After the storm, logs and timber was taken. Small scale restoration based on natural processes is underway. Group

	structuring forestry - lessons learnt from storms! For regeneration, they use only smaller seedlings from nurseries. In 50 years from now in this area - pine, birch, and oak. 
Site2. NbS forest restoration after wind-storm in Private Forest	By Dietrich (forester): From nearly 1,1 mln ha of total forests in Brandenburg district, 0,8 mln ha are private forest, scattered and fragmented. Private owners still want pine monocultures or other species that can bring economic benefits (money). However, the future forests will not rely only on pine monocultures, but rather on a mix of species (already coming, visibly). In areas where wild-storm destroyed some forests, the restoration involved both artificial seeding/planting with reliance on natural processes (regeneration), all under monitoring. 
Site 3. Forest restoration in private forest affected by fire	After burning 2018 (probably from old ammunition unit), a number of species came over very rapidly, such as aspen (<i>Populus tremula</i>), common oak (<i>G. robur</i>), red oak (<i>Q. rubra</i>), birch (<i>Betula pubescens</i>), black locust (<i>Robinia pseudoacacia</i>) etc. Three restoration measures after burning: 1. Planting seedlings of red oak taken from forest 2. Litter enhancement (brought from forests with all seeds and fungi and microorganisms) 3. Spreading seeds/acorns of red oaks The litter brought (including leaves and soils) from forest nearby and then distributed, where seeds and fungi were there and thus contributed to natural regeneration – is another lesson learnt! Soil had to be ploughed because it was so tough (very alkaline after burning, high PH). Natural succession very visible, including pioneer species (aspen, birch). Pine was planted, but is not yet doing well in such soils. Oaks (both common and sessile) seeding planted from private nursery. Black locust is coming naturally. Other fire in 2022, intentionally. Private owner than ploughed and planted with pine and birch. First, the area was cleared. Then seeds/acorns were thrown allover. In red ok, 98% germination in the first year. Common oak is also coming naturally (birds are contributing to it, especially jays). Willow (<i>Salix caprea</i>) is also coming naturally. A few chestnuts (<i>Castanea</i>

	<i>sativa</i>) are tested/planted around. In areas where litter was brought, there is natural regeneration of oak, lime, hornbeam, maple etc. For forest restoration, herbaceous flowering plants were used/used as indicators of what forest tree to plant (according to soil condition) – <i>Senecio sylvaticus</i> and <i>Epilobium angustifolium</i>. As the exotic black locust, it is good as wood as soil stabilization for the future. Coppicing brings rapid wood. Better BL instead of red oak, due to soils. Better ventilation and fertilization of soils. Planting BL with other species, lime or maple, to keep in the shade and not allow for rapid spreading.	
18 th November		
Field trip to State Forest near Eberswalde With Valentina and Inga (HNEE)	Visiting a clear-cut area for vegetation data collection. The method was: a sample plot of a circumference-shaped area (10 X 10 m) where all biomass is counted and registered in an app (PC), such as – all standing trees (DBH), fallen trees, stumps (rank 0 fresh, 1 decaying, 2 rot / advanced decay), and other key vegetation.	
Permanently		
Forest Botanical Garden Eberswalde	The Forstbotanischer Garten Eberswalde covers 8 ha, a botanical garden and arboretum, near HNEE., more than 1200 native and exotic trees and shrubs, including perennial flower beds and alpine garden.	
26 Niv 2024		
Spreewald Biosphere Reserve (SBR) UNESCO site	SNR is since 1990 part of the 600 UNESCO bio reserves. Known also for organic cucumber agriculture) It was a wilderness area until 17th century when wenden/sorben (Slavs) and German started modifying the landscape. Highly modified landscape, used by humans for centuries. Black Adler comes in as dominating, everywhere. Mastering water was the ultimate goal, and a must for people to survive and make living possible, also for agriculture and forestry yields. Old swamp area, people modified through the history. Many artificial canals and roads built by humans, now with vegetation coming over naturally. Many dykes built and water is controlled. Dykes prevented from floods they were often producing danger to people infrastructure and agricultural fields. Water level on time dropped by up to 2 meters. Data of 1930, from 50000	



ha of swamp, now only 5000 remain swamp; and now? In closed canals a lot of eutrophication, some locals consider some areas almost lost their naturalness. Research and monitoring. Forest monitoring at 5 sites. Only one real restoration project water-site mire bigger sites with fern area. No natural forest left, all forest is planted. Core area is 3 percent, 29 percent 31 percent landscape protection (much influenced by humans).

