



GLOBAL CENTRE ON  
BIODIVERSITY  
FOR CLIMATE

# Evidence Synthesis Report

A year of action

*November 2023*

## About the Department for Environment Food and Rural Affairs

The Department for Environment Food and Rural Affairs (Defra) is the UK Government department responsible for safeguarding our natural environment, supporting our world leading food and farming industry, and sustaining a thriving rural economy. This broad remit means that Defra plays a major role in people's day-to-day life, from the food we eat, and the air we breathe, to the water we drink. Defra supports the delivery of His Majesty's Government's ("HMG") international poverty reduction and sustainable development priorities through a breadth of international programming.

## About the Global Centre on Biodiversity for Climate

The Global Centre on Biodiversity for Climate (GCBC) is an international research and development programme that funds research into natural solutions to climate change and poverty. The GCBC was announced at the 26th Conference of the Parties to the United National Framework Convention on Climate Change with £40 million of UK official development assistance funding. Through a series of research grant calls the GCBC will establish a global network of research institutions and experts to address critical research gaps in how the conservation and sustainable use of biodiversity can address climate solutions and improve livelihoods.



# Foreword

In December 2022, the United Kingdom joined representatives from 187 other governments in committing to the landmark Kunming–Montreal Global Biodiversity Framework (GBF) and in doing so pledged to protect nature and address the alarming loss of terrestrial and marine biodiversity on a global scale.

This long-awaited international consensus was heralded as a ‘Paris moment for biodiversity’ in reference to the legally binding Paris Agreement for climate change signed seven years previously. The comparison with climate change is apt because biodiversity and climate change are so closely entwined. The warming planet leads to changing patterns of rainfall and heat stress, to increasing sea-levels, and more to extreme events all of which increase the threat to species and ecosystems globally. But these natural systems can themselves offer a wide range of solutions to help mitigate and adapt to climate change.

Degradation of climate and biodiversity raises particular challenges for nations and peoples in hotter tropical regions, and those challenged by water balance or coastal change. Research to identify and develop new ways to harness biodiversity to tackle the challenges of climate can help these nations adapt to the location-specific challenges they face.

The launch of the Global Centre on Biodiversity for Climate (GCBC) in 2022 marked a significant step in the United Kingdom’s contribution to delivering research to face these challenges, and to develop natural place-based solutions to climate change. This £40 million initiative provides an important opportunity for researchers from the UK and globally to harness the power of biodiversity and explore innovative natural solutions to the climate crisis, creating a more sustainable future for all.

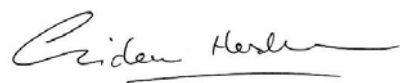
The GCBC’s inaugural year has seen the operationalisation of a concept first pledged at the UK-hosted COP26, with the building blocks of a global centre to tackle biodiversity loss and improve climate outcomes put in place. Central to this has been the appointment of Royal Botanic Gardens Kew and DAI Global as the GCBC’s Strategic Science and Management Leads respectively, who will ensure that the GCBC transitions from concept to delivery of its goals.

Running parallel to this initiation period have been 15 GCBC ‘Phase One’ projects that have worked over a breadth of thematic challenges. These projects have already delivered positive outcomes in the communities in which they have worked and hope to continue to deliver for climate, biodiversity, and people even after GCBC funding ends.

This first GCBC Evidence Synthesis Report presents the key findings of these 15 projects and marks the start of what we hope is a global centre that exhibits the positive impacts that safeguarding nature can have for our climate and people.

## Professor Gideon Henderson

*Chief Scientific Advisor, Department for Environment, Food and Rural Affairs*



Department  
for Environment  
Food & Rural Affairs

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# **Executive Summary**

# About GCBC

Nature and the environment are the bedrock of our planet, which is facing unprecedented changes in climate and biodiversity driven by human activities. The linkages between biodiversity loss, climate change, health, food and economic security, and prosperity have never been clearer. As these interlinked global challenges continue to intensify, the need for co-ordinated, effective, global action based on the best knowledge and evidence is more vital than ever.

The UK government's Global Centre on Biodiversity for Climate (GCBC) looks to address these challenges through a set of Official Development Assistance (ODA) funded research and development projects across priority geographies and themes. GCBC-funded research looks to channel the power of biodiversity to improve climate and poverty outcomes and establish a 'Global Centre' for world-leading research organisations and local

experts to share knowledge and understanding on the sustainable use of biodiversity for climate resilience and development.

Overseen by the UK Department for Environment, Food and Rural Affairs (Defra), the GCBC's first year of operation has seen the appointment of a Hub consisting of a Strategic Science Lead and a Management Lead, Royal Botanic Gardens Kew and DAI Global respectively, who will implement the programme moving forward. Alongside these appointments, the GCBC has funded 15 innovative projects chosen to address a set of thematic challenges in Latin America and the Caribbean, sub-Saharan Africa, and South-East Asia and the Pacific. This Evidence Synthesis Report looks to evaluate and celebrate the achievements of these projects and provide essential guidance into the future direction of the programme.

# GCBC in 2022



**15 projects funded**



**£11.5m invested** in the use of sustainable biodiversity activities for climate resilient development



**28 countries reached** by GCBC funding



**Over 90 delivery partners**



## Key Progress Towards the GCBC's Goals

➤ **£550k** public and private finance leveraged to support effective climate resilient development via the conservation and sustainable use of biodiversity.

**28** case studies of tools or solutions developed using GCBC funding that demonstrate change.

**95** knowledge products that improve operation and implementation of sustainable biodiversity activities on the ground.

**128** research partnerships strengthened or formed because of GCBC input.

➤ **3500** people engaged in GCBC-led research activities.

**19** knowledge products that support policy implementation of sustainable biodiversity activities.

## Key Findings

During its first year of operation, the GCBC has worked across three broad thematic foci:

- Key pressures, such as agriculture, food systems, and natural resource management, that have serious negative impacts on livelihoods, nature, and climate.
- Enablers of change – instruments, data, finance, and governance – required to benefit livelihoods, nature, and climate.

- Evidence gaps, which, if targeted, will increase uptake of solutions and interventions to address the causes and consequences of poverty, biodiversity loss, and climate change.

Below these overarching themes there have been multiple challenges that GCBC projects have looked to address.





## Pressures

**Food systems:** In Malaysia, the Innovative Seaweed Aquaculture project conducted laboratory studies that, for the first time, confirmed that the 'ice-ice' disease, which can lower the yield of seaweed farms and the market value of affected crops, is triggered by environmental stress. This evidence will enable the development of farm management guidelines and disease risk monitoring that will optimise cultivation techniques to limit exposure to climate change induced stressors.

**Infrastructure/urbanisation:** In the Philippines, the Bio+Mine project accessed the disused Sto. Niño mine site and completed a stakeholder engagement and sampling programme, paving the way for future work to restore sites with a negative legacy.

**Pollution:** In South Africa, the Environmental Pollution project team tested the use of disposable nappies and biochar from black wattle (an invasive tree species) as fertilisers in degraded and abandoned agricultural lands, with early evidence showing greater crop growth.



