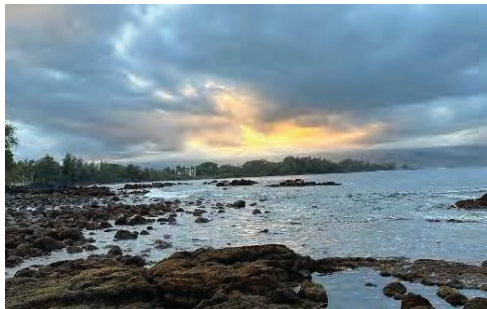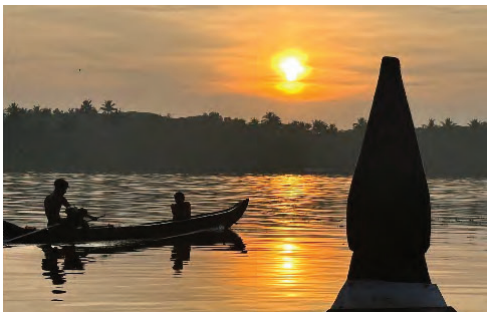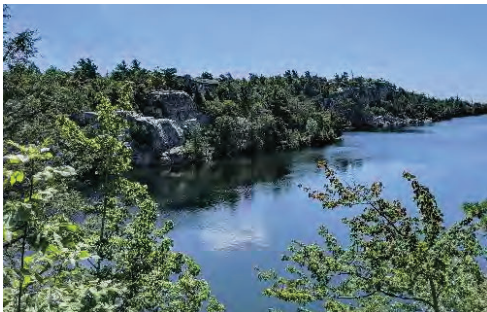# IUCN

Applying the IUCN Global Standard for Nature-based Solutions™

21 case studies from around the globe

Emmanuelle Cohen-Shacham, Edna Cabecinha, and Angela Andrade (Editors)

CEM

About IUCN

IUCN is a membership Union uniquely composed of both government and civil society organisations. It provides public, private and non-governmental organisations with the knowledge and tools that enable human progress, economic development and nature conservation to take place together.

Created in 1948, IUCN is now the world's largest and most diverse environmental network, harnessing the knowledge, resources and reach of more than 1,400 Member organisations and around 17,000 experts. It is a leading provider of conservation data, assessments and analysis. Its broad membership enables IUCN to fill the role of incubator and trusted repository of best practices, tools and international standards.

IUCN provides a neutral space in which diverse stakeholders including governments, NGOs, scientists, businesses, local communities, Indigenous Peoples' Organisations and others can work together to forge and implement solutions to environmental challenges and achieve sustainable development. Working with many partners and supporters, IUCN implements a large and diverse portfolio of conservation projects worldwide. Combining the latest science with the traditional knowledge of local communities, these projects work to reverse habitat loss, restore ecosystems and improve people's well-being.

www.iucn.org
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About the IUCN Commission on Ecosystem Management

The IUCN Commission on Ecosystem Management (CEM) is an international, multicultural and multilingual group of over 2,100 members worldwide. The main objectives of CEM are focused on developing and sharing expert guidance on ecosystem-based approaches to the management of socio-ecological systems and the use of natural and modified ecosystems to achieve biodiversity conservation, address climate change impacts, contribute to human wellbeing and promote sustainable development. Additionally, CEM aims to provide guidance for ecosystem-based approaches to the management of landscapes and seascapes and enhance the resilience of transformed ecosystems necessary to address global changes.

CEM's network of volunteer conservation scientists, experts and managers contributes to the IUCN's work through an array of Thematic Groups, Specialist Groups and Task Forces. Collectively, this volunteer specialist network provides scientific and authoritative advice to IUCN's Programme as it relates to the management, restoration and sustainable use of the world's ecosystems.

https://www.iucn.org/our-union/commissions/commission-ecosystem-management

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Foreword

The world today faces an unprecedented convergence of societal challenges, including climate change, biodiversity loss, water scarcity, food insecurity, and the degradation of natural ecosystems. These crises, deeply interconnected, demand urgent and innovative solutions that not only mitigate risks but also enhance resilience and sustainability. In this context, Nature-based Solutions (NbS) have emerged as a powerful framework, offering a pathway to address these pressing challenges, by harnessing the power of nature to benefit both people and the planet.

At the heart of this effort lies the critical role of the International Union for Conservation of Nature and its Commission on Ecosystem Management, CEM. Over the past decade, IUCN has been at the forefront of conceptualising and advancing the NbS approach, culminated in the development of the Global Standard for NbS. This globally recognised standard provides a robust framework for designing, implementing, and evaluating NbS, ensuring that they are effective, inclusive, and sustainable. It reflects IUCN's commitment to fostering innovation, collaboration, and scientific rigor in addressing some of the most complex challenges of our time.

This book presents 21 compelling case studies of Nature-based Solutions from around the world. Each case study exemplifies how communities, governments, and organisations have successfully implemented NbS to tackle specific societal challenges, while achieving co-benefits for biodiversity conservation and human well-being. These examples range from restoring mangroves, to protecting coastal areas from climate change impacts, to restoring landscapes and promoting agroecology that foster biodiversity and water security for sustainable communities, to urban initiatives that improve air quality and enhance public health, as well as initiatives led by local communities and Indigenous People. Together, they demonstrate the versatility and transformative potential of NbS across diverse social, ecological, and geographic contexts worldwide.

