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**Planning, monitoring, reporting and review: global
review of collective progress in the implementation of
the Kunming-Montreal Global Biodiversity Framework**

Voluntary peer review of the revision and implementation of the *Plan national concernant la protection de la nature: 3e plan à l'horizon 2030* of Luxembourg**

Note by the Secretariat

1. The Executive Secretary is pleased to circulate herewith, for the information of participants in the seventeenth meeting of the Conference of the Parties, an information document on the voluntary peer review of the revision and implementation of *Plan national concernant la protection de la nature: 3e plan à l'horizon* of Luxembourg.
2. Luxembourg is the first country to be formally reviewed under the VPR mechanism. The development of the voluntary peer review methodology was mandated by Conference of the Parties (decision [XII/29](#)). It was later tested and piloted in Ethiopia, India,¹ Montenegro, Sri Lanka and Uganda.² Luxembourg was selected after a call for expressions of interest³ where various countries responded and nominated reviewers. A review team was assembled by the Secretariat of the Convention on Biological Diversity to carry out the review. The team comprised Alice Hughes (Team Leader) from the United Kingdom of Great Britain and Northern Ireland (University of Melbourne), Lalaina Randrianasolo from Madagascar (Direction Générale de la Gouvernance Environnementale), Hugo Aranibar Rojas from Bolivia (National Museum of Natural History) and Eduardo Espeleta Queblatin from the Philippines (Independent). The team and their work were supported and facilitated by the Secretariat of the Convention on Biological Diversity.
3. The attached report on the voluntary peer review has not been formally edited. It is being circulated in the form in which it was received.

* [CBD/COP/17/1/Rev.1](#).

** The present document is being issued without formal editing.

¹ See decision XII/29, paragraph 3. The test reviews are available in document [UNEP/CBD/SBI/1/INF/31](#) (Ethiopia) and at www.cbd.int/doc/nbsap/in-vpr-en.pdf (India).

² Decision XIII/25, paragraph 2. See for further background information: <https://www.cbd.int/nbsap/vpr>.

³ Notifications 2025-032 and 2025-055.

Luxembourg Voluntary Peer Review 2026

Preface

The review team of the Voluntary Peer Review (VPR) of the revision and implementation of Luxembourg's NBSAP, *Plan National concernant la Protection de la Nature — 3e plan* (PNPN3), expresses sincere gratitude to the Biodiversity team of the Ministry of Environment of Luxembourg – Ms Nora Elvinger, Mr Eric Schauls, Ms Lea Bonblet, Ms Elisabeth Kirsch, Mr Mike Reckel and Ms Valeria Bellanim for their support to the VPR exercise throughout the length of the process, including the identification and provision of documents for the desk-study, and for their support for the in-country visit. They also would like to thank all the representatives of ministry, agencies and stakeholders who took the time to share their views during the in-country visit.

The team wishes to acknowledge the generous support of the governments of Japan, through the Japan Biodiversity Fund, and Switzerland which enabled this exercise to be conducted.

The team also acknowledges with appreciation the support and facilitation provided by the CBD Secretariat.

It is anticipated that the information contained in this review report will be helpful for the mid-term review of the *Plan National concernant la Protection de la Nature — 3e plan* (PNPN3), and that the recommendations contained herein can contribute in a meaningful way to enhancing capacities both in Luxembourg and among the broader community of Parties to effectively implement the Kunming-Montreal Global Biodiversity Framework and the Convention. It is also anticipated that the report will promote opportunities for peer-to-peer learning, scientific and technical cooperation at regional and global levels and motivate other Parties to volunteer to be reviewed and nominate experts to participate in review teams.

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Executive Summary

Overview

Luxembourg is a country of approximately 2,586km², located in Europe, nestled between Belgium, France and Germany. Despite its small size, Luxembourg hosts considerable biodiversity, with 36% of its area covered by forest, and at least 337 bird species, 346 wild bee species, around 1,300 vascular plants, 72 mammals, 20 reptiles and amphibians, and over 95 butterfly species. Luxembourg also shows a high diversity of landscape types with 28 habitat types of Community interest under the EU Habitats Directive, alongside a comprehensive set of 21 habitat types of national interest, including over 1800km of waterways. This complexity requires a diverse suite of approaches to enable sustainable governance and conservation.

Consequently, Luxembourg has a suite of initiatives integrating sustainability across all facets of the landscape and a high-level of commitment to meeting the goals and targets of both European and global environmental agendas. This is reflected in a complex ecosystem of ministries and agencies responsible for various aspects of environmental management, governance, and monitoring, supported by significant financial investment in a wide range of initiatives. However, despite this commitment, and the diversity of targeted initiatives, challenges remain in strengthening capacity, mainstreaming biodiversity considerations across sectors, addressing competing land-use demands, and navigating complex legislative frameworks. The diversity of agencies and mandates also brings a range of priorities and perspectives, highlighting the importance of effective coordination and collaboration to support successful implementation. Notably, despite many good policies, most ecosystems and species continue to show declining condition (as is the case for much of Europe), thus identifying where there are opportunities to halt and reverse declines are critical. Work is needed to enhance the effectiveness of national plans on improving the status of species and ecosystems within Luxembourg.

This report offers an independent assessment of the processes and progress towards the implementation of Luxembourg's National Plan for Nature Protection (PNPN3) ahead of its forthcoming mid-term review. The assessment was conducted by an international team of reviewers⁴ in the context of the Convention on Biological Diversity's Voluntary Peer Review (VPR) Mechanism. The methodology⁵ used included an in-depth desk study of documentation relating to biodiversity management in Luxembourg, followed by an in-country visit consisting of interviews with key agencies and multiple stakeholders in the country.

⁴ Alice C. Hughes (University of Melbourne) – team lead, Hanitra Lalaina Randrianasolo, (Direction Générale de la Gouvernance Environnementale, Madagascar), Hugo Aranibar Rojas, (National Museum of Natural History, Bolivia) and Eduardo Espeleta Queblatin, (Philippines), with facilitation and support from the Secretariat of the CBD.

⁵ Methodology can be found in Annex A4.

Best Practices

Strong multi-level governance and institutional coordination

Luxembourg's complex ecosystem of interacting agencies, high levels of funding, and clear prioritisation of European Union (EU) initiatives has facilitated its ability to track targets at the European and global levels. Most notably their strategies for interagency work, diverse partnerships, and clearly designated roles within the policy and governance landscape means that lines of responsibility are clear. Likewise, under Common Agricultural Data Space, Luxembourg contributes to the EU agricultural data revolution by ensuring that data sharing is governed, secured, and beneficial for all actors along the production chain. This can make information available to eventually enable more efficient use of agrochemicals and energy resources in agriculture sector.

Luxembourg's implementation network includes strategic measures and initiatives which cover most of the landscape and reflect local conditions. For example six separate river partnerships provide individual focused responsibility for each of the river catchments (section 2.a.ii). Likewise, six Biological stations lead restoration initiatives in collaboration with local municipalities and through the development and implementation of biodiversity contracts (section 2.a.ii). Biodiversity contracts guarantee extensive management of agricultural landscapes thereby improving habitats for grassland and wetland species (sections 2.a.ii; 2.b.ii, 3.b.i) and various institutes and agencies work closely with the Ministry of Environment to monitor populations for various species (sections 2.b.ii, A1.2).

The diverse mosaic of agencies and strategies provides nuanced and targeted selection of approaches across the landscape. This diversity also necessitates interagency collaboration in addition to good working relationships with other stakeholders, such as farmers and farmers unions (section 3.a.ii). The cultivation of these relationships has led to success in many of the programs, especially those, such as biodiversity contracts, which explicitly require partnerships with farmers to be effective (sections 2.a.ii; 2.b.ii, 3.b.i). The biodiversity contracts are often linked to a guaranteed market (such as school canteens, through the "Natur geneissen" program; section 2.1.2), which, given the surplus in agricultural produce from the country, can be seen as highly attractive. Whilst these contracts are available for any farmer, this is especially attractive for more elderly farmers who may no longer be eligible to various other subsidies, so reducing financial expenditure and effort, and having a more secure market for produce via Natur geneissen may be highly attractive.

The enactment of the Nature Pact has been highly effective at enabling nationwide targeted action. The Nature Pact has a wide range of different targets and components which municipalities can aim to complete (sections 2.a.ii, 3.b.ii, 4.a.ii). Consequently its' implementation has driven "gamification" leading municipalities to compete for which can complete the highest number of targets. Given that 94% of all municipalities have committed to the Nature Pact, and 84% have certified it this provides another means for municipalities to complete a diverse range of targets, with advisors funded by the State to facilitate implementation where necessary.

Evidence based policies and alignment between policies and directives

Luxembourg's national plans are well aligned with EU-wide initiatives. For species listed as priorities within EU directives, action plans have been developed, with dedicated coordinators to facilitate their implementation, and some of them apply SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) strategies (section 2.b.ii). Likewise, detailed plans exist for pollinators, threatened plants, and invasive species, and in most of these cases SMART targets have been developed, with timelines to help guide the timely implementation of targets (section 2.b.ii). These plans, coupled with adequate financial resources reduce many of the common barriers to targeted species and ecosystem conservation (section 4.a.ii). The majority of priority species (though not all) are also monitored by a single agency, a single team at the Luxembourg Institute of Science and Technology (LIST), facilitating data standardisation, and at least for programmatic data, reducing data fragmentation (section 2.b.ii). However, different taxa are monitored by different groups and agencies, and greater alignment between the standards and protocols applied for monitoring across taxa may facilitate the interoperability of data for different taxa. Furthermore, targeted measures have been developed to support most EU targets and directives, including certification standards such as “LuxFlag” to facilitate traceability standards (section 3.1.2).

Monitoring informs and facilitates targeted actions to manage systems. Where targeted actions involving wildlife occur, these are generally supported by rigorous monitoring. For example, nationwide efforts for “free-flowing rivers” through barrier removal work with freshwater biodiversity specialists to monitor sites across the implementation of these plans (sections 2.b.i, A1.1.2). In the cases where barriers cannot be removed, and “fish-ladders” need to be installed, their effectiveness, and the ability for species to use them is also monitored (even in the case of older, and potentially less effective fish-ladders).

Systematic mechanisms enable effective landscape governance. Various mechanisms have been systematically put in place to enable effective landscape governance. For example, compensation is supported by a system of ecopoints (section 3.b.ii), which also applies to offsetting mechanisms when habitat destruction is unavoidable; with ecosystem type and maturity encompassed within the system to prevent the loss of potentially high biodiversity habitats. In addition, regular, and high-resolution remote sensing data, including LIDAR data for habitat structure information is regularly collected (section 2.a.ii). This data means that the destruction or conversion of biotopes could be detected and monitored, providing another means of enforcement. Such information also facilitates the use of schemes such as biodiversity contracts.

Converting former industrial sites into mixed-use projects curbs urban sprawl. This allows housing demand to be met without the need to construct in green areas (Section 3.b.ii). Furthermore, various initiatives have been implemented to effectively and sustainably manage space within cities. For example, new residential projects under the Sponge City model allocate 55% of their space to Nature-Based Solutions. Through strong public-private partnerships, permeable pavements and green roofs are installed to mitigate urban heat and prevent flooding (Section 3.b.ii). Mechanisms to streamline development also exist. For example, the Nature

Protection Law has created an ecological compensation system based on ecopoints. This mechanism allows developers to contribute funds to the Nature and Forest Agency, which enables and centralizes large-scale restoration projects (Section 3.b.ii).

Mainstreaming is critical to successful implementation of policy

Strong mechanisms to mainstream biodiversity policies enable sustainable development. For example, the Business Pact for Nature guides construction and real estate development companies in assessing their environmental impact. By aligning their financial risk analyses with biodiversity goals, it directly strengthens the sector's corporate responsibility (Section 3.b.ii). These are supported by strong policy frameworks and well-established funding mechanisms to support implementation.

Education and engagement are key to long-term success (section 4.a.ii). Many educational and other outreach initiatives exist, including programs for schools run by the Biological stations, in addition to other agencies such as the ANF and various non-governmental organization (NGOs) (section 2.a.ii), and courses on sustainability and organic farming by agencies such as Institut fir Biologesch Landwirtschaft an Agrarökologie (IBLA) (section 3.a.ii). These programs provide engagement at all levels and helps inform sustainable decision-making. Furthermore, the availability of training for farmers enables best practice, and the latest approaches to be applied across the landscape.

Luxembourg is an international sustainable-finance hub and leader, that has developed exemplar environmental and social finance instruments. Luxembourg hosts a diverse financial system which means that funds are rarely the limiting issue (section 4.a), though some areas (such as programs for knowledge transfer and communication) still need additional support.

Key Challenges and Recommendations

Whilst Luxembourg has clearly invested considerable effort into assessing and conserving biodiversity nationwide, critical gaps remain. Many of these issues centre around four key themes:

- Planning, Legislation and Project Management;
- Data, expertise and capacity;
- Alignment priorities and mainstreaming across sectors;
- Interagency coordination and collaboration

Planning, Legislation and Project Management

Streamline legislation and reporting requirements: Complex legislation and reporting structures were stated to be a common issue, potentially generating confusion over responsibility and challenges to enforcement (section 2.a.iii).

Simplifying both reporting structures, and the legislation (as well as the interdependence between legislation, as legislation often references other legislative dependencies- which may complicate enacting various regulations) would facilitate many conservation initiatives, as the process of permitting and the reporting burdens currently present a major barrier in implementing new projects (section 2.a.iv). Likewise, complex reporting structures may mean that even when non-compliance or other issues are reported, time since event may have exceeded the maximum time allowed for enforcement before any actions are taken, undermining the ability to enforce regulations. However, regulatory reforms aimed at simplifying administrative procedures could risk weakening environmental protection, thus taskforces are needed to examine how these structures could be simplified without creating loopholes, and adequate safeguards put in place (Section 3.b.iii). Furthermore, technical audits by independent scientific entities should be required to assess the impacts of various projects, and identify if any additional safeguards should be included (Section 3.b.iv).

Centralize and streamline permitting and licensing requirements: Single projects or initiatives may require permissions (permits) from multiple agencies. For example, obtaining appropriate permissions to remove a barrier in a stream would require separate permits from multiple agencies (most under the Ministry of Environment), which operate with different timelines. This creates not only a heavy bureaucratic burden but can result in mismatched timelines of when work can be conducted. Regulatory overlap and administrative fragmentation can also cause projects to stall due to complex procedures and outdated permits (Section 3.b.iii).

Creating a mechanism that would centralise this process and streamline the components would enhance the efficiency of project implementation, not only enhancing potential effectiveness (especially if rapid action is needed), but would also enhance uptake, as high regulatory demands may dissuade agencies and individuals from starting new projects. The identification of single point of contact for biodiversity for certain issues, and operationalizing existing platforms through a Binding Open Data Protocol, would also facilitate collaboration and communication between agencies (Section 3.b.iv) which would have broad benefits for environmental management. Centralising permitting could provide the means to publicise a list of ongoing projects and actions, reducing potential redundancy, and enhancing synergy between projects (by building on comparable initiatives rather than duplicating them) (section 2.a.iv).

Improve compliance monitoring and reporting: Some agencies currently report a lack of confidence in the efficacy of reporting, and state that in some instances individuals may perceive the economic returns on violating regulations (especially where demonstration that a violation has occurred may be challenging i.e., early mowing or fertilisation of a biotope) are worth the low risk of apprehension. Mechanisms are clearly needed for these processes to be effective.

Developing mechanisms to inform the complainant of the outcomes of the complaint would both enhance trust in the process, and likely increase the level of reporting, as reports (section 2.a.iv), may not be made if there is no faith that the information will be acted on, especially if

high volumes of information are needed. Regulations to help enforce compliance, on detecting, reporting, and potentially sanctioning non-compliance may also improve effectiveness. These efforts would also be strengthened by making various measures, as well as reporting mandatory, rather than voluntary, and ensuring independent (rather than self) assessment to ensure regulations are followed, as well as determining responses following complaints.

In terms of enhancing compliance and improving outcomes, the lack of binding standards in corporate sustainability creates ambiguities and opens the door to potential greenwashing, as proving non-compliance is much more challenging (Section 3.b.iii). Strengthening technical and financial support to enable the industry to widely adopt the ACT-D methodology - a framework that guides companies in assessing, committing to, transforming, and disclosing their ecosystem impacts- will ensure that companies conduct dual materiality analyses under standardized criteria and thus reduce opportunities for greenwashing (Section 3.b.iv).

Data, expertise and capacity

Enhance National scientific expertise and capacity: At present there is no forestry university, or clear ecology programs, and at LIST, there is only one team monitoring most EU Annex II species, whilst various other agencies monitor various taxa. This means too few taxa are monitored, different taxa may be monitored in entirely different ways, it is difficult to compare data for different groups, and there is no ability to assess drivers of change.

It would help to establish complementary teams both for taxonomic expertise (and to identify taxa for which there is currently little or no monitoring), and to design surveys to explore drivers. The lack of capacity, and challenges in hiring (because many scientists in these agencies are government employees) could be overcome by dedicated and clear mechanisms to support a PhD program. This would also provide future capacity. Another option would be expanding the newly started “environment program” at the university to encompass ecology and provide a means to work with dedicated agencies to help build on knowledge gaps and other priorities (sections 2.b.iv, 4.a.iv).

Mobilise citizen science: Luxembourg’s highly successful experience with citizen science in butterfly and invasive alien species monitoring demonstrates that democratising monitoring through citizen science can be highly effective. However, during the in-country visit, stakeholders highlighted that there is relatively low participation. By providing citizens, amateur naturalists, and local communities with standardized protocols and digital platforms (rather than relying entirely on public portals such as observation.org), the State can exponentially multiply its data collection capacity in the field, operating as a validating entity without relying solely on academic researchers. At present inventory and monitoring is limited by taxa, and in some cases stochastic (the only ecosystem the Museum monitors are caves, whilst the ANF monitors other biotopes).

Develop a centralised repository for species monitoring data. At present Luxembourg has no centralised repository for the collation of scientifically collected data for monitoring species. Broadly, the lack of long-term population monitoring data and shared dedicated databases for

monitoring presents a challenge to evaluating the success of, and need for management interventions, as observation.org is not designed for this (section 2.b.iii). Likewise, few studies are conducted to understand drivers of change, meaning that redressing losses in populations (section 2.b.iii), and learning from success is more challenging, impacting both conservation and population management (such as hunting quotas).

A dedicated portal may help this and consolidate collaboration between the Museum of Natural History (hereafter referred to as “the Museum”), LIST and other agencies, as well as increasing the forms of data input to better suit the needs of monitoring and assessing drivers in changes of the status of species (section 2.b.iv) and could explicitly allow for these different forms of key species data. This could also link to enforcing the requirement (but not mandated) to share data after a permit or license is followed up, and that further permits are only provided on the fulfillment of conditions from former permits; including sharing the data generated. Furthermore, this portal could also reduce the data-fragmentation currently reported.

Alignment of priorities and mainstreaming across sectors

Realign priorities and directives: Different agencies, and mandates established under different legislation can create conflicting priorities, which are challenging to reconcile and can represent a major barrier to successful implementation (section 3.b.iv). For example, the nature restoration regulation may conflict with the water framework directive, preventing the development of buffer-strips in riparian systems (section 2.a.iii).

New mechanisms to enhance synergies between directives and take a systems approach to maximise biodiversity are needed to reduce conflicts between national directives and initiatives. Thematic taskforces could develop a framework to help align and simplify decision-making in the case of overlapping mandates, and lead to more efficient and effective outcomes. (Section 3.b.iv).

Implement the Nature Pact: Whilst the Nature Pact is optional, it has seen very successful uptake, with 94 of the 100 municipalities joining the program (of which 84 are certified). Points are allocated based on a number of measures within six categories, which are harmonised with the framework of the *Plan National concernant la Protection de la Nature -3e plan* (PNPN3), providing an easy means for benchmarking, with advisors within each municipality supported by the state to facilitate implementation. However, not only does this effort exclude privately owned land (though the catalogue of measures is being modified to enable its inclusion) but as many measures are not possible in some municipalities, coupled with high administrative burdens (and possible lack of sufficient human capacity in smaller municipalities), progress can stall after initial “easier” measures have been implemented. Enaction, and “gamification” (competition in success between municipalities) has been highly successful, but challenges remain, especially for smaller municipalities which may not be able to implement many of the targets.

Developing more flexible measures, especially for smaller municipalities, may facilitate more sustained success nationwide, and sustain engagement and participation even in smaller municipalities once the “easier objectives” have been completed (section 3.b.iv).

Promote best practice: Organic agriculture, Biodiversity-Friendly Agriculture, and other elements of sustainable development (such as maintaining hedgerows) have clear economic benefits (retention of topsoil, reduction in river-sedimentation) (section 2.a.iv) but are often seen to compromise the area of productive land available or reduce overall agricultural outputs.

Mechanisms to enhance economic security (such as facilitating access to the market through *Natur geneissen*) may help ameliorate some concerns. More consistent emphasis on these advantages within the Ministry’s initiatives could support stronger landscape governance and encourage wide adoption of sustainable approaches. To enable that in longer terms, additional support for policy analysis on the economic benefits of shifting to biodiversity-friendly agriculture, and on human resource development such as through the universities and professional training could enhance uptake and implementation.

Enhance engagement: For issues which are contentious (such as the control of invasive species) implementation of policies can be challenging or perceived to receive little support. Enhancing public education, particularly on sensitive but important environmental topics (section 2.b.iii) would facilitate, and may be essential for the successful implementation of such initiatives.

Interagency coordination and collaboration

Improve information flow: Information flow represents a recurrent issue, particularly for data which falls under the jurisdiction of the Ministry of Agriculture, given the crucial role of agricultural areas in reaching the targets of the PNPN3. In particular data on land ownership is stated to be subject to strict data protection regulations (such as the EU General Data Protection Regulation) but is necessary to initiate any form of environmental initiative (barrier removal, biodiversity contract) on this land.

To overcome this regulatory barrier, the short-term proposal involves developing institutional intermediation mechanisms where the Ministry acts as a secure bridge between environmental authorities, conservation organizations, municipalities, and landowners, to facilitate communication without compromising the identity of the data subjects. In the medium term, as highlighted by land mobilization and spatial data (section 3.b.iv) it is necessary to assess the national regulatory framework to establish public interest exceptions that would allow, under high-security conditions, access to property data for environmental management bodies, harmonizing the transparency required for biodiversity objectives with EU data protection principles.

Develop inter-agency councils and increase dialogue between agencies. Collaboration between different ministries can sometimes be challenging due to different priorities and mandates. However, it is clear that such collaboration is essential for positive biodiversity

outcomes. Efforts are needed to better align plans (section 3.b.iii). Thematic interagency councils, as well as increasing dialogue to strengthen trust, maintain communication and improve information flow is recommended to further align perspectives and improve cross-sectoral effectiveness (section 3.a.iv).

Build diversity of experience into Ministries and agencies. Ministries and agencies where most staff have similar backgrounds and experience may reduce the representativeness of perspectives encompassed in decision making and planning, and could represent a challenge to effective inter-agency collaboration. Developing mechanisms to diversify the expertise of staff in all Ministries and enhancing measures for secondment of staff between Ministries could facilitate the development of efficient and effective interagency work, as well as strengthening ties between Ministries.

Review Report

1. Introduction

The Voluntary Peer Review (VPR) process is part of the Convention on Biological Diversity's planning, monitoring, reporting and review mechanism⁶. It is an in-depth process by which a group of reviewers from different countries reviews the development and implementation of the National Biodiversity Strategy and Action Plan of a country under review. The main objective is to strengthen Parties' capacities, and to help make their implementation efforts more effective. Specific objectives include i) to assess national progress toward the current CBD Strategic Plan and produce specific recommendations for the Parties under review; ii) to provide opportunities for peer learning; and iii) to create greater transparency and accountability to the public and other Parties. The development of the VPR methodology was mandated and overseen by COP ([Decision XII/29](#)). It was later tested and piloted in Ethiopia, India⁷, Montenegro, Sri Lanka and Uganda⁸.

Luxembourg is the first country to be formally reviewed under the VPR mechanism. It was selected after a call for expressions of interest⁹ where various countries responded and nominated reviewers. A review team was assembled by the CBD Secretariat to carry out the review. The team comprised Ms. Alice Hughes (Team Leader) from the United Kingdom of Great Britain and Northern Ireland (University of Melbourne), Ms. Lalaina Randrianasolo from Madagascar (Direction Générale de la Gouvernance Environnementale), Mr Hugo Aranibar Rojas from Bolivia (National Museum of Natural History) and Mr. Eduardo Espeleta Queblatin from the Philippines (Independent). The team and their work was supported and facilitated by the CBD Secretariat.

After a kick-off meeting with the National Focal Point of Luxembourg, where the team reviewed the country's objectives and priority areas for review, the review team conducted a desk review, studying the National Biodiversity Strategy and Action Plan (NBSAP) for the period 2023 – 2030, the national targets, the 7th National Report, the 2025 Environmental Implementation Review, and a significant number of other documents¹⁰. The review team, the CBD Secretariat and the country team met various times by electronic means in order to discuss the approach, share preliminary assessments and prepare for the in-country visit. Further exchanges took place by e-mail. The in-country visit took place from 31 May to 6 June 2026. It allowed the review team to build on the desk study with additional direct information from a wide range of officials and stakeholders. Financial support for the review and in-country visit

⁶ See Decision 14/29 paragraph 3, 15/6 paragraph 1(e).

⁷ See Decision XII/29 paragraph 3. The test reviews on Ethiopia and India are available at <https://www.cbd.int/documents/UNEP/CBD/SBI/1/INF/31> and https://preview-www.cbd.int/doc/nbsap/in-vpr-en.pdf?_gl=1*128azmu*_ga*MTk2MDMzNDM5OS4xNzgwMzI3MDk2*_ga_7S1TPRE7F5*czE3ODgzNzYxMjkkbzEyNCRnMSR0MTc4ODM3NjQ2NyRqMjkkbDAkaDA.

⁸ Decision XIII/25, paragraph 2. See for further background information: <https://www.cbd.int/nbsap/vpr>.

⁹ Notifications 2025-032 and 2025-055.

¹⁰ See Annex A4. Methods and Annex A6. Responsibility Matrix for more details on the desk review.

was provided by the Government of Switzerland and the Government of Japan, through the Japan Biodiversity Fund.

The review found that despite progress and good practices several areas, ecosystems in Luxembourg remain among the most fragmented in Europe and the significant majority of protected species show an unfavourable conservation status. The report reveals a number of success factors and challenges for biodiversity action in Luxembourg. Successes include strong multi-level governance, evidence-based policies, and effective use of mainstreaming as a means of policy implementation. Outstanding challenges and areas for improvement include inefficient reporting, permitting, and licensing processes, underdeveloped scientific capacity, compliance and implementation gaps, and interagency coordination. Key drivers of biodiversity loss impacted by these challenges include agriculture, forestry, and urban areas and infrastructures. Finance remains a key enabling condition for biodiversity action in Luxembourg. While Luxembourg benefits from high capital capacity and dedicated environment funds with targeted funding streams, capacity remains unevenly distributed and often fragmented.

Key recommendations from the review include streamlining legislation and reporting requirements, improving compliance and monitoring, enhancing national scientific expertise and capacity, mobilizing citizen science, better aligning priorities and directives, and improving information flow.

The review report is organized in three main sections. The first reviews the status and trends of both ecosystems and species in Luxembourg. It discusses the major challenges to the maintenance and recovery of biodiversity, expounds on the strengths and effectiveness of the programs and mechanisms currently underway and provides targeted recommendations where mechanisms to improve effectiveness of recovery efforts were identified. The second section addresses the predominant change drivers in Luxembourg – agriculture, forestry, urbanization and infrastructure looking again at status and trends, best practices, challenges and recommendations. The final section looks at the enabling conditions for biodiversity action in Luxembourg, focusing on the finance sector.

2. Conserving Natural Systems

Conserving and managing natural systems is a major component of maintaining biodiversity across the landscape. Successful conservation requires both an evidence base to enable targeted management and identification of key sites, and systems in place with responsibility to manage different components of the landscape. This creates a complex system where multiple actors and agencies must collaborate to both meet national and regional mandates (see Annex A1), and systems in place to both detect change and ensure that these mandates are being met. Within Luxembourg this has created a diverse system of agencies and programs, as well as innovative solutions to facilitate effective governance across the landscape.

2.a. Ecosystems

2.a.i. Status and Trends of Systems

In 2021, natural and semi-natural areas covered 65.1% of Luxembourg's territory¹¹. Of this, forests make up the largest portion, with 36% of the land area, whilst “grassland” make up 28.6% (natural, semi-natural and managed). Overarching protection efforts have been largely effective, with only a 2.8% decrease in natural and semi-natural areas since 1999¹². Whilst this net-change seems small overall, between 2001 to 2025, Luxembourg lost 11 kilohectare (kha), of which 38% was in natural forest; however, 82% of gains took place outside plantations^{13,14},¹⁵. Whilst compensation schemes are meant to replace mature habitats with double the area of less mature habitats (to compensate for the loss of mature habitats), without biodiversity data and inventories, establishing the impact on biodiversity is very challenging. In addition, most stands are aging, with very few young stands (particularly beech and oak)¹⁶. Likewise, natural and semi-natural grassland have shown an annual loss of 575 hectare (ha), and the annual creation of 593 ha, meaning that higher diversity natural grasslands may be replaced by non-ecologically equivalent systems. Converse to these trends, average farm size has increased, as has average field-size leading to a loss of refuge areas¹⁷. Additionally, whilst Luxembourg still hosts a considerable portion of forest, it is one of the most fragmented landscapes in the European Union (EU)¹⁸, with up to 90% of habitats overall, and 62% of forests¹⁹, 76% of grasslands, and 81% of wetland habitats strongly fragmented^{20,21}. Likewise, even less extensive biotopes have shown declines, such as tall-herb communities as well as grasslands, which are particularly vulnerable (as are the species restricted to these systems). The majority of habitat losses are attributed to inappropriate agricultural practices, including expansion of farmland, overgrazing, fertilization, in addition to overgrowth resulting from land abandonment^{22,23,24}. Further detail on these trends, and ongoing programs in place to sustainably manage ecosystems is provided in Annex A1.1.

¹¹ <https://statistiques.public.lu/en/publications/series/en-chiffres/2025/biodiversite-en-chiffres-2025.html>

¹² <https://statistiques.public.lu/en/publications/series/en-chiffres/2025/biodiversite-en-chiffres-2025.html>

¹³ <https://www.globalforestwatch.org/dashboards/country/LUX/?category=forest-change&location=WyJb3VudHJ5IiwTFVYII0%3D&scrollTo=forest-gain>

¹⁴ <https://www.luxtimes.lu/luxembourg/alarm-bells-ringing-for-luxembourgs-forests/158238541.html>

¹⁵ Luxembourg's forests are secondary, forests noted as “natural forests” in portals such as global forest watch are structurally mature and thus, provide critical habitats for native species.

¹⁶ <https://environnement.public.lu/content/dam/environnement/documents/natur/forets/foret-en-chiffres.pdf>

¹⁷ Rubio-Delgado, et al. (2024). *Agricultural Systems*, 218, 103973.

¹⁸ <https://www.iaacblog.com/programs/luxembourg-fragmentation-biodiversity-loss-alvaro-cerezo-2020-2021-mact01/>

¹⁹ <https://www.eea.europa.eu/en/analysis/indicators/landscape-fragmentation-pressure-in-europe>

²⁰ <https://www.iaacblog.com/programs/luxembourg-fragmentation-biodiversity-loss-alvaro-cerezo-2020-2021-mact01/>

²¹ Vogt P., Caudullo G. Global analysis of forest attribute layers for the EU Observatory on Deforestation and Forest Degradation, Publications Office of the European Union, Luxembourg, 2022, doi:10.2760/41048, JRC130494.

²² <https://environnement.public.lu/dam-assets/documents/natur/biodiversite/pnpn/pnpn-version-3.pdf>

²³ Pravalie et al (2026) *International Soil and Water Conservation Research*, 100613.