Nearly 60-70% of all land modified in terms of water hydrology. Still some organic farming. Water level management in some areas, to keep stable level. Hard to manage because of less water. Water is mainly coming from the river; some water from mines through pumping.

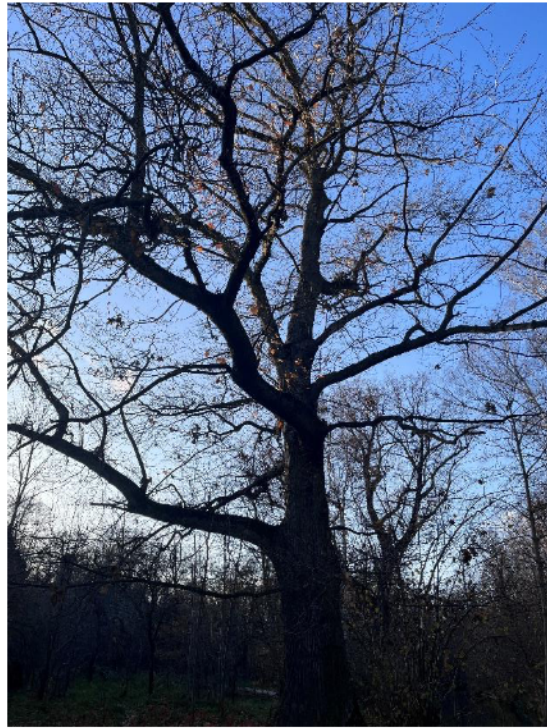
There are still mining sites. The plans are to close the mines, but for a while will still pump water, ultimately sites will be re flooded and restored. All mining sites will become lakes, water will steam from beneath and water from above. Up to 2038 iron mines will be closed, 10 years later water stops to be pumped.

The big challenge is to revert artificial canals to natural streams, and reduce water flow and make it stable. We intended a research on how to keep water in the area during summers - maybe close artificial canals and save water, but a study is needed. Scenarios are examined.

Difficult to keep water during dry seasons nowadays. All regions have similar problems, high temperature an issue, higher now than 20 years ago, bigger evapotranspiration.

Create or recreate lakes for water storage is the vision. What to do when climate change hits much stronger? Where to get water from for the SRB then?





Restoration: resetting projects, but farming landscape projects difficult, and in some times water level drops. Because of many artificial canals, difficult to build any reliable model (water flows differently). But there is model for bigger catchment of the river, but no data for smaller flooded areas.

Until 18 century, 75 percent of the forest was cut down. Some patches remain. Flood forest - black alder and ash. In drier forests - oaks, elm. Willow everywhere. Exotics - red oaks, hybrid poplar. All core forest areas owned by state, and they are bigger in size and better connected.

Nearly 30% is natura 2000 sites. SBR has its own management plan, and the management plans for Natura 2000 are considered (separate old s for 16 flora and fauna sites, but not connected), and forests have management plans, open areas also have management plans. Privates have to follow SBR rules, but not mandatory FSC,

but forbidden to clear cut forests.

There were many pumping stations, less now. In degradation areas, water level is 0,5-1 m lower than before.

Hunting allowed, sometimes overpopulations by deer or locally by wild boar.

Water level is regulated by locks to keep water within the area, so now the area is filled by naturally distributed groundwater.

Most of open areas managed by private. State and private forests 50/50, many and many tiny patches in various land ownership, very fragmented land ownership. Difficult to get consent from land owners for any regeneration projects.

Issues with raccoon (introduced), SBR want to buy electric fence to protect some bird regeneration areas.