The case studies in this book are more than success stories – they are a testament to what is possible when working with nature, rather than against it. They underscore the importance of integrating NbS into policy, planning, and practice at all levels, from local communities to international agreements. More importantly, they remind us that addressing societal challenges is not solely about solving problems, it is also about creating opportunities for a more equitable, resilient, and harmonious future.

As you explore the pages of this book, we invite you to reflect on the lessons learned, the challenges overcome, and the potential of NbS to shape a better world. It is our hope that these case studies will inspire action, foster collaboration, and deepen understanding of the critical role of NbS in addressing the defining challenges of our time.

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Angela Andrade
Chair, IUCN Commission on Ecosystem Management

Executive summary

Nature-based Solutions (NbS) were defined by IUCN as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits". This definition was adopted in Resolution 069, at the 2016 World Conservation Congress. NbS is as an umbrella type concept for ecosystem-based and ecosystem-related approaches that aim at addressing major global societal challenges: climate change through adaptation and mitigation; disaster risk, biodiversity loss and ecosystem degradation, and ensuring food security, water security, human health, and social and economic development. IUCN's definitional and conceptual framework for NbS served as basis for the development of an operational framework for NbS.

The IUCN Global Standard for Nature-based Solutions™ (hereafter "Global Standard for NbS" or "NbS Global Standard") was developed during a two-year process, aiming at setting a common basis of understanding for NbS, and providing a robust framework to design, implement, assess, adapt and improve NbS. The Global Standard for NbS – with its eight criteria and 28 indicators – was launched in 2020, supported by the 2020 World Conservation Congress when it adopted Resolution 060 promoting the Global Standard for NbS. The eight criteria (**C**) focus on the major elements that are critical to consider for successful NbS: addressing societal challenges (**C1**); design at scale (**C2**); net gain to biodiversity and ecosystem integrity (**C3**); economic viability and feasibility (**C4**); inclusive, transparent and empowering governance (**C5**); equitably balancing trade-offs (**C6**); adaptive management (**C7**); and sustainability and mainstreaming (**C8**). The Global Standard for NbS is a context-dependent, process-oriented operational framework, which is precise in defining what needs to be assessed, as well as being adaptable to various geographic and ecological contexts, and addressing different societal challenges. It is the only comprehensive and global operational framework available at the moment.

To support the implementation phase of the NbS Global Standard, IUCN Commission on Ecosystem Management (CEM) rigorously selected 21 case studies around the globe, to analyse, learn from and showcase examples of NbS good practice implemented around the globe; and explore in detail how the IUCN Global Standard for NbS can be applied in different contexts. The authors of the 21 case studies were provided with the IUCN Global Standard's Self-Assessment Tool (NbS-SAT), and assessed how well their case study met the eight criteria and 28 indicators.

The 21 case studies were implemented in a diversity of contexts across the globe and in different regions, in equally diverse types of **biomes** – ranging from marine and coastal, to freshwater, terrestrial (including polar alpine biomes, forest, woodlands and grasslands biomes) to intensive land use biomes (including three cities) – as well as in two business-related cases to illustrate how NbS can also be implemented in a business context. The analyses of case studies showed that a **wide range of NbS interventions** falling under the NbS umbrella were implemented to address multiple societal challenges in an integrated manner. The targeted **societal challenges** include climate change (through mitigation and adaptation), biodiversity loss and ecosystem degradation, disaster risk, as well as ensuring food security, water security, human health, and social and economic development.

The SAT results finds that **C3** – ensuring net gain to biodiversity and ecosystem integrity – was the most highly rated by multiple case studies with biodiversity conservation as the primary focus, and NbS interventions planned to restore diverse types of ecosystems, protect habitats and increase biodiversity. In addition, most case studies had both field and biodiversity surveys already in place to establish baseline conditions and assess the state of the ecosystems. Furthermore, societal challenges were at the core of the NbS definition, therefore, understanding and prioritising them is key to setting up the planning and implementation of an NbS intervention. This explains that **C1** – addressing societal challenges – was assessed as the second strongest criterion. Similarly, the assessments showed a high and diverse number of societal challenges identified and addressed across the case studies, and in many cases discussed and prioritised upfront explicitly through engagement of communities and in consultation with stakeholders.

In contrast, **C4** – economic viability and feasibility of the intervention – was assessed as the weakest

criterion. Many case studies lacked or had only limited accounting for cost and benefits, cost-effectiveness studies or comprehensive economic feasibility studies undertaken. This can be attributed to limited external funding, reliance on volunteer labour, constraints due to the COVID-19 pandemic, or insufficient policy backing. **C6** – equitably balancing trade-offs – was the second weakest criterion. Some limiting factors included data scarcity, sometimes complex societal needs, limited funding, or the lack of capacity to understand and assess the diverse types of trade-offs.

A diverse spectrum of **stakeholders** was found to be involved in all the case studies, including decision-makers at the national, regional and local levels, academia, the private sector, non-governmental organisations, and managers. Moreover, given the importance of involving Indigenous Peoples and Local Communities (IPLCs) in the design and implementation of successful NbS, most case studies indicated their participation in the interventions – pointing to one of the study's valuable findings about how IPLCs engaged in and influenced the planning and implementation of NbS interventions.

Lastly, the assessment of the 21 case studies against the NbS Global Standard's eight criteria and 28 indicators, helped their authors highlight lessons learned and identify key aspects to take into account when planning and implementing successful NbS interventions, such as: strong and diverse stakeholders engagement; IPLCs involvement; inclusive and clear governance models; unacknowledged needs; long-term financial planning; required skills; adaptive management; and available land and land tenure.

