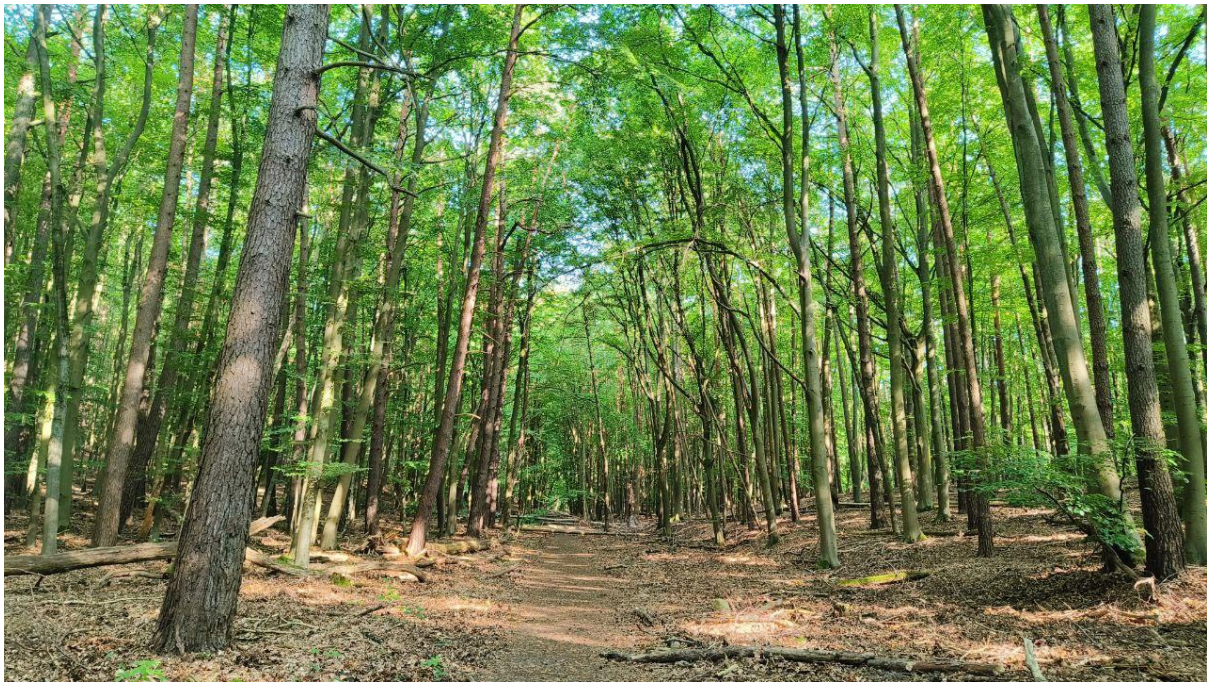




* Schorfheide-Chorin Biosphere Reserve

Scientific Report

Fellowship Project:

Sustainable Landscape Rehabilitation – Insights from German Nature Reserves for Conflict-Affected Regions

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Executive Summary

This report, titled *"Sustainable Landscape Rehabilitation: Insights from German Nature Reserves for Conflict-Affected Regions,"* explores strategies and best practices for ecological restoration and management in landscapes affected by conflict, drawing insights from Germany's renowned nature reserve network. The study aims to provide actionable recommendations for regions impacted by crises, emphasizing socio-ecological resilience and biodiversity recovery.

Key findings of the research include:

- Human capital outranks hardware – surveys and interviews rate skilled staff as the single most critical resource for both routine management and emergency response.
- Policy integration, diversified funding and strong stakeholder engagement are decisive for long-term sustainability; Germany blends EU LIFE grants, agri-environment payments, wind-energy rents and volunteer labour to keep restoration programmes running for decades.
- Long-term, fixed-plot monitoring combined with university partnerships (25 years in Schorfheide-Chorin) provides the rigorous, comparable data needed for adaptive management at low cost.
- "Micro-habitat indicator" scorecards translate complex biodiversity needs into a language foresters and rangers can act on, turning deadwood, cavities and fungi niches into clear management targets.
- Technology is a force-multiplier, not a substitute for people – tools like eDNA, LiDAR, drones and real-time GIS help tiny staffs (often < 15 rangers per 10 000 ha) survey damage, track recovery and direct resources efficiently.
- Crisis-ready wildfire doctrine for UXO-contaminated lands (30–50 m firebreaks, cleared access lanes, volunteer-brigade protocols) shows how safety measures can coexist with "leave-deadwood" wilderness goals.
- Hybrid governance (state parks, private foundations, biosphere reserves) and legal land-tenure security attract long-horizon investment, making it easier to finance 20- to 30-year restoration trajectories.
- Citizen-science schemes ("Ambassadors for Wilderness") plug expertise gaps and build public ownership, especially where professional taxonomists are scarce or diverted to other sectors.