²⁴ [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652238/IPOL_STU\(2020\)652238_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652238/IPOL_STU(2020)652238_EN.pdf)

2.a.ii. Successful Components of Ecosystem Management

Luxembourg has a diversity of approaches for conservation across the landscape, with different complementary programs providing dynamic coverage, designed to reflect the conditions of most of the country. Most notably “biodiversity contracts” (and Nature parks, Biological stations) have been widely implemented in agricultural environments to provide refuges for a diversity of amphibians, pollinators, and meadow dependant species, as well as other farmland habitats (hedges, dry walls, tree rows etc), which have shown declines across much of Europe. Success of these contracts has been partially attributed to the good working relationships between agencies such as Biological stations with farmers, the Ministry of Environment, the Ministry of Agriculture, farmers unions and the water administration through coordination groups. Nationwide six Biological stations work with local municipalities to develop and implement biodiversity contracts, enabling restoration and conservation across a considerable part of the landscape²⁵. These groups have worked to optimise implementation and have enhanced the uptake by farmers who may have been intimidated by these programs. Furthermore, Biological stations actively engage with schools, providing education for all ages, and educating the next generation of decision makers, farmers, and other citizens^{26,27}.

At a national scale the Nature Pact has seen significant success, with uptake in 94% of all municipalities, and certification in 84%. Competition between municipalities has helped spur success in the implementation of various measures, supported by a state-funded advisor, though work may be needed to diversify measures and provide further support (particularly for uptake in smaller municipalities). Luxembourg has a diverse ecosystem of government and non-government agencies representing different components of landscape management, research and protection. Among these, aquatic systems are particularly well represented, with multiple agencies working on the health and connectivity of riverine systems. including individual partnerships for each of the six rivers and their catchments. In addition to their individual focus on specific rivers (given the quite different challenges faced by each), these partnerships meet three times a year for interchange and exchange. The impact of these partnerships is further supported by outreach events and complemented by outreach by other initiatives such as “*National Climate Pact day*” and “*National Nature Pact day*”; raising awareness and support more broadly.

The river partnerships enable targeted and appropriate action for each of Luxembourg’s rivers, as six partnerships provide a focus on each of Luxembourg’s rivers. Interventions impacts are assessed through monitoring by biologists (such as ichthyologists) and guided by GIS specialists who have hydromorphologically mapped rivers at 100 m intervals, which includes measures of 31 parameters. These measures are used to support implementation of Article 9 of the national restoration plan^{28,29}, and adequately reflect species ecology into river connectivity programs, especially on the impact of barrier removal and effectiveness of fish-ladders. GIS is

²⁵ <https://legilux.public.lu/eli/etat/leg/rgd/2019/09/30/a667/jo>

²⁶ https://bne.lu/en/les_acteurs/siconasud-ouest-siconacentre/

²⁷ <https://mamer.lu/en/siconakidsactivitiesforcycles24/>

²⁸ <https://www.eib.org/en/stories/luxembourg-rivers-floods-biodiversity-dam-removal-rewilding>

²⁹ <https://www.zesumme-vereinfachen.lu/en-GB/projects/nrp>

also applied to forest monitoring and is supported by the mapping of the biotope cadastre³⁰, and through the application of LIDAR scanning every three years. In addition, dedicated forest agents are responsible for different districts and can prosecute individuals for the illegal destruction of both forest and non-forest biotopes.

Further effective mechanisms for management at the landscape level include *Comités de Pilotage* (Steering Committees (COPILs)), which are becoming increasingly engaged in management plans, and are generally responsible for several Natura 2000 sites each³¹.

In addition, programs to monitor and manage forest systems (under the Nature and Forest Agency (ANF)) are currently being refined, and the potential measures included in management has been reduced from the previous 3,000 to 900 measures to attempt to increase standardisation across the country and hopefully increase the effectiveness of measures through increased uptake and greater interoperability.

To bolster efforts, 20 million Euros (EUR) are currently available for projects on ecosystem health and restoration, which will be allocated on a points-based scheme to ensure they provide representative coverage across the environment. Other initiatives are also underway to counteract previously reported challenges, such as the development of the GENA platform to standardise and catalogue information, and to facilitate the work of Biological stations. Furthermore, efforts to develop indicators for “green GDP” are currently underway.

Overall, Luxembourg demonstrates a clear effort to implement landscape-wide programs for the sustainable management of ecosystems (see Annex A1.1.). Good relations with most agencies facilitate this process; however, significant challenges, especially the effective communication and collaboration between various agencies with the Ministry of Agriculture is perceived to pose a major barrier to successfully reversing declines in the status of various species, coupled with various other challenges (outlined below).

2.a.iii. Challenges

Luxembourg hosts multiple types of protected areas as well as areas falling under different directives, with some of these falling under the governance of different agencies^{32,33}. These multiple protected area types all have different targets with some designations physically overlapping, this presents a challenge for monitoring progress and communicating on reporting standards. Simplifying the designations, (potentially making the alignment with International Union for Conservation of Nature (IUCN) protected area categories clearer³⁴), standardising targets and reporting structures would facilitate effective monitoring. This is a particular challenge within less strict categories of protection, where permissible actions, and appropriate management was more varied, potentially posing a significant burden in terms of appropriate management and required reporting standards. Furthermore, national and local components of

³⁰ <https://data.public.lu/en/datasets/cadastre-des-biotopes-du-milieu-forestier/>

³¹ <https://luxembourg.public.lu/en/society-and-culture/territoire-et-climat/natura-2000.html>

³² <https://www.eea.europa.eu/en/europe-environment-2025/countries/luxembourg/terrestrial-protected-areas>

³³ <https://luxembourg.public.lu/en/society-and-culture/territoire-et-climat/natura-2000.html>

³⁴ <https://portals.iucn.org/library/efiles/documents/pag-021.pdf>

protection may not be aligned (for example, priorities at the municipality vs national levels), sometimes creating barriers to implementation and ultimately success.

Further challenges exist around the complexity of different directives, the management requirements of different biotopes, and even the degree of buffering each received. From a management perspective this poses a major challenge to farmers, especially when as much as half agricultural land falls under some form of protection or directive. Simplifying and unifying policy (even if it may not be as optimal for each) could reduce tensions and simplify the complexities of navigating complex regulatory structures. In addition, the lack of accessible information on land management, cultivation and use (data managed by The Ministry of Agriculture), which is critical to establish potential biodiversity contracts, and for removal of river barriers, presents a major barrier. Whilst in forests, (which cover 36% of Luxembourg's land surface), half national forest is privately owned, and of this, ownership information is not available for around one third. This barrier to accessing data poses may preclude effective activities across a significant part of the country.

Some taxa (i.e., butterflies and other pollinators) and sites (such as Natura 2000)³⁵ which are listed as European priorities are well monitored, yet other species and systems typically have more limited data. Grassland and open ecosystems do have a higher level of protection than EU averages, but these systems still generally show decline. More broadly, whilst much of the focus of environmental laws are on sites protected within Natura 2000, stipulations for protection also exist for some other biotopes. However, various issues may undermine the effectiveness of conservation in these regions. For example, the definition of forest can include natural, semi-natural, and plantation forests, and whilst broadleaf forest is not meant to be replaced by coniferous forest, it could be replaced by broadleaf tree plantations for timber or fruit production as long as forest specifications on height (5 m at maturity) are reached. Statistics on forest may also include areas in rotation (including cleared areas) (provided the cycle length is at least 10 years)³⁶, meaning that not all “forest” may currently be covered by trees (though replanting must occur within three years of clearance).

Better methods to assess and prioritise connectivity are needed, especially for landscape features such as riparian buffers and hedgerows. Whilst the destruction of hedgerows has largely stopped, hedgerows only border around 15% of agricultural plots in Luxembourg³⁷. This lack of hedgerows could be remedied through “set aside policy”, as with refinement this could provide a mechanism to create a more biodiverse and economic permanent set-aside area rather than temporary uncultivated field-margins. Given that hedgerows would have benefits to agriculture (reduction of soil erosion and provision of windbreaks) and provide connection and refuges for biodiversity, they should be perceived as an asset to farmers. However, with increasing field size and homogeneity within agricultural areas, many hedgerows have previously been lost, despite the economic and environmental benefits. Further efforts to

³⁵ https://www.interregeurope.eu/sites/default/files/inline/Naturpark_Our_managing_Natura2000_sites.pdf

³⁶ <https://legilux.public.lu/eli/etat/leg/loi/2023/08/23/a544/jo>

³⁷ <https://www.luxtimes.lu/sponsoredcontent/national-tree-day-planting-trees-means-taking-action-for-the-future-with-fondation-hellef-fir-dnatur/101911073.html>

highlight these benefits may enable their protection and restoration, as whilst clearance is illegal without appropriate permits³⁸, enforcing restrictions around trimming is challenging (despite high resolution maps to assist monitoring)^{39, 40}. Whilst Luxembourg is doing better than various EU nations in some regards, the growing farm size^{41, 42}, loss of other habitats as a consequence of agriculture, and loss of habitat patches highlight where work is still needed. Enhancing efforts to communicate existing available subsidies⁴³, and prioritising plantation of new hedgerows could have considerable benefits.

Prior to the release of the National Restoration Plan (NRP) concerns about potential deregulation undermining the process have been noted⁴⁴. Furthermore, a lack of time and tight schedule may undermine the efficacy and scientific quality of the process. The initial version of the NRP could increase the use of indicators for ecological quality (such as functional diversity of taxa not already listed as EU priorities), and though “monocultures are to be avoided” (which is common elsewhere), non-native species can be used if they are seen to be “good for biodiversity”⁴⁵. Whilst non-native species may often grow fast, they often host a lower diversity of native species (i.e., pollinators) and can increase invasion risk, thus should be avoided during restoration^{46, 47}. Furthermore, some ecosystems may be neglected by these priorities; for example, heaths have been almost entirely replaced by forests, and as “forest” is deemed as a more “climax community”. Thus, restoration of smaller biotopes may be neglected, despite endemic species. From the perspective of implementing the *Plan National concernant la Protection de la Nature — 3e plan* (PNPN3) and the architecture of the NRP, one of the main operational barriers is the territorial and procedural tension with the energy transition objectives.

Furthermore, current approaches to mapping highlight the operational complexity and create some challenges for fine scale management. For example, the Luxembourg Biotope Cadastre Methodology (updated in April 2025)^{48, 49} uses base field navigation maps at a scale of 1:5,000, while general spatial accuracy is established at 25m² for common biotope types. However, to capture critical ecological dynamics at the microscale, the methodology requires (and includes)

³⁸ <https://guichet.public.lu/en/entreprises/gestion-juridique-comptabilite/construction-amenagement-site/travaux-bois-eau-zone-protegee/permis-deboisement-defrichement.html>

³⁹ <https://www.naturemweltasbl.lu/faq-items/est-ce-legal-de-couper-ses-haies/>

⁴⁰

<https://map.geoportail.lu/theme/agriculture?lang=de&version=3&X=700599&Y=6377154&zoom=11&rotation=0&features=&layers=139&opacities=0.75&time=&bgLayer=roadmap>

⁴¹ <https://rural-interfaces.eu/wp-content/uploads/2020/04/csp-at-a-glance-luxembourg-en.pdf>

⁴² <https://agriculture.public.lu/dam-assets/veroeffentlichungen/broschueren/agrarstatistik/20210322-luxembourgish-agriculture-facts-and-figures.pdf>

⁴³ <https://agriculture.public.lu/de/beihilfen/biodiversitaetsprogramme/schaffung-oekologische-strukturelemente.html>

⁴⁴ <https://www.meco.lu/en/blog/documentcenter/luxembourgs-national-restoration-plan-mouvement-ecologique-submits-a-statement/>

⁴⁵ <https://www.zesumme-vereinfachen.lu/en-GB/projects/nrp/2>

⁴⁶ Burghardt, et al. (2010). *Ecosphere*, 1(5), 1-22.

⁴⁷ Tartaglia & Aronson (2024). *Urban Ecosystems*, 27(6), 2587-2611.

⁴⁸ <https://data.public.lu/en/datasets/inspire-annex-i-theme-protected-sites-biotope-cadastre-of-the-open-landscapes-1/>

⁴⁹ <https://environnement.public.lu/content/dam/environnement/documents/natur/biodiversite/cadastre-des-biotopes/2025-methodologieobk-fr-final.pdf>

much higher spatial precision for smaller or specialized habitats, allowing microbiotopes such as Natura 2000 code 6110 grasslands to be mapped at a resolution of 1m². Additionally, the documentation of habitat disturbances is not governed by a fixed spatial value but is calculated proportionally when a disturbance affects 20% of the initial biotope surface area. Furthermore, the regulations emphasize that fieldwork must be exhaustive, requiring specialists to record all species on the Red List (categories Rare, Endangered, and Critically Endangered) and estimate their population numbers. Consequently, whilst methodological documentation itself warns that the legal protection of ecosystems is defined by the actual species composition on the ground, not by their registration in the official land registry, conducting and continuously updating such high precision field inventories demands substantial scientific capacity and institutional resources. This operational requirement exemplifies a broader institutional challenge observed across multiple environmental sectors. For instance, national scientific staffing levels at key monitoring agencies have remained virtually unchanged since 2008, and while the local university system is launching initiatives in agroecology and environmental sciences, it still lacks specialized degree programs in field botany, taxonomy, or classical forestry. This shortage of specialized taxonomic expertise illustrates a structural bottleneck that can inadvertently delay the formal identification and timely protection of threatened biotopes.

Aquatic systems also represent a challenge, and a point of frequent tension, both between directives (water, habitats), agencies, and other groups, despite the fact that the need for “green infrastructure” to manage floods is being widely acknowledged. As a consequence of these challenges, it is highly unlikely that river water quality will reach water quality mandates^{50,51}. Challenges with determining the owners to remove barriers due to a lack of information from the Ministry of Agriculture and challenges around implementing buffer-strips (which would reduce runoff, sedimentation and temperatures) undermine recovery of aquatic systems (though work is also needed here to align directives and priorities, as planting trees within riparian buffers may conflict with other EU directives). Although national water and nature conservation legislations legally mandate 10-meter protective buffer zones along watercourses, these restrictions are often insufficiently enforced in practice, and when in open areas conflicts between directives prevents the planting of trees as open areas are required to stay “open”.

Furthermore, the complexity for permitting required for projects on these river ecosystems represents a significant barrier, as different timelines, regulations and agencies may limit the time to implement new initiatives and may even deter further activities due to the administrative challenges. Centralisation and streamlining of permitting processes are clearly needed for programs (especially in freshwater systems) to be implemented effectively. More broadly, this complexity in permitting and licensing applies across landscapes; for example, whilst many countries have “buffer-strips” to enhance connectivity along roads and railways, these efforts have faced major challenges due to administrative complexities within Luxembourg.

⁵⁰ <https://sustainabilitymag.lu/en/nature/la-crise-de-lor-bleu/state-luxembourgs-water-supply>

⁵¹ <https://www.list.lu/media-event/news/news-detail/water-quality-and-biodiversity-in-europes-rivers-a-tale-of-progress-and-challenges>

Communication and enforcement of regulations also remain a challenge. Not only is interagency work often difficult, but enforcing compliance, and reporting structures for violations may not be effective. For example, if a biotope declines in condition or disappears, the managers of the area are alerted that the management is inadequate, and information provided such as recommending the use of biodiversity contract guidelines (2024/25). However, information on who to contact, and where funding might be available to reverse these trends is not always easy to access, and further action to ensure recommendations are followed may vary. Slow degradation, such as increases in nitrates, or shrubs, or other mismanagement applied (like mowing “too early” when too early can be challenging to assess) is challenging to act on due to poor threshold setting, and a challenge in providing accountability; unless explicitly included within a biodiversity contract (and even in this case, the economic benefit may exceed the penalty, especially when the risk of apprehension is low, such as in management related activities such as early mowing or fertilisation). If illegal activities occur, such as destruction of a protected biotope, whilst it can be communicated to the police, proving illegality, especially within an actionable timeframe is challenging; and the process may expire before any actions can be implemented. Furthermore, as few agencies have the legal standing for direct action, convoluted processes undermine how effective these processes may be. Likewise, if illegal actions are reported, those reporting the action are unlikely to ever be informed of the outcome, limiting the motivation to report, and thus, the effectiveness of the process. Clearly, given the volume of available data, particularly geospatial data, further actions are needed to enforce these actions.

2.a.iv. Recommendations

Whilst Luxembourg exceeds the EU average in some environmental targets, especially for various EU plans (such as within the CAP) and the conservation of open habitats, continued declines of biodiversity for various taxa have been observed. Overcoming these issues requires the development of better metrics, reporting structures, data repositories and coordination, and clear use of indicators to ensure high-quality habitats are effectively managed and protected. Furthermore, as the main driver of degradation is agriculture, better mechanisms are clearly needed to work with the Ministry of Agriculture, especially to access key information such as managers of farms. Better working relationships with agriculture would also reduce some of the “stigma” currently associated with conversion of sites to flower meadows, as well as providing a more efficient means to manage landscapes and meet targets at all scales. More broadly, simplifying interagency communication may help ease administrative burdens, and increase the effectiveness of management at all levels. This is also the case for project permits, as different agencies and different timelines can pose a major barrier to implementing projects. Simplifying these structures and permitting processes would greatly facilitate the implementation of various ecological and conservation projects (such as barrier removal in rivers).

Better mechanisms for reporting, and stricter sanctions and penalties for inappropriate management of biotopes, agriculture, and violations of policy as well as better promotion and

uptake of the subsidies for the restoration of hedges are needed⁵². Set-aside agricultural schemes across much of Europe has limited value to biodiversity when run on a rotational basis, whilst permanent set-aside of hedgerows and “refuges” (and other natural habitat) would provide refugia for wildlife, improve habitat connectivity and reduce fragmentation as well as improving soil health. This may also be particularly important for sensitive species, as changes in soil nutrients and pH may alter the community structure for various herbaceous communities. Given that Luxembourg remains the most fragmented landscape in Europe, strategies to reconnect habitats through these measures (as well as those noted in the PNP3) would also reduce fragmentation and provide critical breeding grounds for many species currently showing declines. Fragmentation remains a major issue, and new mechanisms, such as riparian areas, afforesting along linear infrastructure and hedgerows could have widespread benefits without requiring use of productive land. Further specifications on the use of agrochemicals in the vicinity of sensitive sites may also be required.

Multiple regulations do exist around environmental impact assessments, and the process for obtaining permission (especially in green-zone sites). For the most part development requires permission from the minister, including most elements of tree felling. However, whilst the sanctions and penalties for non-compliance have been developed, the mechanisms for enforcement, and responsible agencies may be less well established, especially within agricultural areas. Furthermore, many regulations are targeted at larger extents, making smaller patches and hedges more challenging to effectively protect (despite legislation), or more likely to fall through gaps of enforcement⁵³. Streamlining regulations (rather than adding new directives and regulations with multiple dependencies, when not required by EU legislation) may facilitate enforcement and interpretation given the complexity of current legislation around development in rural areas and even management of native ecosystems. Furthermore, providing better feedback following complaints may improve the reporting rates, and improved enforcement (and the probability of apprehension) would reduce the probability of mismanagement of land.

Many current spatial targets are principally focused on the habitats Directive, birds Directive and Natura 2000 sites, with relatively little outside these areas. Likewise, different biotopes can require different buffers and strategies, and simplifying this architecture (wherever possible) may improve compliance. Simplifying the structures may also therefore help ensure that all key sites are identified and protected. Clearer mechanisms for implementation of programs and action plans should be outlined, together with the responsible agencies, and clear timelines. Likewise, mechanisms to better synergise directives, to maximise complementarity would likely increase both efficiency and the effectiveness of directives overall, especially when areas are subject to regulations based on multiple directives. Whilst many initiatives are currently underway, these actions, in addition to improvements of work with the Ministry of Agriculture would also help overcome the challenges for aquatic systems, including water quality (as this

⁵² <https://agriculture.public.lu/de/beihilfen/biodiversitaetsprogramme/schaffung-oekologische-strukturelemente.html>

⁵³ <https://legilux.public.lu/eli/etat/leg/loi/2018/07/18/a771/consolide/20231001>

is in part a consequence of agricultural runoff, and increased sedimentation due to lack of riparian buffers), and connectivity; through identifying owners and removing barriers.

For restoration, previous recommendations have already been provided⁵⁴ but may not have been implemented. These include the presentation of the NRP to enable time for consultation and stakeholder participation. Ensure funding is clearly outlined, and protect strategies from potential deregulation, and align with the targets of PNPN3. Furthermore, clear scientific evidence and monitoring will be needed to assess the effectiveness of restoration procedures, and scientific information and quality metrics must be reflected in restoration planning going forwards. The new NRP, has a high volume of detail on riverine systems, but less detail is included for other ecosystems, which will also be needed for these plans to translate effectively across all ecosystems. Finally fulfilling all these ambitions for the effective conservation and management of ecosystems also relies on improved collaboration, and data flow to facilitate efficient and targeted actions.

2.b. Species

2.b.i. Status and Trends of Systems

Whilst the territory of Luxembourg⁵⁵ is small, it still hosts considerable biodiversity, including at least 700 species considered eligible for protection under Natura 2000 (including at least 337 bird species). In total of 1061 species in Luxembourg have Red List assessments, including 148 fungi species, 250 plant species, and 663 animals (including 116 molluscs, 145 arthropods, and 402 vertebrates).

Yet, despite this high diversity, up to 14 species of birds have been recorded as extinct (8 recently) and a considerable portion of species are considered threatened, including 33% of reptiles, 29% of amphibian species, 28% of fish, 35% of vascular plants, 30% of birds and 15% of invertebrates; highlighting that considerable work is needed to improve the status of these species⁵⁶. Overall, 83.3% of species considered as “protected species of European importance” show an unfavourable conservation status in the 2013-2018 assessment (see Annex A1.2). Furthermore, this actively increased between assessments, as whilst 18.3% of species had a “Favourable” status in 2007-2012, and 75% were unfavourable, by the 2013-2018 period⁵⁷ “Favourable” decreased to 15% whilst unfavourable increased to 83.3%. Interestingly, of these unfavourable species both the number of unfavourable improving and unfavourable decreasing increased (whilst the number of unfavourable unknown decreased).

Exploring these trends by taxonomic group, whilst these “protected species” only make up a subset of taxa, no amphibians, fish, reptiles and “other invertebrates” had species listed with a favourable status. Species decline (across taxa) are strongest in open habitats (81% of species),

⁵⁴ https://www.naturemweltasbl.lu/wp-content/uploads/2026/01/Factsheet_Luxembourg.pdf

⁵⁵ <https://luxembourg.public.lu/en/society-and-culture/territoire-et-climat/natura-2000.html>

⁵⁶ <https://statistiques.public.lu/fr/publications/series/en-chiffres/2025/biodiversite-en-chiffres-2025.html>

⁵⁷ <https://www.eea.europa.eu/en/analysis/maps-and-charts/conservation-status-and-trends-article-17-national-summary-dashboards-archived>

followed by wetland and aquatic habitats, whereas forest dependant species appear to show smaller declines (though many habitat specialist species across Europe may have been lost before good data was available). These declines are generally attributed to changing climate, loss of habitat and exposure to chemicals and invasive species; thus agriculture, and to an extent urbanisation is increasing these negative trends. Habitat loss (typically due to agriculture) is the greatest driver of declines, followed by urbanisation and the modification of natural systems.

Within these trends considerable nuance exists. These include various programs for species conservation using site-based approaches, combined with rigorous monitoring. However, challenges exist including gaps in data collation for various taxa, and inter-agency collaboration challenges (particularly with the Ministry of agriculture) presenting some of the greatest barriers to the ability to proactively intervene to conserve species.

2.b.ii. Successful Components of Species Management

Overall, Luxembourg has a significant amount of biodiversity data, with various agencies tasked with monitoring different components. This includes LIST, the Museum of Natural History, the ANF and various non-governmental organizations (NGOs) and agencies. The diversity of institutes with roles in species monitoring leads to a wide range of programs, with particular strengths in area-based monitoring in some sites (i.e., species in sites managed by Biological stations, such as multiple amphibian species and orchids). This structure means that for priority species large volumes of data may exist, with dedicated responsibility for data deposition at the Museum and a clear remit on species that need to be monitored, which aligns with regional mandates for species.

Outside common frameworks (see Annex A1.2.), Luxembourg has a strategy for plant conservation with its own set of 18 targets⁵⁸. These focus on building capacity and building a data infrastructure to make data available including the development of an “online flora”. The plant conservation strategy includes assessments of the extinction risk of all plant taxa, and outlines their recovery plans, as well as implementing steps for these plans. Building on this ensures representative protection for plant communities in line with the 30x30 target and works to reduce the pressures on wild plant communities (including exposure to excess nutrients from agriculture). Furthermore, these targets include mainstreaming of conservation initiatives across economic sectors, and the translation of Kunming-Montreal Global Biodiversity Framework (KM-GBF) targets into a form that focuses on plant diversity in the context of the situation in Luxembourg; maximising the potential for success from implementation (provided there are sufficient resources to implement these plans).

Other action plans and initiatives also exist, though these may be fragmented depending on the taxa and ecosystem. For example, the national action plan on infectious diseases affecting amphibians in the Grand Duchy of Luxembourg (2023-2028) focuses on emerging infectious diseases (Chytrid fungus and Ranavirus) in amphibians⁵⁹. There are also specific action plans on various invasive species, in addition to locally endangered species. In addition, efforts are

⁵⁸ https://sicona.lu/wp/wp-content/uploads/LUX-Plant-Strategy-2022-2030_14_11_2022.pdf

⁵⁹ <https://biota.lu/portfolio/>

underway to test a variety of techniques to monitor some species, including select use of bioacoustics (for example, for some amphibian species), initial use of eDNA in various regions, as well as a range of other approaches (camera traps etc), though work is still needed to consolidate this data.

For regional priority species, most species will have not only a specific “species action plan” but also a national coordinator to ensure a clear chain of responsibility and ensure coherent coordination for the conservation and management of that species. Some of these action plans, such as those for amphibians have good support and clear coordination, such as the strategy to create ponds with Biological stations, and population monitoring by both LIST and Biological stations. Trust and collaboration between agencies have been cited as major factors in the success of these programs. This trust also includes diverse stakeholders, with many agencies working on conservation stating that work between agencies, as well as trust with farmers (for example, in the implementation of biodiversity contracts) has been a critical factor behind the success of programs. Based on this trust, challenges, such as the reticence of farmers to enter into contracts due to a variety of factors, can in some instances be overcome, and solutions (such as reducing any binding conditions which may present a barrier to farmers entering programs) have been reduced.

The interaction between agencies responsible for ecosystems (such as rivers), and species is also demonstrated in some of the work on “free-flowing rivers”, which includes nationwide strategies (further detailed in the ecosystems section). For rivers where barriers cannot be removed, fish-ladders are often present to maintain connectivity for migratory fish. Following the installation of new fish-ladders an Ichthyologist will assess functionality of systems above fish-ladders, as well as regular surveys for older fish-ladders. These forms of collaboration, as well as the standardised inclusion of experts in monitoring enables robust measures to be implemented. Likewise, focused programs on other key species (such as *Perdix perdix*) are currently underway and may present a blueprint for research and conservation of other taxa.

Clear preparatory strategies for certain taxa are also present. For example, beavers have been back for 20 years and now occupy 250 sites across the country. As farmers may not welcome beavers to new areas, preparations to areas where they may spread start early (under the leadership of the ANF). This includes public information and working with farmers to reduce any opposition to colonisation of new sites by beavers.

2.b.iii. Challenges

Whilst there are clear efforts to monitor trends for a subset of taxa where EU-wide schemes exist, plants⁶⁰, or which represent one of the few groups⁶¹ for which a detailed conservation strategies outside EU prioritisation schemes, comparable data is missing for many taxa. This program translates the KM-GBF and related targets to provide a systematic framework for conserving plants, based on developing plans, identifying threats, and implementation across

⁶⁰ https://sicona.lu/wp/wp-content/uploads/LUX-Plant-Strategy-2022-2030_14_11_2022.pdf

⁶¹

https://environnement.public.lu/fr/natur/biodiversite/plan_d_action_especes_et_habitats1/paepah/plan_d_action_especes.html

sectors; but equivalent plans are not present for other taxa. Most initiatives translate European schemes to the Luxembourg scale, meaning good and interoperable data for these taxa (birds, butterflies, pollinators), may be limited outside these contexts. Good examples do exist (for example, the Luxembourg Butterfly Atlas, and Luxembourg butterfly monitoring scheme⁶²), but many comparable schemes (such as surveys of farmland and forest birds) are not readily accessible in recent years (though work on a new breeding bird atlas is underway). Butterfly monitoring shows the nuanced shifts in species distributions over time, as well as overall trends in butterfly richness; but comparable data is needed for a greater selection of other taxa. In forests, periodic national forest inventories are conducted and are evaluated by the Higher Forestry Council; however, these largely focus only on the tree species, and more community level data (floristic and faunistic data) could be useful for assessing the status, and diversity of these communities^{63,64}.

Data for monitoring trends for species populations, or ranges outside major schemes is frequently not available. For example, in the Living Planet Database (which is updated in line with meetings of the CBD Conference of the Parties) only a single population from Luxembourg is included (a single bat species; *Myotis emarginatus*⁶⁵), even though significant other data has been collected at a national level. Within the Museum, whilst they are the main repository of species occurrence data, the main data repository is now Observation.org or Recorder, which is not developed to enable monitoring. The lack of monitoring data for populations and biotopes has been highlighted as a considerable barrier, as it means that identifying effective interventions (i.e., what supports population recovery), as well as understanding the drivers of decline, remains challenging. The lack of such data presents a major issue across all components of the landscape, and when such data does exist (European Priority species plus select others), as there is no standard means to collate such data, it precludes more in-depth assessment, and consequently management. For example, when fox hunting was banned, the impacts of this change in control on the population could not be evaluated due to a lack of population data prior to the ban. Likewise, at least eight bird species are recorded to have recently gone extinct within Luxembourg⁶⁶, but determining the drivers, and how to prevent comparable extirpations is impossible without further data. In addition to standards and deposition of data, there are challenges in dataflow, and even when reporting of data is a “required part of receiving permits”, there are no mechanisms for enforcement, meaning that when projects generate data, this data may not be shared, yet the Leaders of projects will still receive permits for further projects.

The lack of data above stems from two major challenges, firstly; a lack of a designated central digital infrastructure for the deposition of biodiversity data for the purposes of monitoring and management, and secondly, insufficient capacity for research. This lack of scientific capacity

⁶² <https://mnhn.public.lu/dam-assets/publications/ferrantia/ferrantia90.pdf>

⁶³ <https://legilux.public.lu/eli/etat/leg/loi/2023/08/23/a544/jo>

⁶⁴ <https://legilux.public.lu/eli/etat/leg/loi/2018/07/18/a771/consolide/20231001>

⁶⁵ Pir, J. B. and Dietz, M. (2018) Bulletin de la Société des naturalistes luxembourgeois, 120, p. 16

⁶⁶ <https://www.luxtimes.lu/luxembourg/conservationists-sound-alarm-bells-over-endangered-birds-in-luxembourg/27133581.html>

is demonstrated by the lack of increase in scientific capacity in Luxembourg since monitoring started in 2008 (and despite growth in other areas, such as administration)⁶⁷.

Other management gaps include additional support for the control of invasive species, or other species which require management (such as deer, which also prevent habitat recovery and regeneration). For example, whilst hunters have a minimum quota this is not enforced, making using this as a mechanism of population management challenging. Effective and efficient hunting measures to manage populations require addressing the market bottleneck. Until recently restaurants could only sell game within one month of the hunting closure period, and the market is highly seasonal; but the availability of stored venison far exceeds this. Coupled with this, veterinary checks^{68,69} are only available in one place nationally, and whilst hunted carcasses can be refrigerated or frozen for disposal; this system is wasteful. A more streamlined system would make this control mechanism more effective and efficient and reduce the wastage of animals. Furthermore, the control of these animals (such as deer) as well as invasive species (such as coypu (*Myocastor coypus*) or raccoons (*Procyon lotor*)) requires both the dedicated efforts (as noted above, and education to enable better support of the responsible agencies, as such actions can be unpopular or controversial^{70,71}.