This publication showcases a diverse set of 21 NbS interventions implemented around the globe, thus facilitating a better understanding of the process by which the Global Standard for NbS is applied in various contexts. Our findings support the growing evidence for successful NbS interventions planned and implemented in different contexts, and will hopefully inspire widespread of similar practices, contributing to address societal challenges at scale.

Case study 15

Virginia Grassland Bird Initiative: Supporting bird-friendly practices on working lands – Virginia, USA

Justin Proctor* and Amy Johnson, Virginia Working Landscapes, Smithsonian's National Zoo and Conservation Biology Institute, Front Royal, USA; **October Greenfield**, The Piedmont Environmental Council, Warrenton, USA; **Caty McVicker**, Quail Forever/USDA-NRCS; **Jacob Gilley**, American Farmland Trust, USA *ProctorCJ@si.edu
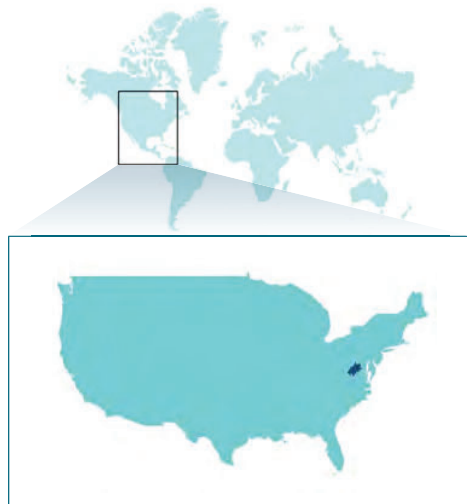
16 counties across the northern Shenandoah Valley, Blue Ridge Mountains, and Piedmont; Virginia, USA   *Source: Base map by* UN Maps *(2025).*

Societal challenges

Types of NbS

EbM	EbA	ER	EbMgt

AbC

Types of biomes

T3 – Shrublands & shrubby woodlands
T4 – Savannas and grasslands **T7 –** Intensive land-use **F1 –** Rivers and streams

Stakeholders

Further information are available here and here.

Main objectives

- Raise regional awareness on the plight of grasslands and grassland birds, and how those birds can be used as bioindicators of healthy working landscapes;

- Present locally derived research to diverse partners, who collaboratively translate it into best management practices (BMPs), which are vetted to simultaneously reverse the declines of grassland birds, improve the resiliency of working landscapes, and positively impact the livelihoods depending on those lands;

- Assist producers and landowners in adopting BMPs through the development of incentives programmes that target gaps in funding assistance, as well as facilitate their access to state and federal cost-share programmes;

- Maximise conservation output by collaborating with local technical service providers and conservation practitioners to unify messaging and identify priority BMPs that more holistically address regional efforts to improve soil health, water quality, and biodiversity within grassland ecosystems;

- Establish direct links between the implementation of BMPs and an increase in ecosystem services, resulting in more resistant landscapes to the impacts of climate change (e.g. floods and droughts), reduced management costs, and healthier grasslands (i.e., forages) for hay and livestock production;

- Create novel ways to engage rural communities in conservation education and implementation through diverse outreach programs, including engaging with volunteer community scientists, focusing on events that create new interactions between farmers and their landscapes, and communicating local research and conservation through mixed media platforms (film, photography, art);

- Place Virginia on the map as a nationally recognised conservation region for grassland birds.

The Virginia Grassland Bird Initiative (VGBI) outreach programme involves bringing farmers together to showcase the benefits of integrating regenerative agriculture and wildlife conservation practices onto working landscapes, in Madison County, VA, USA. *Photo: Hugh Kenny*

Setting the context

North America's native grasslands have suffered the most intense impact by humans of any of the country's terrestrial ecosystems, resulting in grassland birds experiencing a steeper decline than any other guild of birds (Brennan & Kuvlesky, 2005; Rosenberg et al., 2019). Remaining grassland birds have now adapted to using hayfields and pasturelands as surrogate habitat. With most of the remaining grasslands in Virginia currently held in private hands and under agricultural use, both farmers and their working landscapes have become instrumental in the future of grassland bird conservation. The conservation of these birds presents an inspiring pallet of opportunities for developing best management practices that can simultaneously build more functional and resilient agricultural landscapes. This in turn directly impacts the future of sustaining healthy farmlands, food security, and farmer livelihoods.

The Virginia Grassland Bird Initiative (VGBI) was launched in early 2021, in an effort to address this conservation challenge, focusing on working landscapes across 16 counties that include Virginia's Piedmont, Blue Ridge, and Shenandoah Valley. VGBI core partners include Smithsonian's Virginia Working Landscapes (VWL), The Piedmont Environmental Council (PEC), American Farmland Trust (AFT), and Quail Forever (QF), combining expertise in land preservation, science, regenerative agriculture, and habitat restoration to catalyse conservation action across diverse communities of rural landowners and producers. Together, VGBI partners have shown that grassland bird conservation has strong ties to regenerative farming, and can be used as a tool to accelerate the adoption of an extensive suite of best management practices on working landscapes.

Implemented activities

VGBI partners bring new conservation knowledge and capacity to a wide demographic of landowners and producers in a region where available conservation technical assistance struggles to meet a growing demand, and where the conservation value of working grasslands has yet to be fully realised.

VGBI has evolved to address its conservation goals through diverse programming and outreach, including:

1. VGBI partners conduct one-on-one site visits with landowners and producers to identify opportunities in which grassland bird conservation practices can be adapted onto working landscapes. Partners showcase the short- and long-term ecological benefits gained from adopting these practices, including improvements to soil health, water quality, landscape tolerance to droughts and floods, and economic gain derived from healthier forages and livestock. Landowners and producers with whom VGBI interacts are encouraged to join upcoming partner events to better foster an ongoing, stronger relationship through which further access to conservation technical assistance can be offered.