The report proposes the adaptation of these methods to conflict-affected regions, focusing on ecological parallels, potential barriers, and region-specific modifications.

Through interdisciplinary approaches, we hope this report contributes to the broader dialogue on ecological restoration amidst crises and underscores the value of international collaboration.

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1. Introduction

1.1 Background

Armed conflict accelerates landscape degradation by destroying vegetation, draining or polluting wetlands, fragmenting forests and disrupting traditional land-use systems. The resulting loss of ecosystem services compounds social and economic hardship for local communities. A rapid yet scientifically grounded pathway to recovery is therefore essential for countries such as Ukraine, whose protected-area network has been directly affected by hostilities and by decades of under-investment. The environmental toll of this conflict continues to mount, with over 60 billion USD in estimated losses as of 2024. Much of this damage stems from heavy fighting in key industrial and agricultural regions, where shelling and contamination have affected soil, water, and air. Ukraine's network of nature reserves, encompassing unique steppe regions and critical bird habitats, now faces shelling, fires, and occupation. The Ministry of Environmental Protection estimates that at least 25 nature reserves are under Russian control or regularly attacked. These areas—once sanctuaries for endangered species—now endure habitat loss, poaching, and severe disruptions to scientific and conservation work. As the conflict continues, every day spent under occupation raises the likelihood of irreversible harm to these precious ecosystems, highlighting the urgent need for protective and restorative measures ([Russia–Ukraine war: Environmental impact, 2024](#)).

Germany offers an unusually rich source of practical experience. Its protected natural landscapes—16 national parks, 18 biosphere reserves and more than 5 000 Natura 2000 sites—cover roughly one third of the country and have been managed for long-term socio-ecological resilience ([Biodiversity Information System for Europe](#)). Flagship sites such as Müritz National Park and the Schorfheide-Chorin Biosphere Reserve illustrate how peatland rewetting, green-corridor design and community-led adaptive management can restore both biodiversity and ecosystem functions under multiple stressors. Equally relevant are Germany's well-documented approaches to landscape zoning, cartographic decision-support and stakeholder co-management, all of which parallel Ukraine's own spatial-planning traditions.

1.2 Objectives

This study aims to:

1. Examine the sustainable management practices employed in German nature reserves.
2. Identify transferable techniques and frameworks applicable to conflict-affected landscapes.
3. Develop recommendations to enhance ecological resilience and biodiversity in post-crisis regions.

1.3 Scope of the Study

The overall scope of the research includes all of the German protected areas within the IUCN category Ia, Ib and II and their nature protection and recovery practices. However, research mainly focuses on four nature reserves—Müritz National Park, Schorfheide-Chorin Biosphere Reserve and Spreewald Biosphere Reserve. These sites were selected for their diverse management practices and ecological characteristics. The study integrates ecological science with socio-economic considerations to ensure the applicability of its findings across different conflict-affected regions.

2. Methodology

2.1 Data Sources

This study draws on a combination of primary and secondary data sources:

- **Primary Data:** Observations and interviews conducted during site visits to German nature reserves, focusing on management practices, community involvement, and ecological outcomes.
- **Secondary Data:** Review of scientific literature, policy documents, and case studies, including insights from the European Natura 2000 network and key articles on ecological restoration and conservation.

2.2 Survey

To complement the desk research and interviews, an online survey was conducted targeting staff of German protected areas. The aim was to collect firsthand insights on emergency management, institutional challenges, and resilience strategies, particularly in contexts comparable to post-crisis recovery needs in Ukraine.