## Enablers

**Governance:** The OneFood project team have successfully achieved co-ownership of the OneFood concept with the South African government. This will facilitate greater uptake of project activities in future years of operation and has led to the development of a joint fellowship scheme for conducting in-depth research on tools to assess hazards in the country's food systems.

**Governance:** The TerraViva project created a community-led governance model that integrates strategies for climate resilience, low-carbon, and sustainable growth in a coffee-growing region in Colombia. The project can act as a model for community-led initiatives in many productive landscapes.



## Evidence Gaps

**Restoration and conservation solutions:** The ARBOLES project conducted the first large-scale evaluation of hydraulic attributes across Amazonia. The project found that while Southern Amazonian forests are the most resistant to drought in the region, they face the greatest risk and highest temperatures.

**Restoration and conservation solutions:** The KELPER2 team showed that kelp forests recover faster in managed areas and found evidence that supports kelp's importance as a blue carbon donor in the Pacific.

**Restoration and conservation solutions:** Over 4,500 timber samples were collected by the Central and Eastern European Conflict Timber project team, leading to the development of predictive models to trace timber origins of samples of interest in the region.

**Small Island Developing States:** The DEEPEND project has yielded a remarkable set of scientific results, including the isolation of bacteria from deep-sea regions that show antibiotic activity and anticancer properties.

Building on this progress, the GCBC Hub and delivery partners will continue to fight the interlinked climate and biodiversity crises while tackling poverty on a

global scale to meet global targets and support our planet, people, and livelihoods towards a sustainable and prosperous future.





# Introduction

# Background

In their Sixth Assessment Report, the United Nations' (UN) Intergovernmental Panel on Climate Change (IPCC) stated with high confidence that global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2000 years (IPCC, 2023). The devastating impact of this is evident around the world, with weather and climate extremes breaking records at alarming frequency, species loss at a greater rate than at any point in history, and the World Health Organisation identifying climate change as the single biggest health threat facing humanity (WHO, 2021).

Occurring alongside the climate disaster, biodiversity – the diversity within species, between species and of ecosystems – is declining faster than at any other point in human history (IPBES, 2019). According to the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES), biodiversity loss is caused by five key connecting drivers, one of which is climate change. Biodiversity loss and climate change are intrinsically interlinked – just as climate change alters habitats and ecosystems, loss of biodiversity contributes to climate change and intensifies its effects.

The effects of biodiversity loss are profound, not least on climate change itself. Ecosystems such as forests, croplands, peatlands, and wetlands are globally significant carbon sinks. The conservation and

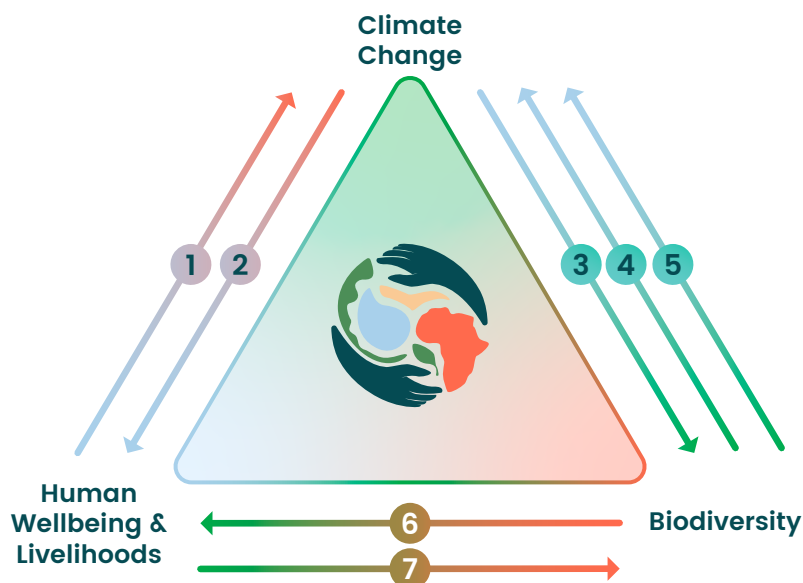
restoration of these terrestrial and marine ecosystems is essential for limiting carbon emissions and could provide up to a third of the mitigation effort required until 2030 to limit climate warming below 2°C (IPBES, 2019).

People are intrinsically connected to biodiversity loss and climate change. We have experienced remarkable growth and prosperity over the past 50 years; however, this has come at a heavy cost to the natural systems that underpin life on Earth. Land-use change arising from human activity is the single biggest driver of biodiversity loss worldwide (Jaureguiberry et al., 2022). Biodiversity loss and climate change negatively impact people, particularly in the Global South, where the effects of poverty are exacerbated by these crises. People living in the poorest populations are more likely to suffer from a climate related disaster than those in developed nations (IPCC, 2023), and the loss of biodiversity has a substantial impact on livelihoods in the most vulnerable communities as they are more likely to rely on natural capital for their livelihoods (IPBES, 2019).

The nexus between climate, biodiversity, and people creates a complex relationship, with dangerous events in one negatively impacting on the other two. This close relationship also presents positive opportunities to take meaningful action, and it is here that the Global Centre on Biodiversity for Climate looks to act. (Figure 1, adapted from Korn et al., 2019).



Figure 1 – The Climate Change, Biodiversity and Human Wellbeing &amp; Livelihoods nexus, adapted from Korn et al., 2019



\*adapted from Korn et al., 2019

- 1 **Human impact on climate change:** Increase in GHG concentrations
- 2 **Climate change impact on humans:** Increased risk of natural disaster / drought / rising sea levels
- 3 **Climate impact on biodiversity:** Irreversible loss of ecosystems and their organisms
- 4 **Mitigation:** Global carbon sinks
- 5 **Adaptation:** Resilient crops / disaster management solutions
- 6 **Biodiversity benefits on human wellbeing and livelihoods:** Food security / water security / medicine development / economic opportunities
- 7 **Human impact on biodiversity:** Land and sea use change / direct exploitation / pollution / invasive organisms

## Building the GCBC

The Global Centre on Biodiversity for Climate (GCBC) is a UK Official Development Assistance (ODA) research and development programme that funds research into natural solutions to climate change and poverty.

By bringing together scientists, managers, and in-country practitioners, the GCBC seeks to address critical research gaps and develop scalable approaches to the conservation and sustainable use of biodiversity that delivers climate solutions and improves livelihoods of some of the world's most vulnerable populations. Through a series of research grant calls, the GCBC will build the evidence base needed to:

- Improve resilience to climate impacts, support sustainable livelihoods and economic opportunities, and reduce carbon emissions and biodiversity loss.
- Foster collaboration between experts and research disciplines to inform policy and unlock finance for biodiversity-based solutions to climate change and poverty.
- Incorporate strong engagement from Indigenous Peoples and local communities to design and deliver projects based on local need.
- Identify and disseminate policy-relevant good practice which can be scaled up and replicated.
- Deliver on our international climate and biodiversity commitments and implementation of the Sustainable Development Goals.