In Warren County, VA, USA, VGBI partners have been conducting research on hayfields in Virginia for more than a decade to figure out how to balance the goals of hay farmers with the needs of vulnerable grassland bird species that cohabit those fields. *Photo: Amy Johnson*

2. Informed by ongoing partner research, VGBI has created a robust financial incentives programme that offsets the financial risk for farmers to adopt bird-friendly conservation practices. Both the research and incentives programme are also informing federal cost-share programs (i.e. via USDA NRCS)[1] that open the doors for prolonged financial (and technical) assistance.

3. VGBI actively participates in three Regional Conservation Partnerships. Through extensive strategic planning within each set of partnerships, VGBI recognised a major obstacle to implementing conservation on private working landscapes lies in the inability for farmers to sort through and connect with the complex web of state and federal agencies, land trusts, and non-profit organisations that offer free technical assistance in any given region. To help overcome this barrier, VGBI helped create a novel outreach event – conservation speed-dating workshops – that have been successful at connecting both new and seasoned farmers with their local technical service providers and to conservation cost-share programmes that are specifically relevant to their operations and landscapes.

4. VGBI partners have developed a wide breadth of outreach programmes that help build community and provoke action around conservation themes. Events include conservation walks on exemplar farms, knowledge-sharing events between partners, state and federal staff, and other conservation non-profit organisations, workshops with stakeholders on the value of establishing regenerative agriculture certifications, and thematic field learning sessions with landowners and producers highlighting pollinators, birds, and native plants.

Key results

VGBI measures its ongoing success through the amount of acreage converted into conservation, the number of producers that adopt conservation practices and become local advocates for those practices, the ability to unify messaging and collaborations built between regional practitioners, and the increase in abundance and diversity of grassland bird populations on Virginia's working landscapes over time. Restoring biodiversity, ecosystem services, and ecosystem functionality to working grasslands, through research-based BMPs, directly results in the diversification of grassland plant, pollinator, and wildlife communities, improved mitigation of drought and flood events, positive impact on soil health and water quality, and elevated rates of carbon sequestration (Campomizzi et al., 2019; Perlut & Strong, 2011; Temple et al., 1999). A more functional farmland ecosystem builds stronger resiliency against climate change, improving long-term regional food security.

As of 2024, VGBI has:

• Built a team of four staff housed under different organisations that collaboratively carry the

VGBI mission forward. Through this model, the team is able to harness the unique strengths of each organisation to diversify the scope and impact of VGBI's conservation goals, and better service a wider geography of agricultural communities;

- Used locally-derived research to develop a suite of best management practices (BMPs) that balance the needs of at-risk grassland bird species with producer goals on working landscapes in Virginia;

- Created an in-house financial incentives programme for producers that offsets any perceived financial risk of trying new bird-friendly management practices for the first time. Since 2022, 46 farms across 11 counties have participated in the VGBI Incentives Program, totaling 2,968 acres (1,201 ha). An additional 2,000+ acres (approximately 809 ha) have participated in the programme voluntarily. Bird surveys conducted by community scientists on participating properties are contributing data to VWL's research assessing impacts of habitat management on grassland bird communities;

- Created a nest box programme for cavity-nesting birds in agricultural landscapes, focused on engaging youth and reaching farmers and landowners that are newly exploring conservation management on their farms;

- Developed novel outreach strategies that are reshaping the way that landowners and farmers engage with their local conservation specialists, directly increasing landowner and producer engagement with local technical assistance and cost-share programmes offered by NRCS, SWCD,[2] and other agencies;

- Worked side by side with NRCS staff to integrate new research into the agency's Wildlife Habitat Evaluation Tool, ultimately revising cost-share programmes to better work for grassland birds and farmer production goals. For example, using results from VWL research, VGBI catalysed the reactivation and associated management timelines of EQIP[3] 511 in Virginia, to financially assist farmers willing to delay their first spring hay harvest to protect the critical grassland bird nesting period;

- Became a strong presence on three Regional Conservation Partnerships in Virginia;

- Secured over US$ 600,000 from grant proposals and over US$ 300,000 from donors to fund the initiative;

- Built a user-friendly priority mapping tool and BMP tracking tool designed to generate higher-impact collaborative projects and better track them, respectively.


A conservation speed-dating event led by VGBI partners brings together scientists, technical service providers, landowners, and farmers to explore conservation opportunities on private lands   *Photo: Brooke McDonough*

Application of the Global Standard for NbS Self-Assessment Tool

The results of the NbS-SAT are presented graphically in Figure 25 and discussed in the subsequent passages.
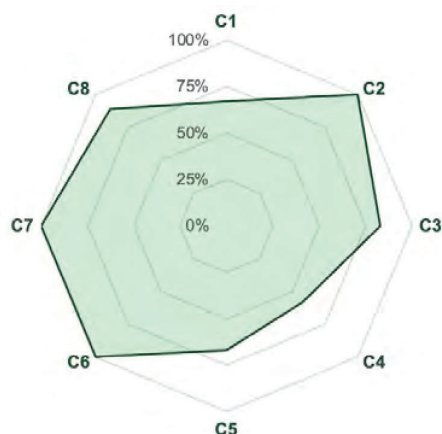
Figure 25 Overview of the Global Standard for NbS SAT results: case study 15, Virginia, USA   *Source: Figure prepared by the authors.*

> **Strongest criteria: C2 – Design at scale; C6 – Balance trade-offs; C7 – Adaptative management**

Key factors

C2: VGBI decision-making, strategic planning, and programming is specifically designed around the balanced needs of economy, society, and ecosystems. VGBI was designed to address the needs of both farmers and grassland birds, and use locally-derived research to identify best management practices that marry the needs of both. Supported BMPs must also be compatible with federal, state, or local cost-share programmes that take the financial burden off the producer.