The survey included 12 structured and semi-structured questions, addressing:

- Types of crises encountered
- Key operational challenges during emergencies
- Frequency of staff training
- Perceptions of the importance of technology, funding, and human resources
- Methods of damage documentation and reporting
- Strategies for resilience building
- Funding mechanisms for crisis management
- Willingness to participate in follow-up exchanges
- Open feedback and recommendations

Participants provided both quantitative ratings (e.g., 1–5 scales) and qualitative comments.

The survey was distributed online using Google Forms. Participation was voluntary. Two protected areas responded:

- Nationalpark Hamburgisches Wattenmeer
- Naturpark RheinTaunus

The survey was conducted between June 2 and December 3, 2024.

Quantitative data were summarized using basic descriptive statistics (frequency, percentage, and average ratings). Qualitative feedback was analyzed through thematic categorization to identify key perspectives and insights relevant to resilience planning and protected area management.

2.3 Case Study Selection

The following German nature reserves were chosen for their diverse ecological and management characteristics:

- **Müritz National Park:** Known for wetland restoration and the integration of natural disturbances.
- **Schorfheide-Chorin Biosphere Reserve:** Highlighting sustainable forestry practices and habitat corridors.
- **Spreewald Biosphere Reserve:** A model of floodplain ecosystem management and community-led conservation.

These reserves were selected to provide a broad understanding of sustainable management in different ecological contexts. The location of Schorfheide-Chorin Biosphere Reserve and Spreewald Biosphere Reserve was suitable for the trips from HNEE which granted more time for the observations.

2.4 Analytical Framework

The analysis employed a combination of qualitative and quantitative methods:

1. **Comparative Analysis:** Examined the similarities and differences in ecological, social, and policy contexts between German reserves and conflict-affected regions.
2. **Policy Review:** Assessed the legal and institutional frameworks underpinning the management of German reserves and their potential adaptation to post-conflict landscapes.

3. Overview of German Nature Reserves

Germany protects nature through a multi-layered hierarchy of designations that together cover roughly one-third of the country's land surface ([Nationale Naturlandschaften e.V., 2024](#)). At the national level these designations fall under the *Nationale Naturlandschaften* brand and include:

Table 3.1 Distribution of Germany protected areas types

National designation	Number of sites	Core objective
National Parks	16	"Let nature be nature" in large core areas managed by non-intervention
Biosphere Reserves	18	UNESCO "learning sites" that balance conservation with local livelihoods
Nature Parks	104	Landscape-scale areas integrating biodiversity, recreation and regional branding
Wilderness Areas	3	Strict protection of spontaneous ecological processes

The national network dovetails with the EU-wide Natura 2000 system, through which Germany safeguards about 5 200 Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) that together cover 15.5 % of terrestrial territory and 45 % of marine waters. Across Europe, Natura 2000 is recognised as "the largest coordinated network of protected areas in the world" ([European Environment Agency \[EEA\], 2024](#)).

3.1 Müritz National Park

Created on 12 September 1990, Müritz National Park covers $\approx 32\,000$ ha (322 km^2) in the Mecklenburg Lake District ([Nationalparkamt Müritz, 2024](#)). More than a hundred natural lakes lie inside its boundary, foremost Lake Müritz (117 km^2), the largest lake located entirely within Germany

Park managers have restored the hydrology of **127 bogs and fens (~ 1 900 ha)** and **31 lakes (~ 1 430 ha)**, reversing decades of drainage and boosting carbon storage (Rowinsky & Kobel, 2011) . The rewetted mosaics now support flagship birds such as white-tailed eagle (*Haliaeetus albicilla*), osprey (*Pandion haliaetus*) and large migratory flocks of common cranes (*Grus grus*) (Nationalparkamt Mritzt, 2024).

3.2 Schorfheide-Chorin Biosphere Reserve

Designated a UNESCO biosphere reserve on 1 October 1990, Schorfheide-Chorin spans 129 161 ha (1 291 km²) of post-glacial forests, lakes and peatlands in Brandenburg ([UNESCO, 2022](#)). An EU evaluation reports that the reserve “does a very good job of ensuring connectivity within its boundaries,” with green corridors aiding the recovery of European otter, beaver and raptor populations (ETC/BD, 2021).

About 62 % of the farmland is already organic, illustrating how conservation goals are integrated with sustainable agriculture ([UNESCO, 2022](#)). Public-private schemes reward farmers for buffer-strip and wet-grassland management, demonstrating practical ways to align livelihoods with biodiversity targets ([Schorfheide-Chorin Biosphere Reserve, 2024](#)).