Logging is permitted, except for core areas. Only with special machinery less damaging.

Flooding forest is not that much in use.

Open landscape owners make hay or sell hay to others - conventional farming. Hay bales can be used for heat, in ovens, but not much.

In Natura 2000 sites, land owners get compensations for protecting nature, under contracts with SBR under funding on how to do the management (harvests, cutting grass) - but owners are not happy, they say what they get is equal to what they do for management, but SBR has done calculations saying not the case. SBR works in projects on different solutions to get products from biomass, fodder, heat, paper etc. (several farmers already deliver products to markets).

No plans for more forests or reforestation as there is natural regeneration more than enough. *Prunus serotina* exotic is an issue. Difficult to manage exotic invasive, better is the prevention, because latter is useless measures.

Because of managed water there is strong mineralization, fern layers are disappearing, lower layers of boggy areas. Also higher evapotranspiration.

Very few illegal loggings, a little illegal hunting (statistics can be available), but local communities are aware and keep eyes on this.

According to EU rules, 10 percent of all forests should stay natural (to check it). In SBR all natural forest belongs to state. But difficulties to work with land owners over forest management, privates not willing (in Brandenburg area too).

Last 30 years tend to close to nature forest management all over the country, near to nature forestry. We use more natural regeneration than planting, brave use of CC and water

	conditions. Develop flexible type of species, a mix a species (nor monocultures as in the past). Hard to say what will be in 100 years. More dynamic forestry is the way. Over part 20 years forestry sector tries to be less pine monoculture, but close to nature and broader leaves forest coming. Millions of private forest owners, some inherited and no ideas what's going on there. Most challenged issue for regeneration is from both roe and red deer, but mainly roe. In some areas overpopulated. Soil conditions and CC will dictate species composition used in future forests. 70 percent of Brandenburg beech forest is natural. Models for 100 years now shows no space for beech development, pessimistic scenario. What species will come over? What to promote? More oaks from rarer region will come and has future. Maples too, good soils for them. No o problems with Robinia from my point of view. But for future forestry of Germany, it can face the CC for timber quality and benefits.	
Schwarzer Weg (Black Path)	A small-scale bog restoration through assisted remutualization: not only left for natural recovery, but also water flow is regulated (dykes closed in summer and winter open). Bogs are growing slowly, some 0,5-1 cm a year.	
Gustewitz		Area near former peat bog, now no extraction. Beaver seems to be around.
28 Nov 2024		
Schorfheide-Chorin Biosphere Reserve Guide - Martin Flade (director)	General information about SCBR: 48% forest, 29%, 10% grassland, 7% lakes, and 4% mires. Organic farming is one of the characteristics. 12-15 thousand years since ice age that shaped landscapes, also influenced by Baltic Sea. All young ice age excavation and sedimentation is part of history, leaving many lakes and stones, typical relief. Most important habitat is lowland beech forest, including World heritage sites. Some core zines are protected for more than 100 years before BR establishment. Many Pine monocultures planted after 2 World War, for compensation to Russia. 3 types of forests: deciduous (mainly beech), coniferous (pine, needs transformation) and mixed.	



Forest ownership: 69% state, 11% municipalities, 20% private (2 types: small owned by farmers 2-3 ha, big forest owners are individuals, former aristocrats who lost forests during Soviet and got them back after reunification, there is special law, they fought for gaining forests back). Small forest area owned by church (very strange according to Martin). 90% of all forests are commercial (only 10% out of forest management/use). Annual growth 9-10 m³/ha/year in beech forests, 5-6 in pine.

Forest management: subordinated to BR administration since 1990th, but the consent needs to be agreed by nature conservation and forest management (which can lead to problems, many operations can be blocked). But a good collaboration was set! No ideological conflict.

Hunting: while area was governmental hunting area for 700 years including Nazi and socialists, including high level politicians. These lands were managed for hunting basically. Then transformed it into preserved areas - a real advancement. Red deer among favorite. BR allows strict game management, no hunting (no trophy hunting) all over the area except for two days in late autumn (allow to shoot everything, except wolf) because huge deer accumulations may destroy forests. In core zones of forest rejuvenation game should be managed, because such situations are called artificially created. A problem for mature conservation.