C6: To best address the needs of producers newly engaging with grassland bird conservation through its financial incentives programme, VGBI has invited the insights of multiple perspectives through an advisory committee to evaluate the costs and benefits of BMP adoption across time and scale. The advisory committee includes experts in local rights, usage, and access to land and resources, ensuring that these are well accounted for throughout programme development. The advisory committee has identified and incorporated competitive prices per acre for incentive payments to farmers, with flexibility for each individual participant, ensuring that mutually agreed upon trade-offs are in place.

C7: VGBI's strategy for addressing conservation on working lands is both robust and adaptive. Ongoing VWL research on grassland birds (e.g. breeding biology, nesting phenology, fledgling dispersal, adult migration) and social science (e.g. conservation behaviours and drivers of participation in conservation research), addressing the most pertinent and relevant questions for both birds and farmers, continually fuels and directs VGBI's approach to producer engagement, BMP selection and endorsement, programming, and outreach.

> **Second strongest criterion: C4 – Economic viability**

Key factors: Not all the main and indirect costs and benefits associated with VGBI have been fully explored yet. Likewise, a full cost effectiveness study has not been conducted, and affordability against the next best alternative practices has not been deduced. While benefits related to ecosystem health and landscape resiliency have been well-studied, monetary cost analyses are forthcoming.

Main lessons and challenges

Some key lessons learned are:

- The self-assessment process afforded our core team an opportunity to reflect on VGBI's considerable growth and evolution throughout the initiative's first four years.

- The initiative's strengths include its partnerships, relevancy to landowners and producers, and adaptive compatibility with other conservation efforts in the region.

- Additionally, VGBI excels in its conservation messaging and outreach efforts. Notably, our programming leads to the adoption and implementation of biodiversity conservation on working landscapes. Through new partnerships and strategies, our work is now being applied to a greater extent to lands owned and farmed by minority and underserved producers.

Acknowledgements

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2 Association of Illinois Soil and Water Conservation Districts (AISWCD) (n.d.). Association of Illinois Soil and Water Conservation Districts. AISWCD

3 (USDA NRCS) (n.d.). Environmental Quality Incentives Program. USDA NRCS

Eastern meadowlarks are one of a handful of obligate grassland nesting birds in Virginia that have experienced serious population declines over the past 50 years, Warren County, VA, USA. *Photo: October Greenfield*
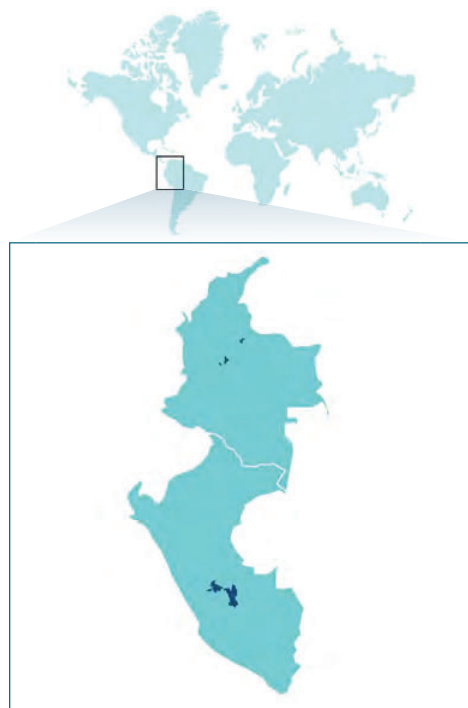
Case study 21

Building Bird Friendly® coffee landscapes – Colombia and Peru

Ruth Bennett,* Danitza Marleni Medina Velasquez, Smithsonian Institution, National Zoo and Conservation Biology Institute, Migratory Bird Center, USA; Esteban Botero-Delgadillo, SELVA, Bogotá, Colombia; Nicolas Gatti, CIEP, INTA, Buenos Aires, Argentina *BennettR@si.edu

In Colombia: Inza, Cauca; Western Cundinamarca; Socorro, Santander; in Peru: Villa Rica and Perene *Source: Base map by UN Maps (2025).*

Societal challenges

Types of NbS

EbMgt   INRM

Types of biomes

T1 – Tropical-subtropical Forests T7 – Intensive land-use

Stakeholders

Further information are available here and here.

Main objectives

The overall objective is to ensure social and economic development and address biodiversity loss and ecosystem degradation by the following:

• increase knowledge about which tree species and provide the greatest co-benefits to coffee producers and biodiversity;

• increase knowledge about how the distribution of forests and coffee agroforests in a landscape impact bird diversity;

• co-develop landscape-level sustainability assessments and conservation action plans with coffee producers, coffee industry, and local governments (e.g. define areas to restore forest corridors; increase the prevalence of tree species with greatest co-benefits for birds and farmers within the landscape);

• increase the portfolio of land management practices that qualify a coffee producer for Bird Friendly® certification, targeting criteria that conserve biodiversity at the landscape scale;

• co-develop solutions to lower barriers to adoption of Bird Friendly® practices and certification for coffee producers and farming associations;

• strengthen economic and social incentives to adopt or retain Bird Friendly® coffee farming practices.