3.3 Spreewald Biosphere Reserve

Recognised by UNESCO in 1991, the Spreewald Biosphere Reserve encompasses ≈ 47 500 ha (475 km²) of lowland fen and flood-plain 100 km south-east of Berlin ([Spreewald Tourism Association, 2025](#)). Its defining feature is a 1 500 km network of natural and man-made channels, which sustains some 5 000–6 000 plant and animal species, including fire-bellied toad (*Bombina bombina*) and European pond turtle (*Emys orbicularis*) ([UNESCO, 2024a](#); [Spreewald Tourism Association, 2025](#)).

Adaptive water-level regulation balances flood control, organic farming (the reserve has Germany’s highest share of organic agriculture) and fen conservation ([UNESCO, 2024b](#)). Traditional Sorbian communities continue low-intensity haymaking, fishing and craft production, showing how cultural heritage and ecological restoration can reinforce each other.

4. Insights from Expert Interviews

To better understand the practical aspects of ecosystem restoration, monitoring, and adaptive management in German protected areas, a series of online- interviews were conducted with key experts from biosphere reserves and nature conservation institutions. These interviews provided first-hand perspectives on institutional challenges, innovative practices, and strategies that can be adapted to post-conflict and biodiversity-sensitive areas in Ukraine.

4.1 Interview with Dr. Benjamin Herold, Monitoring Coordinator at Schorfheide-Chorin Biosphere Reserve

The expert interviewed holds a PhD has been responsible for coordinating monitoring and research in the Schorfheide-Chorin Biosphere Reserve since 2019. Their expertise spans multiple habitat types, and their role bridges the gap between researchers and land users, such as foresters and farmers.

4.1.1 Long-Term Monitoring: Methodological Rigor and Institutional Challenges

One of the most striking aspects of the biosphere reserve’s monitoring system is its longevity and scientific depth. Developed in collaboration with Eberswalde University of Sustainable Development (HNEE), the program has been in place for over 25 years. It covers all major landscape types — forests, peatlands, lakes, rivers — using a rotating cycle of indicators assessed every 3, 6, or 12 years depending on the parameter (e.g., soil layers every 12 years, vegetation every 3 or 6).

Monitoring is implemented using fixed plots located across core, buffer, and development zones, following strict methodological consistency to ensure comparability over time. However, a key issue has emerged: while data collection is robust, the results often remain underutilized due to limited staff capacity and a lack of communication channels between scientific and administrative actors. As the expert noted:

“The numbers and the monitoring research data is gathering and growing, but we are not able to use the results because they are stored in a database and you have to be guided to understand all of the results.”

This gap mirrors challenges in Ukraine, where monitoring often depends on project-based efforts and lacks continuity or integration into decision-making.

4.1.2 Forests and the Microhabitat-Based Conservation Approach

A notable innovation mentioned during the interview was the use of “microhabitat indicators” as a practical language to translate biodiversity needs into forest management. This concept, developed through collaborative projects in Schorfheide-Chorin and neighboring Müritz National Park, focuses on identifying and preserving specific structural elements in forests — such as tree cavities, deadwood features, and fungal niches — that support large numbers of specialized species. The idea is to create a shared vocabulary between ecologists and foresters:

“It’s meant as a language... The conservation people can understand it, the biologists and the foresters can understand it. It translates the requirement of the many different species... into a language that everybody can understand.”

The concept has already influenced EU-wide guidance documents through the European Forest Institute. For Ukraine, adopting such a method could be crucial in making biodiversity monitoring more effective and actionable — especially in partially managed or recovering forests.

4.1.3 Scaling Up with Remote Sensing and eDNA

The expert also emphasized the need to bridge the gap between fine-scale monitoring and landscape-scale understanding. With 130,000 hectares under management and only 11 staff members, traditional field monitoring alone is insufficient. They proposed complementing fieldwork with new technologies such as eDNA sampling for aquatic biodiversity and remote sensing for forest health. For example, eDNA is now under consideration for fish community assessment in lakes, potentially replacing less accurate traditional techniques.

This approach resonates with Ukrainian efforts to incorporate UAVs and satellite data into post-war ecological monitoring, especially where access is physically restricted.