No feeding (no added biotechnology) in order to avoid overpopulation.

240 lakes. Clear water lakes are of huge significance. Small lakes formed by former ice blocks see important for frogs and birds or dragonflies etc. Some areas restored, rewetted, BR obliged to restore water regime. 14000 ha Mires, most drained, including forest mires. 4000 ha rewetted mires + 3000 ha lakes.

Agriculture: small agriculture in the past. Then collective farming during GDR. Now, the target to transform it into organic farming of former collective farms, so far only 70 percent transformed, remaining is conventional farming. Transition from large farming to small and nature conservation - practice example, leave vegetation gaps (rows) between different crops, for biodiversity (pollinators).



Steppe grass fields slopes, water transport sediments into valleys. Stippa on focus. Mans gent should be done by grazing (put sheep to grass hills), otherwise steppe vegetation is lost.

Tourism becomes important. Two types - culture & nature tourism combined (churches, concerts), and organic farming tourism (buy products, eco/organic). BR created a regional marketing label - 85 cooperating enterprises of agriculture working for the targets of the BR. E g, food products processing, gastronomy, crafts, trade and markets. No income from tourism. No car parking at the core zones. 10000 people visiting forests annually. Certified (by BR) guides to go into code zones, also along the trails.

Research development projects. Micro habitats: tree holes, branch cavities, bark pockets, trees with hoof

fungus etc. One can measure them (on 1 ha), quantify and map. Micro habitats can be assessed and defined.

Transition from commercial to natural forests can take time, but excluding them from logging use can be fascinating in terms of species and habitat richness. To have full biodiversity it needs full habitats present.

Conclusion: Forest management should guarantee the continuity of forest soils and all forest phases (from young to dead stages). So all micro habitat elements need to be present all the time and spatially. Patchiness example from Martin led research (PPT to share).

UNESCO World Natural Heritage Beech Forest Grumsin Forest, water and bogs	Beech can leave 350-600 years old. But in commercial forest beech is 100-150 years, so other development phases are absent. World heritage site. Forests On site: beech, sessile oak higher elevations, and common oak in lowlands, ash, some maple. Good regeneration 	 all species, especially beech. 530 mm year. Small patches of mires and peatlands inside the old growth beech (plus sessile oak, ash, hornbeam) forests, and lakes - variety of habitats. Nearly 1000 ha.
2 December 2024		
Reforestation experimental sites after 2022 forest fire General view on Brandenburg forests	By Prof. Jan Schroeder (LFE): In state forests of Brandenburg, pine is not used for planting anymore. Natural pine regeneration is left for succession only. Monocultures in state forests are avoided as considered not economically and ecologically viable. Other species in the mix are promoted, like oaks (common, sessile and red), beech etc. In private forests, they can be free in selecting what they plant, except they should keep the forest type and take recommendations from foresters. In federal (national scale, different from state / 'lands') forests, pine is not restricted but rather preferred as a noise protector. Pine monocultures challenges (by Jan), a combination of abiotic and biotic factors: - Climate change (warmer, more droughts, direr and longer dry days) - Forest fires (especially during last years because of droughts or drier periods) - Pests, especially caterpillars in monocultures (in oaks too) - One new: mistletoe species coming over, two on coniferous and one broad-leaves, from forest edge penetrating into deeper forests now	
Forest fire	On 17 June 2022, the hottest day, a fire started (either by a thrown down cigarette or from nearby military base) and spread so quickly that firefighters were unable to mobilize to localize it. The fire last for three days.	



LFE then designed a reforestation plan on a burnt state-owned forestland covered mainly by pine before fire in June 2022 (220 ha burnt, of which 50 ha is state-owned, the rest by municipality).

Site1. Western side from Beelitz

The LFE site is nearly 20 ha, fenced (issues with both roe and red deer). Planting seedlings work on the ground is being carried out by some 30 young people, through a state-funded training (to make them complete it in 3 years and become forest workers), who will start the planting from today. Common oak (1-year seedling) and red oak (3-year), 50 / 50, will be supplied from a nearby state nursery.