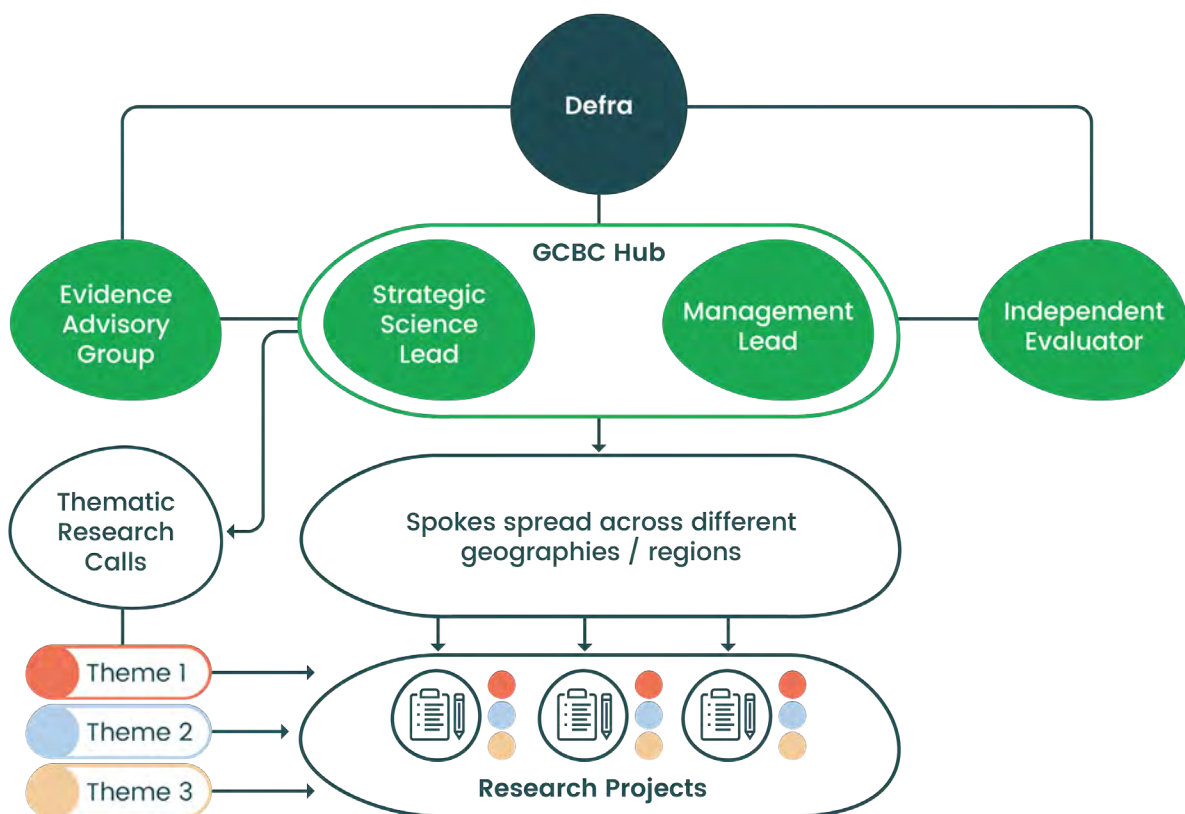
## Structure and Governance

In 2022, the GCBC programme undertook a scoping exercise in collaboration with the Joint Nature Conservation Committee (JNCC) to identify projects that align with its overarching objectives. The result of this work was the identification of a range of thematic challenges that the GCBC has looked to address through the funding of 15 research and development projects within, but not limited to, its priority geographies: Sub-Saharan Africa, Latin America and the Caribbean, and Southeast Asia and the Pacific.

By acting across a breadth of thematic foci, these projects have provided the GCBC with invaluable lessons on the key areas that future GCBC-funded projects should target moving forward. This research vision has been mapped out by the programme's Strategic Science Lead, Royal Botanic Gardens (RBG) Kew, in a Research Strategy that will guide the GCBC throughout its lifetime.

While the first year of the GCBC has been delivered by Defra, future programme delivery will be led by a recently formed 'Hub' comprised of Royal Botanic Gardens Kew as the Strategic Science Lead and DAI Global as the Management Lead. The Hub will oversee the delivery of GCBC funding, working with grant recipients to drive progress towards the programme goals. An Evidence Advisory Group, comprising experts from a diverse range of backgrounds and geographies, has also been formed to provide independent advice and scrutiny on the design, scope, outputs, and overall strategic direction of the GCBC. In subsequent years, the GCBC plans to procure the services of an Independent Evaluator for the programme who will be responsible for evaluating the GCBC's performance, processes, and impact.

Figure 2 – Hub Structure



## About this Evidence Report

As the GCBC moves forward into 'Phase Two' (2023 and beyond) of the programme, it is important to look back on the achievements and outcomes of the funding allocated to 15 projects which tackled a range of biodiversity and climate challenges across the world. This report brings together the work undertaken during the first year of GCBC funding and explores the progress

made against the GCBC's Theory of Change. Included in the report are key findings from across the project portfolio and a close look at some of the innovative tools and solutions developed to tackle interlinked climate-poverty-biodiversity crises. Finally, this report looks forward to the future of the GCBC.

Figure 3 – Geographic distribution of GCBC Phase One portfolio



- 1 Nature Transition Support Programme
- 2 TerraViva
- 3 NERC LATAM projects: ARBOLES, CONTAIN, KELPER2, SABIOMA
- 4 Plant bio-resources as nature-based solutions in African biodiversity hotspots
- 5 OneFood
- 6 Environmental pollution
- 7 Innovative Seaweed Aquaculture
- 8 DEEPEND
- 9 Bio-Mine
- 10 Investing in Impact Evaluation
- 11 Transparency and Traceability of Forest Risk Commodities
- 12 Central and Eastern European Conflict Timber Project

# Strategic Approach

The GCBC's Theory of Change, developed during the first year, outlines an impact pathway through which the GCBC triggers a series of steps that will lead to the desired **long-term impact** of the programme: "Positive impacts for biodiversity, poverty alleviation, and improved ecosystem resilience to climate change".