4.1.4 Partnerships and Capacity Building

A successful model of cooperation between academia and practice was highlighted: the biosphere reserve contracts HNEE to carry out technical aspects of monitoring, including soil and water analysis, while also enabling student engagement through bachelor and diploma theses. This model offers a blueprint for Ukrainian reserves seeking to boost scientific capacity despite budget limitations.

Moreover, the interview revealed the broader concern over institutional underfunding, staff shortages, and low prioritization of monitoring in policy:

“Publishing and working with the results is the first victim. Monitoring is treated as a luxury topic.”

The lesson is clear: even in Germany, long-term success of conservation efforts depends not only on good methodology, but on political and financial commitment to apply and sustain them.

4.2 Interview with Dr. Antje Bischoff, Project Manager at a German Wilderness Foundation

This interview was conducted with a leading representative of a private nature conservation foundation in Germany. The expert has worked for over 16 years in both public and private environmental sectors and currently manages projects in former military training grounds now designated for wilderness development. These areas are often characterized by high conservation value — and high ecological risk — due to legacy contamination with unexploded ordnance.

4.2.1 Fire Risk in Ammunition-Contaminated Landscapes

One of the most significant challenges described was the persistent threat of wildfire in areas polluted with old military munitions. High temperatures in summer can trigger spontaneous combustion of explosives, causing uncontrollable fires. A layered fire-prevention system has been implemented, involving 30–50 meter firebreaks, cleared corridors for fire brigades, water access points, and path maintenance for rapid response.

“You have to keep the ways free for the fire brigades, and you have to have areas cleared of ammunition so they can go there... And if it's not a small fire, fire can fly. In 2019, fire flew over the firebreak and ignited the forest on the other side.”

This experience is particularly relevant for Ukrainian protected areas, many of which face similar risks due to recent military activity. The expert emphasized the difficulty in balancing conservation goals (e.g., leaving deadwood for biodiversity) with safety measures and public perceptions:

“We had a really big discussion on deadwood... People said it's the fault of nature conservationists. But we need deadwood for the nutrition cycle.”

The German example illustrates the importance of public communication and cross-agency coordination in managing post-military or fire-prone landscapes — both urgent issues in Ukraine's war-affected nature reserves.

4.2.2 Organizational Structure and Resource Limitations

The expert highlighted the structural advantages of operating as a private foundation — with full land ownership, financial flexibility, and fewer bureaucratic restrictions. Despite this, she noted that the foundation still struggles with some underfunding and staff shortages:

“We have 14,000 hectares and 12 people... We want to monitor vegetation, fauna, everything — but we don't have the staff or the money.”

Funding is largely project-based, and staff positions often depend on temporary grants. This parallels Ukraine's challenges, where ecological staff in state reserves are frequently underpaid and overextended. A key insight was the advantage of long-term land ownership for conservation stability:

“Our capital is the land... By law, we are not allowed to sell it. It will be in the foundation forever.”

Such permanence enables strategic investments, like the installation of wind energy infrastructure to generate operational income. This model could be highly informative for Ukrainian governments exploring mixed funding strategies for sustainable restoration.

4.2.3 Stakeholder Coordination and Emergency Response

Unlike some Ukrainian reserves which often maintain their own fire departments (often poorly funded), German protected areas rely on municipal or volunteer fire brigades. While this shifts the cost burden away from the conservation institution, it also requires strong coordination:

“If there is a forest fire, the fire brigade is in charge... We are there to show them the ways, we cooperate closely.”

For Ukraine, centralizing some functions (e.g. emergency response funding, training) while keeping conservation decentralized may improve resilience.

4.2.4 Monitoring and Expert Shortages

The expert emphasized that even with external funding, implementing biodiversity monitoring can be limited by the lack of available specialists. In Germany, many taxonomic experts now work in consulting for renewable energy projects (e.g., wind farm impact assessments), and conservation agencies struggle to compete for their time.

“Even if you have the money, it’s difficult to find people... There’s a lack of specialists, especially in beetles, fungi, and soil fauna.”

In response, the foundation has launched a citizen-based monitoring program called *Ambassadors for Wilderness*, where trained volunteers monitor indicator groups like butterflies and bats using simplified protocols. This hybrid approach offers a potential model for Ukraine — particularly in areas where professional ecologists are scarce or working in dangerous conditions.