There are several experimental sites:
 Dead trees left and to be planted with oaks
 Left for natural succession (2,5 ha)
 Sites with standing dead trees cut 4 m tall and left for deadwood/biomass and shelter as protection from winds.



	 The LFE team is monitoring how works are being implemented on the ground. LFE is not interfering in planting, just observers, mainly guide the workers in what they are doing. The forest area is a typical site under economic management. The planting scheme is as follows: seedlings are planted using special spades, by making holes in the soil, normally 1 seedling near the stump (north side) and 1 seedling in-between stumps. Reliance is on natural regeneration too, so felling operation (replanting) will be done according to successfulness rate. Everything is being monitored for successfulness.
Site 2. Eastern side off Beelitz	By Jakob (local forester): Black locust planted on burnt sites to have curved trunk stems wood, for kids play grounds and even export to Korea etc. Here planted from seedlings purchased from private nursery nearby. Foresters also planted beech and larch having already pine coming naturally. State forest nurseries may not satisfy the needs in FRM, so privates can assist.
4 December 2024	
Wilderness area on former military training area at Jüterbog	 Meeting with Antje Bischoff (along with Angela), our field guide. The wilderness area represents a former military training area, historically used for military since 1910 or so including Soviet troops, who left the area in 1994.  The land belongs to Wildnis Stiftung (Private Wilderness Foundation) who bought it from the state, covering more than 14000 ha of forests and open areas. Forests are planted, mainly Scots pine, regenerating naturally. It is regarded as an opportunity for nature restoration (the Government of Germany can do nothing because of ammunition and associated risks). Restoring / rewilding the area without human intervention is the main vision of the Foundation. Most of the land is now protected as Nature Reserve category (rather strict). The wildlife is coming back too, such as wild cat, wolves, more deer (roe and red) - proven by monitoring and video camera traps. Forest is gradually and slowly changing, from monocultures to more diversified. These was seen good natural regeneration of pine, birch (pioneering), less of common oak (because not many seed trees left), some black alder around mire patches.

	Permissions to hunting allowed and encouraged in order to protect natural regeneration. 
Burned sites under natural restoration / reforestation	Fire happens almost every year, especially during recent dry seasons, caused by human or phosphorous self-ignition left in ammunition believed to be from former military training area. The whole area is full of remnants of trenches or holes in the soil for tanks. The access is not allowed, but tourists can use marked trails. Ammunition is still grooved to be grounded/hid throughout the forest, so risky to step in (staff from the area sign special papers if want to take the risk on their own). Rangers monitor the area, including for fire prevention and signaling.  In 2019 nearly 800 ha of land were under fire and became burnt, fire stopped by itself (rain came over) while firefighters assisted.



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Scholarship Certificate

As part of the East-West Dialogue 2024 programme - *Academic Exchange and Research Cooperation for Security, Collaboration and Civil Society Development in Europe 2024*, funded by the German Academic Exchange Service (DAAD) with means from the German Foreign Office (AA), the Eberswalde University for Sustainable Development is awarding a research fellowship of a total of 2,550 € (monthly rate of 2,150 € and 400 € travel allowance) for a one-month research stay in Germany from 7th November 2024 till 5th December 2024 to:

Aurel Lozan

born on 06.11.1969 in the Republic of Moldova

This scholarship is awarded on the basis of a decision made by a selection committee formed by representatives of the Eberswalde University for Sustainable Development and the project partners.

We congratulate you on this scholarship and wish you a successful stay in Germany. We hope that in addition to your professional tasks you will also take the opportunity to get to know your host country, its people and its culture better. We would be delighted if you would continue your commitment to international academic cooperation after your stay abroad and stay in contact with the Eberswalde University for Sustainable Development and the DAAD.

Eberswalde, 05.12.2024

Ort, Datum

Unterschrift (Prof. Dr. Dr. h.c. Pierre L. Ibisch)