Setting the context

Native trees cover in coffee-growing landscapes has decreased by over 70% in the past 20 years (Jha et al., 2014), and the loss of trees is linked to sustained bird population declines (Kramer et al., 2018; Rosenberg et al., 2019). To combat these losses, the Smithsonian Migratory Bird Centre developed the Bird Friendly® certification in 2000, pioneering the first coffee farm standard to promote the retention of native vegetation and organic practices. To receive Bird Friendly® certification, farms must be audited by an accredited certification agency to confirm that they have at least 10 species of shade trees, 40% canopy cover, a 12 m tall canopy with multiple strata, intact riparian corridors, and
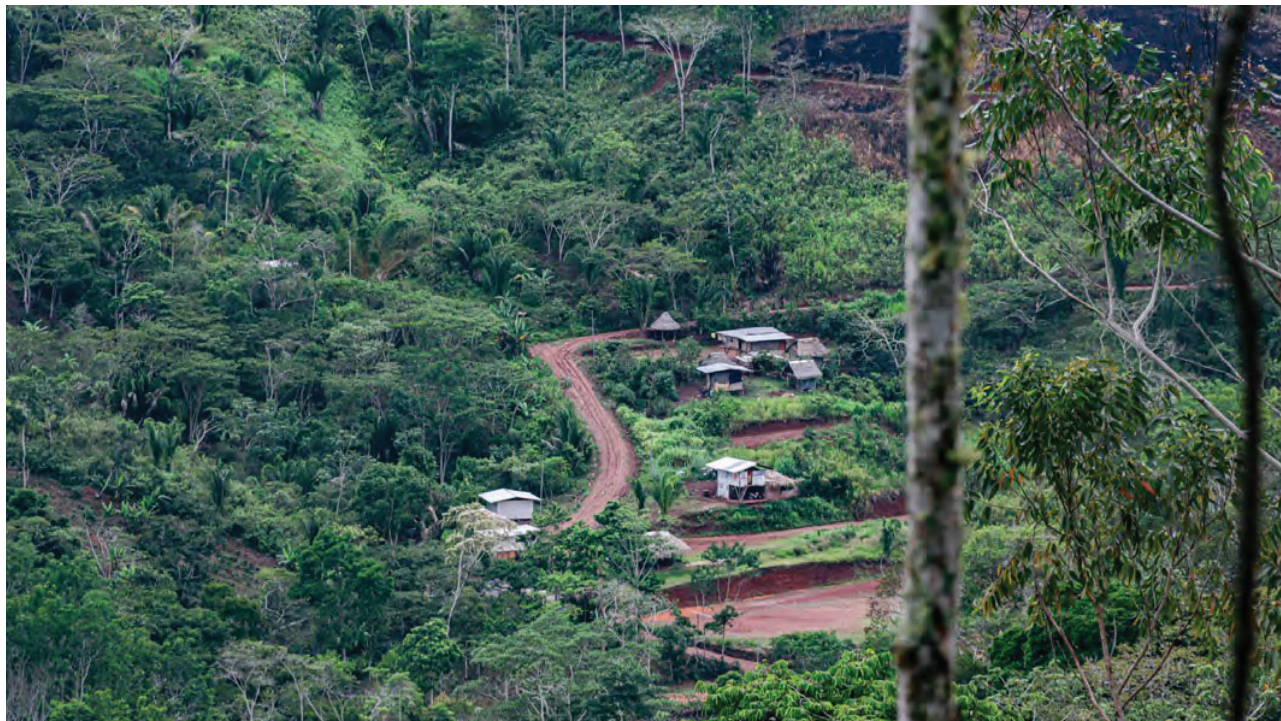
The coffee farming landscape around Villa Rica, Peru, dominated by coffee agroforests with native and introduced species of shade trees   *Photo: Danitza Marleni Medina Velasquez*

active organic certification. Farms that meet the Bird Friendly® certification standard conserve more birds and associated biodiversity than any other coffee farming system (Philpott et al., 2008). Today, over 42,000 acres (17,000 ha) of coffee farmland is certified as Bird Friendly® in 12 countries, primarily within Latin America, Ethiopia, and India. Bird Friendly® coffees are distributed and sold by 15 importers and 82 coffee roasters in North America, the United Kingdom, the EU, and Japan.

Despite the growing market for Bird Friendly® coffee, tree cover continues to decline in coffee-growing regions, driving continued loss of biodiversity and critical ecosystem services. Recent assessments indicate that coffee producers face multiple barriers to adopt Bird Friendly® practices, including low awareness of Bird Friendly® practices and certification, difficulty sustaining productive yields in high altitude locations, and a supply that outweighs the demand for certified coffees. Furthermore, the certification is currently only available for organic farms that maintain a dense and diverse shade tree canopy, despite evidence that farms can also conserve biodiversity by conserving existing forests (Valente et al., 2022), allowing fallow land to regenerate into forest (Chandler et al., 2013), and planting and retaining tree species that produce high quality food and shelter for local wildlife (Narango et al., 2019). To meet the goal of providing viable economic and social incentives to

conserve biodiversity within tropical coffee farming landscapes, the Bird Friendly® programme must address the pressing issues of demand, adoption, and scale.