4.2.5 Governance and Financial Oversight

Though legally private, the foundation maintains public accountability through mandatory reporting to financial authorities and participation of public actors (e.g., federal land authorities, NGOs like WWF) on its board. This hybrid governance model allows flexibility while maintaining trust:

“Every foundation... is controlled by financial agencies. You have to prove that your money is used for a common purpose.”

Such a system contrasts with the current Ukrainian model, where all protected lands are state-owned, and private or hybrid conservation ownership is not legally permitted. The interview offers critical inspiration for potential legal reforms that could allow NGO-led conservation with state oversight in post-war Ukraine.

5. Survey results

The survey responses provided valuable practical insights that complement findings from literature and field interviews. Several major themes emerged:

Respondents reported a broad range of challenges, including:

- **Anthropogenic disturbances** (pollution, deforestation) — 100% of participants
- **Natural disasters** (floods, fires) — 50%
- **Animal epidemics** (e.g., avian flu) — 50%

This diversity reflects the complexity of risks that German protected areas face and highlights the need for flexible and integrated management approaches.

Key challenges encountered during crises included:

- **Loss of biodiversity** (100%)
- **Legal and political constraints** (100%)

- **Resource shortages** (50%)
- **Infrastructure damage** (50%)

This indicates that effective crisis management must address not only ecological restoration but also systemic institutional and legal factors.

Personnel were unanimously rated as the most critical resource (5/5). Although technology and funding were also valued, they were seen as supportive rather than decisive. This finding reinforces earlier interview insights that investment in human capacity is central to effective protected area management.

Technology (e.g., GIS, drones, remote sensing) was rated highly (average 4/5), suggesting that while not replacing human expertise, technological tools increasingly support monitoring, damage assessment, and response planning.

Training practices showed variability: one area conducted annual emergency training, while the other did so less frequently. This indicates a potential area for improvement in preparedness standards.

Damage reporting was comprehensive, combining:

- Internal documentation (100%)
- Public stakeholder reporting (100%)
- Scientific evaluations and publications (50%)

This multi-layered approach supports accountability and informed decision-making.

Respondents employed a combination of:

- Internal management reforms
- Community and authority engagement
- Infrastructure upgrades
- Application of innovative technologies and protocols
- Educational initiatives focused on sustainability

The emphasis on adaptive and participatory strategies aligns with best practices identified in German and international conservation literature.

Emergency responses were funded through:

- State budgets (50%)
- Internal governmental budgets (50%)

No reliance on donations or commercial income was reported, suggesting the importance of secure public financing for long-term resilience.

One participant highlighted systemic challenges beyond local control:

"Money is not everything, but good personnel is irreplaceable. Ultimately, the future of protected areas is determined not locally but within broader spatial, societal, and global contexts."

This *perspective* underscores the need for multi-level policy coherence, linking local conservation efforts with national and global systemic reforms.

6 Insights from German Practice & Transfer Pathways for Ukraine

6.1 Key Findings from Interviews, Survey and Field Review

Table 1 distils seven cross-cutting lessons from recent field visits and expert interviews in four leading German protected areas. Each row pairs a thematic insight (left column) with concrete evidence from reserve practice (middle column) and the underlying mechanism that makes the approach effective (right column). Together, these examples span ecological monitoring, crisis-ready fire management on former military lands, technology adoption, finance, and community engagement. The synthesis is intended to serve as a rapid reference for managers planning post-conflict landscape rehabilitation in Ukraine and other disturbance-prone regions, highlighting transferable practices that remain robust even when budgets and staff are limited.