2.b.iv Recommendations

Mechanisms to collect data to monitor populations, especially with studies designed not only to assess trends, but to provide sufficient detail to understand the factors associated with changes in populations would facilitate targeted interventions. However, monitoring is generally only present for taxa for which there are EU wide programs, and even this data is not made continuously available; meaning that for the last few years there is very little data to assess population ranges and trajectories. This not only leaves the majority of taxa without data but makes evaluating the success of any intervention challenging. Furthermore, even for taxa for which there is data, most taxa are declining; and few species other than plants have nationwide plans which include detailed species-specific recovery plans, and developing recovery plans which address drivers of species declines may alter many species current population trajectories. As LIST is the agency responsible for monitoring many populations but lacks the human resources to design surveys to move beyond detecting change to determining the cause of trends, this limits the ability to respond to changes in populations even when they are detected. Thus, if a population is increasing, factors underlying that success are challenging to identify, likewise if a population within an apparently stable biotope continue to decline, detecting what further management interventions may counteract declines may be challenging.

Addressing this requires several key steps:

⁶⁷ <https://statistiques.public.lu/en/actualites/2025/stn44-25-biodiversite.html>

⁶⁸ <https://faolex.fao.org/docs/pdf/lux8505.pdf>

⁶⁹ <https://ma.gouvernement.lu/en/administrations/alva.html>

⁷⁰ <https://www.luxtimes.lu/luxembourg/nutrias-are-colonising-luxembourg-nature-agency-warns/89653760.html>

⁷¹ <https://www.luxtimes.lu/luxembourg/why-luxembourgs-racoon-population-is-growing-despite-heavy-culling/158371887.html>

Firstly, using the strategy for plant conservation as a blueprint, similar strategies are required for other taxa. This strategy not only reflects the key cross-sectoral drivers of threat, but also directly references developing recovery plans. Furthermore, whilst extensive plans exist for species listed as European priorities, the systematic lack of data for species which fall outside these frameworks does need to be addressed, as it presents a significant barrier to detecting, assessing and mitigating declines. This includes developing the data infrastructure to ensure interoperable biodiversity data can be accessed, including long-term monitoring data. It also includes a mechanism to increase the scientific capacity to research species within Luxembourg.

Secondly, as many of the agencies tasked with collating biodiversity data are government (i.e., the Museum) recruitment is challenging, and programs devoted to forestry and ecology are not available within the university at present. As a new university centre (the Luxembourg Centre for Socio-Environmental Systems (LCSES)) focused on environmental data within Luxembourg seems to be under development, developing programs on ecology and aligned disciplines⁷², and providing the capacity to host PhD students would address these shortfalls, in addition to the lack of growth in scientific staff since at least 2008, despite increases in capacity of other sectors⁷³. Furthermore, “open” units could be made available for undergraduate students studying other disciplines to improve awareness and the ability to mainstream. This would also provide the staffing needed to explore drivers of changes in wildlife populations, enabling more effective management. PhD students were also crucial to the development of Species Action plans for pollinators, the ability to have more streamlined programs would enhance this capacity, as well as for expanding the ability to conduct further research to bridge current knowledge gaps (such as assessing the drivers of species declines). Coupled with this funding could help provide support (and reduce any potential for competition between LIST and the Museum) and support the means for postdoctoral and other non-permanent, but targeted positions to meet monitoring needs, and invest in future capacity needs.

Furthermore, as species reliant on open habitats show significant declines, further assessment on why, and how agricultural strategies can address these declines are crucial; but requires targeted studies to assess drivers, and therefore also requires enhanced scientific capacity. Counteracting declining wildlife populations will be challenging, as for example declines in many bird populations are at the EU level; thus, addressing them at a national level will likely be challenging (as these trends are indicative of broader trends, and for migratory species are unlikely to be possible at the State level). Regional strategies, such as the pollinator strategies for Europe have been very effective in at least assessing trends⁷⁴, but counteracting negative trends requires further attention, with action plans so far only present for limited taxa. Further engagement with agriculture (as showcased through Biodiversity contracts), and trialling different strategies to meet targets that do exist⁷⁵; for example, those around pollinators. Interestingly, there are also clear blind spots; for example, small-scale beekeeping is not

⁷² <https://www.uni.lu/lcses-en/>

⁷³ <https://statistiques.public.lu/en/actualites/2025/stn44-25-biodiversite.html>

⁷⁴ European Commission 2024, <https://data.europa.eu/doi/10.2760/2005545>, JRC138660

⁷⁵ Hellweg et al (2022) *Agriculture, Ecosystems & Environment*, 326, 107764

allowed in green zones, but it is allowed if there are over 30 beehives⁷⁶, meaning that areas where native pollinators should be promoted, will have the most competition and risk of disease of all regions; clearly a mismatch with other initiatives⁷⁷.

Invasive species actions and assessments currently provide a blueprint for the monitoring and management of other groups. This includes a clear strategy which fulfills SMART criteria, with dedicated steps and roles, which have nominated agencies responsible, a centralised biodiversity portal for data monitoring wildlife populations, and aggregating reported data, and clear citizen science information and reporting structures. Whilst apps do exist for some native groups (e.g., Luxembourg birds) other elements of this plan should be enacted for other species, in addition to the clear funding structure which has been established for the management of invasive species. This approach highlights the integration of science and policy, but equivalent approaches are clearly needed to halt ongoing declines in other taxa. However, the challenge here is communication, as those working on control of various invasive species often face strong challenges from activists. Better political support, and media and education campaigns (including the Natural History Museum and schools) could help reduce these barriers and enhance support.

Given that agencies (such as the LIST, biota.lu⁷⁸) already serve considerable roles in monitoring diversity for various taxa, working to develop indicators as well as standard monitoring frameworks, and a shared database could provide a more systematic mechanism for monitoring. However, further work, including cross-agency work will be needed to focus on going beyond detecting negative trends, and to assessing drivers of population declines.

3. Change Drivers

Conserving biodiversity effectively is impossible without engaging with the drivers of biodiversity loss. These include loss and degradation, and fragmentation of habitats as well as the management of landscapes (such as pollution, etc.). Here we explore some of the major components of the landscape which can drive biodiversity loss; agriculture and urban areas, and how they are currently working to maintain and conserve diversity across landscapes. This section includes diverse components within both agricultural and urban contexts, including industry, and power infrastructures.

Within this section we first discuss the current structure of the landscape, as well as initiatives currently in place (further detail is provided in Annex A2), we provide examples of successful initiatives within both agriculture, and urban settings, then explore major challenges, and make potential recommendations to build on current efforts and manage any gaps in current strategies. Notably, Luxembourg has a clear commitment to meeting (or exceeding) environmental targets, with for example high levels of alignment EU mandates and targets, and detailed and regularly updated plans to identify challenges and develop programs to manage them; however, gaps and

⁷⁶ https://environnement.public.lu/dam-assets/fr/conserv_nature/publications/2024/20250228-imkerguide-en-online.pdf

⁷⁷ <https://legilux.public.lu/eli/etat/leg/loi/2018/07/18/a771/consolide/20231001>

⁷⁸ <https://neobiota.lu/> ; <https://biota.lu/>

barriers continue to preclude the effectiveness of some initiatives, and these challenges are discussed below.

3.a. Agriculture and Forestry

3.a.i. Status and Trends of Systems

Agriculture is one of the main sources of pressure on habitats and species in Luxembourg^{79,80,81}. Over half of Luxembourg's land (52.28%⁸²), additionally, the “*Utilized agricultural area*” increased by 4.2% between 1990 and 2019.⁸³ Yet, 80% of food is imported and agriculture only contributes 0.2% to GDP and employs a small (and decreasing) fraction of the workforce. Luxembourg hosts around 1,800 farms, half of which manage more than 50 ha, focusing primarily on dairy, meat, viticulture, and cereals^{84,85}. Notably, the number of farms has decreased dramatically in recent years, almost halving since 1990, and decreasing by almost 1,000 since the year 2000 (2,728 in 2000 to only 1,872 in 2019)⁸⁶. This decrease in numbers has been accompanied by an increase in size of farms. For example, the proportion of large farms has also increased, from just 2.8% of farms extending over 150 ha in 1990, to 24.8% in 2017 and up to 27.4% by 2019; highlighting both a rapid increase in farm size (averaging 33.2 ha in 1990 compared to over double that at 30.3% now). Furthermore, Luxembourg's farmers are aging, with an average age of 55 and under 18% of farmers under 40; meaning that the process of succession and future governance represent areas of uncertainty^{87,88}. Broadly, at EU level⁸⁹, at least two-thirds of farm-dependent habitats are in poor condition, and Luxembourg reflects this trend⁹⁰.

Luxembourg's six protected grasslands show degraded conservation status (two inadequate, four unfavourable). Semi-natural grasslands have declined by more than 50% since the mid-

⁷⁹ https://www.chd.lu/sites/default/files/2025-04/20250417_cellulescientifique_notederecherche_pairing-scheme_agri-env.pdf

⁸⁰ https://www.oecd.org/en/publications/environment-at-a-glance-country-notes_59ce6fe6-en/luxembourg_884db5ce-en.html

⁸¹ https://www.oecd.org/en/publications/oecd-environmental-performance-reviews-luxembourg-2020_fd9f43e6-en.html

⁸² <https://agriculture.public.lu/dam-assets/veroeffentlichungen/broschueren/agrarstatistik/20210322-luxembourgish-agriculture-facts-and-figures.pdf>

⁸³ <https://agriculture.public.lu/dam-assets/veroeffentlichungen/broschueren/agrarstatistik/20210322-luxembourgish-agriculture-facts-and-figures.pdf>

⁸⁴ <https://chronicle.lu/category/environment/58063-natur-emwelt-highlights-importance-of-agriculture-in-luxembourg>

⁸⁵ https://eu-cap-network.ec.europa.eu/sites/default/files/publications/2023-03/TG%20Organics_Case%20Study_Luxembourg.pdf

⁸⁶ <https://agriculture.public.lu/dam-assets/veroeffentlichungen/broschueren/agrarstatistik/20210322-luxembourgish-agriculture-facts-and-figures.pdf>

⁸⁷ <https://chronicle.lu/category/agriculture-viticulture/60931-luxembourg-launches-action-plan-for-generational-renewal-in-agriculture>

⁸⁸ <https://www.luxtimes.lu/luxembourg/farm-workforces-in-luxembourg-are-ageing-despite-adding-young-blood/19023458.html>

⁸⁹ Ramao, Carlos, European Environment Agency, “*Majority of protected habitats rated as in poor or bad condition*,” Interview in Good Morning Europe on EU Nature Decline, 2025.

⁹⁰ EC Staff Working Document, Environmental Implementation Review Country Report – Luxembourg, 2025.

20th century and remains highly fragmented. Around 20-25% of grasslands are managed under CAP biodiversity measures, but ecological outcomes are not consistently tracked.

The PNPN3 measures for agriculture include:

- a) 10% of agricultural areas under biodiversity contracts, whereas at present 7.4% is covered by biodiversity contracts (>9,600 ha).
- b) Specified areas managed without the use of fertilizer and plant protection products (agrochemicals), and the revision of nitrate regulations, with at present 20% of agricultural lands are covered by programs that involve soil management and 70% of farmers enrolled in various programs that manage nitrates in grasslands, whilst 122,774 ha of farmland is under sustainable nutrient management. Organic farming increased from 6.23% in 2022 to 10% in 2025^{91,92} (the EU average of 10.50%), whilst 20% of Natura 2000 areas overlap with farmland^{93,94,95,96,97}.
- c) Strengthening the assessment system for environmental risks of pesticides, and reduced use of pesticides and associated risks by 50%, at present approximately 37,763 ha have reduced use, and 80% of farmers entered contracts to avoid glyphosate use⁹⁸. Furthermore, between recent assessments between 2011 and 2023 risk was assessed to decrease from 111 units on the pest risk index to 31⁹⁹.
- d) Increasing carbon sequestration in soils to achieve climate neutrality by 2050, whilst this priority has been noted, work is still needed to move towards this target¹⁰⁰.

An assessment of Plan National concernant la Protection de la Nature — 2e plan milestones, achievements, and lessons learned was conducted in 2023, just before the start of PNPN3¹⁰¹. At the time of the assessment in 2023, less than one third of targets relating to agriculture were achieved. The same assessment noted the “*Lack of paradigm shifts in several sectors, primarily the agricultural sector*”, and that “*measures for collaboration with the agriculture sector have not been successful or have not delivered expected results.*” There is also a need to strengthen “*public environmental education along with formal education and continuing professional development for stakeholders.*”, which would cover all concerned sectors, including agriculture.

⁹¹ <https://www.eea.europa.eu/en/europe-environment-2025/countries/luxembourg/area-under-organic-farming>,

⁹² <https://today.rtl.lu/news/luxembourg/agriculture-ministry-calls-for-annual-1-increase-in-land-used-for-organic-farming-402180781>

⁹³ Ministry of Agriculture, Food and Viticulture (MAFV), Luxembourg Organic Sector Factsheet: Production, Market Trends & Policy in Luxembourg, Digital Country Factsheet, 2025.

⁹⁴ European Commission (EC) Staff Working Document, Environmental Implementation Review Country Report – Luxembourg, 2025.

⁹⁵ EC Staff Working Document, Environmental Implementation Review Country Report – Luxembourg, 2025.

⁹⁶ <https://www.meco.lu/wp-content/uploads/2026/01/Statement-Organic-farming-PAN-BIo-2030.pdf>

⁹⁷ <https://www.eea.europa.eu/en/europe-environment-2025/countries/luxembourg/area-under-organic-farming>

⁹⁸ <https://agriculture.public.lu/de/agrarpolitik/gemeinsame-agrarpolitik/nationaler-strategieplan.html#bloub-4>

⁹⁹ EC 2026 Member State Trends and use of chemical pesticide and the use of more hazardous pesticide.

Member States: Trends - Food Safety - European Commission Member States: Trends - Food Safety - European Commission.

¹⁰⁰ EC Staff Working Document, Environmental Implementation Review Country Report – Luxembourg, 2025.

¹⁰¹ Ministry of the Environment 3rd National Plan for Nature (NBSAP), National Plan for the Protection of Nature - Natur - Portal of Environment - [emwelt.lu](https://www.emwelt.lu) - Luxembourg, 2023.

3.a.ii. Best Practice for Sustainability in Agricultural Areas

Localized stakeholder interactions in Natura 2000 areas have played a major role in the success of Natura 2000 within Luxembourg. Ministry of Agriculture staff participate in multi-stakeholder dialogues sponsored by local entities such as syndicates and biological stations, to address local land and water management issues. In the agricultural zones of Natura 2000 areas, animators are deployed by national government agencies or Biological stations work with a range of multi-stakeholder networks, including Biological stations, farmers and foresters, NGOs and other agencies. Biological stations and NGOs are also engaged in providing on farm advisory services and support and developing biodiversity contracts¹⁰². As of 2025 only 3.5% of the UAA (utilized agricultural surface) does not have an eco-scheme, an agri-environmental measure or a biodiversity contract.

The Ministry of Agriculture Policy Office has initiated dialogue among farmers to better understand issues and identify actions to accelerate and expand the adoption of ecologically sound farming practices. The Ministry of Agriculture also provides online information support to farmers interested in selecting from a range of ecologically friendly farm measures with clear information on available incentives. In addition, new approaches and innovative reforms are increasingly being developed and implemented, which could gradually “wean” the sector from overreliance on unsustainable high external input systems. The Ministry of Agriculture has indicated preference for development of “more tools than bans” to enable farmers to better adapt recommended ecologically oriented practices to their location-specific needs while retaining the overall viability of their farm enterprise^{103,104}. The Ministry of Agriculture Policy Office has identified the various entry points in the agency where PNPN3 targets, along with climate change adaptation goals, can be fully embedded. The consequence of available support, and the provision of animators¹⁰⁵ is that many that farmers eventually overcome initial apprehension following supportive interactions with informed advisors, which also has broad relevance to other elements of sustainability. Ministry of Agriculture and Ministry of the Environment are collaborating to develop cross-sectoral guidelines for the protection and ecological management of grasslands.

The Ministry of Agriculture runs a program that provides financial grants for farmers/farmer cooperatives to provide customized advisory services for location-specific needs. The Ministry of Agriculture and the National Research Fund have launched a research grants system to fund climate and sustainability-oriented agricultural research¹⁰⁶. Whilst there is already a program for knowledge transfer and continuing education¹⁰⁷, direct subsidies to individual farmers could be more effective if complemented by increased (indirect) subsidies for research and development, and innovations which could provide alternative technical solutions to overcome

¹⁰² MAFV 2024 Annual Performance Report for Luxembourg's CAP Strategic Plan, 2025.

¹⁰³ Luxtoday, How Luxembourg is reshaping agricultural policy — Luxtoday.lu, 5 August, 2025

¹⁰⁴ MAFV, Rapport Annuel, 2025.

¹⁰⁵ <http://www.esel.lu/en/community-of-animators/>

¹⁰⁶ National Research Fund (Luxembourg), National Research Priorities (National Research Priorities - FNR.pdf), <https://www.fnr.lu/funding-instruments/fnr-mavdr/>.

¹⁰⁷ <https://agriculture.public.lu/de/beihilfen/wissenstransfer-und-beratung.html>

climate change-related challenges and farmer-perceived barriers to applying ecologically sound agriculture¹⁰⁸.

Participatory governance platforms and programs facilitate conversation and collaborative work along the agricultural food chain to strengthen climate resilience and maintain competitiveness. For example, the recently launched Farm-to-Fork Strategy covers the agricultural food chain and includes reforms in the system for collecting farm data, including farm sustainability data. The Agriculture Food Chain Observatory aims to strengthen the farmer's position and revenues from the food supply chain, particularly through improved transparency and communication. The Code of Conduct for Responsible Food Business and Marketing Practices is a business initiative (particularly those in the middle of the agricultural supply chain) to introduce reforms in production processes¹⁰⁹. To complement this, Ministry of Agriculture programs for safe and efficient use of pesticides and use of inorganic fertilizers can also be adopted more readily on a wider scale, with various campaigns in place to promote both sustainable and organic agriculture¹¹⁰. Studies also indicate a higher propensity among young farmers to adopt precision farming and organic practices. For instance, 4.7% of young farmers in Luxembourg and more broadly in EU engage in organic agriculture, versus less than 3% of older farmers¹¹¹. To support these changes and help ensure a market linked to more sustainable products, some schools are reconfiguring their food catering to use local produce, particularly from young organic farmers, and farms within biodiversity contracts, providing a guaranteed market in a time of insecure markets more broadly. This is organised through the Naturgeneissen program, which provides a mechanism to connect schools with producers, and help supports sustainable landscape management such as for organic farms, or farms within biodiversity contracts^{112,113}. The citizen-led local development program "LEADER" supports community networks with science support, to increase the value addition of farm products¹¹⁴. Furthermore, any biotope that forms during a biodiversity contract can be destroyed within five years of the end of the contract without repercussions, overcoming anxiety about potentially, permanently committing to unproductive land once a contract is entered, and overcoming some of the reticence previously widespread in farmers¹¹⁵.

Among the key milestones are the establishment of "non-productive" but ecologically important areas such as small fragments of natural and semi-natural habitat in farmland to provide refuges as well as enhancing connectivity. Current fragments represent about 56% of

¹⁰⁸ Organization for Economic Cooperation and Development (OECD), Agricultural Policy Monitoring and Evaluation 2024: Innovation for Sustainable Productivity Growth, OECD Publishing, Paris, <https://doi.org/10.1787/74da57ed-en>.

¹⁰⁹ EC, <https://transition-pathways.europa.eu/agri-food/policies/eu-code-conduct-responsible-food-business-and-marketing-practices>, 2025.

¹¹⁰ EC, Future-proofing EU Agri-Food through research and innovation (website-Agriculture and Rural Development) Biodiversity-friendly agriculture, 2026.

¹¹¹ MAFV, Luxembourg Organic Sector Factsheet: Production, Market Trends & Policy in Luxembourg, Digital Country Factsheet, 2025.

¹¹² <https://naturgeneissen.lu/en/>

¹¹³ <https://naturgeneissen.lu/en/agriculture/>

¹¹⁴ Landwirtschaft Portal, LEADER Stories - Agriculture portal - Luxembourg, 2026.

¹¹⁵ https://gouvernement.lu/fr/actualites/toutes_actualites/articles/2006/12/01lux.html

the target area for 2024, resulting in a total cumulative area covering around 7,700 ha. Refuge zones (designated protected habitats that safeguard vulnerable plant and wildlife) covered 76% of the annual target for 2024¹¹⁶. The Ministry of Agriculture further reports that areas under biodiversity contracts have reached 9,690 ha or 7.4% of the total agriculture land¹¹⁷.

Under the Common Agricultural Data Space, Luxembourg also contributes to the EU agricultural data revolution by ensuring that data sharing is “governed, secured, and beneficial for all actors”. This can make information available to eventually enable more efficient resource use of agrochemicals and energy in agriculture¹¹⁸. A pesticide risk index has been developed and implemented. In 2019, 80% of farmers entered contracts to avoid glyphosate use. Even after the 2023 judicial lifting of the ban, the share of farmers resuming application is expected to remain low, and the government has continued to discourage its use¹¹⁹. While industrial point-source effluents are under systematic control, addressing diffuse agricultural pollution, (such as nitrate runoff) represents a more complex challenge. To tackle this, Luxembourg has periodically updated regulations (e.g., the 2023 revision of national nitrate regulations), as part of an ongoing effort to improve nutrient management and protect the long-term quality of its water bodies¹⁵²¹⁵². To mitigate the nitrate and chemical load resulting from high livestock density and the application of mineral fertilizers, this regulation is complemented by collaborative instruments. To support implementation, regional platforms have been developed¹²⁰ and structured voluntary multi-stakeholder agreements to reduce fertilizer use in water protection areas provide commitment to actions. However, these agreements are generally voluntary, which may reduce the effectiveness of these measures. Under the program for soil management and nitrates, hotspots indicating the location of nutrient excess impacts have been identified, complemented by the implementation of a grassland strategy and ongoing updates to nitrate regulations that will guide fertilizer use and management. Accordingly, 20% of the agricultural lands are covered by programs that involve soil management. The Luxembourg implementation report on the Nitrate Directive observes that 70% of farmers are enrolled in various programs that manage nitrates in grasslands¹²¹. Nitrogen fertilization has been reduced on permanent and temporary grasslands covering approximately 35,000 ha. The special report on sustainable use of pesticides under the Directive highlights the reduced pesticide sales volumes during the reporting year, (as reflected in a favourable scoring under the EU Harmonized Risk Index 1).

The Luxembourg government and non-government sector are currently contributing to the EU-wide dialogue for a new vision for agriculture¹²². There is a trend for shared advocacy on some strategies, particularly around better targeting of the subsidy system. The NGO

¹¹⁶ https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/11/examens-environnementaux-de-l-ocde-luxembourg-2020_7be63c58/fd9f43e6-en.pdf

¹¹⁷ MAFV 2024 Annual Performance Report for Luxembourg's CAP Strategic Plan, 2025.

¹¹⁸ Luxembourg Institute of Science and Technology (LIST), Europe's agricultural data revolution and the strength of Luxembourg's contribution, 2025.

¹¹⁹ Schnuer, Cordula, Luxembourg to lobby EU against glyphosate after ban lifted | Delano News, 2023.

¹²⁰ <https://www.naturpark-mellerdall.lu/projekte/trinkwasserschutz/>

¹²¹ EC Staff Working Document, Environmental Implementation Review Country Report – Luxembourg, 2025.

¹²² EC, https://agriculture.ec.europa.eu/overview-vision-agriculture-food/vision-agriculture-and-food_en, 2026.

community, through its affiliation with regional NGOs has been articulate on the removal of harmful subsidies^{123,124}. The policy reforms will potentially favour the further attainment of NBSAP targets relevant to agriculture.

3.a.iii. Challenges

As of 2026, an overarching challenge for delivering the agriculture-related targets of PNPN3 (e.g., organic agriculture, nitrates, pesticides, etc.) is that the pace of mainstreaming of targets in the sector may not match the scope and ambition of PNPN3 targets and the remaining time for their implementation¹²⁵. While the agriculture sector leadership (Ministry of Agriculture and Chamber of Agriculture) recognizes the long-term benefits of environmental actions in the sector, it is unable yet to reconcile this with perceived ongoing geopolitical, socio-economic and climate change pressures. Furthermore, although evaluations are currently underway, information on current trends in farmer practices and local impacts, which is needed for the development of better sectoral plans, is not readily available and/or is under data protection rules and therefore sharing may be restricted. Other agencies have found it challenging to work effectively with Ministry of Agriculture to address these issues, which represent a major barriers to progress towards biodiversity targets in the PNPN3 given the crucial importance of this information to implementing various targets.

Adequacy of metrics, dialogue, and the agriculture sector promotional programs.

Some of the PNPN3 targets related to agriculture do not have clear baselines and target definitions, and these should be clearly reviewed as part of the PNPN3s mid-term review. The interministerial committee for PNPN3 has yet to be established. Several dialogues between the technical offices of Ministry of Agriculture and Ministry of the Environment are ongoing in relation to the specific activities of thematic programs for pollinators pesticides, nitrates, and grassland restoration, but further work is needed to enhance cross-ministry and agency work. Furthermore, in some areas, insufficient progress has been made; for example, it has been suggested that the nitrate directives have inadequate articulation and a lack of promotional and training programs for the application of Integrated Pest Management approaches. Innovative promotional platforms for mainstreaming Biodiversity-Friendly Agriculture Practices, such as the Integrated Agriculture and Forestry Advisory and the network of demonstration sites for the management of biodiversity and water, have not yet been fully rolled out, whilst work is

¹²³ International Federation of Organic Agriculture Movements (IFOAM), “We were consulted but not heard,” Organics Europe, Brussels, 2024, https://www.organicseurope.bio/content/uploads/2024/04/ECVC-IFOAM_EU_policy_CAP_Letter-VDL-CAPreview_202404.pdf?dd

¹²⁴ Birdlife, European Environmental Bureau (EEB), Greenpeace, and WWF. 2025. Time for Farmers and Nature to Thrive. <https://www.birdlife.org/wp-content/uploads/2025/05/CAP-Vision-Post-2027-BirdLife-EEB-Greenpeace-WWF.pdf>

¹²⁵ Movement Ecologique (Ecological Movement Luxembourg) and Nature, Joint Position Paper on Assessment of Luxembourg’s Progress toward the EU Nature Restoration, 2026.

<https://www.meco.lu/en/blog/documentcenter/Luxembourg’s-national-restoration-plan-mouvement-ecologique-submits-a-statement/>, 2026. <https://www.meco.lu/en/blog/documentcenter/luxembourgs-national-restoration-plan-mouvement-ecologique-submits-a-statement/>

being done to both enhance these demonstrations and the provision of supportive advisory services^{126,127}.

Level of support for constituency building. Localized initiatives are challenged by overlapping national policies and standards that occasionally prevent timely resolution of local issues (e.g., maintenance of waterways and on the establishment of grassland buffer strips). The PNPN3 intentions for agriculture (i.e., Biodiversity-Friendly Agriculture Practices), which is cross-sectoral in nature, are not yet fully integrated into the local land use planning process. Within rural settings, while currently young farmers are often specialized in dairy farming, their potential contribution to help transform agriculture (assuming they would be more open to newer approaches, including organic agriculture), is challenged by lack of access to land due to high land prices, lack of financial instruments and family land-use decisions. According to Ministry of Agriculture, approximately 60% of farms have no clear designated successors¹²⁸. Furthermore, retired farmers can benefit from implementing biodiversity programmes instead of selling or lending their land for agricultural production.

Level of discourse on the actual economics and profitability of Biodiversity-Friendly Agriculture Practice (versus environmental benefits). Government personnel and partner NGOs who interact regularly with farmers believe that the latter greatly fear the loss of productive land when they apply recommended practices. Farmers also consider the cost of production inputs, volatile prices of farm products, and climate conditions. Despite compensation (i.e., for reduced active production land due to non-productive land (set-aside, hedgerows, etc.)), some farmers may still fear the erosion of identity if they are no longer producing food. There are also concerns about the intersection of protection and productivity. At present 30% of each farm's grassland utilised Agricultural Areas are being protected and feed harvest is limited to twice a year, the other 70% need to be cut one more additional time to compensate for the loss of harvest on the 30% if production is to remain the same. However, as Luxembourg is a net-exporter of agricultural commodities, shifting from high volume to higher value or more artisanal products may be a better approach than attempting to obtain the same productivity from a smaller land area.

At the national level, various agencies perceive a seeming lack of interest and readiness on the side of the agriculture sector leadership (Ministry and Chamber) to discuss the growing body of research findings that documents the environmental impact of prevailing agricultural practices and the possible role of subsidies in this regard, though notably only 3.5% of utilised agricultural land has no eco-schemes indicating good uptake of these initiatives¹²⁹. The ensuing lack of informed discourse (on potential economic benefits of biodiversity-friendly agricultural

¹²⁶ Ministry of the Environment, Presentation on Program on Adaptation to Climate Change, The draft strategy for adaptation to the effects of climate change: a Holistic and participatory approach - News - Environment Portal - emwelt.lu - Luxembourg, 2025.

¹²⁷ Movement Ecologique (Ecological Movement Luxembourg) and Nature, Joint Position Paper on Assessment of Luxembourg's Progress toward the EU Nature Restoration, 2026.

¹²⁸ Chronicle Lu, Luxembourg Highlights 'Challenges' for Young Farmers, Highlights EU Budget Issues, published 28 Oct. 2025.

¹²⁹ <https://agriculture.ec.europa.eu/system/files/2023-06/approved-28-cap-strategic-plans-2023-27.pdf>

practices (Biodiversity-Friendly Agriculture Practice) in modern agriculture results in insufficient motivation for wider adoption of biodiversity-friendly agricultural practices in the sector.

The Ministry of Agriculture information platform for CAP-supported farmers currently focuses on compensation that can be received from foregoing benefits under Biodiversity-Friendly Agriculture Practice. There is limited discussion on actual returns of investments from on farm biodiversity-oriented interventions, though advisory institutes such as IBLA are starting to address this (i.e., cost and returns)¹³⁰. Also, while research funding is generally available, there is a lack of agreed upon sector-wide agenda of research priorities to address implementation issues of biodiversity friendly farming. Targeted funds aligned with these research priorities could provide systematic guidance to researchers to bridge these knowledge gaps (e.g., landscape level and on farm technologies and tools) and facilitate sector-wide farm transitions to Biodiversity-Friendly Agriculture Practices. Some stakeholders (environmental NGOs, young farmers) perceive that the complaints raised on CAP-related environmental restrictions may not be representative of concerns across the sector.

Compliance monitoring and liability. While compliance with environmental directives and regulations is mandatory for member states, compliance by farmers and landowners is largely voluntary. While most studies point to agriculture as a key source of many cases of negative impact on habitats and species, enforcing legal liability is difficult due to the nature of “non-point” pollution from farms (referring to the challenge of traceability). In this situation, the enforcement chain for the environmental regulations relies more on promotional programs (rural advisory systems), permitting systems, incentive systems, and the system of monitoring, sanctions, and remediation. It is also difficult to assess the state of overall efforts on the enforcement in the agriculture sector, as the responsibility is spread across different mandated agencies.

Human resource capacity is a key gap. Gaps in human resources capacity for implementing the PNP3 have been highlighted as a major challenge^{131,132}. Programs are in place to expose school-age children to nature protection and nature-friendly farm practices (led by Biological stations, IBLA and the ANF). This is an investment in the long-term sustainability of the farm sector as envisioned by the PNP3 (i.e., next 15 to 20 years from now). However, the sufficiency of short-term and long-term human resource availability for biodiversity-friendly agriculture is uncertain (i.e., next 3-7 years covering the NBSAP period). The University of Luxembourg may be launching a new course in agroecology, a topic critical to understanding the changes needed in the agriculture sector. However, it may not be sufficient to address the near term to medium term human resource needs related to the PNP3, especially for planning

¹³⁰ <https://ibla.lu/en/ibla>

¹³¹ Ministry of the Environment 3rd National Plan for Nature (NBSAP), National Plan for the Protection of Nature - Natur - Portal of Environment - emwelt.lu - Luxembourg, 2023.