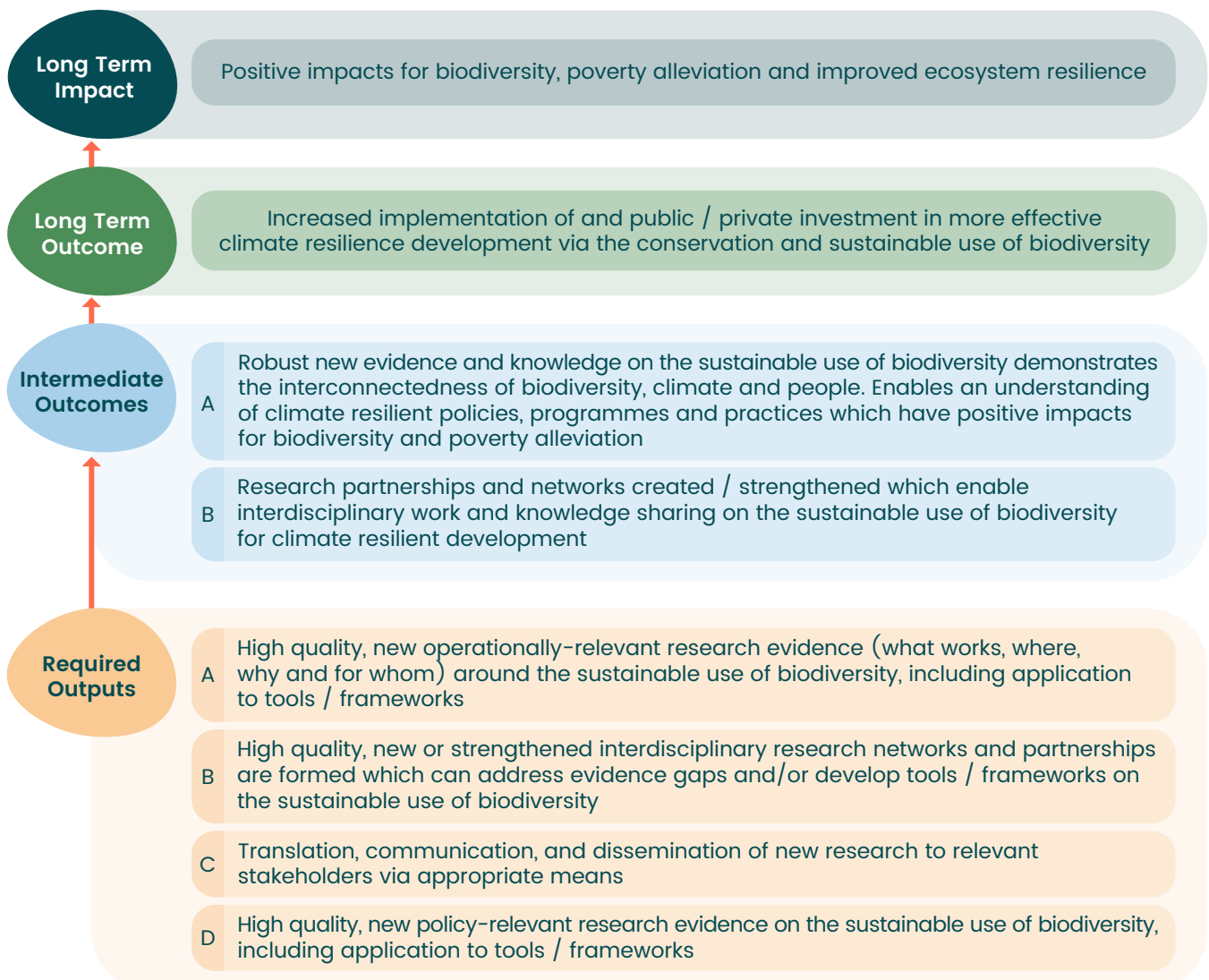
The key **long-term outcome** required to progress towards this impact is an increase in the implementation of, and public/private investment in, more effective climate resilient development, harnessing the sustainable use of biodiversity. Sustained investment during and after the GCBC's lifetime is essential to ensure that the programme impact is reached and maintained. Increasing implementation of, and investment in, effective climate resilient development relies on multiple **intermediate outcomes** to be directly delivered by the programme.

The first intermediate outcome is the creation of a robust new evidence base that increases knowledge on the sustainable use of biodiversity and

demonstrates how interventions and policies can lead to positive climate and poverty outcomes. Secondly, the GCBC aims to build a research network for interdisciplinary work and knowledge sharing of ideas developed through GCBC research.

Meeting these intermediate outcomes will provide both the evidence required for, and awareness of, effective climate resilient development solutions via the sustainable use of biodiversity. This evidence, in combination with effective dissemination, will lead to the desired increased implementation of, and investment in, such activities beyond the GCBC. Evidence produced through the work of the GCBC's research consortia will be synthesised at a systems level and findings will be translated and disseminated through the GCBC's global network. A logical framework containing programme-level indicators has been developed to track the progress of the GCBC towards the impacts, outcomes, and outputs outlined in its Theory of Change.

Figure 4 – GCBC Theory of Change



# Key achievements of GCBC's Phase One projects

The GCBC is making significant progress against the impact and outcomes outlined in the Theory of Change, with evidence suggesting that transformational change is likely to occur from the GCBC projects funded in the first year. Transformational change is defined as 'change that catalyses further changes', enabling either a shift from one state to another or faster change. This can entail a range of simultaneous transformations to political power, social relations, decision-making processes, equitable markets, and technology.

## Over £550,000 of public and private finance leveraged to support effective climate resilient development via the conservation and sustainable use of biodiversity

- £200,000 of public finance leveraged came from a grant from the US Forest Service for sample collection on the Central and Eastern European Conflict Timber Project.
- The Tropical Important Plant Areas (TIPAs) project in Africa leveraged around £250,000 private finance from three separate sources.
- GCBC funding has leveraged £171,000 from the Tinker Foundation to support the TerraViva project in Gaitania.
- Both public and private finance leveraged is expected to increase as the GCBC programme progresses and focuses on its long-term outcome objectives.

## 28 case studies of tools or solutions developed using GCBC funding that demonstrate change

- The OneFood project has made progress in achieving buy-in from South African partner

policymakers and South African co-ownership of this innovative concept. This has been demonstrated through the set-up of a fellowship scheme that will support career development focusing on the OneFood concept in South Africa.

- The TerraViva project has worked with stakeholders in the Gaitania area located in Colombia's Tolima region to develop a Common Territorial Agenda that will serve as a plan for promoting sustainable and equitable land use in the area. Five actionable strategies were further co-created and validated by the community through an innovation and learning event called Ideatón Gaitania Innova.

## Knowledge sharing between new research partnerships formed through the GCBC

- The Environmental Pollution project gained invaluable knowledge on the functionality of water sources in KwaZulu-Natal, South Africa, through household surveys in the local area.
- The OneFood Community of Practice (CoP) has been established, which allows stakeholders to co-learn and develop solutions through which biodiversity can be integrated into food systems. As of April 2023, the CoP has 100 members.
- Initial challenges setting up nursery farms in Malaysia were overcome by working with local seaweed farmers to utilise unique farming methods and ensure progression of the Innovative Seaweed Aquaculture project.



### 95 knowledge products that improve operation and implementation of sustainable biodiversity activities on the ground have been produced

- A database of carefully curated existing occurrence records has been established for Ethiopian endemic plant species, providing a valuable tool for future conservation planning in the region.
- Geohazard, water quality, and ecosystem maps of the disused Sto. Niño mine in the Philippines have informed the development of a system to rehabilitate the mine that will be implemented by the Bio+Mine project.
- A free-to-use interactive cloud-based tool, Your Maps Your Way (YMYW), has been developed by the SABIOMA team. This allows local experts and stakeholders to collaboratively produce local land cover maps to assess ongoing land use change in any region globally.