Thematic insight	Evidence from German reserves	Why it works
A. Long-term, plot-based monitoring	25-year programme in Schorfheide-Chorin tracks soils, vegetation and fauna on a 3-, 6- or 12-year cycle, co-run with Eberswalde University (Herold, interview, 2024).	Continuity + university partnership keep methods rigorous yet affordable.
B. “Microhabitat indicators” for forest biodiversity	Field guides translate deadwood, cavities and fungal niches into a common language for rangers and foresters (Herold, interview, 2024).	Turns abstract species needs into concrete management targets.
C. Technology as a force-multiplier	eDNA pilots for lake fish, LiDAR for forest structure, drones for Spreewald waterway mapping (Herold, interview, 2024; Spreewald Tourism Association, 2025).	Compensates for small staff and speeds up post-event damage surveys.
D. Crisis-ready wildfire planning on UXO lands	30–50 m firebreaks, cleared access lanes and volunteer-brigade protocols on former military ranges (Bischoff, interview, 2024).	Balances safety with “leave-deadwood” wilderness goals.
E. Human capital outranks hardware	Staff rated “decisive” (5/5) in survey; tech and money scored high but secondary.	Skilled people translate data and plans into action.
F. Hybrid governance & diversified finance	Private foundation owns 14 000 ha of wilderness and funds operations via wind-energy rents plus public grants (Bischoff, interview, 2024).	Legal permanence of land tenure attracts long-term investment.
G. Citizen-science monitoring	“Ambassadors for Wilderness” volunteers collect butterfly and bat data when taxonomic experts are scarce (Bischoff, interview, 2024).	Fills expertise gaps and builds public support.

6.2 Transfer to Ukraine – Priority Actions

Table 2 pivots from observation to action. For each German best-practice distilled earlier, it identifies the specific gap facing war-affected Ukrainian reserves and outlines a concrete transfer mechanism—

whether institutional, legal, or technical—that can bridge that gap. The matrix thereby serves as a tactical checklist for planners drafting Ukraine’s post-conflict restoration roadmap, signalling where modest policy tweaks or targeted investments could unlock outsized gains in monitoring rigour, wildfire resilience, and community-backed biodiversity recovery.

German lesson	Ukrainian context	Transfer mechanism
Standardised long-term monitoring	Current post-war surveys are project-based and fragmented.	Establish a National Fixed-Plot Network inside core + buffer zones of the Natural Reserve Fund; co-delegate lab work to universities as in HNEE model.
Microhabitat indicator toolkit	Forest rangers lack a simple biodiversity “checklist”.	Adapt German field cards into a bilingual “Microhabitat Atlas for Ukrainian Forests.
Remote-sensing + eDNA bundle	Many peatlands and UXO areas are unsafe or inaccessible.	Create a joint Remote Sensing & eDNA Task-Force (State Forest Agency + academia) to fast-screen fire scars, bomb craters and fish recovery.
UXO wildfire doctrine	1.3 Thousands ha of reserves lie in current or former combat zones.	Copy Schorfheide 3-tier system: (i) GIS map UXO risk, (ii) pre-clear 50 m fire lanes, (iii) sign MoUs with municipal brigades for rapid response.
Invest in people first	Staffing in many reserves below 50 % of pre-war level.	Ring-fence at least 20 % of restoration grants for training and core salaries, echoing survey emphasis on personnel.
Legal room for private or hybrid reserves	All strict reserves are state-owned.	Amend the Natural Reserve Fund Law to allow non-profit land trusts with public oversight, mirroring German foundation model.
Citizen science	Taxonomic expertise lost to emigration or military duty.	Launch a “Guardians of Nature” volunteer scheme using streamlined protocols (butterflies, birds, bats) plus mobile app reporting.

Taken together, the two tables underline three cross-cutting messages:

1. **People first, gadgets second.** Both interviews and survey results rate skilled staff as the decisive success factor, with technology viewed as a “force multiplier” rather than a substitute
2. **Standardisation does not equal rigidity.** German managers rely on fixed-plot monitoring and micro-habitat scorecards to ensure data comparability, yet keep enough flexibility to test new tools such as eDNA or LiDAR when opportunities arise.
3. **Hybrid governance unlocks funding and trust.** Long-term land tenure (e.g., foundation-owned wilderness) plus multi-source finance creates the stability needed for decades-long restoration trajectories; this model could be trialled in Ukraine by updating Natural-Reserve-Fund legislation.

If Ukraine adopts even a subset of these practices—beginning with a national fixed-plot network, an emergency UXO wildfire protocol and a ring-fenced training budget—it can accelerate ecological

recovery, reduce monitoring costs and build public ownership of conservation goals. These outcomes directly support the EU Biodiversity Strategy targets that Ukraine has pledged to meet during its accession process.