¹³² Consultative Group on International Agricultural Research (CGIAR), Capacity Building for NBSAP and CBD Implementation: A Call to Action, <https://www.cgiar.org/news-events/news/capacity-building-for-nbsap-and-cbd-implementation-a-call-to-action>, 2024.

and research staff of Ministry of Agriculture and Ministry of the Environment, animators of syndicates and river partnership. Available platforms for reforms in education such as the National Platform for the Environment and Sustainable Development, focus on direct actions on nature protection and forest and species protection, etc.¹³³, but may lack information on the paradigm reforms in agriculture systems.

3.a.iv. Recommendations

The achievement of PNP3 sector-wide targets for agriculture will require a multi-stakeholder effort that builds on shared social values, reflection on relevant learnings, and collaboration mechanisms. The following tentative recommendations revolve around the need to fully launch actionable programs, broaden constituencies, enhance access to knowledge, deepen the motivation for action, and human resource capacity for transitioning to biodiversity-friendly agriculture practices.

Accelerate cross-sectoral partnerships to finalize the indicators and metrics for relevant physical and institutional targets related to agriculture and subsequently transpose these targets to the mainstream programs of Ministry of Agriculture. The upcoming mid-term review of the PNP3 provides the opportunity for an independent, evidence-based review of the gaps. Simultaneously, it will identify the various partnerships which could be strengthened. An example would be the pioneering collaborative actions at the syndicate level and river partnerships involving state and non-state actors. Examples of Ministry of Agriculture programs include those for Integrated Pest Management¹³⁴,¹³⁵ (which complement the Pollinator Initiative and Plant Protection Products Sustainable use), Livestock and Dairy Program (for the Grassland Initiative), and Fertilizer promotion and safe use program (for the Soil system and Nitrate Directive). Municipal local governments also play key roles in translating sectoral plans into local land use plans and zoning^{136,137}. If fully aligned to sectoral aspirations, the local land use plans could stimulate more active local interest and discourse on the topic and higher local appreciation of the benefits from transitioning to Biodiversity-Friendly Agriculture Practice systems. Based on suggestions from some senior Ministry of Agriculture technical officials, the PNP3 leadership (interministerial committee) could explore the experiences of nearby Belgium, and other European countries in promoting a collaborative localized approach to promote Biodiversity-Friendly Agriculture Practice in regions where gaining traction has been more challenging.

¹³³Chronicle Lu, Nature&emwelt Highlights “Gaps in Luxembourg’s Environmental Program in EU Review”, <https://www.chronicle.lu/category/environment/55861-natur-ewelt-highlights-gaps-in-Luxembourg-s-environmental-progress-in-eu-review>, published 14 Jul 2025.

¹³⁴

https://directory.startupluxembourg.com/innovations/decision_support_system_dss_for_integrated_soil_management_strategies

¹³⁵ <https://www.ibmabiocontrolsuccess.org/case/agroecological-ipm-in-vineyards-in-luxembourg/>

¹³⁶ Programme Directeur D'Aménagement Du Territoire (PDAT), 2023.

¹³⁷ Weichold, Ivonne, Managing Land: Protecting, Integrating, and Allocating Agriculture in Urban Design and Planning—The Case of Luxembourg, In *New Forms of Urban Agriculture: An Urban Ecology Perspective*, <https://orbi.lu.uni.lu/handle/10993/67801>, 2022.

Provide full support for localized initiatives addressing land use issues that broaden the local constituency and demand for Biodiversity-Friendly Agriculture Practice.

Luxembourg can increase participatory action research; disseminate important research-based evidence and best practices which would help stakeholders (including consumers) understand the link between local land use and environmental issues, and interministerial actions to clarify and communicate overlapping rules and standards. The localized discourse on Biodiversity-Friendly Agriculture Practice should also be included in subnational agriculture roundtables (both in Natura and non-Natura areas), which could highlight its contribution to priority local land use issues, overall climate change adaptation, and enhancing the quality of life of rural communities. These discussions should help alleviate the stigma associated with the environmental protocols of biodiversity contracts and enable farmers to overcome any anxiety surrounding the implementation of Biodiversity-Friendly Agriculture Practice related policies. Agreed upon actions can be supported by location-sensitive integrated farm and forest advisory systems (also noted in the PNP3). This collaborative effort can be facilitated by NGO facilitators, agricultural advisors from Biological stations, and trained advisors under the Ministry of Agriculture and Ministry of the Environment¹³⁸.

Enhance the incorporation of PNP3 in the Agriculture sector by contributing to the ongoing reforms strategic plans through better evidence from research and knowledge management. To ensure full scale sector-wide adoption, the ideals of PNP3 and Biodiversity-Friendly Agriculture Practice need to be gradually internalized (incorporated) into the agriculture sector's strategic plans, and eventually in its investment programs and operating systems. This is a long-term process and also requires in working to reduce any stigma in taking some land out of production. It is recommended that the ministries engaged with PNP3 leadership engage the research community (EU and Luxembourg) to continue to support policy analysis on the economic benefits of shifting to biodiversity-friendly agriculture¹³⁹. This analysis compares the total economic gains and losses associated with “business as usual” production systems and alternative production systems. Such research informs economic managers and the ongoing dialogue towards an EU-wide New Vision in Agriculture (and specific to Luxembourg), which started in 2025¹⁴⁰.

Corollary to the above role, the PNP3 associated ministries may support research and development to help assess and develop recommendations to modify specific subsidy systems, particularly for the upcoming new CAP period (2027 onwards). The key agricultural research and development needed would be to generate information that can guide the extent to which future adjustments (derogations) of CAP subsidy conditionalities can be modified without compromising timely and adequate PNP3 outcomes for Biodiversity-Friendly Agriculture Practice. The EU-based Technical Support Instrument can also provide technical expertise for policy refinement and implementation, as recommended by the recent Environmental

¹³⁸ SER-E, Declaration on EU Nature Restoration Law 2022 – SER-Europe Chapter. (Arguments-Environmental-NGOs.pdf), 2022.

¹³⁹ Ministry of the Environment 3rd National Plan for Nature (NBSAP), National Plan for the Protection of Nature - Natur - Portal of Environment - emwelt.lu - Luxembourg, 2023.

¹⁴⁰ EC Staff Working Document, Environmental Implementation Review Country Report – Luxembourg, 2025.

Implementation Review. Subsidy reforms need to be complemented with more forceful mechanisms for penalizing non-compliance, which may be facilitated through recent innovations in digital data management¹⁴¹. The recently updated EU policy framework for Environmental Crime, Environmental and Liability directives¹⁴² may be a good starting point for the legal components.

The interministerial committee responsible for PNPN3 implementation needs to engage the research and development community to launch an integrated research and development agenda to help farmer/producer networks address implementation needs of Biodiversity-Friendly Agriculture Practice at the landscape and farm level. The key research and development output needed is a menu of technologies and support services, including the role of digital agriculture for resilient and biodiversity-friendly alternative production systems with robust benefit-cost analysis along value chains. A cross-sectoral knowledge management system needs to be set up to support the continuing flow of content and learning among key actors in both the agricultural and related sectors.

To expand the geographic domain of biodiversity-oriented production systems deserving attention, consider more diverse certification systems for biodiversity-friendly farming.

Organic agriculture areas cover around 9.4% of the land area. Luxembourg aim to achieve 15% by the end of 2030, and eventually 25% by 2050¹⁴³. Lack of market access (due to a lack of demand), and high costs within the value chain were stated to pose a major barrier to securing a market for produce. Thus, facilitating links to retailers who can sell products at an enhanced profit may reassure farmers of the value of organic agriculture. Work has been done to build these links; for example, guaranteed market access to schools through the Natur geneissen program¹⁴⁴; as well as hospitals, elderly homes, and other State facilities. Highlighting these benefits may help more farmers join the scheme by highlighting the economic benefits.

Further strengthen current frameworks for human resources capacity of relevant professions that help facilitate the transformation in the agriculture sector. Luxembourg may endeavour to identify needs for “Knowledge, Attitude, and Practices” particularly of agriculture and allied professions at the national and local levels that will be involved in stewarding the transition of agriculture sector programs towards Biodiversity-Friendly Agricultural Practices, hand in hand with improving resiliency to climate change. Based on this, Luxembourg may consider developing a human resource capacity building program that would generate a continuing flow of agricultural professionals and agriculture facilitators trained on principles and practices associated with the Biodiversity-Friendly Agricultural Practices, such as agroecology. This could include consideration of short, medium, and long-term needs aligned with the timetable of the PNPN3 and its successor program as well as the overall ongoing policy pivots in the sector (i.e., EU’s New Vision in Agriculture). Furthermore,

¹⁴¹ Luxembourg Institute of Science and Technology (LIST), Europe’s agricultural data revolution and the strength of Luxembourg’s contribution, 2025.

¹⁴² EC Staff Working Document, Environmental Implementation Review Country Report – Luxembourg, 2025.

¹⁴³ <https://www.meco.lu/wp-content/uploads/2026/01/Statement-Organic-farming-PAN-BIo-2030.pdf>

¹⁴⁴ <https://naturgeneissen.lu/en/>

they may provide continuing capacity building particularly after formal education and training through knowledge management interventions, which may include access to scholarships and other mechanisms to improve capacity at all stages.

3.b. Urban Areas and Infrastructures

3.b.i. Status and Trends of Urban Systems

This section assesses the current distribution of land use and spatial competition driven by population growth, infrastructure development, and the energy transition. In this context, as shown in the previous section agricultural areas currently cover 52.28% of the land area, urban areas cover 10.05%, while forest areas account for 37.19%¹⁴⁵. Remaining natural habitats are subject to increasing pressure from urban expansion driven by demographic growth. The most recent demographic projections anticipate that the population will approach or exceed one million inhabitants by 2070, reaching between 900,000 and 1 million residents depending on the economic and migratory growth scenario¹⁴⁶.

Urban and industrial development intensifies competition for land and contributes to landscape fragmentation, with 90% of Luxembourg's territory classified as highly fragmented in 2021¹⁴⁷. By 2030 the Integrated National Energy and Climate Plan, aims to reduce greenhouse gas emissions by 55%, achieve a 37% share of renewable energy and reach climate neutrality by 2050. This requires the deployment of new photovoltaic and wind generation, which faces strict spatial constraints due to existing protected habitats and residential buffer zones¹⁴⁸.

The PNPN3 aims to protect 30% of the national territory and implement strict protection for 10% aims to concentrate conservation and restoration efforts in priority areas. These targets do not preclude infrastructure development or limit environmental measures solely to these zones. Instead, they highlight the need for integrated spatial planning where urban growth is efficiently guided toward established population centres. This approach ensures that socio-economic development and ecological networks can coexist across the entire territory.

Development pressures like surface sealing and pollution from emissions, degrade native species habitats and reduce carbon sinks^{149,150,151}, altering the soil's natural capacity to act as a climate regulator and filter. Partially as a consequence, two-thirds of protected habitats of European importance, in Luxembourg, remain in an unfavourable conservation status¹⁵². Luxembourg currently ranks fourth in the EU for its share of artificial land¹⁵³, and soil

¹⁴⁵ <https://luxembourg.public.lu/dam-assets/publications/le-luxembourg-en-chiffres/2025/luxembourg-in-figures-2025.pdf>

¹⁴⁶ <https://www.statistiques.lu>

¹⁴⁷ <https://www.eea.europa.eu/en/analysis/indicators/landscape-fragmentation-pressure-in-europe>

¹⁴⁸ https://environnement.public.lu/dam-assets/documents/klima_an_energie/pnec/pnec-24-vf.pdf

¹⁴⁹ <https://environnement.public.lu/content/dam/environnement/documents/natur/forets/NFAP-Luxembourg-2019-review.pdf>

¹⁵⁰ <https://environnement.public.lu/dam-assets/documents/natur/biodiversite/pnppn/pnppn-version-3.pdf>

¹⁵¹ <https://www.espon.eu/sites/default/files/2024-06/no-net-land-take-policies-and-practices-in-european-regions-final-report.pdf>

¹⁵² <https://environnement.public.lu/dam-assets/documents/natur/biodiversite/pnppn/pnppn-version-3.pdf>

¹⁵³ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Land_cover_statistics

sealing¹⁵⁴ in these areas disrupts hydrological cycles by blocking natural infiltration, which impacts the recharge of aquifers that supply 50% of the national demand for drinking water and increases the risk and severity of flooding during heavy rainfall¹⁵⁵. Furthermore, the expansion of these sealed surfaces exacerbates the formation of urban heat islands in the built environment¹⁵⁶, diminishes the soil capacity to act as a carbon sink, and fragments biological corridors¹⁵¹. To mitigate these environmental and spatial pressures, the policy focus has shifted towards integrated urban regeneration. This strategy prioritizes the redevelopment of obsolete industrial sites (friches), the activation and use of undeveloped building gaps within zoned areas, and the promotion of vertical densification to accommodate growth without consuming new land¹⁵⁷.

3.b.ii. Sustainability in Urban Landscapes

The Programme Directeur D'Aménagement Du Territoire (PDAT) proposes a differentiated densification model based on minimum building coefficients for different regions. This classification seeks to optimize the efficiency of developed land and limit low-density expansion in rural areas¹⁵⁷; thus, establishing the structural need for vertical densification strategies (growth in building height to reduce sprawl) within existing residential infrastructure. The State requires developers to use Environmental Impact Assessments to identify and mitigate potential damage to biological environments before issuing operating or development permits. This applies comprehensively to both the development of traditional industrial complexes and the deployment of large-scale renewable energy infrastructure¹⁵⁸. Housing development also requires this if the project is of a significant scale, such as the creation of a completely new General Development Plan or a major Specific Development Plan.

A key strategic pillar for reducing urban sprawl onto natural land is the revitalization of obsolete industrial sites. While this approach is transformative for specific regions, it is complemented by broader strategies, such as densification within existing urban fabric and the utilization of urban voids¹⁵⁷. In practice, regenerating these industrial liabilities through mixed-use schemes consolidates new, functional centres that absorb housing pressure without consuming greenfield land^{159, 157}. To assess the 611ha of these obsolete sites, the Decision Tools for Contaminated Land Management (DECLAM) project was implemented to establish risk threshold to classify soil contamination, providing the legal certainty required for rehabilitating these areas¹⁶⁰.

¹⁵⁴ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Land_cover_statistics#:~:text=for%20Sustainable%20Development%20.,In%202022%2C%20artificial%20land%20accounted%20for%204.4%25%20of%20the%20EU's,landscapes%20of%20cities%20and%20town

¹⁵⁵ <https://meco.gouvernement.lu/dam-assets/assets-luxembourg-strategie/risk2050-final-report-012024.pdf>

¹⁵⁶ <https://www.espon.eu/sites/default/files/2024-06/no-net-land-take-policies-and-practices-in-european-regions-final-report.pdf>

¹⁵⁷ <https://amenagement-territoire.public.lu/dam-assets/fr/strategies-territoriales/pdat-2023/pdat-programme-directeur-damenagement-du-territoire-4072023.pdf>

¹⁵⁸ <https://legilux.public.lu/eli/etat/leg/loi/2018/05/15/a398/jo>

¹⁵⁹ <https://luxembourgtransition.lu/en/project/redevelopment-of-the-metzeschmelz-brownfield-site/>

¹⁶⁰ <https://researchportal.list.lu/projects/detail/default-2bb8ea51d5065f8eff0eeffbaa5f42da0-1>

Managing urban heat and flooding risks requires replacing impermeable surfaces with sustainable drainage systems, following the Sponge City model^{157,161}. As part of this same comprehensive framework, this operational transition is aligned with the urban aspirations of the PNPN3. For example, new building projects must include at least 10% green space.¹⁶² The State uses the Nature Pact to finance and incentivize municipalities to implement green and blue infrastructure, such as permeable pavements and green roofs¹⁵², which is complemented at the local level by the introduction of fast-growing micro-forests applying urban tree management criteria, such as part of the EU Tree Pledge¹⁶³. In this context, residential projects such as Kiem 2050, demonstrates that it is feasible to allocate more than half of a development's surface area (55%) to Nature-Based Solutions to mitigate thermal and hydrological vulnerabilities¹⁶⁴. This precedent demonstrates that realizing large-scale urban ecosystems requires strong public-private partnerships, where the private sector executes sustainable construction while the State guarantees land access and housing affordability¹⁶⁵ to serve as replicable models for future developments.

The Zero Waste Luxembourg strategy (2022) seeks to mitigate environmental pollution directly at its source by establishing clear obligations for the planned dismantling of buildings and the preparation of inventories of recoverable materials, guiding the industrial and construction sector towards circular economy schemes¹⁶⁶. The Environmental Authority then monitors industrial and economic activities to ensure it does not harm water resources and ecosystems through effluent discharge. The frequency of these on-site inspections is regulated by the Industrial Emissions Directive, which requires controls based on a systematic risk assessment. In 2024, the Environmental Authority recorded 401 inspections to verify emissions, chemicals, and waste management¹⁶⁷. At the territorial level, the Nature Pact and biodiversity contracts finance the creation of riparian buffer zones which act as essential nutrient filters.

To protect the structural integrity of forest carbon sinks from the spatial expansion of urban, industrial, or energy developments, the Nature Protection Act explicitly prohibits the destruction, reduction, or change of surface use of forest lands. In parallel, to ensure soil conservation, biodiversity protection, and the maintenance of forest microclimates within active woodland management, the Act explicitly forbids clear-cutting of any forest stand larger than 0.5ha without prior ministerial authorization. The guidelines of the National Forest Accounting Plan¹⁶⁸ direct management towards biomass retention, excluding complete clear-cutting in broadleaf stands and strictly limiting it to areas smaller than 2 ha in coniferous

¹⁶¹ <https://luxembourgtransition.lu/en/project/the-sponge-city-concept-on-the-nordstad-central-axis/>

¹⁶² <https://www.vdl.lu/fr/la-ville/engagements-de-la-ville/developpement-urbain/plan-damenagement-particulier-pap>

¹⁶³ <https://www.vdl.lu/fr/visiter/loisirs-et-nature/arbres/30-000-arbres-jusquen-2030>

¹⁶⁴ <https://www.kiem2050.lu/en>

¹⁶⁵ <https://fondskirchberg.public.lu/fr/presse/communiqués/lancementkiem2050.html>

¹⁶⁶ <https://luxembourg.public.lu/en/society-and-culture/sustainable-development/null-offall-strategie-waste-prevention-strategy.html>

¹⁶⁷

https://aev.gouvernement.lu/fr/actualites.gouvernement2024+fr+actualites+toutes_actualites+communiqués+2025+03-mars+14-controles-administration-environnement.html

¹⁶⁸ <https://environnement.public.lu/content/dam/environnement/documents/natur/forets/NFAP-Luxembourg-2019-review.pdf>

stands. Furthermore, the 2018 Nature Protection Act introduced a formal ecological assessment and compensation system regulated by ecopoints (see section 4.a.ii). This ensures biodiversity conservation by requiring developers (public or private) to bear the cost of restoring habitats equivalent to those they impact¹⁶⁹. Operationally, this mechanism allows developers to contribute the monetary value of ecopoints to Public Compensation Funds managed by the ANF. By centralizing these contributions, the system facilitates the implementation of ecological restoration measures that might otherwise be unfeasible for individual developers to execute, thereby supporting the broader habitat connectivity objectives defined by the PNPN3¹⁷⁰.

As a complement to spatial planning, the execution of sustainable urban development and large-scale infrastructure relies increasingly on private sector mobilization and sustainable finance. At the corporate level, the commitment to biodiversity has been translated into initiatives such as the Business Pact for Nature, which guides companies, including real estate and construction firms, to improve their relationship with ecosystems using the ACT-D methodology (Assess, Commit, Transform, and Disclose their impacts). This tool supports the national objective of having companies employing at least 10% of the country's workforce make a formal commitment to biodiversity by 2026¹⁷¹. In parallel, the financial sector is adopting comprehensive risk management frameworks¹⁷², with support from the Luxembourg Sustainable Finance Initiative¹⁷³. In practice, this means that infrastructure and property investment entities now routinely assess both the impact of their investments on nature and the financial risks that environmental degradation could pose to their physical assets¹⁷⁴. This model demonstrates how aligning financial risk assessments with biodiversity goals can boost corporate responsibility; however, despite these advances, the systemic challenge of balancing economic growth with ecosystem integrity requires further attention.

3.b.iii Challenges

The ongoing spatial competition for land exerts direct pressure on remaining ecosystems representing a fundamental challenge to achieving the goal of reducing land consumption to 0.25 ha/day by 2035 and serves as a stepping stone toward the ultimate target of net-zero land take (0 ha/day) by 2050, which is essential to halting biodiversity loss at the national level^{157,152}. In the territorial and regulatory sphere, the application of environmental protection legislation presents a constant challenge for the real estate sector and large-scale infrastructure developers, who argue that ecological assessment procedures hinder supply and extends project timelines. Conservation organizations and observatories have highlighted that regulatory adjustments (e.g., recent legislative proposals implemented to simplify administrative procedures and introduce flexibility into exemptions for construction projects) could weaken legislation.

¹⁶⁹ <https://legilux.public.lu/eli/etat/leg/loi/2018/07/18/a771/jo>

¹⁷⁰

<https://environnement.public.lu/content/dam/environnement/documents/natur/biodiversite/compensation/guide-calcul-ecopoints-04-2024.pdf>

¹⁷¹ https://imslux.lu/eng/nos-activites/pole-de-specialites/28_biodiversity

¹⁷² https://tnfd.global/wp-content/uploads/2023/07/23-23882-TNFD_v0.4__4.3_v3-1-1.pdf

¹⁷³ <https://lsfi.lu/>

¹⁷⁴ <https://tnfd.global/wp-content/uploads/2024/12/TNFD-report-2024.pdf>

Relaxing environmental standards could accelerate biodiversity degradation and compromise long-term conservation objectives¹⁷⁵. Furthermore, deregulation could threaten the operational viability of the upcoming Nature Restoration Plan, slated for a draft release in 2026 and adoption in 2027. Technical assessments warn that the success of this Plan relies on safeguarding and enforcing existing legal frameworks as a stable baseline¹⁷⁶. If this baseline is eroded through new exemptions, restoration efforts could be undermined, thereby limiting the net recovery of ecosystems. Furthermore, whilst agencies such as the Ministry for Spatial planning will commission special sectoral reports to facilitate effective zoning, a lack of collaboration from certain ministries can present a barrier too effective planning.

A further challenge for sustainable urban development lies in the diversity of non-binding approaches and methodologies within corporate sustainability and investment frameworks. Despite progress driven by the financial sector, consolidating industrial resilience requires an urgent transition from current voluntary schemes to standardized verification methodologies. This standardization of independent assessment criteria is fundamental to avoiding ambiguities (such as greenwashing) in real estate and construction value chains. Ultimately, it ensures that the market maintains the correct incentives for entities that bare the real costs of strictly aligning their operations with environmental regulations. Though at present there is little evidence demonstrating that environmental regulations are the true obstacle to housing production¹⁷⁷.

However, overlapping regulations, rigid permitting processes, and the inconsistent enforcement of existing frameworks often trap projects in complex institutional administration rather than directly translating into greater functionality and environmental protection. This complexity manifests through overlapping licensing processes, where the deployment of a single energy, industrial, or infrastructure project often requires unsynchronized authorizations from different entities managing water, land use, and biodiversity protection. The First Biennial Transparency Report indicates that the persistence of administrative silos constitutes a structural barrier to an integrated approach, hindering the systematic implementation of measures and conditioning the pace of the ecological transition¹⁷⁸. Conversely, the analysis of the State's territorial capacity models (Raum+) ¹⁷⁹, shows that real supply constraints may be linked to the dynamics of land mobilization, (i.e., the difficulty of bringing theoretically available land onto the market due to socio-economic factors such as speculation), and not to a physical scarcity of space caused by nature conservation laws.

Additionally, the energy transition introduces new pressures on land use. To structure the renewable energy market and mitigate spatial competition following initial pilot projects, the Ministry of Economy has established a multi-year tender schedule (2025-2028) focused on large-scale installations¹⁷⁹. Legislative assessments recognize that agricultural habitats must continue to support ecosystem services and cannot cede land exclusively for energy expansion;

¹⁷⁵ https://wdocs-pub.chd.lu/docs/Dossiers_parlementaires/8449/20250515_Avis_2.pdf

¹⁷⁶ https://www.naturemweltasbl.lu/wp-content/uploads/2026/01/Factsheet_Luxembourg.pdf

¹⁷⁷ https://www.meco.lu/wp-content/uploads/2025/02/Resume-avis-protection-de-la-nature_FR.pdf

¹⁷⁸ https://unfccc.int/sites/default/files/resource/LU_BTR1_Report_2025-07-15.pdf

¹⁷⁹ <https://www.klima-agence.lu/en/agrivoltaics-agri-pv-luxembourg-combining-agriculture-and-solar-energy>

consequently, agrivoltaic installations are promoted as the most viable dual-use option to maximize overall land-use efficiency without compromising food security or agricultural productivity¹⁸⁰.

A major driver of these spatial conflicts is a timing mismatch in infrastructural planning. Currently, developers must commit capital during initial feasibility phases relying only on high-level, macro-scale maps. If this subsequent technical assessment documents biological findings or critical connectivity zones that conflict with protection mandates, the legal responsibility for managing the resulting impact falls directly on the project developer^{169,181}. This creates a critical problem for conservation, given that capital is committed early in the planning phase and discovering high-value biodiversity during later detailed assessments makes relocating the project financially unviable. Consequently, it frequently becomes more cost-effective to rely on reactive compensation rather than redesigning the infrastructure to avoid sensitive areas, particularly for private developers.

The revised Renewable Energy Directive (RED III) establishes the legal presumption that renewable energy projects constitute overriding public interests, allowing the authorization of climate infrastructure by overriding the legal conservation frameworks of the Natura 2000 network¹⁸². However, conservation groups warn that applying these broad RED III exceptions without rigorous safeguards could directly worsen the national baseline, where two-thirds of protected habitats already show an unfavourable status¹⁷⁶.

In urban environments, specific pressures such as light pollution pose a critical threat to biodiversity, making the reduction of artificial light emissions a primary goal and the creation of dark corridors for nocturnal species a distinct priority measure. These corridors are planned primarily outside urban areas and are grounded in species distribution data. While preliminary mapping and technical assessments are already underway to be assessed by the Natural Environment Observatory¹⁵², overall implementation progress remains gradual.

Finally, territorial governance faces the challenge of municipal autonomy. Municipalities develop their General Development Plans (PAG) independently of other levels of government, making it difficult to align local decisions with national strategic interests¹⁵⁷. Specifically, in rural municipalities, development plans often allocate excessive areas with vegetation cover for low density detached housing to meet residential demand, which expands buildable perimeters beyond sustainable spatial thresholds and target densities, thereby threatening national targets for reducing urban sprawl¹⁵⁷. While large urban centres have the tools to manage the goal of net-zero urban sprawl by 2050, many small municipalities lack the technical capacity to implement effective preventative safeguards against urban expansion.

3.b.iv. Recommendations

To offset risks from deregulation, and in response to initiatives such as Draft Law 8449 (which aims to introduce administrative simplification to accelerate the creation of housing and

¹⁸⁰ https://www.chd.lu/sites/default/files/2025-03/20250324_pairing-scheme_agri-env.pdf

¹⁸¹ [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021XC1028\(02\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021XC1028(02))

¹⁸² https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=OJ:L_202302413

the deployment of renewable energies), we recommend that the technical safeguards proposed by the Natural Environment Observatory¹⁷⁵ and the Mouvement Ecologique¹⁸³ be integrated. To ensure that external off-site ecological offsets operate strictly as a subsidiary resource, their application should be conditional upon formally demonstrating the exhaustion of on-site mitigation options directly at the project site. This requirement aligns with official national guidelines on Continuous Ecological Functionality measures, which mandate that biological compensation must take place directly at or adjacent to the impacted area, whereas external compensation¹⁸⁴ through Favourable Conservation Status measures is permitted only under specific verified circumstances¹⁸⁵. To guarantee that infrastructure projects, particularly within the recently designated acceleration zones, do not degrade ecological functionality, all spatial interventions should be subject to a mandatory technical audit conducted by an independent scientific entity such as the Natural Environment Observatory or LIST. This auditing body must rely on national technical guidelines^{186,170170} to ensure that mitigation measures and effectively protect biological connectivity. Specifically, these guidelines enable developers to adjust infrastructure layouts during the engineering design phase (such as relocating building footprints away from sensitive zones or integrating dedicated wildlife crossings) before construction begins, whilst allowing for adjustments to infrastructure project before implementation. This will ensure the continuity of ecological functionality and the taxonomic suitability of species, moving beyond generic solutions (such as fixed green space quotas) that lack sufficient scientific basis. Finally, the scope of exceptions to the Nature Protection Act for altering protected species habitats should be properly defined, prioritizing proactive planning tools (such as prior ecological surveys and municipal green master plans aligned with Nature Pact)¹⁵². Unlike the current reactive project-by-project assessment model, these tools would map ecological constraints before the design phase, providing operational certainty to the real estate sector. This proactive planning would allow for the implementation of Nature-Based Solutions in high-density urban projects, integrating green and blue infrastructure (such as green roofs, permeable pavements, and sustainable drainage systems) directly into new developments^{157,152}. While these features excel at urban climate adaptation, they do not provide a suitable one to one ecological compensation for destroyed habitats. Consequently, as initiatives like Draft Law 8449 move forward, specific regulatory criteria must be proposed to prevent developers from using rooftop greening solely to meet the mandatory 10% green space requirement in specific development plans, thereby ensuring that authentic ground level biological corridors are preserved and effectively mitigating the fragmentation of urban biological corridors.

Improving ecological compensation¹⁷⁰¹⁷⁰ by enhancing the Ecopoint mechanism through distributed ledger technologies (tokenization) could facilitate effective application. This would require a situational assessment to define how best to adapt the existing registry and its

¹⁸³ https://www.meco.lu/wp-content/uploads/2025/02/Resume-avis-protection-de-la-nature_FR.pdf

¹⁸⁴ https://environnement.public.lu/fr/publications/conserv_nature/2026/leitfaden-cef.htm

¹⁸⁶ <https://environnement.public.lu/content/dam/environnement/documents/natur/biodiversite/cadastre-des-biotopes/2025-methodologieobk-fr-final.pdf>

operational frameworks. Following this assessment phase, the actual deployment of the tokenization technology would allow for the conversion of certified ecological restoration outcomes into secure, traceable digital assets, this process creates a transparent system that simplifies how private investors can fund and verify conservation efforts¹⁸⁷. The regulatory viability of this tokenization is supported by a recent legislative precedent, the Law of 6 February 2025, which implements the European Union's MiCAR Regulation, granting the Financial Sector Supervisory Commission broad powers to supervise digital assets and provide legal certainty to the market^{188,189}. Leveraging this regulated environment, Luxembourg would have the necessary institutional infrastructure to issue tokens (tokenized Ecopoints) backed by ecological restoration projects that represent verified net ecological gains certified by the ANF. This would provide the environmental offset market with a potential mechanism to optimize liquidity, traceability, and transparency in the direct channelling of private funds toward the operational objectives of the upcoming 2027 NRP.

To mitigate the challenges arising from the implementation of national goals in the face of municipal autonomy, as identified in the PDAT¹⁵⁷, we suggest transitioning from current digital mapping systems to advanced spatial intelligence workflows from the initial design phases. The PDAT establishes a clear objective to reduce land consumption to an average of 0.25 ha/day by 2035, aiming for the goal of Net Zero Artificialization by 2050. To achieve this objective and provide technical certainty from the outset of projects using the best available information, we recommend that the current procedure of overlaying technical layers (biodiversity, topography, hydrology, microclimate, soil sealing, and LIDAR-derived structural data, among others) be replaced by a preventive auditing mechanism based on volumetric scenario simulations, such as those generated by the Virtual City Map¹⁹⁰. Furthermore, this preventive approach should strategically align with and anticipate the national bioclimatic model currently under development and scheduled for completion by late 2027. Integrating this upcoming tool will enable municipalities to input 3D construction plans for new developments and directly simulate localized climate impacts, including wind obstruction, soil sealing, and green infrastructure deficits, thereby transforming project evaluation into a dynamic and predictive process.