### 128 research partnerships strengthened or formed because of GCBC input

- 70 partnerships with public organisations, such as governmental departments, museums, and universities.
- 23 collaborations with private sector entities.
- 35 collaborations with the third sector, including non-governmental and charitable organisations.

### Over 3500 people engaged in GCBC-led research activities

- The Royal Botanic Gardens Kew African TIPAs & Bioresource projects reached 22 communities and over 400 farms in Ethiopia with the Payment for Agricultural Conservation Services (PACS) scheme, using enset (wild banana) as a trial crop;

six communities in plant nursery and community awareness training programmes in Guinea; and ten schools and around 100 children in a school training programme in Guinea.

- During the TerraViva project, 64 community members from four villages participated in a series of six workshops in which participatory tools and processes facilitated a group vision built on the collective strengths and aspirations of coffee farmers to develop solutions to holistically manage various land uses in their region.
- Over 300 participants attended a NERC ARBOLES end-of-project meeting to focus on solutions to forest degradation in the Amazon. These included key policymakers from the state government and representatives from the private and third sectors.

### 19 knowledge products produced that support policy implementation of sustainable biodiversity activities

- A brief that provides policy recommendations to ensure the long-term sustainability of natural seaweed stocks in a time of increasing demand has been produced by the Innovative Seaweed Aquaculture project.
- An Evidence Gap Map (EGM) containing 557 impact evaluations and 39 systematic reviews of land use change and forestry interventions was developed by the Investing in Impact Evaluation project. This EGM will help policy makers make evidence-informed decisions on programming and future allocation of resources for research.
- The OneFood project has produced a 'Policy Tipping Point' review to highlight the activities required to deliver change in the food sector.





# **GCBC Phase One Portfolio**

# TerraViva

## Piloting a living laboratory approach to sustainable agriculture

**Countries:** Colombia

**Partners:** TerraViva Consortium – Sustainable Agriculture Network (SAN), Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT), Fundacion Natura, Inter-American Institute for Cooperation on Agriculture (IICA)

### Background

Integrated landscape approaches have emerged as a spatial unit for holistically managing various land uses and stakeholder needs within a region. It is a governance strategy that acknowledges the interdependencies of human and natural systems and seeks to optimise synergies and minimise trade-offs to harmonise wellbeing of rural communities with their environment. TerraViva is an emerging landscape management initiative, piloted in coffee-dominated landscapes in the Gaitania area of Tolima, Colombia. It supports the creation of an holistic plan with embedded platforms of good governance, wellbeing, livelihoods, and traditional leadership to help small scale producers and their communities adapt to climate change and live in harmony with nature. The goal of TerraViva is to create a long-term development vision, or Common Territorial Agenda (CTA), built from the perspective of local stakeholders that leads to a collection of solutions to meet both production and environmental goals of the territory.

### Activities

Throughout the study, SAN worked with four coffee-producing villages in the Gaitania area, utilising participatory tools such as appreciative inquiry and community capitals framework to encourage communities to focus on the human and natural resources they already possess and how these can be used to benefit the community. To produce the final CTA, a two-stage process was followed by the team. Firstly, data collection and analysis were undertaken that included focus group discussions,

gender analysis, coffee value chain mapping, and GIS mapping. A data democratisation step followed, where stakeholder workshops and a multi-stakeholder forum were used to share data that contributed to a proposed list of actionable solutions to form the basis of the CTA. The strategies in the CTA were then validated through an event named *Ideatón Gaitania Innova*, during which local stakeholders worked together to refine the actionable strategies within the framework of the CTA.

### Achievements

At the end of the 9-month study, the team gathered valuable insights into the key factors contributing to the success of community-led development visions and the great potential of using participatory tools and process to promote sustainable development and secure livelihoods at the local level. The approach had immediate and observable effects on the people and generated great enthusiasm and cooperation as evidenced by the commitment of the communities to work together to develop the CTA. The CTA contained 31 mutually exclusive and actionable strategies that could advance the community towards a common vision of productive, social, and environmental wellbeing. Following *Ideatón Gaitania Innova*, the CTA was used to develop ten actionable strategies for the Gaitania region. Six of these strategies were presented to the public, and five were selected for implementation in the region:

- Recycled plastic poles: Reduce deforestation by replacing the wooden poles with recycled plastic

posts in bean, grandadilla, and pea producers' drying stations.

- Green filters: Treatment of coffee wastewater (honey water) using a green filter.
- Bio-factory: Production of bio-inputs for agricultural production in the village which could improve crop quality and reduce the need for chemical inputs.
- Coffee school: Training space on good practices for coffee cultivation with a demonstration plot which could improve coffee quality and marketing.
- Efficient stove provision: Provision of efficient stoves for households in the village that still use wood for cooking to reduce pressure on forests.

In addition to these, a guide was produced to help other organisations develop similar methods in the future. This will inform a larger-scale programme of work seeking to impact approximately 100,000 people from eight Colombian municipalities with 60,000 hectares of coffee-dominated landscapes.

**Success Measures:** 1 case study demonstrating change • 6 operationally relevant knowledge products • 6 policy relevant knowledge products • 13 consortium staff • 106 local stakeholders at activities across the project

# Bio+Mine

## Biodiversity positive mining for the net zero challenge

**Countries:** Philippines

**Partners:** UK: Natural History Museum, Imperial College London **Philippines:** De La Salle University, Mindanao State University– Iligan Institute of Technology (MSU-IIT) **Australia:** University of New South Wales Sydney (UNSW)

### Background

Mines deliver essential metals that are crucial for the energy transition to address climate change. However, their legacy has often resulted in areas that have physio-chemical properties that are unable to support sustainable post-mining activities and can have negative impacts on local ecosystem biodiversity and communities. The Bio+Mine project, focusing on the Sto. Niño mine site in the Philippines, aims to devise sustainable interventions for degraded mine sites that leave nature positive sustainable landscapes.

### Activities

The Bio+Mine project delivered an in-depth audit of the abandoned mine site in terms of geological, hydrogeological, ecological, and social parameters. The project utilised low-cost drones for remote sensing and monitoring, advanced automated mineral characterisation tools for rapid and thorough analysis of mineralogical materials, and rapid environmental DNA techniques for sampling water, soils, and waste materials.

### Achievements

The Bio+Mine project secured the necessary social licence with regulators and stakeholders to access the Sto Niño mine site and completed both extensive stakeholder engagement and a field sampling program. This included water sampling at 40 sites; soil and rock sampling from more than 80 sites; 45 samples taken from mining wastes; ecological samples including plants, invertebrates, soil, and water extracts for genomic studies; a programme of >140km of drone remote sensing deployment; and more than 500 social interactions with local stakeholders.

These activities and the ongoing analytical programme have yielded an integrated social, geological, and ecological dataset from both the impacted site and non-impacted background areas.

Phase Two of the project will see the team work with Indigenous Peoples and local communities to jointly implement a series of co-designed interventions for the site, developed from the dataset produced in Phase One, that can characterise and monitor the environmental and biodiversity performance of the Sto. Niño site into the future. The Bio+Mine project aims to serve as an exemplar to be further developed for planning post-mining landscapes elsewhere.