7. Conclusions

This report set out to answer a simple but urgent question: **what lessons from Germany's mature network of protected areas can accelerate landscape rehabilitation in conflict-affected regions such as Ukraine?** Drawing on field visits, 2 expert interviews, an on-line survey of German reserve staff, and a review of more than 40 scientific and policy sources, five overarching insights emerge.

1. **Skilled people outrank hardware.** Both interviews and survey respondents ranked staff capacity as the decisive factor for crisis response and long-term monitoring, with technology—drones, LiDAR, eDNA—serving as a force-multiplier rather than a substitute.
2. **Standardised, long-term monitoring underpins adaptive management.** Fixed-plot networks and micro-habitat scorecards used in Schorfheide-Chorin translate complex biodiversity needs into operational targets for foresters and rangers, a model readily adaptable to Ukraine's Polissia and Carpathian reserves (European Topic Centre on Biodiversity [ETC/BD]).
3. **Hybrid governance and diversified finance increase resilience.** The coexistence of state parks, private foundations and biosphere reserves—supported by LIFE grants, wind-energy rents and agri-environment payments—has provided the financial stability needed for multi-decade restoration trajectories.
4. **Community participation is not a luxury—it is a risk-management tool.** From volunteer butterfly counts in wilderness areas to Sorbian-led reed harvesting in Spreewald, citizen engagement has filled expertise gaps, reduced conflict and added social value to conservation outcomes.

Final reflection

Ecosystem recovery in a post-war landscape is more than an environmental task; it is a nation-building exercise. Germany's experience teaches that commitment to science, people and plural governance can turn degraded land into reservoirs of resilience and hope. By embracing these principles—and adapting them to local realities—Ukraine can move from emergency response to long-term stewardship, setting a precedent for conflict-affected regions worldwide. The current challenges that Ukraine is facing are unmatched in the more recent history, the damage seems unrecoverable. However, there is a hope that with the help of international community and strong desire of Ukrainian people to recover the country it will be possible to rebuild and make protected area system better than before. Experience of Germany in that regard is externally valuable.

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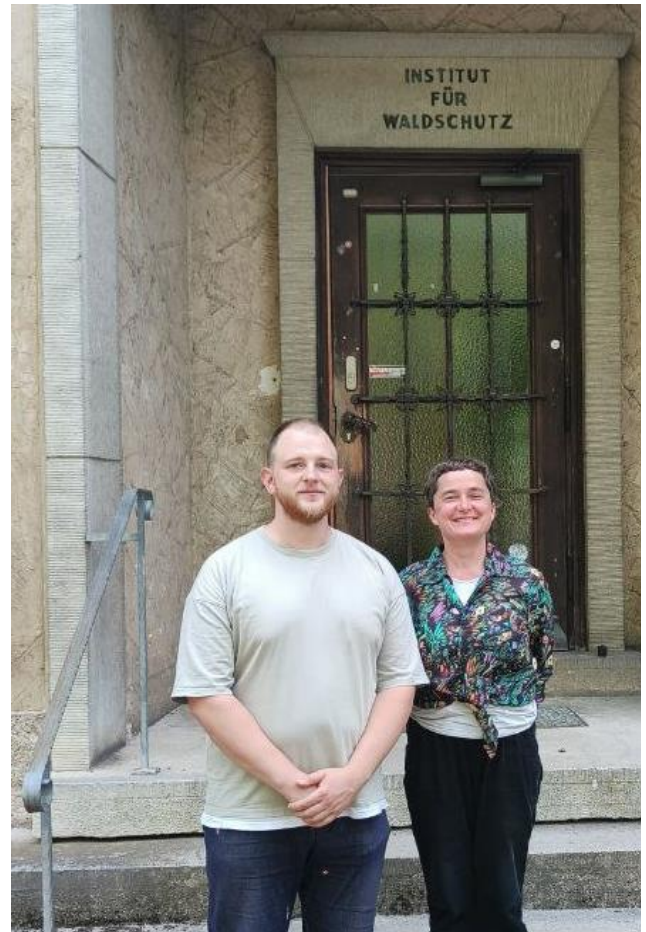
Survey participants. Representatives of Nationalpark Hamburgisches Wattenmeer and Naturpark Rhein-Taunus

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*Photos taken near the Forest Campus HNE, Eberswalde (Centre for Economics and Ecosystem Management) with the project coordinator - Angela Dichte



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