Given that the Raum+ model cited in the PDAT currently functions as a projection of theoretical capacity (identifying 5,700 ha of internal reserves), there is a major opportunity to optimize data interoperability during the feasibility phases by systematically leveraging the redesigned National Geoportal. Cross-referencing of the open-source tool Virtual City Map¹⁹⁰ with Raum+ data establishes an advanced analytical workflow. By accessing this 3D interface, which overlays approximately 1,000 layers of public data onto a high-precision terrain model, volumetric modelling and spatial simulations are standardized as an institutional tool for the

<https://publications.iadb.org/en/nftree-replication-guide-development-financing-mechanisms-conservation-high-ecological-value>

¹⁸⁸ <https://legilux.public.lu/eli/etat/leg/loi/2025/02/06/a50/jo>

¹⁸⁹ <https://www.cssf.lu/en/2026/02/the-cssf-has-updated-its-faq-crypto-assets-undertakings-for-collective-investment-previously-faq-virtual-assets-undertakings-for-collective-investment-and-draws-the-attention-to-the-following-po/>

¹⁹⁰ <https://www.geoportail.lu/en/applications/3d-viewer/>

comprehensive evaluation of sites. Utilizing this integrated workflow before finalizing the General Development Plans allows municipalities to validate building densities in real time against environmental constraints. Leveraging these tools helps local authorities existing reserves, halting low-density sprawl, proactively identifying ecological constraints, and reducing the incidence of subsequent environmental or legal conflicts.

The administrative fragmentation and siloed approaches identified in the BTR1 report¹⁷⁸**Error! Bookmark not defined.**, can generate conflicts due to a lack of both inter-sectoral and intra-sectoral coordination.

To effectively address this and optimize public resources, a precise situational assessment is required to determine which specific institutional capacities, procedures, and regulatory frameworks must be strengthened or adapted. This assessment should systematically identify and resolve operational redundancies, unsynchronized authorizations, and specific conflicting requirements that arise between the environmental sector, land-use planning, and other relevant entities, as identified during the assessment. As part of this broader improvement, we suggest streamlining cross-sectoral workflows through the implementation of centralized mechanisms, such as a dedicated biodiversity single window, designed not only to directly support the operational implementation of the PNPN3, but also to generate procedural and coordination synergies with other sectoral plans. The ultimate goal of connecting these sectoral plans through a single window is to ensure true policy coherence. Within Luxembourg's National Adaptation Strategy, this necessary cross-sectoral coherence is explicitly anchored in the One Health paradigm¹⁹¹. By structuring institutional coordination around this framework, the single window would provide a clear mechanism for competent authorities to evaluate projects holistically, positioning biodiversity conservation and ecosystem integrity as the central pillars that sustain human and animal health in the face of climate pressures, rather than through isolated departmental lenses. At the operational level, to overcome siloed work and make this single window truly operational, we recommend establishing a Binding Open Data Protocol. While the official portal data.public.lu already exists to centralize public information¹⁹², institutional compliance remains inconsistent, as some ministries regularly upload their datasets while others do not. Furthermore, although the European Union Open Data Directive 2019/1024 mandates broader availability of public sector information than is currently observed in practice, a tailored national protocol is essential to bridge this gap. This mechanism would require public institutions, academic institutions, and research centres to publish their monitoring data on the existing national platform, establishing this step as a technical prerequisite for the renewal of their government funding agreements or other institutional mechanisms to be defined. This would facilitate sustainable development by ensuring that project evaluations are interoperable and based on shared scientific evidence.

At the corporate and financial level, it is imperative to move beyond initial voluntary commitments to meet the national goal of having companies (which represent 10% of the national workforce) make formal biodiversity commitments by 2026. Therefore, we

¹⁹¹ <https://gouvernement.lu/dam-assets/images-documents/actualites/2026/05-mai/07-wilmes-strategie-changement-climatique/strategie-et-plan-national-dadaptation-changement-climatique.pdf>

¹⁹² <https://data.public.lu/en/>

recommend that the State integrate and strengthen technical and financial support mechanisms that facilitate the widespread adoption of the ACT-D methodology¹⁷¹ in industries and medium-sized enterprises. These mechanisms would allow the productive sector to conduct double materiality analyses, (a fundamental requirement under the European Sustainability Reporting Standards)¹⁹³ and a core element in Taskforce for Nature Based Financial Disclosures (TNFD) recommendations. These approaches would both identify financial risks and operational dependencies, and their impacts on nature in a standardized and verifiable manner¹⁷², helping companies align their economic growth with nature conservation and ensure the future viability of their businesses.

4. Enabling Conditions

Meeting any goal or target is only possible given the appropriate conditions including funds, human capacity, and genuine willingness and support. Whilst the previous sections (and the Annexes) demonstrate the commitment, and legal architecture to implement change, discussing the financial architecture which enables this change is also critical. Here we discuss the financial landscape present in Luxembourg, including both national efforts and initiatives, as well as the clear commitments to Official Development Assistance (ODA) funds, particularly through targeted mechanisms to support conservation efforts at all scales. The diversity of funds and mechanisms (see Annex A3 for details) underscores Luxembourg's commitment to genuinely enable change; however, we also discuss inevitable gaps and challenges before making recommendations on how these challenges might be managed or overcome.

4.a. Finance

4.a.i. Overview of Finance Sector

Luxembourg's biodiversity finance is based on a multi-instrument financing architecture (Annex A3.1.1) rather than a single dedicated biodiversity fund. This approach mobilises resources from multiple public, private and international sources. Public financing remains the cornerstone, combining State budget allocations; specialised environmental funds (*Fonds pour la protection de l'Environnement*, the *Fonds pour la Gestion de l'Eau*, the *Fonds pour l'Energie et le Climat*, the *Fonds des routes*), and targeted subsidy schemes, supporting biodiversity-related actions. At a local level, municipal fundings are channelled through mechanisms such as the Nature Pact, while ecological compensation mechanisms generate additional resources linked to development impacts and restoration requirements. International climate and development finance further complements domestic resources, whereas private investment, blended finance and philanthropic instruments are still developing as emerging components of Luxembourg's biodiversity finance landscape.

Public expenditure on biodiversity conservation is primarily channelled through the Ministry of the Environment. Luxembourg also mobilises biodiversity-related revenues from

¹⁹³ https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=OJ:L_202302772

environmental taxes, including water and carbon taxes; as well as non-taxes revenues such as timber sales, ecotourism and fishing licence fees¹⁹⁴.

As a Member State Luxembourg benefits from several European Union funding instruments/programmes including the European Green Deal¹⁹⁵, LIFE Programmes¹⁹⁶, Nature Restoration agenda¹⁹⁷, Natura 2000^{198,199}, Horizon Europe²⁰⁰, Recovery and Resilience Facility (RRF)²⁰¹, CAP²⁰² Pillar I and Pillar II Agri-Environment-Climate measures, European Agricultural Fund for Rural Development²⁰³, EU Cohesion Policy (ERDF & ESF+)²⁰⁴. Collectively, such instruments underpin conservation efforts, agri-environmental measures, ecosystem restoration, climate resilience and broader environmental governance (Annex A3.1.2.).

Moreover, Luxembourg plays an active role in international biodiversity and climate finance through a combination of Bilateral and Multilateral Environmental Agreements, ODA, international and climate finance commitments. Through its development cooperation, Luxembourg integrates environmental and natural resource considerations into programmes addressing sustainable development, climate resilience, ecosystem management, and poverty reduction. This combination of not only ODA funding, but also biodiversity and climate funding is unusual, highlighting Luxembourg's leading role as an environmental finance hub²⁰⁵. The PNPN3 explicitly highlights an ambition to scale up international biodiversity finance which is set to quadruple by 2030²⁰⁶.

Luxembourg also has a diverse Sustainable-Finance Ecosystem which helps support the enactment of legislation for conservation and sustainable development. In addition, through its International Climate Finance (ICF) Strategy 2026-2030²⁰⁷, Luxembourg has introduced a Climate nexus approach, which integrates climate action, ecosystem conservation, community resilience, and finance into a single framework. This strategy strengthens its role as a leader in innovative, nature-positive, and transformative finance. This includes a green budgeting process at national level have been built on the monitoring of investments linked to the 2020

¹⁹⁴ <https://www.oecd.org/en/data/datasets/policy-instruments-for-the-environment-pine-database.html>

¹⁹⁵ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

¹⁹⁶ https://cinea.ec.europa.eu/programmes/life_en

¹⁹⁷ https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law_en

¹⁹⁸ https://environment.ec.europa.eu/topics/nature-and-biodiversity/natura-2000_en

¹⁹⁹ <https://natura2000.lu/>

²⁰⁰ https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

²⁰¹ https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en

²⁰² https://agriculture.ec.europa.eu/common-agricultural-policy_en

²⁰³ https://commission.europa.eu/funding-and-tenders/find-funding/eu-funding-programmes/european-agricultural-fund-rural-development-eafrd_en

²⁰⁴ https://ec.europa.eu/regional_policy/en/policy/what/investment-policy/

²⁰⁵ <https://cooperation.gouvernement.lu/en/service/activites.html>

²⁰⁶ <https://environment.public.lu/fr/natur/biodiversite/pnnp/html>

²⁰⁷ <https://klima.lu/en/news-2/the-minister-serge-wilmes-presented-the-national-strategy-for-international-climate-finance-2026-2030/>

Sustainability Bond and on efforts to achieve the objectives of the Integrated National Energy and Climate Plan²⁰⁸.

4.a.ii. Successful Examples of Enabling Conditions

Luxembourg has made important efforts to strengthen biodiversity governance and sustainable finance, through development of policy, strategic and legal frameworks. The country has also developed economic and financial instruments that provide solid basis for biodiversity conservation and sustainable development. Indeed, through its own public budget or EU funding mechanism, the country provides financial support for PNPN3 implementation and EU commitments by various mechanisms, such as: (i) Municipal incentives through the Nature Pact to support local biodiversity action²⁰⁹; (ii) Eco-compensation system, with the eco-point and compensation pool system which allows developers to pay a compensation fee instead of implementing compensation activities themselves²¹⁰; (iii) CAP support for sustainable agriculture, organic farming, pesticide reduction, lower greenhouse gas and ammonia emissions, and carbon sequestration (iv) Emerging Green budgeting and tagging into public finance, especially for expenditure linked to the National Energy and Climate; (v) Private sector support for cleaner technologies, energy efficiency, pollution management, and other environmental investments²¹¹.

The Nature Pact is widely developed at local level, engaging 94 municipalities (as of June 2026)²¹². It supports municipalities through legislative, financial, technical, and advisory assistance. The programme is based on a catalogue of 79 measures, and municipalities are independently audited and receive score for their conservation efforts. These scores determine certification levels ranging from Baseline (40%), Bronze (50%), Silver (60%), to Gold (70%)²¹³. Although, technical and administrative capacity still varies between municipalities, based on expertise, staff time, political priorities, land ownership, budget capacity, availability of technical assistance and the ability to prepare projects. Luxembourg has developed eco-compensation system which contributes to finance biodiversity conservation and restoration in some areas in compensation of ecological damage arising from development projects. Established in 2018, this framework, incorporates ecopoints, national and regional compensation pools, achieving “no net loss” of biodiversity. Under this system, developers may be required either to implement compensatory measures directly or to make a payment based on the number of ecopoints generated by the project’s ecological impacts. These payments go into compensation pools managed through a national registry. This system assigns a monetary value based on the ecological value of biotopes and habitats. The revenue linked to this system is evaluated to 9.6 million EUR in the 2026 budget projections²¹⁴.

In the agriculture sector, one of the most significant funding mechanisms is the CAP Pillar I and Pillar II. PNPN3 identifies also biodiversity contracts are an important instrument for

²⁰⁸ igf.gouvernement.lu

²⁰⁹ pactenature.lu

²¹⁰ <https://environnement.public.lu/fr.html>

²¹¹ MyGuichet.lu

²¹² www.pactenature.lu

²¹³ www.pactenature.lu

²¹⁴ <https://budget.public.lu/lb/budget2026/am-detail.html>

conserving agricultural biotopes and habitats, with a target to manage 10% of utilised agricultural area, or around 13,000 ha, under biodiversity contracts without fertilisers or pesticides. The CAP is financed through two funds: the European Agricultural Guarantee Fund, which supports direct payments and market measures; and the European Agricultural Fund for Rural Development, which supports rural development. Through the CAP Pillar II, Luxembourg provides technical and financial supports to Agri-environment-climate measures, incentives for organic farming, reduced pesticide and nitrogen use, crop diversity and grassland and landscape management, through biodiversity contract. CAP plan includes non-productive surfaces, pesticide limitation grants and organic farming objectives. At the European level, EUR 387 billion is allocated to the CAP for the 2021-2027 period, including EUR 291.1 billion through the European Agricultural Guarantee Fund and EUR 95.5 billion through the European Agricultural Fund for Rural Development ²¹⁵.

Luxembourg has strong international commitments on biodiversity funding. The PNPN3-pillar 4, states that Luxembourg intends to significantly increase financial resources allocated to international biodiversity commitments by 2030, with particular attention to forests, wetlands, and the marine environment, as well as to cooperation with partner and developing countries (PNPN3, 2023) ^{216, 217}. The overall envelope allocated by Luxembourg for the ODA has progressively increased for about USD 694.2 million (preliminary data) of ODA in 2025, representing 0.99% of Gross National Income (Annex A3.1.3.), in accordance with the Coalition Agreement by which the Government has committed to maintaining the quantitative effort of ODA at 1% of GNI (Development co-operation profiles) ²¹⁸.

Furthermore, the International Climate Finance Strategy 2026-2030 significantly increases the country's international climate finance commitment ²¹⁹, with 320 million EUR allocated for the 2026-2030 period, compared with 220 million EUR committed for 2021-2025. This increase reflects Luxembourg's ambition to strengthen its contribution to global climate action while aligning its financial support with objectives of the Paris Agreement and the KM-GBF. This strategy places stronger emphasis on integrated climate-nature approaches through its climate Nexus Approach, which connects climate action, ecosystem conservation, community resilience, and sustainable finance. A significant share of this finance is expected to support ecosystem protection, restoration, nature-based solutions, and biodiversity-related intervention through the Climate and Ecosystem pillar, which focuses on conservation and restoration forests, land, water, marine ecosystems and biodiversity. By increasing financial commitments and introducing innovative instruments such as blended finance, guarantees, and investment vehicles, Luxembourg aims not only to increase public climate finance but also to mobilise additional private capital for climate and nature-positive investments.

²¹⁵ https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/cap-funds_en

²¹⁶ <https://environnement.public.lu/fr/natur/biodiversite/pnnp/html>

²¹⁷ <https://environnement.public.lu/fr/natur/biodiversite/pnnp/html>

²¹⁸ Luxembourg ODA Overview, available at

<https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/development-co-operation-profiles>

²¹⁹ <https://gouvernement.lu/dam-assets/images-documents/actualites/2026/06-juin/16-wilmes-fci/document/strategie-nationale-du-financement-climatique-international-2026-2030.pdf>

Moreover, Luxembourg is recognised for its strong support for multilateral environmental finance mechanism, including the Global Environment Facility (GEF). The country has been a longstanding contributor to the GEF and other multilateral and environmental funds as part of its broader commitment to sustainable development, biodiversity conservation, and climate action. For example, the multi-year replenishment has increased from Special Drawing Rights (SDR) 4.0 million for GEF-5 to SDR 4.76 million, equivalent to €4.76 million for GEF-7 (Annex A3.1.4.)²²⁰. Luxembourg is also recognized as a key contributor for the Global Biodiversity Framework Fund (greatest contributor on a per-capita basis), dedicated to the implementation of the KM-GBF. The country concluded a Contribution Agreement for 7 million EUR pledge in 2024, reinforcing its acknowledgement as an active international actor in biodiversity finance²²¹.

Luxembourg has also established or launched various platforms, initiatives, or programmes linked to sustainable finance, which play important roles at international, regional and national levels. For example, the Luxembourg's Sustainable Finance Initiative²²², LuxFlag's Impact Label²²³, Global Green Finance Index²²⁴, Luxembourg-EIB Climate-Finance Platform²²⁵, Natural Capital Finance Alliance²²⁶, Luxembourg House of Financial Technology²²⁷ and Fondation de Luxembourg's climate and biodiversity projects (Annex A3.1.5.). The Luxembourg Sustainable Finance initiative, managed jointly by the Ministry of Finance and the Ministry of Environment, Luxembourg for Finance, and the High Council for Sustainable Development, serves as the national coordination platform for Luxembourg's sustainable finance ecosystem. It brings together public authorities, financial regulators, financial institutions, investors, industry associations, Luxembourg stock Exchange and Luxembourg Green Exchange, LuxFlag, academia, and civil society to implement the country's Sustainable Finance Strategy. Luxembourg also represents a leading sustainable finance centre and hub, which raises awareness of sustainable finance through development of practical tools, and providing capacity building activities and support to increase engagement and connections among sustainable finance stakeholders²²⁸.

Luxembourg has engaged the whole Government in Sustainable finance, through the 2023-2028 Government's Coalition Agreement and the Ministry of Finance's 10-Point Action Plan for Sustainable Finance, which has 10 objectives (Annex A3.1.6.): (i) to amplify Luxembourg's leadership in sustainable finance, (ii) to become a centre of excellence in gender finance, (iii) to go beyond green, (iv) to mobilize private capital for sustainability, (v) to develop innovative

²²⁰ <https://www.thegef.org/sites/default/files/council-meeting-document>

²²¹ GEF Towards a resource mobilization strategy for the global biodiversity framework fund 2025-2030
https://www.thegef.org/sites/default/files/documents/2025-12/en_gef.gbff_c.05.04.rev_01_resource%20mobilization%20strategy%20for%20the%20global%20biodiversity%20framework%20fund_0.pdf

²²² <https://lsfi.lu/>

²²³ <https://luxflag.org/>

²²⁴ <https://www.greenfinanceindex.net>

²²⁵ <https://www.eib.org/en/products/mandates-partnerships/donor-partnerships/trust-funds/luxembourg-climate-finance-platform.htm>

²²⁶ <https://www.naturalcapitalfinancealliance.org/>

²²⁷ <https://lhof.com/>

²²⁸ <https://lsfi.lu/fr/what-we-do-new>

solutions for global impact, (vi) to strengthen global connectivity in sustainable finance, (vii) to support initiatives, (viii) to develop the talents of tomorrow, (iix) to leverage finance transition to net-zero, (ix) to drive digitalisation of sustainable finance, and (x) to strengthen the Luxembourg Sustainable Finance²²⁹.

Luxembourg has made significant progress in Sustainable finance by developing a comprehensive ecosystem of environmental and social finance instruments and initiatives. Key achievements include (i) leadership in Green, Social, Sustainability and Sustainability-linked bonds through the Luxembourg Stock Exchange and the Luxembourg Green Exchange (LGX), the world's first dedicated platform for sustainable finance; (ii) a leading position in ESG UCITS funding, as the world's second largest centre for investments fund and as European hub for ESG UCITS, with funds disclosing through Sustainable Finance Disclosure; (iii) a strong track record in impact investing and development finance, particularly through blended finance initiatives and platforms such as the International Climate Finance Accelerator (ICFA), the International Social Finance Accelerator (ISFA); (iv) over three decades of leadership in inclusive finance and microfinance; (v) growing recognition in Gender Finance, supported by Luxembourg Women in Finance Charter and the Ministry of Finance's ambition to establish Luxembourg as a Centre of Excellence for gender finance through its 10-point action plan; (vi) Sustainable finance innovation fostered through dedicated institutions and public-private partnerships; and (vii) a well-established philanthropic ecosystem, including the Fondation de Luxembourg, which supports collaboration among foundations, NGOs and other stakeholders. (Annex A3.1.7.).

Moreover, Luxembourg has supported various international biodiversity programmes, such as (i) UNEP's Vanishing Treasures initiative, protecting three iconic and endangered species; (ii) the Blue Natural Capital Finance Facility, focusing on coastal-ecosystems, biodiversity services and blended finance for sustainable coasts (iii) the Resilient Landscapes Luxembourg initiative, which aims to connect scientific research with investable opportunities in sustainable landscapes and to attract more private finance for nature-based solutions; and recently the (iv) Tropical Forest Forever Facility (TFFF), which aims to ensure tropical forest conservation with at least 20% of the funding allocated to indigenous people and local communities. Luxembourg has made an announcement that it will contribute to and host the financial arm of the TFFF, the Tropical Forest Investment Fund, providing a major contribution to supporting some of the most biodiverse parts of the planet²³⁰.

4.a.iii. Constraints and Barriers

The European Commission's 2025 Environmental Review for Luxembourg estimates overall environmental investment gap at about 403 million EUR per year for 2021-2027²³¹, but it reports no significant observed gap for biodiversity and ecosystems, based on available data;

²²⁹ <https://gouvernement.lu/dam-assets/documents/actualites/2024/04/23-roth-action-plan-sustainable-Finance/minfin-244181-infographie-fr.pdf>

²³⁰ https://tfff.earth/luxembourg-commits-to-the-tropical-forest-forever-facility-and-will-host-its-investment-fund/?utm_source=copilot.com

²³¹ https://environment.ec.europa.eu/publications/2025-environmental-implementation-review-country-report-luxembourg_en

while also saying that data consistency needs further assessment. This should not be interpreted as biodiversity and conservation are fully funded, because the ecological evidence shows a major effectiveness and implementation gap, stressed by biodiversity loss, species and habitats degradation. The reflection should focus more explicitly on the relationship between biodiversity expenditure and ecological outcomes. While spending on biodiversity protection has increased, key indicators show that species and ecosystems remain under significant pressure, suggesting that increased funding has not yet translated into proportional ecological recovery²³².

Luxembourg's biodiversity finance architecture is fragmented across various instruments including the State budget, environmental, water, energy and climate funds, ecological compensation schemes, private sector and philanthropic contributions, EU funding mechanisms and initiatives, sustainable finance related to nature and climate and international contributions. The actual biodiversity financial architecture does not link all funding sources with the PNP3 measures and the expected ecological outcomes per euro spent. Indeed, the PNP3 Multiannual planning only presents the contribution of the public budget.

Biodiversity spending is rising but ecological indicators remain weak

Luxembourg has increased environment and biodiversity-related public spending, but biodiversity indicators continue to show a decline in ecosystem health, justifying the need of a system that links biodiversity expenditure to ecological status and recovery. Similar conclusions appear in the Organisation for Economic Co-operation and Development (OECD) report attributing biodiversity decline over four decades to economic growth, urban sprawl, intensified agriculture, habitat loss and fragmentation, invasive species, and climate change²³³.

The budget of Luxembourg's Ministry of the Environment, amounts approximately 521 million EUR, representing 1.73% of total State expenditure. Under the 2026-2029 Multiannual financial framework, the Ministry's budget is projected to increase steadily to 678 million EUR by 2029, reflecting the Government's continued commitment to environmental and biodiversity policies²³⁴. Official biodiversity statistics indicates that public expenditure on biodiversity protection reached approximately EUR 96 million in 2022, around 2.6 times the level recorded in 2008, demonstrating a sustained upward trend in biodiversity financing²³⁵. This trend is reinforced by The Multiannual financial planning under the PNP3, which foresees annual biodiversity-related investments increasing from approximately EUR 85 million at the beginning of the implementation period to more than EUR 111 million by 2030, representing a cumulative investment of over EUR 790 million during 2022-2030²³⁶. Together, these figures illustrate Luxembourg's long-term commitment to scaling-up public investment in biodiversity conservation and ecosystem restoration.

²³² <https://luxembourg.public.lu/fr/publications/statec-le-luxembourg-en-chiffres.html>,
<https://www.chd.lu/en/node/3254>

²³³ https://www.oecd.org/en/publications/2025/09/country-by-country-reporting-compilation-of-2025-peer-review-reports_997d5e6a.html

²³⁴ <https://budget.public.lu/lb/budget2026/am-detail.htm>

²³⁵ <https://statistiques.public.lu/fr/publications/series/en-chiffres/2025/biodiversite-en-chiffres-2025.html>

²³⁶ <https://environnement.public.lu/fr/nature/protection-nature/pnp3.html>

Luxembourg's substantial biodiversity financing reflects the significant investment required to halt biodiversity loss and restore ecosystem health. A similar conclusion was drawn in the OECD Environmental Performance Review (2025)²³⁷, which underscores the need for continued investment and strengthens policy action to reverse biodiversity loss while supporting ecosystem restoration and resilience. This review highlights the need to reinforce restoration programmes; however, restoring degraded biodiversity requires long-term management and is generally costlier than maintaining intact ecosystems. Habitat fragmentation requires investment in ecological corridors to counteract, and critical land parcel management, whilst intensive agriculture requires the development and implementation of ecosystem services payment schemes, and the reform of perverse incentives. Moreover, unfavourable species/habitat status calls for implementation of targeted actions for species recovery (see section 2).

These situations highlight the need for sufficient and targeted funding allocation towards biodiversity-positive programmes, preventive conservation measures, and biodiversity mainstreaming across economic sectors. Such an approach should not only increase investment in ecosystem protection and restoration but also identify and reduce economic and financial incentives which can contribute to biodiversity loss, including environmentally harmful subsidies.

Economic and financial subsidies: some sectorial policies, economic and financial incentives may indirectly foster biodiversity loss

Target 18 of the KM-GBF calls all countries to identify, reform, phase out, or eliminate incentives, including subsidies, that negatively affect biodiversity and to reinforce biodiversity-positive incentives. This target holds particular significance for Luxembourg (like many European countries), as pressures on biodiversity are exacerbated by public policies and financial incentives that may directly or indirectly foster land artificialisation, intensive agriculture, fossil fuel consumption, transport network growth, or resource-intensive practices. Biodiversity finance in Luxembourg should extend beyond increasing green spending to critically assess whether existing subsidies, tax benefits, or public support mechanisms counteract biodiversity objectives.

Agriculture emerges as a critical sector for subsidy reform. While certain existing measures encourage biodiversity-friendly practices in Luxembourg, such as organic farming²³⁸, reduced pesticide application, establishment of refuge zones, grassland conservation, lower nitrogen inputs, and Agri-Environment-Climate initiatives under the CAP- Pillar II; other support mechanisms, such as CAP-Pillar I -Direct Payment, prioritize intensive production. Reform efforts should thus aim to reprioritize agricultural incentives toward verifiable biodiversity outcomes and must ensure that farmers are supported adequately and practicably. The challenge to overcome is also to ensure CAP biodiversity measures more based on results. Payments

²³⁷ https://www.oecd.org/en/publications/environment-at-a-glance-country-notes_59ce6fe6-en/luxembourg_884db5ce-en.html

²³⁸ <https://agriculture.public.lu/dam-assets/veroeffentlichungen/broschueren/biolandwirtschaft/20251222-panbio-2030-a4-web.pdf>

should be linked not only to hectares enrolled, but also to ecological outcomes such as pollinator habitat, species-rich grassland quality, hedgerow connectivity, reduced nutrient loads or improved bird indicators. For that, data collection and monitoring need to be reinforced and farmers' capacity needs to be reinforced.

For the transport sector, tax policies or pricing structures favouring petrol and diesel consumption, car-dependent transportation or infrastructure expansion may have indirect negative impacts on biodiversity. However, reforms require a phased approach that incorporates social equity considerations and the provision of sustainable alternatives, including enhanced public transport, low-impact mobility options, and improved spatial planning. Luxembourg has made efforts to green its tax system, especially through energy and transport taxes, but the OECD stresses the need to remove environmentally harmful subsidies and strengthen green-growth policy instruments²³⁹. The limited application of economic instruments such as taxes, subsidies, and licenses, have undermined the effectiveness of mechanisms envisioned under prior of PNPN3. If the system supports land conversion and intensive uses more than preservation, restoration and stewardship, public grants will always be fighting.

Luxembourg has developed ecological compensation mechanisms. By paying a fee, project developers can be relieved of their obligation to compensate for the ecological damage caused by their project. The OECD recognised the importance of compensation system but warned that Luxembourg should avoid “undue compensation” and ensure that compensation is used only after avoidance and reduction of damage²⁴⁰. Indeed, mitigation measures have predominantly been required for bird breeding or wintering areas, or when bird flight corridors are affected. Biodiversity offsets are only credible when developer follows the mitigation hierarchy: avoid, reduce, restore and compensate as last resort. The Government needs also to ensure land availability especially for municipalities in the south of the country, which face high demographic and economic pressures²⁴¹.

Luxembourg has promising private finance initiatives, that could be further developed to support biodiversity objectives. However, biodiversity projects often remain challenging for private investors because their benefits are primarily delivered through public goods and ecosystem services, such as species recovery, water regulation, carbon storage, flood mitigation, and landscape quality, rather direct and predictable financial returns. But, as leading international finance centre, Luxembourg is well positioned to mobilise private capital for nature finance. The key challenge is to further leverage its sustainable finance ecosystem to support biodiversity investments by developing credible projects pipelines, robust environmental safeguards, reliable impact measurement and reporting frameworks, and

²³⁹ https://www.oecd.org/en/publications/environment-at-a-glance-country-notes_59ce6fe6-en/luxembourg_884db5ce-en.html#section-d1e442

²⁴⁰ https://www.oecd.org/en/publications/oecd-environmental-performance-reviews-luxembourg-2020_fd9f43e6-en/full-report/biodiversity_84adc648.htm

²⁴¹ Bilan national du système d'évaluation et de compensation en éco-points – état des lieux et perspectives - Actualités - Portail de l'environnement - emwelt.lu - Luxembourg

innovative financial instruments capable of aligning financial returns with measurable biodiversity outcomes.

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However, Luxembourg needs to be vigilant regarding the risk of greenwashing, particularly given its role as a major international financial centre for investment funds. Unsubstantiated claims such as “green”, “ESG”, “sustainable”, or “climate-neutral” can undermine market integrity and affect consumers, investors and international capital flows. The growing use of sustainability labels may create a risk that environmental credentials are used primarily as marketing tools rather than as evidence of measurable and verifiable environmental impacts. To maintain credibility, Luxembourg should continue strengthening transparency requirements, impact measurement methodologies, disclosure frameworks, independent means for oversight and assurance, and verification mechanisms for sustainable finance products²⁴⁴.

4.a.iv. Recommendations

The PNPN3 explicitly recognises that adequate financial, human and land resources are essential for its successful implementation. While Luxembourg has substantially increased biodiversity-related expenditure in recent years, ecological indicators show that current investments have not yet sufficiently targeted or been transformative to reverse biodiversity loss.

²⁴² https://www.oecd.org/en/publications/oecd-environmental-performance-reviews-luxembourg-2020_fd9f43e6-en/full-report/biodiversity_84adc648.htm

²⁴³ Bilan national du système d'évaluation et de compensation en éco-points – état des lieux et perspectives - Actualités - Portail de l'environnement - emwelt.lu - Luxembourg

²⁴⁴ <https://www.pwc.be/en/company-information/corporate-responsibility.htm>

This underscores the need for a more effective biodiversity governance that explicitly links inputs to measurable ecological outcomes. The recommendation is therefore to shift from a fragmented collection of budget lines and project-based funding towards a coherent national biodiversity investment framework by 2030. Such a framework should align financial planning and resource allocation with the objectives of the PNP3, the EU Biodiversity Strategy for 2030, and Luxembourg's forthcoming NRP, due by September 2026 under the EU Nature Restoration Regulation.

As highlighted in PNP3, achieving transformative change requires biodiversity to be mainstreamed across all sectors of society. A key step is to strengthen the integration of biodiversity considerations into economic, social, cultural and development policies. To support, Luxembourg could develop national assessments that demonstrate the interlinkages between biodiversity, ecosystem services, and human well-being, drawing inspiration from the assessments of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), which have already conducted various regional assessments. These could include national-scale assessments similar to: (i) the Thematic Assessment on the Interlinkages among Biodiversity, Water, Food and health (Nexus Assessment); (ii) the Thematic Assessment on the Underlying Causes of Biodiversity Loss, the Determinants of Transformative Change and Options for Achieving the 2050 Vision for Biodiversity (Transformative Change); (iii) the Methodological Assessment of the Impact and Dependence of Business on Biodiversity and Nature's Contributions to People (Business and Biodiversity Assessment); and (iv) the Methodological Assessment Regarding the Diverse Conceptualization of Multiple Values of Nature and its benefits, including Biodiversity and Ecosystem Functions and Services (Value Assessment). Obviously, some of these would have more direct use at a national scale, such as the business and biodiversity assessment, particularly given other interactions between biodiversity and business (such as the work of the TNFD) where methodological innovation is needed at all scales.