**Success Measures:** 1 case study demonstrating change • 4 operationally relevant knowledge products • 13 research partnerships formed or strengthened • 23 early career staff from the consortium participating in Bio+Mine pilot activities • 380 local stakeholder individuals participating in Bio+Mine pilot activities • 2 policy relevant knowledge products, including a site plan that will serve as a local planning tool



© Bio+Mine



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# OneFood

## Delivering climate resilience through safe and sustainable food systems

**Countries:** South Africa

**Partners:** UK: Centre for Environment Fisheries & Aquaculture Science (Cefas), Animal & Plant Health Agency (APHA); South Africa: Department of Science and Innovation, (DSI); Council for Scientific and Industrial Research (CSIR); Human Sciences Research Council (HSRC); National Agricultural Marketing Council, (NAMC); Agricultural Research Council, (ARC); Department of Forestry, Fisheries and the Environment, (DFFE); FCDO SIN regional office; Intergovernmental: FAO; plus 13 other partners

### Background

The indivisible link between food production and nature means that actions on food security impact the environment and vice versa. Climate change adds further complexity to this problem. The combination of these facts is thus a difficult balance that requires a clear understanding of the impacts associated with exploitation of the natural resources and the needs of the communities consuming the food. Hazards drive inefficiencies in food systems. These include those that impact food production and those hazards posed to the environment by production itself. To date, little consideration has been afforded to linkages between specific hazards in driving inefficiencies within and between food sectors or the impact that multiple hazards have on food system efficiency and sustainability. In addition, appropriate investment in hazard control has not been articulated relative to potential gains for biodiversity or reductions in climate impacts resulting from improved food sector efficiency. The OneFood project places hazard profiling and management at the heart of environmentally, economically, and socially sustainable food system design. It seeks to develop new tools for calculating the impacts of hazards occurring between food sectors and considers the consequences for the environment and human, animal, and plant health. The project will map hazards across and between food sectors with selected partner countries, inform modelling of terrestrial and aquatic sectors applicable across multiple geographic and food sector contexts, and examine the food systems in the context of the Sustainable Development Goals and biodiversity targets.

### Activities

During the first year of implementation, the OneFood project has operated in South Africa. There, a variety of activities have been implemented to make progress on the key questions of the project including:

- Working extensively with the South African government to achieve co-ownership of the OneFood concept.
- Forming the OneFood fellowship scheme with the South African government. This will provide in-depth research on tools to assess hazards in South African food systems and will support postdoctoral fellows and MSc studentships.
- Establishing the OneFood Community of Practice platform to co-learn and develop solutions to integrate biodiversity into food systems.

- Hosting an international OneFood workshop to enable cross-disciplinary engagement.
- Gathering base information, for example, the production of reports that map the South African food sector.

Over the next years, the project will: continue to recruit postdoctoral and master's candidates through the OneFood fellowship scheme; conduct further hazard mapping and analysis; develop and test biodiversity and climate assessment methods; and further develop the OneFood economic model.

**Success Measures:** 2 case studies demonstrating change • 12 operationally relevant knowledge products • 19 research partnerships formed or strengthened • Over 200 people engaged in OneFood activities • 2 policy relevant knowledge products

# Innovative Seaweed Aquaculture

## A nature-based solution for biodiversity restoration and poverty alleviation in a time of accelerating global climate change

**Countries:** Malaysia

**Partners:** UK: Natural History Museum and the Scottish Association for Marine Science (SAMS)

**Malaysia:** University of Malaya, Jabatan Perikanan Sabah Fisheries Department

### Background

Seaweeds form some of the most productive marine ecosystems, supporting a greater diversity of species than almost any other marine habitat and providing a wide range of ecosystem services critical to the health of the oceans. Despite their vital role in the global food supply chain, there has been very little effort to protect them. Their conservation remains patchy or non-existent globally. Increasing demand and temperatures mean that seaweeds are predicted to lose up to 71% of their current distribution under certain climate change scenarios by 2100. The Innovative Seaweed Aquaculture project seeks to address this by developing new temperature-resilient seaweed stocks for farming and by outlining protection measures for seaweed globally. Seaweed cultivation offers a potential nature-based, carbon neutral, and climate resilient solution to restore seaweed forests globally and alleviate poverty, particularly in the Global South. The project is being delivered via two main workstreams: i) the sustainable cultivation of novel red seaweed eucaumatoid strains collected locally from the wild; and ii) the conservation and management of wild seaweeds and cultivars around the world.

### Activities

The project performed a series of acclimation studies of novel red seaweed strains, Eucheumatoids, that involved the sharing of knowledge between farmers and scientists. Eucheumatoids are a major source of the hydrocolloid carrageenan which is widely used in the food and cosmetic industries for its gelling, thickening, and stabilising abilities. Activities included sample collection, acclimatisation to local farm conditions, and cultivation at a local seaweed farm. At the same time, samples were tested in the laboratory to identify temperature-resilient strains that could potentially be used as new farm cultivars. For further information on the project activities, please see 'Case Study 3: Developing novel seaweed cultivars from wild populations'.

### Achievements

The project's sampling trips resulted in the collection of 683 wild red seaweed samples, the most ever collected in Malaysia for use in cultivar development from wild populations. A novel cultivation approach has highlighted the need to change current cultivation methods when working with wild collections of red seaweeds. For the first time, laboratory studies have confirmed that ice-ice, where a loss of pigmentation is followed by tissue degradation, is triggered by environmental stress. Developments of new cultivars will enable the local indigenous community to better adapt to the effect of climate change. Coupled with results from acclimation research this will improve the long-term resilience of the seaweed industry.



An impressive, annotated repository of >300 papers on seaweed aquaculture and wild harvesting has also been produced. Further key results include a dataset summarising industry location for 73 countries, a Marine Protected Areas (MPA) dataset categorising seaweeds protection status, a policy brief in association with the United Nations University and a draft Global Seaweed Conservation Strategy.

**Success Measures:** 1 case study demonstrating change • 2 operationally relevant knowledge products • 2 research partnerships formed or strengthened • 28 people engaged in Innovative Seaweed activities, of whom over 85% were Malaysian • 3 policy relevant knowledge products

# ARBOLES

## A trait-based understanding of Latin American forest biodiversity and resilience

**Countries:** Argentina, Chile, Peru, Brazil

**Partners:** UK: 4 universities (Leeds, Lancaster, Oxford and Imperial College London) and the Natural History Museum; Latin America: Universidad Nacional de Cordoba (Argentina), Universidad Austral de Chile (Chile), National Institute for Space Research (Brazil), Instituto de Investigaciones de la Amazonia Peruana (Peru)