Implemented activities

To strengthen Bird Friendly® coffee in line with the principles of the NbS Global Standard's criteria, the Smithsonian Migratory Bird Centre launched a research and conservation project in four coffee growing regions of Peru and Colombia. The intervention seeks to: i) further knowledge of how forest cover and coffee plantation management interact to impact bird diversity; ii) identify conservation opportunities that align with local landowner and coffee industry priorities; and iii) reduce barriers to adopting Bird Friendly® practices. Thus far, the programme has: created detailed landcover models that map forests and coffee agroforests in each region; measured current bird diversity within each region; monitored bird and insect abundance on 30–90 shade tree species per region; conducted producer focal groups and surveys, hosted producer workshops to raise awareness of Bird Friendly® practices; conducted workshops to evaluate threats and opportunities for landscape-level biodiversity conservation; trained local primary school teachers to implement an environmental education curriculum; and advanced conversations with coffee companies to integrate Bird Friendly® practices into their extension and sustainability programs.

A sun-grown coffee farm, in Cundinamarca, Colombia, with low levels of biodiversity and native vegetation. Smithsonian Bird Friendly coffee certification builds market incentives to transition this type of farm to an agroforestry system with greater biodiversity and ecosystem services   *Photo: SELVA*

Although the research phase is ongoing, the programme is co-developing outreach activities and assets with coffee companies and producers to facilitate adoption of actions that benefit biodiversity at both farm and landscape scales. This includes the development of nurseries for the tree species that have the greatest co-benefits to local biodiversity and coffee producers. In future years, the project seeks to support co-development of proposals with communities and companies to integrate these species onto farms or adjacent lands that don't currently meet Bird Friendly® standards. Finally, the programme has conducted market research and awareness campaigns in North America to increase demand for Bird Friendly® coffees within export markets.

Key results

The project is ongoing, and results will continue to be finalised over the next few years. To date, the project has published a study that compares the biodiversity conservation value of large shade coffee farms with farms that have a mix sun coffee monocultures and forest patches in northern Colombia (Valente et al., 2022). That study is currently being replicated across six additional landscapes to test the applicability of results to other landscapes. In all four regions, the project has created coffee shade tree catalogues that describe how birds, insects, and farmers use

the suite of tree species studied. Shade tree catalogues in Spanish are available for download for each region. In total, 900 catalogues were printed and distributed to coffee agronomists, producers, agroforestry implementers, and government officials at workshops that explained how to use the catalogues. Additionally, one online shade tree catalogue was created for Peru, which is available for download in English and Spanish.

Results from the socio-economic study of 700 coffee producers found that producers in Colombia were willing to adopt new conservation actions (e.g. planting trees, retaining forest patches) for a premium of US$ 0.44–0.49 per kg of coffee sold, while in Peru, the cost is 50% less (US$ 0.26 per kg). The study also found that farmer willingness to adopt environmental actions increased when certifications or sustainability programmes offered flexibility to deal with climate and pest/disease shocks. Additionally, farmer willingness to coordinate conservation actions with neighbouring farms was greater in Colombia than in Peru, indicating great opportunity there to work toward landscape goals such as forest corridor restoration. These regional differences highlight the necessity of evaluating community trust and willingness to cooperate before implementing a certification programme that targets landscape-level conservation outcomes. The results are currently being prepared for

submission to a peer-reviewed journal in the field of applied economics.

The intervention has conducted 47 workshops to date about biodiversity conservation in coffee landscapes for over 500 unique coffee producers, municipal government officials, protected areas managers, and coffee industry employees. In addition to shade tree catalogues, over 1,000 posters were distributed at these workshops that highlight Bird Friendly® management practices and the local birds that benefit from the practices. The project has also facilitated successful implementation of an environmental education curriculum called *Amigos del Café* in 32 primary school classrooms. The curriculum was developed by the Cornell Lab of Ornithology, Nespresso, and collaborators, and highlights the benefits birds and biodiversity provide to coffee growing communities and landscapes.

To develop stronger market incentives for Bird Friendly® management practices, the project published a study that describes consumer preferences for the attributes of sustainable coffee certifications (Gatti et al., 2022). Additionally, the programme has been investing heavily in building new points of sale for Bird Friendly® certified coffees. This investment led to a 90% increase in the number of roasters offering Bird Friendly® certified coffees between 2021 and 2024.

Finally, the results of this project are being used to revise the Bird Friendly® certification standard with additional options for producers to become certified. Prior to the study, producers could only qualify for certification by maintaining a complex agroforestry system with dense and diverse native shade trees. Our new results show that conservation of both forest patches next to any type of coffee farm conserve more forest specialist species and similar overall diversity of wildlife as complex agroforestry systems. Due to this, we developed a new pathway to obtain certification by setting aside for producers who conserve at least 40% of their land as forest, regardless of how much shade they use in their coffee. The forest must be comprised primarily of native trees, have a developed understory, and a long-term management plan that mitigates deforestation risks due to agricultural encroachment and changes in land tenure. In 2024, Bird Friendly® certified three cooperatives under this new forest-set-aside certification option and is working with an additional five cooperatives to complete the required management plan and certification documents. Collectively, the new certification option is protecting 2,000 ha of primary forest. The project continues to advance conversations with companies that purchase coffee from the study sites to develop long term financial and technical support for biodiversity-friendly farming practices regardless of certification status.
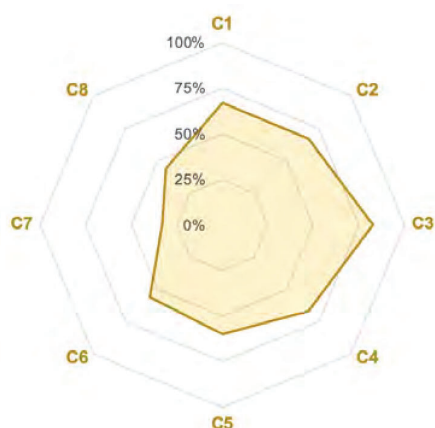

A project technician shares an outreach presentation about best management practices for biodiversity and environmental sustainability with coffee producers, in Santander, Colombia   *Photo: SELVA*

The results of the NbS-SAT are presented graphically in Figure 31 and discussed in the subsequent passages.