Such national assessments would provide an evidence base for demonstrating the economic, social, cultural and environmental value of biodiversity and ecosystem services. This would also support more effective communication, raise awareness, and foster greater engagement among public authorities, businesses, civil society and citizens, thereby contributing to the transformative change envisioned by PNP3.

Luxembourg can also integrate natural capital accounting more systematically into economic and financial decision-making. The process can be progressive as the country has already developed a National Forestry Accounting Plan (NFAP) dedicated for forestry and Climate Change²⁴⁵. OECD recommends introducing national capital accounting to a broader natural resource such as agriculture and soil, water resources, land-use change, ecosystem services valuation and biodiversity²⁴⁶. This means also aligning statistical systems with recognised frameworks such as the UN System of Environmental-Economic Accounting²⁴⁷.

²⁴⁵ <https://environnement.public.lu/fr/natur/forets/plan-comptable-forestier.html>

²⁴⁶ <https://www.oecd.org/en/publications/environment-at-a-glance-country-notes>

²⁴⁷ <https://seea.un.org/content/about-seea>

For the private sector, Natural Capital Accounting provides essential information that can better support risk management and informed investment decisions. Business and investors increasingly need to understand how they depend on ecosystems and how their activities affect biodiversity. Linking such information to disclosure framework such as Sustainable Finance Disclosure Regulation (SFDR) can help strategic, economic and financial decision making.

As land acquisition has been identified as a key instrument for permanently safeguarding rare and threatened biotopes, Luxembourg should establish a dedicated biodiversity land conservation fund to secure long-term protection and restoration of priority ecosystems. The fund could support strategic land acquisition, conservation easements, long-term agreements with private landowners, and municipal land conservation strategies, while leveraging both public and private finance. Such a financing mechanism would provide a durable framework to secure ecologically important land, enhance habitat connectivity, and ensure the long-term implementation of the PNPN3 and the EU Nature restoration objectives.

Thus, to improve the financial mechanism, Luxembourg needs to: (i) identify and map existing financing instruments; (ii) assess the reforms needed, including political, economic, institutional or operational reforms; (iii) identify and promote innovative financial mechanisms; (iv) Improve transparency on biodiversity finance, through biodiversity tagging and disclosure tools. As Luxembourg is applying the Biodiversity Finance (BIOFIN) methodology to improve its biodiversity finance mechanism, the process will help to review political and institutional context, to evaluate biodiversity funding needs, to identify funding gaps and to support the design of a relevant biodiversity financing mechanism and plan.

Progress on Natural Capital Accounting (NCA) with need to extend to a broader natural resource

One practical way to support transformative change is to integrate natural capital more systematically into economic and financial decision-making. Natural capital accounting provides a framework for measuring and valuing ecosystems and the services they provide, thereby informing public policy, budgeting, and investment decisions. In line with the Regulation on Land Use, Land-Use Change and Forestry (LULUCF Regulation EU 2018/841), Luxembourg has prepared its National Forestry Accounting Plan²⁴⁸ and established forest reference levels for the 2021-2025 period. However, these efforts are primarily focused on forests and climate change. A logical next step would be to develop a comprehensive natural capital accounting framework that extends beyond forestry to include biodiversity, land, water, and their contributions to human well-being and economic activity. Such a framework would enable Luxembourg to measure, monitor, and report the extent, condition, and value of natural assets and flow of ecosystem services they provide. Integrating these accounts into national economic statistics would improve the visibility of nature's contribution to people and the economy, support evidence-based policymaking, help track finance.

For the private sector, natural capital accounting provides essential information that can support better risk management and informed investment decisions. Frameworks such as SRFD and

²⁴⁸ <https://environnement.public.lu/fr/natur/forets/plan-comptable-forestier.html>

Corporate Sustainability Reporting Directive (CSRD), which shapes how financial market participants classify, disclose, and manage sustainability-related investments, can help strategic, economic and financial decision making.

However, natural capital accounting requires reliable data, adequate tools, monitoring. Considering its main pressure and threats, Luxembourg can prioritise thematic such as biodiversity, agriculture, and water, as next step.

Develop a National Biodiversity Finance Plan

Luxembourg has various policies, strategic and legal frameworks for biodiversity conservation, however ensuring conversion of these instruments into a coordinated, funded and measurable implementation remains challenging. Consolidation may help the effectiveness at a national level and Luxembourg is developing a National Biodiversity Finance Plan to provide the financial backbone of PNP3, NRP and all others specific strategies and actions plan related to biodiversity conservation. The development of this plan is currently underway, therefore below we elaborate on some of the key considerations.

The finance plan is a financial programming instrument that answers several questions: how much biodiversity action will cost, how much is already budgeted, who will fund it, which ecosystem receive funding, which institutions are responsible, which harmful financial flows must be redirected, which positive financial flows need to be improved, and how the funding produced ecological impacts, which ecological results are expected?

Luxembourg should build this finance plan through conducting four main assessments/reviews²⁴⁹:

- (i) *Biodiversity Expenditure Review*: This means identifying all current public, private and blended expenditure that supports biodiversity actions across all sectors and international commitments. The review should not only count obvious conservation spending. It should also identify spending that indirectly supports biodiversity, spending that is neutral, and spending that may damage biodiversity. The OECD Environmental Performance Reviews has recommended that Luxembourg needs to review the costs and benefits of economic sectoral instruments affecting biodiversity, including biodiversity contracts and agricultural and forestry subsidies²⁵⁰.
- (ii) *Financial Needs Assessment for PNP3*: Every biodiversity target should be detailed into concrete actions, including priorities, SMART indicators, implementing responsible, available financial support and needs, monitoring arrangement. Obviously exact costing may be impossible, but sensible nominal funding allocations may facilitate this assessment.
- (iii) *Biodiversity finance gap*: The gap is the difference between what Luxembourg currently spends and what is required to deliver PNP3 and all biodiversity-related agendas and obligations by 2030. Without this gap analysis, biodiversity finance

²⁴⁹ <https://www.biofin.org/about-biofin/biofin-approach>

²⁵⁰ https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/11/examens-environnementaux-de-l-ocde-luxembourg-2020_7be63c58/fd9f43e6-en.pdf

remains political rhetoric; a credible finance plan must show, for each priority, the existing budget, financing source (core national budget, EU funding), responsible institution, implementation deadline, the budget additional needed.

- (iv) *The National Biodiversity Finance Plan for 2026–2030*: Which outlines the solutions plans and the means to ensure their implementation. The finance plan should be completed by an assessment of subsidies. This may be politically uncomfortable but necessary as Luxembourg cannot credibly finance biodiversity recovery with one hand while subsidising activities that may generate biodiversity pressure with the other.

Institutionally, the biodiversity Finance Plan should be jointly led by the Ministry of Finance and the Ministry of the Environment to ensure strong political ownership and strategic alignment. However, its development and implementation should involve all relevant ministries and stakeholders to promote whole-government and whole-of-society ownership.

The Finance Plan should be complemented by strengthened governance arrangements, including a fully operational Interministerial Biodiversity Committee to coordinate implementation across sectors, enhanced biodiversity mainstreaming in policies and sectoral strategies, an operational methodology for biodiversity tagging and tracking, strengthened biodiversity monitoring and reporting systems, and increased public awareness and stakeholder engagement. Together, these measures would improve policy coherence, accountability, and the effectiveness of biodiversity finance and implementation.

Luxembourg should also adopt a 2026-2030 Biodiversity Finance Implementation Roadmap to translate strategic commitments into a coordinated and accountable financing framework. The roadmap should transform biodiversity finance from fragmented environmental expenditure into costed, ring-fenced, and performance-based delivery system, with clearly defined priorities, financing sources, implementation responsibilities, timelines, and measurable outcomes. It should align public and private financial flows with objectives of the PNPN3.

In 2026, Luxembourg should lay the foundations. The ongoing Technical Support Instrument Reform and the use of BIOFIN methodology should lead to a PNPN3 action-cost matrix, a National Biodiversity Finance Plan and an assessment covering subsidies, tax measures and public expenditure that may biodiversity-positive or harmful.

In 2027, Luxembourg should move from diagnosis to financing instruments. It should launch the ring-fenced PNPN3 implementation, biodiversity tagging and the public biodiversity finance dashboard.

In 2028, Luxembourg should scale delivery tools and expand Result-Based Payments for ecosystem services, strengthen the Biodiversity Funding system, scale private and blended financing, reinforce polluter-pays instruments.

In 2029, Luxembourg should move into correction and enforcement. It should conduct an independent mid-term biodiversity finance assessment. Performing instruments need scaled-up, while underperforming instruments should be improved or redesigned before 2030.

By 2030, biodiversity finance should be fully integrated into Luxembourg's national budget cycle.

Improve biodiversity budget tagging across all ministries

Luxembourg is among the 15 EU Members States that have introduced green budget tagging. Green budget tagging involves identifying and classifying budget measures according to their positive or negative impacts on environmental and climate objectives, thereby improving the transparency and alignment of public expenditures with sustainability goals.

The green budgeting process at national level have been built on the monitoring of investments linked to the 2020 Sustainability Bond and on efforts to achieve the objectives of the Integrated National Energy and Climate Plan (PNEC).²⁵¹

While these initiatives represent an important step towards integrating environmental considerations into public finance, Luxembourg could further strengthen its budgeting framework by expanding green budgeting tagging into a comprehensive biodiversity expenditure tagging system. Such an approach would enable the systematic identification, monitoring, and evaluation of public expenditure that contributes to the objectives of the PNPN3, thereby improving transparency, resource allocation, and accountability for biodiversity outcomes. However, the current approach is primarily focused on tracking and tagging climate and energy-related expenditure. Although some expenditures that contribute to climate mitigation or adaptation may also generate biodiversity co-benefits, they are not specifically designed or assessed to deliver measurable ecological outcomes. Whilst some activities related to climate change adaptation or attenuation may be classified as green, they are not dedicated to give ecological outcomes. In addition, the current focus on climate and energy tagging cannot fully address biodiversity's distinct spatial and ecological characteristics. Green budgeting and expenditure tagging are important instruments for improving transparency of public finance, supporting the development of green and sustainable finance, and reducing the risk of greenwashing. They provide a systematic methodology for assessing and classifying public expenditures according to their environmental impacts, typically distinguish measures as "Green", "Neutral", or "Brown", depending on whether they contribute positively, have no significant effect, or adversely affect environmental objectives.

As an EU Member State, Luxembourg already applies the EU Taxonomy Regulation as a common framework for classifying environmentally sustainable economic and financial activities²⁵². The taxonomy assesses economic activities with regard to six environmental objectives²⁵³: (1) climate change mitigation; (2) climate change adaptation; (3) sustainable use and protection of aquatic and marine resources; (4) transition to a circular economy; (5) pollution prevention and control; and (6) protection and restoration of biodiversity and ecosystems. Under the EU Taxonomy, an activity is considered environmentally sustainable if it meets three cumulative criteria: (1) it makes a substantial contribution to at least one of the

²⁵¹ igf.gouvernement.lu

²⁵² https://joint-research-centre.ec.europa.eu/projects-and-activities/sustainable-finance/eu-taxonomy_en

²⁵³ https://joint-research-centre.ec.europa.eu/projects-and-activities/sustainable-finance/eu-taxonomy_en

six environmental objectives; (2) it does not cause significant harm to the remaining objectives and (3) it complies with minimum social safeguards based on internationally recognised standards, including the OECD Guidelines for Multinational Enterprises, the United Nations Guiding Principle on Business and Human Rights, and the fundamental conventions of the International Labour Organization). The taxonomy regulation is complemented by the SFDR²⁵⁴ and the CSRD²⁵⁵, which strengthen transparency and sustainability reporting requirements and enacted in 2024. Companies and financial market participants falling within the scope of these regulations are required to disclose the proportion of their turnover, capital expenditure (CapEx), and operating expenditure (OpEx) that is aligned with the EU Taxonomy.

When introducing the biodiversity tagging system, Luxembourg should first classify public expenditure based on the expected impact on biodiversity. Such classification improves transparency, enables monitoring of biodiversity-related spending and helps identify expenditures that support, are neutral toward, or undermine biodiversity objectives. Although there is currently no internationally harmonised standard for biodiversity tagging, several recognised frameworks provide a sound methodological basis. The OECD Green Budget Tagging Framework²⁵⁶ recommends classifying public expenditures according to its environmental impacts. Similarly, the United Nations Development Programme Global Biodiversity Expenditure Review (BIOFIN Methodology) and the Global Biodiversity Expenditure Taxonomy²⁵⁷ provide comprehensive approaches for identifying and classifying biodiversity-related expenditure according to biodiversity objectives, expenditure categories, and financing instruments.

In Luxembourg, the Ministry of Finance, through the Inspection Générale des Finances, should lead the development of the biodiversity expenditure tagging methodology in close collaboration with the Ministry of the Environment and other sectoral ministries. The methodology should establish clear eligibility criteria, evidence requirements, scoring and classification rules, and quality assurance and validation procedures to ensure consistency, transparency, and comparability of biodiversity-related expenditure across government. It should also be aligned, where appropriate, with the principles of the EU Taxonomy and the existing national green budgeting framework to facilitate integration into the annual budget process.

The use of green taxonomy and green budget tagging system is important and must occur before budget arbitration as a decision-making tool that allows the Ministry of Finance, the whole Government and Parliament to identify, redesign, condition or reject public spending. A budget line tagged as biodiversity-risky should require conditions before approval, and where possible harmful economic incentive should be scheduled for reform or removal. Tagging

²⁵⁴ https://finance.ec.europa.eu/sustainable-finance/disclosures/sustainability-related-disclosure-financial-services-sector_en

²⁵⁵ <https://eur-lex.europa.eu/eli/dir/2022/2464/oj>

²⁵⁶ https://www.oecd.org/en/publications/green-budget-tagging_fe7bfcc4-en/full-report/component-7.html

²⁵⁷ <https://www.undp.org/publications/global-biodiversity-expenditure-taxonomy>

should also be connected to the PNPN3 delivery matrix, and Luxembourg should begin with a pilot phase with the ministries most likely to affect biodiversity.

Improve biodiversity-positive incentives, reform harmful subsidies and apply the polluter-pays principle

All subsidies, economic and fiscal measures and public support schemes in agriculture, transport, housing, construction, land use, forestry, infrastructure and extractive activities should be evaluated to assess if they help biodiversity preservation, damage biodiversity, or do nothing measurable. Measures that damage biodiversity should be phased out, redesigned or made conditional; measures without biodiversity value should be partially redirected toward positive-impact activities or restoration, and biodiversity-positive must be improved or scaled-up. Through EU support, the Technical Support Instrument Project Reform which supports the Assessment of Environmentally Harmful Subsidies (EHS) and potentially harmful policies in Belgium, Finland, Luxembourg and Netherlands is ongoing and the full report is expected to be available in August 2026. This assessment must be valorised at national level to better target (improve, phase out, redirect and eliminate) sectorial subsidies toward the objectives of sustainable development.

Biodiversity-positive initiatives such as Nature Pact, Organic Agriculture, various eco-schemes, Biodiversity Contracts can be improved or scaled up to improve their ecological impacts ²⁵⁸. For harmful subsidies, the assessment aims to highlight the financial impact of ecological damage, to prevent avoidable harm, and to generate revenue for biodiversity preservation and for restoration when residual impacts occur. Revenues should be earmarked for PNPN3 and National Restoration Plan implementation, with environmental and social management and safeguards to ensure that polluter-pays does not become permission to destroy.

Concretely, Luxembourg could assess the feasibility of introducing the following economic instruments: (i) Higher land artificialisation charges for projects that convert open land, agricultural land, semi-natural habitats or ecological corridor areas into sealed or built surfaces. (ii) Biodiversity impact fees for major infrastructure, especially roads, logistics zones, large housing developments and other projects that create habitat loss, barrier effects or long-term disturbance. (iii) Pesticide and fertiliser risk levies should be calibrated according to ecological risk, toxicity, volume and proximity to sensitive habitats, water bodies or protected areas. (iv) Fragmentation charges for infrastructure that affects ecological corridors or reduces landscape connectivity. (v) Water pollution charges for activities that increase nutrient loads, sedimentation, chemical pollution or hydrological degradation (Annex A3.1.8). Together, these instruments would help internalise externalities, generate additional biodiversity finance, and strengthen the application of the polluter-pays principle. The amount collected from biodiversity charges could be centralized into a dedicated biodiversity fund to ensure that the revenue is used to finance PNPN3 implementation.

²⁵⁸ <https://www.meco.lu/>

Institutionally, the reform should be led jointly by the Ministry of Finance and the Ministry of the Environment but with the full engagement of the whole Government, including finance, agriculture, housing, transport, economy and municipalities must share responsibility.

Scale Result-Based Payments for Ecosystem Services (PES)

To better understand the interlinkage between economic activities and their impacts on nature, the Exploring Natural capital Opportunities, Risks and Exposure (ENCORE) tool has been developed. It stresses that water flow regulation, storm mitigation, local climate regulation, flood mitigation services and water supplies, are the ecosystem services with high dependency for the economy²⁵⁹. Luxembourg has also conducted an evaluation of ecosystem services, through the Mapping and Assessing Ecosystems and their Services in 2015. At international level, the IPBES Assessment Reports²⁶⁰ provides valuable scientific basis for designing PES schemes, including eligible ecosystem services, establish payment criteria, and develop robust ecological indicators.

Luxembourg has already developed biodiversity contracts, forests ecosystem subsidies, wetland and grassland payments, municipal nature incentives and an ecological compensation system. But the country needs to valorise broader ecosystem services and go beyond limited scale, strong dependence on public finance, land scarcity and fragmented instruments.

The country should also scale up result-based payments for ecosystem services so that farmers, forest owners, landowners and municipalities are paid for measurable biodiversity outcomes, not merely for joining schemes or completing administrative requirements. The emphasis should shift from funding actions to rewarding ecological performance.

OECD recommends that payment schemes for sustainable and biodiversity-friendly agriculture can evolve from practice-based to results-based or hybrid payments, with a hybrid approach often providing the best balance between farmer participation and effectiveness²⁶¹. Luxembourg can analyse the introduction of a three steps level of payment model: (i) The first level should be a basic practice payment. This would compensate farmers, forest owners, landowners and municipalities for adopting biodiversity-friendly practices. This level is necessary because many biodiversity actions impose real costs, labour requirements or opportunity costs; (ii) The second level should be a result bonus. Beneficiaries should receive additional payments when measurable ecological improvement is demonstrated; (iii) The third level should be a long-term maintenance contract of five to ten years. Biodiversity results are fragile. Long-term contracts should therefore reward continuity, ecological maintenance and adaptive management. Payments should be predictable enough to give land managers confidence, but conditional enough to ensure results remain real

²⁵⁹ <http://countriesencorenature.org>

²⁶⁰ <https://www.ipbes.net/resource-file/19342>

²⁶¹ OECD – Making Agri-Environmental Payments More Cost Effective (2022), available at https://www.oecd.org/en/publications/making-agri-environmental-payments-more-cost-effective_4cf10d76-en.html

Moreover, Luxembourg should develop a National PES Strategy²⁶². This strategy should promote results-based payments at the field level, with higher payments awarded where management practices deliver multiple ecosystem benefits, including biodiversity recovery improved water quality, climate adaptation, flood regulation, ecological connectivity and soil resilience. To ensure environmental integrity and credibility, all payments should be based on robust ecological indicators and supported by rigorous monitoring, independent verification, and transparent reporting.

For that, OEN (L'Observatoire de l'Environnement Naturel), and other biodiversity focused agencies should help define indicators and evaluate whether funded measures are improving habitat and species conditions. Data should become decision-grade: timely, spatial, comparable and used in budget and planning decisions. The contract should allow technical adjustment but if results fail because of non-compliance or poor management, payment should be reduced, suspended or redesigned. In addition, Result-based PES should not pay actors to comply with legal obligations they already have; it should pay for additional, measurable biodiversity gains beyond baseline duties.

Improve the Eco-compensation system

Luxembourg's ecological compensation framework is comparatively robust, as it relies on ecopoints, ecological balance sheets and compensation pools, with stated objective of preventing net biodiversity loss. However, unless the avoidance of impacts is subject to strict and effective enforcement, compensation may risk becoming a legal mechanism that facilitates habitat destruction rather than a measure of last resort. Developers' financial plans should therefore clearly distinguish between three categories of expenditure: budget for avoiding damage, budget for restoring degraded ecosystems, and budget for compensating unavoidable residual damage. If not, Luxembourg risks creating a system where biodiversity destruction becomes financially manageable instead of ecologically unacceptable.

It is essential to uphold the mitigation hierarchy of: “avoid–reduce–restore–compensate”. Before compensation measures are approved, developers should be required to demonstrate that all reasonable efforts have been made to avoid and minimise ecological impacts. For projects affecting ecologically sensitive areas, authorization dossiers should clearly document the alternatives which have been assessed, justify the selected location, and provide evidence that the remaining ecological damage is genuinely unavoidable. Without such rigour, ecological compensation risks functioning merely as a financial transaction rather than a conservation tool.

Furthermore, the regional imbalances require also improvement, particularly in southern Luxembourg. The 2025 review identifies the south as a limited compensation measures, necessitating reforms that establish regional minimum compensation ratios and default requirements for offsets within the same ecological sector, except where well-justified

²⁶² <https://www.biofin.org/finance-solutions>

exceptions are provided²⁶³. The eco-point metric may need to integrate factors such as habitat rarity, restoration complexity, climate resilience, soil function, carbon sequestration, hydrological integrity, and species dependence.

Additionally, baselines are important and monitoring obligations must be legally mandated over extended periods. The success of compensation sites should be evaluated based on ecological functionality. Moreover, greater transparency is necessary through the publication of a public dashboard displaying spatial data linked to compensation sites, the ecopoints lost and gained, project completion status, and evaluation of ecological objectives achieved. While the national register currently provides administrative data, advancing to a system of public accountability would strengthen oversight and trust. Reform efforts should aim for rigorous outcomes characterized by “no net loss” at the local level, demonstrable “net gains” on a national scale.

Enhanced funding for data collection and monitoring

Luxembourg should reserve a fixed percentage of funding within every biodiversity financing instrument for ecological data collection, monitoring, evaluation, and independent verification. Earmarking a dedicated amount of funding for monitoring and evaluation would ensure that biodiversity investments are systematically assessed against measurable ecological outcomes rather than financial inputs alone. It would also strengthen biodiversity governance by generating reliable evidence on the effectiveness and cost-efficiency of biodiversity interventions. Embedding this requirement across all funding streams would help establish a results-based biodiversity finance system in which financial resources are consistently linked to verified conservation and restoration outcomes.

Luxembourg should move from plan-based governance to delivery-based governance, with PNPN3 actions linked to budget, responsible institution, deadline and ecological indicators. A public PNPN3 dashboard showing budget allocation, expenditure, responsible institution, ecological output, delivery risk and reasons for delay would also facilitate the ability to monitor change.

The funding should support the development of a robust biodiversity knowledge and monitoring system can be used for activities such as: (i) Species monitoring, (ii) Habitat mapping and condition assessment, (iii) Remote sensing and spatial data systems, (iv) University research and scientific partnerships, (v) Annual biodiversity accounting, and (vi) Independent audits. Some activities such as restoration projects, compensation sites, result-based payment schemes and private biodiversity finance projects should be verified independently after implementation. Strengthening biodiversity monitoring, data collection, and scientific research would improve the evidence-base for policy decisions, facilitate adaptive management, and enable Luxembourg to measure progress towards the objectives of the PNPN3.

²⁶³ https://gouvernement.lu/fr/actualites/toutes_actualites/communiqués/2025/04-avril/25-wilmes-bilan-ecopoints.html

The funding for monitoring biodiversity or compliance should be built directly into each financing instrument. Every restoration project should automatically allocate part of its budget to baseline assessment, mid-term monitoring and post-project verification to evaluate ecological outcomes and long-term effectiveness. Likewise, every eco-compensation project should include mandatory ecological monitoring at regular intervals, for example, after 3, 5 and 10 years or longer where ecological processes require extended observation to ensure that compensation measures achieve their intended biodiversity outcomes, the ANF already conducts regular monitoring in this context, but these approaches could be further consolidated across the landscape. Similarly, all result-based payment schemes should include finance for independent ecological verification before performance payments or bonuses are disbursed and require transparent impact before any biodiversity claims are made. Integrating monitoring and verification into all financing instruments would strengthen accountability, reduce risk of ineffective spending or greenwashing, support adaptive management, and ensure that investment delivers measurable and durable biodiversity gains.

Institutionally, the biodiversity monitoring system should be coordinated by the Ministry of the Environment and implemented through a multi-institutional governance framework. At minimum, it should involve the ANF, the Administration de la Gestion de l'Eau (AGE), STATEC, the OEN, Municipalities and syndicates, scientific and research institutions and independent auditors. Each institution should have clearly defined roles and responsibilities for data collection, monitoring, analysis, reporting, and quality assurance. Such a collaborative governance structure would strengthen data quality, promote institutional coordination, enhance transparency and accountability, and ensure that biodiversity monitoring provides a robust evidence-base for evaluating the effectiveness of biodiversity finance and informing adaptive management under the PNPN3.

Annex

A1. Nature

A1.1. Ecosystems

A1.1.1. Status and trends for ecosystems

At the level of biotopes (habitat types), 15% were reduced or destroyed, and 12% degraded between 2016-2020, with hay meadows, followed by wetlands showing the greatest levels of loss and degradation^{264,265,266,267}. Overall, only 41% of biotopes remained unchanged, and 8% improved. At a regional scale, both the number of unfavourable and favourable habitats increased between 2007-2012 and 2013-2018, with almost 50% of habitats classified as unfavourable in the second period (whilst the number of “poor” decreased). Of the “unfavourable” habitats, the number of habitats which are “unfavourable and improving” decreased between the 2007-2012 and 2013-2018 assessments, whilst the number of “unfavourable decreasing” increased by more than double between the same periods. When looked at on a biotope scale, bogs mires and fens are universally unfavourable and declining, freshwater habitats are also almost universally unfavourable, as are heath and scrub. Forest habitats are generally doing better, whilst for grasslands 17% are favourable, and 83% are unfavourable and decreasing. Furthermore, the health of forests has declined, and whilst 79.1% of trees were healthy in 1984, this decreased to 13.4% by the end of 2019; with almost 20% of this decline in healthy trees occurring within 2019 and attributed to heatwaves increasing susceptibility to disease^{268,269,270,271}.

Separately, national forests are periodically inventoried, with the third National Forest inventory presented in 2025 with an aim of guiding national sustainable forest management²⁷². This inventory assesses ownership and diversity, as well as volumes of deadwood. These inventories also highlight a decrease in growth-rates, potentially reflecting changes in climate, and are also noted to have become carbon sources (in part due to bark beetle infestations)²⁷³.

Certain biotopes are better characterised in terms of their value for biodiversity; for example, a quarter of grasslands have been identified as relevant for conservation, and within this “sensitive grasslands” have been identified. In terms of actions to protect areas, Luxembourg's strategy aligns closely with the EU and Natura 2000, with 27.8% of the territory protected, and

²⁶⁴ <https://www.eea.europa.eu/en/analysis/maps-and-charts/conservation-status-and-trends-article-17-national-summary-dashboards-archived>

²⁶⁵ <https://biodiversity.europa.eu/countries/luxembourg>

²⁶⁶ <https://statistiques.public.lu/en/actualites/2025/stn44-25-biodiversite.html>

²⁶⁷ https://environnement.public.lu/fr/natur/biodiversite/observatoire_environnement_naturel/rapports.html

²⁶⁸ <https://www.eea.europa.eu/en/analysis/maps-and-charts/conservation-status-and-trends-article-17-national-summary-dashboards-archived>

²⁶⁹ <https://statistiques.public.lu/en/publications/series/en-chiffres/2025/biodiversite-en-chiffres-2025.html>

²⁷⁰ https://www.icp-forests.net/fileadmin/icp_forests/Dateien/TR/ICPForests_TR2025.pdf

²⁷¹ <https://environnement.public.lu/content/dam/environnement/documents/natur/forets/rsultats-inventaire-phytosanitaire-forts-2022-200922.pdf>

²⁷² <https://klima.lu/en/news-2/presentation-of-the-third-national-forest-inventory-of-luxembourgs-forests-and-the-climate-challenge/>

²⁷³ <https://www.luxtimes.lu/luxembourg/bark-beetles-pose-threat-to-luxembourgs-forests/4566799.html>

27.1% covered by Natura 2000 sites²⁷⁴. Likewise, special protected areas under the birds directive cover 16.1% of the territory, whilst the EU average is only 14.3%. Of this only 4.2% has the strictest form of protection (ZPINs), which falls below the 10% proposed at the EU level. Luxembourg hosts 67 Natura 2000 sites, which includes 72 kilohectare, with a further 77 areas defined as national nature reserves (6% of the territory). Protection covers most major habitat types, as well as a selection of biotypes (for example six types of grasslands), however whilst this has been largely effective for forests, five of the six types of protected grasslands have been found to show a degrading status²⁷⁵. Multiple forms of protection currently exist within Luxembourg, including ZPINs (strict protection), Klimabonusbësch, High Biological Value Open Environments, Forest Reserves, Natura 2000, Zones de protection spéciale, Zones spéciales de conservation, and areas designated under birds, and habitat directives²⁷⁶. All of these have independent targets, making monitoring progress towards targets challenging. In addition, Meadows need restoration by 2030 at about 500 ha per year, yet current efforts operate at less than 10% of that pace.²⁷⁷

Management of forestry sites also receive significant attention, with the National Forestry Accounting plan providing long-term management and oversight of the process²⁷⁸. This includes a regular rotation cycle (30 years for deciduous, and 10 for coniferous forests), and a high level of coverage of certification (53% of publicly owned forests are Forest Stewardship Council (FSC) certified). Forests are also assessed for stand dynamics, with almost half of these managed forests, and deadwood volume graded as excellent (grade A).

41.1.2. Policy and programs for ecosystems

To achieve these objectives in the face of development pressures, the sectoral deployment operates in conjunction with the Third National Nature Protection Plan (PNPN3, 2023)²⁷⁹, and establishes operational and quantifiable targets: it requires that at least one-third of protected areas (equivalent to 10% of the national territory) be subject to a strict protection regime, and that at least 30% of species and habitats in an unfavourable state improve their status by 2030. Complying with this plan and with the targets of the National Restoration Plan (NRP) mandated by the European Union²⁸⁰. The official draft NRP was approved by the Governing Council on March 20, 2026), and is open for public consultation until May 6, 2026, and requires the adoption of corporate and financial policies²⁸¹.

Much of the environmental strategy of Luxembourg is based on European environmental policy, and targets of international conventions. This includes protecting 30% of the territory (in line with the KM-GBF) and creating a strong Trans-European network. Furthermore, ZPINs aim to

²⁷⁴ <https://luxembourg.public.lu/en/society-and-culture/territoire-et-climat/natura-2000.html>

²⁷⁵ <https://natura2000.lu/>

²⁷⁶ <https://www.eea.europa.eu/en/europe-environment-2025/countries/luxembourg/terrestrial-protected-areas>

²⁷⁷ https://www.naturemweltasbl.lu/wp-content/uploads/2026/01/Factsheet_Luxembourg.pdf

²⁷⁸ <https://environnement.public.lu/content/dam/environnement/documents/natur/forets/NFAP-Luxembourg-2019-review.pdf>

²⁷⁹ <https://environnement.public.lu/dam-assets/documents/natur/biodiversite/pnppn/pnppn-version-3.pdf>

²⁸⁰ Règlement d'exécution (UE) 2025/912 De la commission du 19 mai 2025 portant modalités d'application du règlement (UE) 2024/1991 du Parlement européen et du Conseil en ce qui concerne un format standard de plan national de restauration (Texte présentant de l'intérêt pour l'EEE)

²⁸¹ <https://www.zesumme-vereinfachen.lu/en-GB/projects/nrp/2>

increase from the current 4.2% coverage to 7.5%, and strict protection of at least one third of protected areas. Most ambitions directly align with those of the KM-GBF, with some extra elements on connectivity (e.g., designation of 10 ecological corridors outside the reserve network) and particularly enhance the protection of sensitive grasslands, to reach 6000 ha within ZPINS by 2030. Likewise, 12 ZPINs are planned with the aim of restoring watercourses. Other targets also align with the KM-GBF, such as the improvement of green infrastructure and the restoration of various habitat types. Most of the aims strongly align with those of the European Union, and the KM-GBF more broadly, though mechanisms to implementation have less detail.