### Background

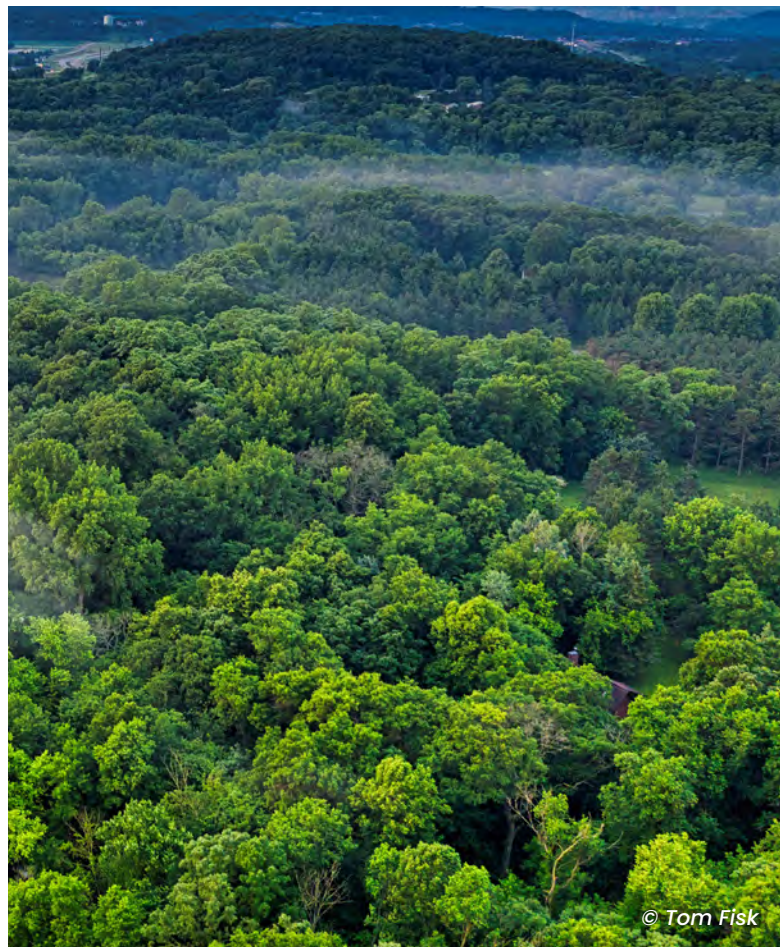
The Amazon rainforest occupies a uniquely important place in the Earth System. Spanning an area of 5.5 million km<sup>2</sup>, the Amazon's forests are the most biodiverse on the planet, absorb 5-10% of global carbon dioxide emissions, and sustain rainfall regionally. However, the invaluable ecosystem and climate services provided by Amazon forests are increasingly under severe pressure from deforestation and changing climate. Concerns have been raised that continued forest loss and climate change may lead to a tipping point, beyond which forests would no longer be sustained and replaced by savanna vegetation. The global change threat to the Amazon is most pronounced in southern Amazonia, where deforestation, maximum temperature increases, and reduced dry season rainfall have been markedly more pronounced than in other Amazon regions. An understanding of how forests in southern Amazonia are changing and their sensitivity to global change stressors is imperative for improved prediction and climate-smart conservation of Amazon forests. ARBOLES aims to understand the plant functional trait basis of Latin America forest biodiversity and resilience by investigating the sensitivity of important southern Amazonian tree species to two key climatic stressors: heat and drought.

### Activities

Two types of activities have been focused on to evaluate climatic sensitivity: i) measurement of traits of adult trees that indicate tolerance limits to climate; and ii) controlled experimental work to evaluate the impact of warming and drought on the performance of key plant species. A variety of research approaches have been used, such as novel large-scale functional trait collection and analysis of trait databases, Forest Inventory Analysis, novel greenhouse warming experiments, and drone and satellite-based remote sensing.

### Achievements

The project delivered the first large-scale evaluation of hydraulic attributes across Amazonia, which featured 11 plots, effectively spanning the entire Amazon Forest precipitation space. This determined that Southern Amazonian forests are more resistant to drought but have the lowest climate safety margins (the difference between physiological stress tolerance levels and current level of stress exposure) for both drought and heat compared with other forests in the region. Additionally, it was found that Southern Amazonian forests are quite resilient to high temperatures when water is plentiful, but that heat amplifies the effect of drought in Southern Amazonian tree species.



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**Success Measures:** 1 case study demonstrating change • 5 operationally relevant knowledge products  
• 2 research partnerships formed or strengthened • 40 people attending the ARBOLES end-of-project workshop

# CONTAIN

## Optimising the long-term management of invasive species affecting biodiversity and the rural economy using adaptive management

**Countries:** Argentina, Brazil, Chile

**Partners:** UK: University of Aberdeen, Queen's University Belfast; Latin America: Unesp (São Paulo State University, Brazil), CONICET (Argentina), Centro de Humedales Río Cruces (Chile), Agricultural and Livestock Service - SAG (Chile)

### Background

The CONTAIN project works across the Latin America region with an aim of realising the multiple environmental, social, and economic benefits and co-benefits of managing Invasive Alien Species (IAS) in a cost-effective manner. The projects objectives are to:

- Move from efficacy to efficiency when evaluating IAS management by considering wider costs and benefits associated with each management action, such as those that scale up with the number of invaders and costs associated to ecosystem services changes brought about by IAS.
- Evaluate and model the capability of invasive trees to provide carbon sequestration ecosystem services as a trade-off against the loss native plant communities, biodiversity, ecosystem services, resilience, and carbon above and below ground. This will inform the ongoing debate on the benefits and limitations of carbon sequestration by native trees as a nature-based solution.
- Evaluate how incentives, such as compensation for the loss of income and sources of income, may contribute to the sustainability of participatory control of IAS for rural communities so heavily affected by IAS that their livelihoods are in peril.

### Activities

The CONTAIN project developed dynamic ecological-economic models to evaluate the desirability of IAS management interventions using the RS-CONTAIN agent-based modelling platform. To do this, the project has undertaken costs of management and restoration studies and monitored the above and below ground carbon benefits of these. These studies were supplemented with field surveys and stakeholder interviews before an economic efficiency evaluation of alternative management interventions was carried out. This finally led to the development of ecological-economic models.

### Achievements

The project successfully reviewed and approved American mink control Plan for Lago Puelo National Park, with detailed Annexes on Methodology, in Spanish. At least five scientific articles are currently in development, and the project has resulted in emulating participatory approaches used in Argentina to be further refined in Chile.



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**Success Measures:** 6 operationally relevant knowledge products • 14 research partnerships formed or strengthened

# KELPER2

## Impacts of kelp harvesting for marine biodiversity and ecosystem services

**Countries:** Argentina, Chile, Peru

**Partners:** UK: Newcastle University, Marine Biological Association, Scottish Association for Marine Science;

Latin America: IMARPE (Peru), IBIOMAR (Argentina), Catholic University of Chile (Chile)

### Background

Wild kelp harvesting is an important industry in Latin American countries, especially in Chile and Peru, with over 40% of global brown algal landings originating from these two countries and where over 13,000 people are directly employed by the industry. With previous work showing that poorly managed kelp harvesting alters the structure and formation of kelp forests, KELPER2 aims to explore the drivers that reduce the resilience of kelp forests and their carbon storage potential to different sustainable harvesting regimes.