Figure 31 Overview of the Global Standard for NbS SAT results: case study 21, Colombia and Peru   *Source: Figure prepared by the authors.*

Strongest criterion: C3 – Biodiversity net gain and ecosystem integrity

Key factors: **C3** is the strongest criterion for the Bird Friendly® coffee project, with indicators 3.1 and 3.2 receiving the strongest rankings within the criterion. The Bird Friendly® programme is focused on biodiversity conservation, and all project activities support this goal. In all four project landscapes, the programme has created and validated land cover models, established habitat indicators of biodiversity, and mapped biodiversity through bird surveys and multi-species occupancy models. We have assessed drivers of forest loss and habitat degradation within coffee farms via producer interviews at local scales and via publicly available datasets at national and international scales. The drivers of forest conversion and degradation have been assessed for each region, and future interventions in each landscape will vary based on these differences.

Research continues in all landscapes to understand which tree species provide the greatest food resources (insects and fruits) and structural habitat for the local bird community. Combined with producer surveys about the utility of these tree species, this research will inform species selection for reforestation and shade-tree enhancement projects. In general, our research shows that: i) birds serve as a good indicator of habitat quality both at landscape and farm scales; and ii) that conserving/rebuilding forests and shade tree diversity on coffee farms are complementary approaches to conserving bird diversity within a farmed landscape.

Second strongest criterion: C4 – Economic viability

Key factors: Indicator 4.1 is our second strongest indicator: "the direct and indirect benefits and costs associated with the NbS, who pays and who benefits, are identified and documented". Success with this indicator has been facilitated by obtaining funding, the expertise of an applied economist, and stakeholder engagement. These resources allowed us to assess the costs and benefits of Bird Friendly® certification across a subset of certified coffee producers, auditors, and roasters/retailers. We have synthesised this information in an internal report that will guide programme decisions and investments in the future. In Colombia and Peru, specifically, we conducted interviews of about 1,000 producers to understand the costs, benefits, and barriers to plant or maintain native vegetation on and off coffee farms. This work was supported primarily from grants from philanthropic and academic organisations.

Project technicians share an educational poster that describes best practices in coffee production for birds and biodiversity   *Photo: SELVA*

Weakest criterion: C7 – Adaptive management

Key factors: Weakness in Criteria 7 is primarily due to a lack of capacity to create structured, long-term monitoring and evaluation plans. Current monitoring and evaluation occur in an ad hoc manner that is not formally described within a long-term work plan.

Second weakest criterion: C8 – Sustainability and mainstreaming

Key factors: This is owing to lack of capacity to engage local and national governments and identify relevant policy and laws that support the goals of the project. Those are key opportunities for project expansion in the future, and the project has now successfully solicited an additional year of funding to participate in conservation planning processes with local government and NGOs in two of the three project landscapes. We use the LandScale platform to guide this conservation planning process. LandScale[1] is the first online platform to synthesise global requirements and reporting procedures for sustainability assessments of large landscapes. The platform uses a participatory conservation framework to guide a rigorous assessment of four sustainability pillars within a landscape: ecosystems; human well-being; governance; and agricultural productivity. The platform also performs a sequential audit of the sustainability assessment to ensure that local communities and stakeholders are engaged, and that all relevant data sources are incorporated.

Main lessons and challenges

Some key lessons learned are:

- The assessment process demonstrated the strong project focus on environmental criteria and outcomes and revealed weaknesses in monitoring and evaluation. Completing the Global Standard for NbS-SAT would be particularly useful during the creation of a new project and at multiple time points during an intervention to ensure a project starts with and executes a plan that complies with a wholistic sustainability framework. However, as our project is a continuation of a certification programme that started 20 years ago for specific biodiversity conservation goals, the application of the Global Standard for NbS-SAT demonstrates some of the ways that best practices have evolved and broadened within the NbS field over that time period. The evaluation is therefore a useful exercise even for established projects that seek to improve both process and outcomes.

- After completing two different rounds of surveys and interviews with local communities, it became clear that our biological research would have been better designed if we had waited to select monitoring locations and focal tree species until after interviews were conducted. For example, we overlooked some common tree species that producers report as being of high importance locally and included some tree species that ended up being rare, poorly known, or not preferred by producers. Given the results of the Global Standard for NbS-SAT overview, it became clear that the project missed an opportunity to collaborate and align with other complimentary local and international projects.

- For the future, the project will ensure that some funding and staff time is allocated to engage local community leaders, local government officials, and other groups that may be working in the area. It was also clear that our monitoring, evaluation, and adaptive management strategy had been pursued in an ad-hoc manner rather than as a fully developed component of the project. Following this result, the project will develop a longer term and more formal monitoring and evaluation plan in future project proposals and planning sessions.

- The most successful aspects of the NbS draw from the legacy and experience of managing a coffee certification for over 20 years. Although the monitoring and evaluation conducted thus far have been pursued in an ad hoc manner, it allowed for the identification of critical barriers and potential solutions for increased implementation of biodiversity friendly farming. Moving forward, monitoring and evaluation will be conducted more frequently to identify opportunities and overcome barriers is a timely manner.