Some plans are less ambitious; for example, implementing 50% of operational objectives, and 66% of priority measures, especially when the breadth of priorities are considered. Likewise, implementing management plans for protected areas. Other plans are more on assessing effectiveness, for example “Establish monitoring and evaluation of the objectives and measures of ensuring actions” for several existing targets, as well as implementation of the “Nature Pact”. Furthermore, various ecosystem focused plans and laws (e.g., forest monitoring law) have been proposed, but the effectiveness of this, and other recent pledges remains unclear. Regular updates to law provide further detail on the mechanisms and penalties for the destruction of natural systems, such as the provisions of the Law of 18 July 2018 on the protection of nature and natural resources, as amended (e.g., destruction of biotopes); or the Law of 20 April 2009 on environmental liability with regard to the prevention and remedying of environmental damage. Yet mechanisms for detection and referral are not always specified, or how infractions may be detected (particularly for small or non-forest systems). Converse to this are subsidies in place for conservation, yet aside from EU CAP related subsidies, access to these subsidies may vary^{282,283}.

Restoration has formed part of the EU strategy even prior to the KM-GBF, which aims to restore 30% of the landscape by 2030. Current aims include planting 1.7 million trees by 2030²⁸⁴ and 3 billion overall according to the NRP, to enhance and restore connectivity, to establish an additional 350 km of riparian buffer-strips. The NRP has recently been submitted in alignment with the EU level regulation under Nature Restoration Law (NRL)²⁸⁵. Whilst there has been some stakeholder participation, this may have been insufficient, and there has been little progress so far²⁸⁶. The initial plans include major themes on pollinators, on freshwater systems, and to a lesser extent on forests and urban tree cover.

Of these restoration strategies the national strategy on free-flowing rivers (in alignment with European regulation on nature restoration, EU 1991/2024, PNPN3 "2.3 Ecological Network"

²⁸² <https://www.meco.lu/en/blog/documentcenter/biodiversiteitskris-zu-letzebuerg-konsequent-handelen-mei-naturflaechen-a-strukturell-reforme-neideg/>

²⁸³ <https://www.meco.lu/wp-content/uploads/2026/05/Objection-Mouvement-Ecologique-NRP.pdf>

²⁸⁴ <https://www.luxtimes.lu/luxembourg/trees-in-need-how-luxembourg-is-protecting-its-forests/85142558.html>

²⁸⁵ <https://www.zesumme-vereinfachen.lu/fr-FR/>

²⁸⁶ <https://www.meco.lu/en/blog/documentcenter/luxembourgs-national-restoration-plan-mouvement-ecologique-submits-a-statement/>

and "2.4 Restoration of Freshwater Ecosystems") is best developed^{287,288}. This initiative has been developed as a consequence of the over 1,000 dams of varying sizes across Luxembourg. The proposal includes designating 12 waterbodies as future nature conservation areas, six water bodies with very good ecological conditions and to connect ten. In addition, 204 barriers need to be removed or mitigated. The NRP will be structured to implement restoration measures covering at least 20% of land areas by 2030, requiring inventories of man-made obstacles to ensure the planned restoration of surface water connectivity; a task for which the PNPN3 has already officially identified 797 technical structures that represent obstacles to the connectivity of the water web and that must be addressed towards the end of the decade. Based on the most recent legislation in support of the NRP²⁸⁹ sites for restoration are meant to be inspected by ANF forest rangers, which includes identifying and reporting violations²⁹⁰, and monitoring the progress of restoration. Key sites have been identified for each biotope nationwide, and targeted management is associated with the implementation of the NRP.

For plantings and enhancement of connectivity the ANF, Biological stations, and Nature parks play key roles. New plantings will focus on strengthening ecological continuity and in buffer zones and prioritise native species and "species good for biodiversity" (and avoid monocultures); however, the safeguards and standards within this have not yet been clearly specified²⁹¹.

A1.2. Species

A1.2.1. Status and trends for species

When it comes to trends, according to the IUCN of the 1,059 conducted assessments, only 537 are considered stable, with 213 unknown, 223 decreasing and only 79 considered to be increasing²⁹². Furthermore, even when it comes to Red list assessments, of the 1,059 that have been conducted, 266 (25%) need updating (meaning they are at least ten years old and therefore considered out of date).

Considerable attention has been devoted to a subset of taxa, with most assessments on birds, and butterflies, as well as other pollinators²⁹³ (for example, the honeybee *Apis mellifera* provides 80% of pollination). Butterflies do have continuous data since 2010, whilst other pollinating taxa (bees, hoverflies: 526 species) have data since 2020. However, based on EU wide data, whilst Luxembourg has high butterfly diversity, the regional loss of butterfly populations shows a 25% decrease. Within Luxembourg, at least 15 species have been documented as extinct, whilst 28 species are threatened, and 5 near threatened. Analysis of ranges of these species indicates that whilst 54% are stable, 13% are decreasing and 14% are

²⁸⁷ <https://eur-lex.europa.eu/eli/reg/2024/1991/oj/eng>

²⁸⁸ <https://storymaps.arcgis.com/stories/8696ab8188fe452da39b1bb23f5b9bf5>

²⁸⁹ <https://legilux.public.lu/eli/etat/leg/loi/2022/03/03/a110/jo>

²⁹⁰ <https://guichet.public.lu/en/citoyens/justice/lanceurs-alerte/alerte-anf.html>

²⁹¹ <https://www.sn1.lu/doi/?pub=2115>

²⁹² <https://www.eea.europa.eu/en/analysis/maps-and-charts/conservation-status-and-trends-article-17-national-summary-dashboards-archived>

²⁹³ <https://pollinatoracademy.eu/get-involved/countries/luxembourg>

increasing. Patterns for different habitats also vary, and the “prairie butterfly index indicates that populations of most prairie species have been stable in recent years”, yet this is not the case for all landscapes, with many species showing continued declines. Major efforts are being put towards monitoring of butterflies, for example Luxembourg Butterfly Monitoring Scheme (LUBMS²⁹⁴) within the Luxembourg Pollinator Monitoring Scheme (LUPoMS) which engages citizen scientists²⁹⁵. These are complemented by the Wild Pollinator Monitoring Programme Luxembourg (MONIPOL), and part of the wider European Butterfly Monitoring Scheme (eBMS)²⁹⁶. These efforts highlight the effort being made towards monitoring butterflies, and other pollinators; though comparable data is rarely available for other groups.

Birds are also monitored, with specific programs for farmland birds, and open environments, and forest birds. These schemes form part of wider European monitoring schemes, such as the Pan-European^{297,298} Common Bird Monitoring Scheme, and further support from the European Bird Census Council and the European Breeding Bird Atlas 2²⁹⁹ (coordinated in Luxembourg by the Centre Ornithological of Luxembourg). At the wider European trends common farmland birds have declined by 34%³⁰⁰. Likewise, in Luxembourg the majority of species monitored³⁰¹ have shown major declines between 1995 and 2020 (with monitoring coordinated via the Common Bird Monitoring in Luxembourg (COBIMO-LUX) program). For species covered within the birds’ directive, analysis on 133 breeding bird species (2007-2018) only 20 species showed increases, whilst 34 are declining and 2 are now extinct. In the longer-term³⁰², 81% of species showed decreasing populations, with over half of these species reliant on open habitats (whilst forest dependent species fluctuated).

Plants also have some monitoring protocols and programs, with 1,423 species documented within Luxembourg; however, two thirds are extinct or in an unfavourable or poor state of conservation. Overall, 8.9% are locally extinct, and 35.2% are threatened³⁰³. The proportion threatened also varies by habitat type^{304,305}.

Invasive species pose a major cost, with damage and management costs within Europe estimated at almost 117 billion Euros between 1960-2020, and the annual cost estimated at 28

²⁹⁴ <https://www.inaturalist.org/projects/butterflies-from-luxembourg/journal/126143-on-the-road-again-butterfly-monitoring-in-luxembourg#:~:text=The%20Luxembourg%20Pollinator%20Monitoring%20Scheme,butterflies%2C%20wild%20bees%20and%20hoverflies.>

²⁹⁵ <https://researchportal.list.lu/projects/detail/lupoms>

²⁹⁶ <https://butterfly-monitoring.net/>

²⁹⁷ <https://pecbms.info/>

²⁹⁸ <https://pecbms.info/trends-and-indicators/indicators/>

²⁹⁹ <https://ebba2.info/live/farmland/>

³⁰⁰ <https://op.europa.eu/webpub/eca/special-reports/biodiversity-13-2020/en/>

³⁰¹ <https://www.eea.europa.eu/en/topics/at-a-glance/nature/state-of-nature-in-europe-a-health-check/explore-nature-reporting-data/national-summary-dashboards-birds-directive-art.12>

³⁰² <https://statistiques.public.lu/dam-assets/catalogue-publications/en-chiffres/2025/biodiv-en-chiffres-fin.pdf>

³⁰³ <https://statistiques.public.lu/dam-assets/catalogue-publications/en-chiffres/2025/biodiv-en-chiffres-fin.pdf>

³⁰⁴ https://sicona.lu/wp/wp-content/uploads/LUX-Plant-Strategy-2022-2030_14_11_2022.pdf

³⁰⁵ <https://environnement.public.lu/dam-assets/documents/natur/biodiversite/pnnp/pnnp3-documentdinformation.pdf>

billion. Luxembourg has 147 recorded alien species recorded, with 22 currently blacklisted³⁰⁶. Clear protocols and reporting structures are present for the monitoring and management of invasive alien species (IAS).

A1.2.2. Policy and programs for species

Whilst various directives and programs exist (Birds directive, Birds of open environments³⁰⁷) many come with a very specific set of aims, often aligned with initiatives at the EU level. Relatively few targets explicitly focus on species, however these include determining priorities of action plans for species (and habitats), and determining declines in insects in general, (and pollinators in particular), including implementation of the European Pollinator Initiative³⁰⁸ (National Action Plan for the Preservation of Pollinating Insects (PAPOLL) 2021-2026: a document comprising 21 actions in 3 specific areas, including Species Action Plans (PAEs) for various butterflies)³⁰⁹.

For invasive species, periodic updates on the number of recorded invasive species are provided officially, with the most recent update entering into force on the 2 August 2022³¹⁰. The current regulation lists 88 species where regulations exist to prevent the potential for release into the environment. Further targets aim to align with Target 6 of the KM-GBF to reduce the introduction of invasive species by 50% by 2030. The Luxembourg strategy for IAS was launched in 2024³¹¹ and includes four main axes, each of which has one to three objectives have been assigned, each accompanied by two to four implementation measures. These include Axis I: Prevention of Immigration and Early Detection, Axis II: Management of IAS and Ecosystems, Axis III: Improving Knowledge and Awareness and Axis IV: Governance and Coordination. In the first axis is the identification and prioritisation stage, which includes the use of various lists to prevent potential IAS entering and identify those which have entered, and using labels to certify various commodities (i.e., soil) as IAS free. In Axis 2 the use of other tools (i.e., recorder Lux) to manage IAS and restore ecosystems. Axis 3 focuses more on education and ability to manage, as well as to develop better tools for detection and management. Lastly, Axis 4 provides the legal instrumentation and coordination with neighbouring countries as well as wider collaboration. The action plan has a strong and clear timeline, dedicated funding, and agreed upon agencies involved, providing a clear framework for effective action.

In addition, the Action plan on Invasive Alien Species on endangered species and habitats of Community interest (RedIAS) is periodically released, with Version 5.2 released in January 2025³¹². The RedIAS assesses what species may be further threatened by invasive species, as well as where these species may be coming into the country from. This action plan highlights the need for both surveillance and the development of a steering committee to help talk things forwards. Measures for early detection, as well as effective management for IAS of Union

³⁰⁶ <https://statistiques.public.lu/dam-assets/catalogue-publications/en-chiffres/2025/biodiv-en-chiffres-fin.pdf>

³⁰⁷ https://environment.ec.europa.eu/topics/nature-and-biodiversity/birds-directive_en

³⁰⁸ <https://www.bc-europe.eu/webpage.php?name=eu-pollinator-initiative>

³⁰⁹ <https://researchportal.list.lu/projects/detail/monipol>

³¹⁰ <https://www.face.eu/2022/08/third-update-of-the-list-of-invasive-alien-species-of-union-concerns/>

³¹¹ <https://neobiota.lu/wp/wp-content/uploads/nationale-strategie-zu-invasiven-gebietsfremden-arten.pdf>

³¹² https://neobiota.lu/wp/wp-content/uploads/RedIAS_Action_plan_Version_5.2.pdf

concern are also noted. Within the strategy key actions are noted, with different agencies noted for each component. Furthermore, the strategy includes a data management component, which may enhance the program's ability to effectively track and manage IAS over time, with a timeline for various components (aligning with the SMART protocol also implemented within CBD targets). Within this approach invasive species are also assigned to alert lists, watchlists, and blacklists based on their degree of spread, and species action plans developed based on both the degree of spread, and the severity of spread.

In addition, both a citizen science portal to inform and engage the public, and a modelling initiative (using FAIRiCUBE)³¹³ have been established to map out the potential range of IAS, which can provide a further mechanism to identify where species may be and target management actions. This means that data for invasive species will be not only some of the most accurate and rapidly reported but will provide a proactive means to target further actions. Thus, the monitoring of invasive species is much better than any comparable initiatives for native species (even those of concern and with species specific plans). The action plan has a clear timetable, objectives and dedicated agencies responsible for different components, but it also has a centralised data portal, a citizen science initiative, and clear approaches and protocols for management of different parts of the process. Therefore, whilst invasive species are regarded as a major concern for Luxembourg, they have much higher quality of data, and much stronger protocols in place than is seen for other taxa or ecosystems.

Most programs within Luxembourg complement efforts at the European level, with many efforts focused on a subset of taxa and regions. For example, Natura 2000 and species listed at the European level have the greatest amounts of data to monitor trends, and the EU birds' directive and key important bird areas³¹⁴ have been designated, with certain sites known to host particularly large proportions of the territory's species (for example 250 bird species within the Moselle Valley); but equivalent data is not available for other taxa.

A2. Change Drivers

A2.1. Agriculture

A2.1.1. Status and Trends in Agriculture

Partnerships have proven essential for sustainable governance at the landscape scale. The syndicate of communes, in collaboration with Sicona in one region, has supported the application of innovative rangeland management innovations that improve diversity, nutrient density, and productivity of grasslands as well as water conservation and management. The application of these approaches also provides important co-benefits in terms of restoration of local avian and amphibian habitats. This approach, initially piloted and demonstrated in 10 ha of farmland, has catalysed current adoption to around 250 ha of farmland within these initiatives. In at least some instances the CAP can facilitate sustainable smallholder agriculture,

³¹³ <https://cordis.europa.eu/project/id/101059238>

³¹⁴ <https://fatbirder.com/world-birding/europe/grand-duchy-of-luxembourg/>

covering up to 75% of the cost of appropriate farm infrastructure. The products are directly consumed by a combination committed suburban farmers (under pre-production agreements), a school catering, and walk-in buyers through the Natur geneissen program.

Land preparation and management practices that lead to soil erosion include intensive tillage, monoculture cropping with limited or no crop rotation, bare soil periods exposed to heavy rainfall, cultivation in slopes, and large-scale field restructuring indicating removal of hedgerows and natural barriers for soil erosion. This could cover about 20% of the land areas naturally prone to erosion due to slope and natural soil features. Studies warn of declines in soil organic matter, soil biodiversity, and increased acidification under intensified practices. Conversely, soil organic carbon stocks in the country appear to be stable at the national scale since 2012, but local changes have been recorded³¹⁵. For example, low-intensity grazing has been implemented at farmers' fields in combination with the growing of valuable breeds that command a higher price. Several restaurants are also promoting these breeds in their menus with positive customer response. Farmers with an average size of 30 to 60 ha have adopted the new approach covering a total of >1,500 ha³¹⁶. IBLA has documented seven demonstration farms which provide case-studies for sustainable practices and innovation.

Conversely, whilst low input approaches are becoming more popular, the average groundwater nitrate levels range 40-60 mg/L, with several sites exceeding the Nitrates Directive threshold (50 mg/L), 31% of soils in 86% of agricultural land area contain nitrogen concentrations above 50 kg/ha³¹⁷ and 87% experienced soil erosion. Nutrient excess (including nitrates) is largely attributed to over dependence on inorganic fertilization. Among the key drivers are high livestock density, high manure surplus relative to available lands, and the practice of specialized dairy farms³¹⁸. Groundwater bodies recently failed drinking water protection tests because of pesticides. The pesticide footprint of agriculture is linked to high reliance on chemical pesticides and herbicides rather than integrated pest management increases total pesticide load and selection pressure for resistant pests. In addition, application at incorrect rates or frequencies, exceeding label maximum residue limits, and poor timing relative to increasing variation on weather-condition exacerbate pesticide footprints^{319,320}. Inadequate buffer zones and field margins allow pesticides to reach streams, ditches, and groundwater through surface runoff and subsurface flow. Improper mixing, loading, and equipment cleaning practices concentrate residues in farmyard areas and can also contaminate local soils and drains. Furthermore, the use of banned or high-risk active substances via imports or off-label use is

³¹⁵ Chartin et al., Organic Carbon in Soils of the Grand Duchy of Luxembourg: Past, Present and Future, April 2022.

³¹⁶ Sundseth, Kerstin & Mezard, Nadine, Management on Farmland: "Conservation Through Agricultural Use, Promoting Low-Cost Farming" Luxembourg Ecosystems LTD Brussels, 2007.

³¹⁷ Ministry of the Environment, Strategy and Action Plan Climate in Luxembourg 2018-2023, Projet de stratégie d'adaptation aux effets de changement climatique, 2018.

³¹⁸ Dëmweltverwaltung, Towards A Holistic Soil Protection in Luxembourg: A Report for the Administration De Environment of the Grand Duchy of Luxembourg, 2021.

<https://environnement.public.lu/content/dam/environnement/documents/natur/sol/rapports/202111-SoilProtection-Report-EN.pdf>

³¹⁹ MAFV, Control Campaign on the Presence of Pesticide Residues in Food, 2023.

³²⁰ Mouvement écologique et al, Road Map for the Pesticide Phase-out, 2024.

sometimes detected in monitoring and import controls^{321,322}, highlighting potential gaps in current regulatory systems.

A2.1.2. Policy and Programs in Agriculture

The PNPN3 cites a suite of target measures for the agriculture sector. PNPN3 articulates cross-cutting governance targets covering all sectors, including agriculture. Relevant targets for Agriculture deal include a) establish (interdisciplinary) management committees or COPILS; b) launch integrated agriculture-forest advisories; c) maintain a network of demonstration sites for biodiversity and water; c) launch communication strategies; and d) implementing human resource capacity building.

The PNPN3 is operationalized through at least two general types of programs: the cross-sectoral plans/programs require very strong inter-agency collaboration, and the sectoral (agriculture) programs that require action by a focal sectoral agency, such as the Ministry of Agriculture. Cross-sectoral programs include the National Action Plans for selected themes. Notable examples are the National Action Programs for Restoration (component agricultural systems), which require strong Ministry of the Environment collaboration, as do many national action plans.

Programs are reinforced by subsidies with environmentally oriented conditionalities under the Common Agriculture Policy. The CAP covers 90% of Luxembourg's agricultural areas, and it embeds better articulation of biodiversity-friendly practices alongside competitiveness, food safety, efficiency, and climate change adaptation programs. Policy reforms aim to prevent further deterioration by updating environmental standards and mandating farm-level practices. The National Climate Change Adaptation Strategy includes several measures implemented by Ministry of Agriculture that intersect with biodiversity-friendly agriculture aspirations of PNPN3. The Luxembourg government and non-government sector also contribute to the EU-wide dialogue for a new vision for agriculture^{323,324}. The NGO community, though its affiliation with regional NGOs has articulated the removal of harmful subsidies.

A.2.2. Urban Areas and Spatial Planning

A2.2.1. State and Trends in Spatial Planning and Urban Areas

Between 2007 and 2018, the rate of land conversion in Luxembourg averaged 0.46 ha per day, representing an annual conversion of approximately 180ha. Regarding the composition of these areas, built-up areas comprise 11.8% of the national territory, of which spaces strictly

³²¹ European Environmental Agency 2025. Pesticide incidence in Rivers Lakes and Groundwater of Europe <https://www.eea.europa.eu/en/analysis/indicators/pesticides-in-rivers-lakes-and>

³²² Vandevoorde, Noé, Three Tools for the Reduction of Pesticide Impacts: A Case Study in the Province of Luxembourg, 2025.

³²³ EC, Future-proofing EU Agri-Food Through Research and Innovation Biodiversity-friendly agriculture, 2026.

³²⁴ Luxtoday, How Luxembourg is reshaping agricultural policy — Luxtoday.lu, 5 August, 2025.

designated for industrial and commercial purposes account for 1.2% of the total³²⁵. The most recent technical updates to spatial databases show that the built-up area increased from 4,577 ha in 2018 to 4,917 ha in 2024, a period in which 336 ha of permanent herbaceous vegetation were converted into new built-up areas. Similarly, strictly paved and built-up areas grew from 17,699 ha to 18,704 ha during the same period³²⁶. This expansion, coupled with the density of the transportation network, has resulted in 90% of the country being classified as highly fragmented, with an average continuous habitat patch size of less than 0.02 square kilometres³²⁷.

Currently, the country meets approximately 50% of its national drinking water demand through groundwater extraction, while the other 50% is covered by the Sebes reservoir. Although the implementation of water efficiency measures has managed to contain the increase in consumption, economic and physical vulnerability models to climate risks indicate that, given projections of population growth, industrial expansion, and climate variability, current reserves will be sufficient until 2035-2040; after this period, a structural deficit is expected, since water shortages occur during the summer months³²⁸. Considering these conditions, statistical estimates project a technical demand of between 243,000 and 324,000 new housing units by 2060³²⁹. In addition, the proportion of cross-border workers in the construction sector grew from 50% to 57% in the last decade, which shifts some of the development pressure towards border areas and demands new mobility corridors that intensify the fragmentation of the shared landscape in the Greater Region³³⁰.

A2.2.2. Policies, Programs, and Metrics in Urban Settings

The land-use planning program articulates the strategic objective of limiting land consumption to 0.25 ha per day by 2035 through a densification model that segments building coefficients according to the centrality and vocation of each municipality. For this model, specific target densities have been defined: 60 dwellings per hectare in the Agglo-Centre (Central Agglomeration)³³¹ and the Southern Region, 40 in Nordstad, 30 in regional centres, and 15 in rural municipalities. The national inventory of 611 ha of obsolete industrial sites is integrated into a revitalization strategy that seeks to minimize the occupation of natural areas. Complementing these sites, the Raum+ territorial capacity model identifies a theoretical internal potential of 5,700 ha within current municipal boundaries, modelled to accommodate up to 161,500 housing units. Given that more than 1,000 ha of these reserves are subject to legal mobilization deadlines, the analysis derived from this model suggests that housing supply

³²⁵ <https://amenagement-territoire.public.lu/dam-assets/fr/actualites/2022/dater-brochure-cartes-chiffres-21102022.pdf>

³²⁶ <https://download.data.public.lu/resources/lis-l-land-cover-2018-2021-2024/20260219-132124/landcover-2018-2021-2024-documentation.pdf>

³²⁷ <https://www.eea.europa.eu/en/analysis/indicators/landscape-fragmentation-pressure-in-europe/>

³²⁸ <https://meco.gouvernement.lu/dam-assets/assets-luxembourg-strategie/risk2050-final-report-012024.pdf>

³²⁹ <https://statistiques.public.lu/fr/publications/series/economie-statistiques/2019/106-2019.html>

³³⁰ https://www.aguram.org/wp-content/uploads/2025/12/AGURAM_AGAPE_Diagnostic_SDH_Version_finale_26juillet2024.pdf

³³¹ <https://luxembourgtransition.lu/en/project/the-green-belt-project-towards-a-life-sustaining-infrastructure-for-the-agglo-centre/>

restrictions are primarily due to land mobilization dynamics and not to a physical shortage of space³³².

On the energy front, the roadmap to 2030 envisions a 55% reduction in emissions and a 37% share of renewable energy. This requires increasing photovoltaic capacity to 1,112 megawatt peak³³³. Achieving this solar target solely through agrivoltaic installations would theoretically require occupying approximately 17 km², equivalent to 1.3% of the country's total agricultural land³³⁴. In the wind energy sector, where the goal is to scale generation to 1,043 gigawatt-hour by 2030, expansion potential is restricted by the Natura 2000 network and residential safety distances, forcing the State to prioritize the repowering of existing turbines and the designation of acceleration zones along highway margins³³⁵.

Regarding urban environmental metrics, the PNPN3³³⁶ sets the objective of not registering a net loss of green spaces or urban forest cover by 2030, based on 2021 levels. The institutional goal is to increase the total area of green spaces in cities, towns, and suburbs by 3% by 2040 and by 5% by 2050. For urban forest cover, the aim is to reach 5.6% by 2030, with the objective of increasing this proportion to 10% by 2050. At the municipal operational scale, the City of Luxembourg maintains an active inventory of 22,000 public trees and has set the official goal of reaching 30,000 specimens by 2030³³⁷.

The management of compensation for environmental impacts is channelled through the Ecopoints system. This mechanism establishes a technical rating scale of 0-64 points, adjusted according to the type of habitat impacted, to determine the magnitude of the restoration measures required of developers³³⁸. In the corporate sphere, biodiversity integration is supported by the Business Pact for Nature, which uses the ACT-D methodology to help companies identify dependencies and impacts. To meet the goal of having companies that employ at least 10% of the national workforce formalize their commitments by 2026, the State is promoting this Pact, which by mid-2025 already had 11 signatory companies³³⁹.

³³² <https://amenagement-territoire.public.lu/dam-assets/fr/strategies-territoriales/pdat-2023/pdat-programme-directeur-dam-nage-ment-du-territoire-4072023.pdf>

³³³ https://environnement.public.lu/dam-assets/documents/klima_an_energie/pnec/pnec-24-vf.pdf

³³⁴ https://www.chd.lu/sites/default/files/2025-03/20250324_pairing-scheme_agri-env.pdf

³³⁵ <https://environnement.public.lu/dam-assets/documents/natur/biodiversite/pnnp/pnnp-version-3.pdf>

³³⁶ <https://www.vdl.lu/fr/visiter/loisirs-et-nature/arbres/30-000-arbres-jusquen-2030>

³³⁷

<https://environnement.public.lu/content/dam/environnement/documents/natur/biodiversite/compensation/guide-calcul-ecopoints-04-2024.pdf>

³³⁸ https://imslux.lu/eng/nos-activites/pole-de-specialites/28_biodiversity

A3. Enabling Conditions

A3.1.1. Luxembourg Biodiversity Finance Architecture (Multi-Instrument System)

Finance Channel	Instrument / Fund	Main Function	Key Features	Strengths	Limitations / Challenges
State budget (core channel)	National budget via Ministry of the Environment Luxembourg	Primary financing of biodiversity and nature policy	Central allocation for conservation, restoration, protected areas	Stable, sovereign control, predictable funding	Competes with other policy priorities; ring-fenced for biodiversity
Dedicated environmental funds	Fonds pour la protection de l'environnement	Environmental protection projects	Supports conservation, biodiversity actions, environmental measures. Also includes sum of ecopoint payments which can be used to fund compensation and recreate destroyed biotopes.	Targeted funding stream	Fragmentation across multiple funds
	Fonds pour la gestion de l'eau	Water ecosystem protection	Financing for water quality, hydrology, aquatic ecosystems	Strong link to ecosystem services	Narrow focus (water only)
	Fonds pour l'énergie et le climat	Climate mitigation/adaptation	Supports climate transition, indirectly benefits biodiversity	Climate–biodiversity co-benefits	Biodiversity not primary objective
	Fonds pour les routes	Transport infrastructure financing	Infrastructure development, may include mitigation measures	High capital capacity	Biodiversity impacts often indirect/limited
Subsidy schemes	Direct subsidies (Agri-Environmental, Conservation payments)	Incentivise land management compatible with biodiversity	Payments to farmers, landowners, conservation actors	Flexible, targeted incentives	Risk of fragmentation; short-term incentives
Municipal-level financing	Nature Pact	Local biodiversity restoration	Municipality-based commitments to nature restoration	Strong local engagement	Uneven capacity across municipalities
International finance	EU & global climate/biodiversity funds	Co-financing biodiversity and climate projects	Grants and co-financing mechanisms	Leverages external resources	Limited share of biodiversity financing
Environmental fiscal revenues	Environmental taxes (resource-based, water, carbon taxes)	Generate revenue and incentivize behavioural change	Pollution pricing, carbon taxation	Aligns incentives with environmental goals	Revenues not always earmarked for biodiversity
Non-tax revenues	Timber sales, ecotourism, fishing licences	Revenue from sustainable natural resource use	Direct income from ecosystem services	Links ecosystems to economic value	Limited scale; dependent on resource availability
Private & philanthropic finance	Emerging green finance, CSR (Corporate Social Responsibility), foundations	Complementary biodiversity investment	Corporate biodiversity actions, donations	Innovation potential	Still small-scale; underdeveloped

A3.1.2. EU Funding Instruments Supporting Biodiversity Finance in Luxembourg

EU Instrument / Programme	Policy Area	Main Biodiversity Relevance	How It Supports Luxembourg	Strengths	Limitations
European Green Deal	Overarching EU strategy	Main umbrella for biodiversity mainstreaming, climate-nature integration	Guides national policy alignment and funding priorities	Strong policy coherence; system-wide integration	Not a direct funding instrument
LIFE Programme	Environment & climate action	Direct funding for nature conservation, biodiversity restoration, species protection	Supports Natura 2000 sites, habitat restoration, pilot biodiversity projects	Highly targeted biodiversity funding; demonstrator effect	Competitive access; project-based (not structural funding)
Natura 2000	Nature conservation network	Protects habitats and species of EU importance	Funds management of protected areas in Luxembourg	Strong legal protection framework	Management funding can be uneven across sites
Horizon Europe	Research & innovation	Biodiversity science, ecosystem modelling, restoration innovation	Supports Luxembourg research institutions and cross-border projects	High innovation capacity; knowledge generation	Limited direct implementation funding
Recovery and Resilience Facility	Economic recovery & green transition	Green investment including biodiversity co-benefits (energy, land use, resilience)	Supports green infrastructure and resilience projects	Large-scale funding capacity	Biodiversity is indirect, not core objective
Common Agricultural Policy	Agriculture & rural land management	Core biodiversity driver via land use, farming practices	Agri-environment-climate measures, eco-schemes, landscape management	Major land-use lever for biodiversity	Environmental ambition varies by implementation
European Agricultural Fund for Rural Development	Rural development	Financing of agri-environment-climate actions and rural biodiversity projects	Supports sustainable farming and rural ecosystem management	Strong biodiversity linkage through Pillar II	Administrative complexity; co-financing requirements
European Regional Development Fund	Regional development	Green infrastructure, ecosystem restoration, urban greening	Supports spatial planning, nature-based solutions	Integrates biodiversity into regional development	Biodiversity is secondary to economic cohesion goals
European Social Fund Plus	Social policy	Indirect biodiversity benefits via green jobs and training	Supports environmental skills and employment transitions	Links biodiversity with social transition	Weak direct ecological impact
EU Nature Restoration Law	Restoration policy	Binding ecosystem restoration targets across EU	Will increase national restoration obligations and funding alignment	Strong legal driver for scaling restoration	Implementation costs and governance complexity

A3.1.3. ODA Allocation Overview

Luxembourg provided USD 694.2 million (preliminary data) of ODA in 2025 (USD 649.8 million in constant terms), representing 0.99% of GNI. This was an increase of 8.9% in real

terms in volume and a decrease in the share of GNI from 2024. Consistently providing around 1% of GNI as ODA, Luxembourg has exceeded the 0.7% UN target since 2000. Luxembourg is in line with its domestic (1%) and EU commitments to collectively achieve a 0.7% ODA/GNI ratio by 2030. Within Luxembourg's ODA portfolio in 2024, 100% was provided in the form of grants.³³⁹ In addition to these standard ODA funds, Luxembourg contributes significantly to focused climate and biodiversity funds as well as being the largest per capita funder of the GEF.

Year	ODA (% of GNI)	ODA (Current Prices)
2020	1.02%	USD 473 million
2021	0.99%	USD 504 million
2022	1.00%	USD 530 million
2023	0.99%	USD 625 million
2024	1.00%	USD 637 million (≈ €551.7 million)
2025*	0.99%	USD 694.2 million (preliminary)

A3.1.4. Luxembourg Contribution to GEF

Source :³⁴⁰

GEF Replenishment	Period	Luxembourg Contribution
GEF-5	2010–2014	SDR 4.0 million (minimum contribution)
GEF-6	2014–2018	SDR 4.0 million
GEF-7	2018–2022	SDR 4.76 million (equivalent to €4.76 million), comprising a basic share of SDR 4.0 million plus a supplemental contribution of SDR 0.76 million .
GEF-8	2022–2026	Luxembourg remained a participating donor. The GEF-8 negotiations retained the minimum participation contribution of SDR 4.0 million , although the finalized country contribution table is published in the GEF-8 replenishment documentation.

A3.1.5. Sustainable Finance Ecosystem

INITIATIVE-PLATFORM-INSTITUTION	Purpose	Main Activities	Relevance to Biodiversity & Climate Finance
Luxembourg Sustainable Finance Initiative (LSFI)	National public-private platform established in 2020 to position Luxembourg as a leading sustainable finance centre.	Develops the Luxembourg Sustainable Finance Strategy 2030, provides market guidance, training, data, and mobilizes financial actors toward sustainable investment.	Integrates biodiversity, nature-related financial risks, transition finance, and sustainable investment into Luxembourg's financial sector strategy.
LuxFlag Impact Label	Independent label certifying investment products that intentionally generate measurable positive impact.	Awards labels to funds investing in microfinance, social impact, climate, and nature themes based on transparent eligibility criteria.	Improves transparency and investor confidence for impact investments, including biodiversity- and climate-focused funds.
Global Green Finance Index (GGFI)	Global benchmark ranking financial centres according to the	Assesses green financial instruments, policies,	Measures Luxembourg's international competitiveness

³³⁹ https://www.oecd.org/en/publications/development-co-operation-profiles_04b376d7-en/luxembourg

³⁴⁰ <https://www.thegef.org/sites/default/files/council-meeting-document>

INITIATIVE-PLATFORM- INSTITUTION	Purpose	Main Activities	Relevance to Biodiversity & Climate Finance
	quality and depth of green finance ecosystems.	sustainable finance expertise, and market perceptions across international financial centres.	and progress as a green finance hub.
Luxembourg–EIB Climate Finance Platform (LCFP)	Partnership between Luxembourg and the European Investment Bank to mobilize private investment for climate action.	Provides concessional finance and risk-sharing to support high-impact climate projects in developing countries.	Catalyses private investment in climate mitigation and adaptation projects, supporting international climate finance objectives.
<u>Natural Capital Finance Alliance (NCFA)</u>	Global finance-sector partnership helping financial institutions integrate nature-related risks and opportunities into decision-making.	Develops methodologies, tools, and guidance for assessing natural capital dependencies, impacts, and risks.	Supports biodiversity finance by enabling banks, insurers, and investors to account for ecosystem risks and opportunities in portfolios.
Luxembourg House of Financial Technology (LHoFT)	Luxembourg's national fintech hub promoting innovation in financial services.	Supports fintech startups, regulatory innovation, digital finance, ESG data solutions, and sustainable finance technologies.	Facilitates digital innovation that strengthens sustainable finance, ESG reporting, biodiversity data, and climate-risk analytics.
<u>Fondation de Luxembourg – Climate Foundation (Fondation pour le Climat)</u>	Philanthropic platform connecting donors with high-impact climate and biodiversity projects in Luxembourg and the Greater Region.	Funds projects on biodiversity conservation, climate change mitigation, scientific research, environmental education, reforestation, sustainable agriculture, renewable energy, and awareness raising. Projects are reviewed by an independent scientific advisory board.	Mobilizes private philanthropic capital for biodiversity conservation and climate action, complementing public finance and sustainable investment initiatives.

A3.1.6. 10-Point Action Plan for Sustainable Finance

Objective	Policy Goal	Main Focus Area	Key Actions / Interpretation	Strengths	Implementation Challenges
(i) Amplify Luxembourg's leadership in sustainable finance	Global positioning	Financial centre strategy	Strengthen Luxembourg as a global hub for ESG funds, green bonds, and sustainable capital markets	Strong existing fund industry and international credibility	Competition from other financial centres
(ii) Centre of excellence in gender finance	Gender-lens investing	Inclusive finance	Develop gender finance frameworks, policies, and financial products	Strong policy signalling and institutional backing	Private sector uptake still uneven
(iii) Go beyond green	Broader sustainability scope	Social + environmental + governance integration	Expand from green finance to SDG-aligned, social, and transition finance	Aligns with holistic sustainability agenda	Risk of conceptual dilution ("everything becomes sustainable")
(iv) Mobilise private capital for sustainability	Capital mobilisation	Blended finance, institutional investment	Attract institutional investors into sustainable and impact finance	Luxembourg's large fund domicile advantage	Risk-return alignment for real-economy projects

Objective	Policy Goal	Main Focus Area	Key Actions / Interpretation	Strengths	Implementation Challenges
(v) Develop innovative solutions for global impact	Financial innovation	Sustainable financial products	Support new instruments (impact funds, transition finance tools)	Strong fintech and fund ecosystem	Scaling innovation beyond pilots
(vi) Strengthen global connectivity in sustainable finance	International cooperation	Cross-border finance networks	Link Luxembourg finance with EU and global markets	EU gateway position	Regulatory harmonisation complexity
(vii) Support initiatives	Ecosystem support	Programmatic funding & platforms	Back accelerators, initiatives, and sustainability programmes	Flexible ecosystem development	Fragmentation of initiatives
(viii) Develop talents of tomorrow	Human capital	Skills and education	Training, ESG education, finance sustainability skills	Strong financial education ecosystem	Talent competition globally
(ix) Leverage finance transition to net-zero	Climate alignment	Transition finance	Align portfolios and capital flows with net-zero pathways	Strong EU regulatory push (SFDR, taxonomy)	Measurement of transition credibility
(x) Drive digitalisation of sustainable finance	Digital finance transformation	ESG data, fintech, AI	Improve ESG data systems, reporting automation, digital platforms	Strong fintech infrastructure	Data standardisation and interoperability issues
(xi) Strengthen the Luxembourg Sustainable Finance Initiative	Governance & coordination	Policy coordination platform	Reinforce coordination of national sustainable finance strategy	Ensures strategic coherence	Multi-stakeholder coordination complexity

A3.1.7. Significant Progress on Sustainable Finance

Pillar	Instrument / Initiative	Main Function	Key Features	Strengths	Limitations / Challenges
(i) Green, Social, Sustainability & Sustainability-linked bonds	Sovereign & market green bond instruments; Luxembourg Green Exchange (LGX)	Mobilise capital for environmental and social objectives	First sovereign green bond listed on Luxembourg Stock Exchange; LGX is global platform for sustainable securities	Global leadership in sustainable capital markets; strong credibility and transparency standards	Limited direct linkage to biodiversity outcomes unless explicitly tagged
Luxembourg Green Exchange (LGX)	Luxembourg Stock Exchange	Dedicated platform for ESG-labelled securities	First platform exclusively for sustainable finance instruments	Enhances market transparency and ESG visibility	Dependence on voluntary issuer disclosure quality
(ii) ESG UCITS & investment fund leadership	UCITS ESG funds + SFDR Article 8 & 9 disclosures	Channel savings into sustainable investments	Luxembourg is a major global fund domicile and EU ESG hub	Strong regulatory ecosystem; high scale and global reach	ESG classification inconsistencies (Article 8/9 interpretation variability)
Sustainable Finance Disclosure Regulation	EU transparency framework	Requires sustainability disclosure by financial products	Standardises ESG reporting across EU	Improves comparability and transparency	Still evolving; data quality and greenwashing risks

Pillar	Instrument / Initiative	Main Function	Key Features	Strengths	Limitations / Challenges
(iii) Impact investing & development finance	Blended finance, ICFA, ISFA	Mobilise private capital for development and climate outcomes	Supports emerging markets and SDG-aligned investments	Strong innovation in blended finance models	Scale still relatively small vs mainstream fund industry
International Climate Finance Accelerator	Climate finance support platform	Supports climate-focused fund managers	Incubates climate finance vehicles	Strong pipeline development role	Early-stage impact measurement challenges
International Social Finance Accelerator	Social impact fund support	Supports SDG-aligned and social finance funds	Focus on inclusive finance and development impact	Strong niche positioning	Limited global scaling so far
(iv) Inclusive finance & microfinance	Microfinance & financial inclusion leadership	Financial access for underserved populations	Long-standing leadership in microfinance sector	Strong development finance reputation	Fragmentation of impact measurement frameworks
(v) Gender finance	Luxembourg Women in Finance Charter + Ministry of Finance 10-point action plan	Promote gender equality in financial sector and investment flows	Gender lens investing; institutional commitment	Strong policy signalling; leadership in gender finance	Implementation depends on private sector adoption
Ministry of Finance Luxembourg	Policy coordination body	Oversees sustainable finance strategy	Integrates gender and sustainability priorities	Strong governance capacity	Cross-sector coordination complexity
(vi) Sustainable finance innovation ecosystem	Public-private partnerships, fintech, ESG innovation platforms	Develop new sustainable finance products and standards	Innovation hubs and regulatory experimentation	Strong ecosystem of financial innovation	Risk of fragmentation across initiatives
(vii) Philanthropy & foundations	Luxembourg Foundation ecosystem (incl. Fondation de Luxembourg)	Channel private wealth into public-good projects	Supports NGOs, environment, social innovation	Flexible funding, high-impact niche projects	Small share of total financial flows
Fondation de Luxembourg	National philanthropic platform	Coordinates and structures charitable giving	Professionalisation of philanthropy sector	Enhances governance of donations	

A3.1.8. Economic Instruments

Economic Instrument	Purpose	Use of Revenues
Higher land artificialisation charges	Discourage conversion of natural and agricultural land and internalise biodiversity loss	Habitat restoration, land acquisition, ecological connectivity, and biodiversity conservation
Biodiversity impact fees	Internalise biodiversity impacts of major developments	Biodiversity restoration, ecological compensation fund, and Nature Restoration Plan implementation
Pesticide and fertiliser risk levies	Reduce diffuse pollution and encourage sustainable farming	Agroecological transition, biodiversity contracts, advisory services, pollinator conservation, and water-quality restoration
Habitat fragmentation charges	Reduce landscape fragmentation and improve ecological connectivity	Wildlife crossings, ecological corridor restoration, strategic land acquisition, and green infrastructure

Economic Instrument	Purpose	Use of Revenues
Water pollution charges	Apply the polluter-pays principle to aquatic ecosystems	River restoration, wetland restoration, water-quality improvement, and catchment management

A4. Methods

The VPR process is a process developed by the Convention of Biodiversity. During this process a group of diverse reviewers (made up from Government, Academia and the Private sector) is selected to review the National Biodiversity Strategic Action Plans of a country. The methodology for the VPR mechanism can be found on the CBD web page and at the following link ([Updated VPR Methodology](#)). The specific steps followed for the Luxembourg VPR exercise are outlined below. The team was initially sent a selection of documents by the Luxembourg Ministry of Environment. Based on reading of some of the key documents (i.e., the PNPN3) an initial structure was developed which explored each sector of the landscape and economy, and reflected key components of national plans, as well as reflecting the “four pillars” ((1) Protection, 2) Restoration, 3) Transformative change, and 4) International Commitments, as well as the enabling environment needed to meet goals and targets). This was also discussed and developed through inputs of all team members during weekly meetings for the team.

Based on these themes all four team members was allocated particular topics, then a matrix was created to distribute the topics among the team and to enable the relevant components of each document to be clearly identified and cross-referenced with the initial structure.

Once all elements had been reviewed, and the matrix filled in each team member then collated the main details from the documents to assess 1). Status and trends (for each of their sections), 2). Policy and programs associated with their section, 3). Major challenges and gaps. Based on this, key gaps were identified, and questions posed to the Ministry of Environment in Luxembourg, where answers were given and further relevant documents also provided. Independent searches were also conducted to attempt to find relevant material where gaps, inconsistencies and barriers seemed to exist, to establish if these apparent observations were supported by accessible evidence.

Based on this initial text was drafted for each section to cover the above points and note initial recommendations where potential solutions to apparent challenges were identified. In addition, key agencies where meetings would be useful were identified, and meetings with these agencies requested.

During the in country visit the team met with diverse stakeholders from across sectors and ministries, based both on the requested list, and other relevant agencies identified by the Ministry of Environment (Annex A5). During each meeting we initially asked for the remit and responsibility of the agency (and team) present, their impressions on the status and trends in their sector, barriers and challenges that they perceived for the fulfilment of national environmental targets, as well as gaps, and conversely, where they saw examples of good

practice. Following this, and based on prior research, more detailed and targeted questions were asked to provide a comprehensive understanding of the status of each sector, and to identify both strengths and weakness in the current system. Notes were made by all team members as well as by the CBD Secretariat and shared each night to ensure that information was not lost.

At the end of the week the team had a focused session to centralise core observations of challenges and gaps, and an action plan for the remaining time developed. All notes were finished and shared, and a new outline for the report created and shared. Following this each team member was asked to finalise their first draft within two weeks, including 1). Overview of the sector, 2). Examples of Best practice, 3). Challenges, Barriers and gaps, and 4). Recommendations. The more detailed policy components for most sections were moved to the annexes, to provide a clear backdrop to the current situation, and a reference point for other countries seeking to understand the governance frameworks present.

In writing the new text, team members were encouraged to go through the extensive notes from meetings and organise them for each topic and based on the new structure. Once each section was drafted, they were shared with the team, then edited by the team leader. In addition to editing text for consistent style, grammar etc, text which was unclear or not in line with observations were queried for clarification. Where text contained quantitative statements or claims references were requested to support these claims, this included where statements had come from in person discussions, as in most cases websites, or agencies documents were available to corroborate this information. Once text was clear, well structured, and conformed to the agreed structure it was merged into the main document and shared with the team for further comments.

Once complete, the draft was shared with Luxembourg for review. Based on these notes were rechecked, and all team members looked at their sections to ensure key recommendations for all sections were included in the executive summary (Summary for Policy makers), for the document. This DMR and the methods and agencies were also added at this juncture. Detailed feedback was then received from Luxembourg, implemented into the draft and a full response file also compiled before the report and review responses were sent back to Luxembourg for approval.

A5. Agencies Met during in Country Visit

- Ministry of Environment
- Ministry of Environment Water team
- Luxembourg Sustainable Finance Initiative
- Ministry of the Environment (sustainable development)
- Natur&emwelt
- Ministry of Energy and Spatial Planning service développement régional
- Service agri-environnement, recherche et innovation
- ETIKA-Initiativ fir Alternativ Finanzéierung
- Mouvement écologique

- Ministry of the Environment (finance sector)
- Syvicol
- Ministry of Agriculture
- Luxembourg Institute of Science and Technology-LIST
- Environment Agency (Administration de l'Environnement-AEV soil protection)
- River partnership
- Water Management Administration (AGE)
- Bio-agriculture
- Forestry Agency (ANF Diekirch) - Direction/forest
- ANF Diekirch - Wildlife/hunting service
- ANF Diekirch - Nature service
- ANF Diekirch - Natural Park Our/Natural Park Oewersauer
- ANF Diekirch - Natur&Geopark Mëllerdall
- ANF Diekirch - Compensation team
- ANF Diekirch - Fondation Hëllef fir Natur
- Natura 2000 coordinators
- Administration des services techniques de l'agriculture (ASTA agriculture & Innovation)
- KLIMA Agence (Luxembourg's climate and energy policy)
- Institut fir Biologesch Landwirtschaft an Agrarökologie Luxembourg - IBLA
- SIAS (Syndicat intercommunal à vocation multiple) - CSPIN (Observatoire env)
- National museum
- SICONA

Field visits:

- Cultural landscape in Luxembourg: Biodiversity through extensive agriculture
- The site ‚op Weiden‘: nature conservation on public land with measures undertaken since 2010 (Intervention of the farmer)
- Conserving rare amphibians (Crested newt *Triturus cristatus* and European tree frog *Hyla arborea*)
- Visit of the creek inhabiting the rare southern damselfly (*Coenagrion mercuriale*) with restoration measures undertaken
 - Den Treffpunkt ass hei: <https://g-o.lu/3/Do0TV>
- ANF Agenda: Mat der interner Récksprooch giffe mir dann folgend Sujeten um Schwaarzenhaff thematiséieren. Den Ben Louis an Gilles Wagener als “Locals” wäerten ons begleeden. Ob elo nach Vertrieeder aus Direktioun do sinn, steet nach net fest.
- Practical management of the nature reserve “Schwaarzenhaff-Jongebësch”
- Environmental education undertaken by the Centre Nature et Forêts “Mirador”
- Species habitat management of the Natterjack toad *Epidalea calamita*

A6. Responsibility Matrix

Theme	6 th National Report	Current NBSAP	National Targets	Previous NBSAPs	2025 Environmental Implementation Review	Government organization	Policy Framework for Environment, Biodiversity and relevant sectors	Legislative Framework for Environment, Biodiversity and relevant sectors	Stakeholders of NBSAP process	National Land Use Planning Policy and Maps
Title	6 th National report for Luxembourg	Plan national concernant la protection de la nature (PNPN)	Luxembourg - Country Profile	Plan National concernant la Protection de la Nature	2025 Environmental Implementation Review	Règlement interne du Gouvernement	Loi modifiée du 17 avril 2018 concernant l'aménagement du	Loi modifiée du 17 avril 2018 concernant l'aménagement du		Programme directeur d'aménagement du territoire (PDAT)
A). Introduction & Background		P1-9					Introduction	Chap1-3		
B). Current status							Introduction	Chap1-3		
1). Major priorities and challenges		P1-9		1. Stratégie nationale Biodiversité. 4. Evaluation du 1er Plan National concernant la Protection de la Nature			Introduction	C1-3 Cons Area		
i). Overview of							Introduction			

overarching strategy and “4 pillar approach”										
ii). Nature Protection		Par 1 P10-15					Part 1 Nature Prot			
<i>Status of ecosystems</i>			Objective 3: Significantly reduce land consumption and landscape fragmentation (ii) Fragmentation. Objective 1: To fully implement legislation relating to the protection of biodiversity (I) Habitats	3. Etat actuel de la situation	Recovery of ecosystems, Ecosystem assessment and accounting			c 4 Habitats; 7 natura		p 36, Sección 1.8 p 49, Sección 2.2.2.
<i>Status of species</i>		Annex E Species & H plans	Objective 5: Combat invasive alien species By 2020, invasive alien species and their pathways will be		Recovery of species, Prevention and management of invasive alien species			C5 Species		p 36, Sección 1.8

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<i>semi-aquatic</i>		Wet Corr								p 98, Sección 4.2.2
<i>Grasslands</i>										
iv). Change drivers of transformation.		Part 3 p 38-57			3. ZERO POLLUTION		Part 3 Change Drivers	C11 Subsidies; C12 Authorization		
<i>Agriculture</i>			Objective 4: Strengthen the contribution of agriculture and forestry (i) Agriculture		Recovery of ecosystems Agricultural ecosystems					p 49, Sección 2.2.2 p 65 Sección 3.1.1
<i>Urbanization</i>			Objective 3: Significantly reduce land consumption and landscape fragmentation (i) Urbanisation							p 18, Sección 2
<i>Industry and energy</i>					4. CLIMATE ACTION					p 32, Sección 1.3
<i>Business and finance</i>										
v). International engagement.		Part 4 58-62		2. Cadre légal, engagements nationaux et internationaux	2. Biodiversity and natural capital Global and EU biodiversity		Part 4 International			

					frameworks					
C). Monitoring:								c-6 Monitoring		
Review of indicators			Objective 6: To raise public awareness by 2020 at the latest, the population will be aware of the value of biological diversity, ecosystems and the services they provide, as well as the measures that can be taken to conserve and use them sustainably.	5. Certains sujets approfondis lors de la phase de consultation en vue de la constitution du catalogue de mesures						
D). Enabling conditions;		Part 3 p 38-57					Part 3 Change Drivers			
i). Finance and capacity to implement			Goal 7: Contribute to halting the loss of biodiversity	7. Finance ment	Part II: Enabling framework – implementation tools					

effectivel y			global y		5. Financi ng					
ii). Environ mental Governan ce and structures				6. Structur es et acteurs.	6. ENVIR ONME NTAL GOVE RNAN CE			c13 Organs C 14 Penaltie s		
E). Knowled ge and Action gaps and action priorities going forwards		p38-57					Part 3 Change Drivers	Part 3 Change Drivers		
i). Identif y gaps in data and gaps in impleme ntation										
ii). Recomm endations for monitorin g gaps										
iii). Recomm endations for impleme ntation gaps and necessary enabling condition s										
Appendix										
Annexes:		Annex A- E								

Theme	Protected area and other habitat maps					Species level monitoring information			National constitution	Relevant Sectoral Plans	
Title	Les zones d'intérêt communautaire Natura 2000	Protected areas of national interest	Geoportail – Startseite	The cadastre of biotopes in open environments - Natur - Environment Portal - Umwelt.lu - Luxembourg.pdf	The inventory of biotopes in the forest environment	La Biodiversité en chiffres	Plans d'actions espèces	Plans d'actions espèces (continuation)	La Constitution du Grand-Duché de Luxembourg	Les Parcs naturels au Grand-Duché de Luxembourg	Plan directeur sectoriel 'paysages' (PSP)
A). Introduction & Background;									Chap. Art 4 Sec 4		
B). Current status											
1). Major priorities and challenges											
i). Overview of overarching strategy and “4 pillar approach”											Intro
ii). Nature Protection;									Chap. Art 4 Sec 4		1.Context and Purpose
Status of ecosystems	Habitats	Les zones protégées d'intérêt national	<u>Geoportail</u>	X	x	p. 7, 9, Sec. 1.2	p.11, sec. 2.4	A) p. 3, sec. 1.1 B) p. 23, sec. 4.1 c) p. 2,3 D) p. 3, sec. 1/ p. p. 5, sec. 5 E) p. 5,6 sec. 5		See 4 articles on parks:	2. The sectoral master plan

Status of species	Oiseau x					p. 24, 25, 29, Sec.2.1 p. 26, Sec. 2.2 p. 30, Sec 2.3	p. 6 , sec. 1.1 flora p. 8, Sec. 1 fauna			Grand Duche	
Implementation of the Nature Pact						p. 42, Sec. 3.3				Haute Soure	
iii). Nature Restoration								p. 5 sec. 5/ p7, sec. 7	Chap. Art 4 Sec 4	Our	
Forests										Mend erall	
Aquatic and semi-aquatic											
Grasslands						p 8, Sec. 1.1					
iv). Change drivers of transformation.									Chap. Art 4 Sec 4		
Agriculture						p 7,8, Sec. 1.1	p. 4, sec 1/ p.7 sec. 1.3 flora p. 20, Sec. 1.2.1 fauna	A) p.5, sec. 5 B) p. 5, sec. 4 c) p. 4, 5 sec. 4 y 5 d) p. 5, sec. 5			
Urbanization						p 7, Sec. 1.1 p 40, Sec. 3.2					
Industry and energy											
Business and finance											
v). International engagement.											
C). Monitoring :							p.6, sec 2.4 flora	A) p 5 b) p. 21, Sec. 3.1.4.5			

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Theme	National economic and development plan, National Sustainable Development Strategy, Five or Ten-year Development Plan, etc. National Macro Planning Documents (national land use plan)		Poverty Reduction Strategy, plans to meet the Sustainable Development Goals	National education and social plan (including gender related plans)							
Title		3e Plan national pour un développement durable: 'Préparer et préserver l'avenir	Plan d'action national pour la prévention et la lutte contre la pauvreté	Plan d'action national pour la prévention et la lutte contre la pauvreté	Plan d'action national de mise en œuvre de la Convention internationale sur l'élimination de toutes les formes de discrimination raciale (PAN Antiracisme – PAN AR)	La garantie pour l'enfance: Plan d'action Luxembourg 2021–2030	Plan National Santé (PNS)	Plan d'action national de mise en œuvre de la Convention relative aux droits des personnes handicapées 2019-2024	Nationaler Rahmenplan zur non-formalen Bildung im Kindes- und Jugendalter	Plan d'action national pour la promotion des droits des personnes LGBTQ+	Apprendre le développement durable
A). Introduction & Background;											
B). Current status											
1). Major priorities and challenges											

[illegible]

Review of indicator s											
D). Enabling condition s;											
i). Finance and capacity to impleme nt effectivel y											
ii). Environ mental Governan ce and structure s											
E). Knowled ge and Action gaps and action priorities going forwards											
i). Identif y gaps in data and gaps in impleme ntation											
ii). Recomm endations for monitori ng gaps											
iii). Recomm endations for impleme ntation gaps and necessar y enabling condition s											

[illegible]

Theme		Relevant sector policies, strategies, plans (i.e., Wetland Policy, Forestry Policy, etc.)							Climate change adaptation and mitigation plans / Disaster Risk reduction plans		
Title		National Forest Action Plan (NFA P) Luxembourg – 2019 Review	Le renforcement de la résilience des forêts du Grand-Duché de Luxembourg	Acteur engagé	La compensation écologique	Bio2025	Plan d'action national de promotion de l'agriculture biologique 'PAN-Bio 2025	Zeitplan und Arbeitsprogramm") – Administration de la gestion de l'eau	Projet de Stratégie et plan d'action pour l'adaptation aux effets du changement climatique au Luxembourg (2025–2035)	Projet de mise à jour du Plan national intégré en matière d'énergie et de climat (PNEC) du Luxembourg pour la période 2021-2030	Le Plan national intégré en matière d'énergie et de climat (PNEC)
A). Introduction & Background;											
B). Current status											
1). Major priorities and challenges											
i). Overview of overarching strategy and “4 pillar approach”											
ii). Nature Protection;											
<i>Status of ecosystems</i>			p. 6 intro, 18, Sec. 2.1 p. 11, Sec. 1.1								
<i>Status of species;</i>			p. 6 intro, 18, Sec. 2.1								
<i>Implementation of the Nature Pact</i>								p 189, M 4.14.3		p. 115 M 108	

Theme		Relevant sector policies, strategies, plans (i.e., Wetland Policy, Forestry Policy, etc.)							Climate change adaptation and mitigation plans / Disaster Risk reduction plans		
iii). Nature Restoration ;			p. 8 sn p. 12 Sec. 1.2 p18, Sec. 2.1 p. 25 sec2.4 / p. 34 M 4.2 y 4.3	p2				p 187-192			
Forests	p. 3 sec 1.1 y p. 4 sec 1.2	p. 3, sec 1 p. 8 sec 3.1 p. 10 sec 3.2	p. 14 p. 28, sec 2.6/ p. 35 M 6.2					p. 182 M 4.13.7		p. 10, sec 1.1.1 p. 266-270, sec 3.1.1.7	p. 3 sec 1.1 y p. 4 sec 1.2
Aquatic and semi-aquatic			p. 34, 25 p. 26, sec 2.4/ p. 34 M 4.4				p. 11 sec 3.3	p. 121 M 4.3.3 p. 190 M 4.14.5			
Grasslands			p. 27, Sec. 2.5					p 178 M 4.13.1 2			
iv). Change drivers of transformation.											
Agriculture			p. 6 p. 26, 27, Sec. 2.5		p. 41, sec 6.4	p. 5 se. 1.2 p. 6 sec 1.3				p. 10, sec 1.1.1	
Urbanization			p. 30, Sec. 2.8	p. 2							
Industry and energy			p. 50 Sec. 3.3							p. 10, sec 1.1.1	
Business and finance			p. 42 Sec. 3.1								
v). Internation			p. 59 sec							p. 127, M 118	

Theme		Relevant sector policies, strategies, plans (i.e., Wetland Policy, Forestry Policy, etc.)							Climate change adaptation and mitigation plans / Disaster Risk reduction plans		
al engagement.			4.2/ p. 62 M2.5								
C). Monitoring :	p4, 5, sec 2.1		p. 13 pr, 38, 46 Sec. 3	p. 4			p. 33, 35 sec 7				p4, 5, sec 2.1
Review of indicators											
D). Enabling conditions;											
i). Finance and capacity to implement effectively		p. 16	p. 28 sec 2.6/ p. 35 M 6.2 p. 50, Sec. 3.3	p4	p. 39 ec. 6.2	p. 11		p. 191 M 4.14.6			
ii). Environmental Governance and structures			p. 39, 42, Sec. 3.1 / p. 54 M 1.1	p. 4			p. 11 sec 3.2 p. 20, 21 sec 4	p. 183, M 4.13.9		p. 23 sec 1.3 p. 18 sec 1.2.2.1 p. 115 M 108	
E). Knowledge and Action gaps and action priorities going forwards											
i). Identify gaps in data and gaps in implementation	p. 33, sec 5				p. 17, 19 sec 4.4		p. 11 sec 3.3	p. 11 sec 1.4			p. 33, sec 5
ii). Recommendations for monitoring gaps											
iii). Recommendations for implementation gaps and necessary enabling conditions											

[illegible]

Theme	General Budget Support arrangements (thematic and sector working groups, technical working group on budget, performance assessment framework).			UN Sustainable Development Cooperation Framework, International co-operation				
Title	Finances durables" – Klima an Energie, Portail de l'environnement	Stratégie de financement climatique international (FCI) 2021- 2025	Site officiel du Budget de l'État, Luxembourg	EU Budget 2028- 2034	Stratégie générale de la coopération luxembourgeo ise: En route pour 2030	Luxembourg's general development cooperation strategy the road to 2030	DAC Network on Environment and Development Co- operation (ENVIRONET)	Pays à
A). Introduction & Background;								
B). Current status								
1). Major priorities and challenges								
i). Overview of overarching strategy and "4 pillar approach"								
ii). Nature Protection;								
<i>Status of ecosystems</i>						Biodiversity and development co-operation		
<i>Status of species;</i>								
<i>Implementation of the Nature Pact</i>								
iii). Nature Restoration;								
<i>Forests</i>								
<i>Aquatic and semi- aquatic</i>								
<i>Grasslands</i>								
iv). Change drivers of transformation.								
<i>Agriculture</i>								
<i>Urbanization</i>								
<i>Industry and energy</i>								
<i>Business and finance</i>								
v). International engagement.					4. Geographic concentration		X	
C). Monitoring:					11. Monitoring & Evaluation and Knowledge management			
Review of indicators								

Theme	General Budget Support arrangements (thematic and sector working groups, technical working group on budget, performance assessment framework).			UN Sustainable Development Cooperation Framework, International co				
D). Enabling conditions;								
i). Finance and capacity to implement effectively					Financial instruments			
ii). Environmental Governance and structures					Non-financial modalities			
E). Knowledge and Action gaps and action priorities going forwards								
i). Identify gaps in data and gaps in implementation								
ii). Recommendations for monitoring gaps								
iii). Recommendations for implementation gaps and necessary enabling conditions								
Appendix								
Annexes:								

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