### Activities

During the implementation period, KELPER2 conducted extensive fieldwork in Peru with surveys on kelp forests and marine heatwave experiments. Through ecological and molecular techniques, the project sought to further understand the resilience of local kelp species to environmental change and harvesting. The project also organised a writing retreat connecting several partners and ensured transfer of knowledge through a series of workshops aimed at fishers and government agencies.

### Achievements

KELPER2 contributed to the generation of new knowledge and evidence around kelp forests in Latin America. Findings included:

- Kelp forest recovery is faster in managed areas due to more intact predatory fish assemblages reducing kelp consumption by herbivores.
- High levels of productivity, kelp detritus, and proximity to continental shelf suggest importance of kelp as a blue carbon donor along the Pacific coastlines of Latin America.
- Kelp supports diverse faunal assemblages and is resilient to heatwaves but results also show that kelp may be susceptible to harvesting.
- Latin American kelp forests provide a wealth of ecosystem services valued at US\$90 million per year.



**Success Measures:** 4 operationally relevant knowledge products, including an annotated genome to *Eisenia cokeri* • 16 research partnerships formed or strengthened • Over 50 people attending the KELPER2 activities



# SABIOMA

## Safeguarding biodiversity and climate resilience

**Countries:** Argentina

**Partners:** UK: UK Centre of Ecology & Hydrology; **Argentina:** University of Buenos Aires, The National University of Córdoba, The National University of Tucuman, The Catholic University of Salta

### Background

SABIOMA looks to develop integrative solutions to design nature-based solutions that promote biodiversity, increase resilience to climate change, and contribute to sustainable livelihoods in Argentina's agro-ecosystems.

### Activities

The SABIOMA project used a variety of methods to measure and monitor biodiversity. These included using Automated Monitoring of Insects (AMI) traps and bird acoustics recordings to monitor changes and response to environmental changes. The project also developed Your Maps Your Way, an open-source tool using Google Earth Engine to produce bespoke land cover maps. Work in the Gran Chaco, Espinal, and Pampas regions focused on conservation, restoration, and sustainability with local stakeholders in different socio-ecological systems. The team first mapped problems before running workshops with local stakeholders to find acceptable solutions for the challenges faced.

### Achievements

The project established a constellation of 8 Automated Monitoring stations in four key habitat types in Argentina, which now forms part of a global network of monitoring devices. A key achievement was the development of Your Maps Your Way, an interactive cloud-based tool to collaborate with local partners to map land use change. Over the next years, the project will focus on implementing and monitoring the efficiency of nature-based solutions in Argentina's agricultural landscapes, acting on knowledge gained from stakeholder workshops. SABIOMA also seeks to strengthen cross-sector collaboration and promote systems thinking, and work with government, agribusiness, supply chains, and customers to develop viable market opportunities.



# Transparency and Traceability of Forest Risk Commodities

**Countries:** Global

**Partners:** World Resources Institute (WRI), Food and Agriculture Organization (FAO)

## Background

The Traceability and Transparency (T&T) research project forms a UK contribution towards the international dialogue on the traceability and transparency of supply chains of internationally traded agricultural commodities and supports discussions in the Forest, Agriculture, and Commodity Trade (FACT) Dialogue. During its COP26 Presidency, the UK launched the FACT Dialogue with Indonesia as co-chair. The government-to-government Dialogue brings together 28 of the largest producers and consumers of Forest Risk Commodities (FRCs), such as palm oil, soya, beef, cocoa, and timber, to protect forests and other ecosystems while promoting sustainable trade and development and addressing the climate and biodiversity crises. The T&T research report aims to analyse the state of global traceability and transparency systems to provide key stakeholders with the understanding they need to promote and guide positive change for people and forests. The T&T project provides a synthesis of the state-of-play regarding T&T of FRCs to enable a more comprehensive and data-driven response that stakeholders, from both the FACT Dialogue and the international community, can use to make evidence-based decisions in pursuit of our shared goals.

## Activities

The T&T project undertook extensive mapping and outreach to ensure sufficient depth for the work. In total, 92 transparency and traceability tools were found, more than 120 reports were compiled as part of the literature review, and 67 interviews were completed with technical experts, tool developers and users, representatives from governments, private sector, civil society, and academia. In addition to this, five case studies were produced covering key commodities with a history of contributing to deforestation: palm oil in Southeast Asia; cocoa and timber in West and Central Africa; and cattle and soy in Latin America. The case studies considered traceability and transparency systems applied to farmers, traders, processors, and end users in a whole systems approach.

## Achievements

The final report *“Traceability and transparency in supply chains for agricultural and forest commodities: A review of success factors and enabling conditions to improve resource use and reduce forest loss”* is due to be released in Autumn 2023. The T&T team has seen global interest in the research undertaken.



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# Nature Transition Support Programme

**Countries:** Colombia and Ecuador, with two new countries proposed to begin in Year 2

**Partners:** UK: UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC);

**Colombia:** Alexander von Humboldt Biological Resources Research Institute; **Ecuador:** Instituto Nacional de Biodiversidad (INABIO); **US:** United Nations Development Programme (UNDP), University of Minnesota

## Background

The Nature Transition Support Programme (NTSP) is an ambitious research programme aiming to support partner countries identify pathways towards an economy that is embedded within nature, as articulated by the Dasgupta Review. NTSP engages a combination of UK-based and global experts, in-country specialists as well as representatives from partner governments to make the case for an economic transition, developing a set of options for sustainable growth based on predicted impacts to natural capital and prosperity of different approaches to land use.

## Activities

Year 1 marked the co-creation phase of NTSP, during which a series of activities were undertaken, including:

- UNEP-WCMC accompanied a Defra delegation to a mission in Quito and Bogota, where the project was presented, after which a focal point from the Colombian government was designated.
- In March 2023, UNEP-WCMC presented the NTSP at a launch event in Quito, Ecuador. This event was attended by the UK's Secretary of State for Environment, Food and Rural Affairs, Ecuador's Ministers of Environment and Finance, as well as environmentalist and economist – Roque Sevilla.
- In-country workshops are scheduled in Quito and Bogota for the beginning of year 2. This is in addition to a webinar summarising the Dasgupta Review, focusing on the nature of the transformation required to embed economies within nature, and an online workshop that introduces the programme and discusses tools and analysis which could form the project building blocks.

Building on these co-creation activities, NTSP will go on to further engage the governments of Ecuador and Colombia on country-specific research priorities for NTSP and carry out a baseline assessment of available data and of current modelling capabilities at the nexus of biodiversity and sustainable development; efforts will be made to advance these models in a way that responds to country objectives. Co-creation activities will enable the programme to move on to supporting government partners to build the capability to understand the ramifications of current and future economic development for nature.

Expansion plans are also being considered that will take NTSP into two more countries.



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# DEEPEND

## Deep-ocean resources and biodiscovery: enabling a sustainable and healthy low-carbon future

**Countries:** Various Pacific Small Island Developing States (PSIDS)

**Partners:** UK: Natural History Museum, National Oceanography Centre, University of Aberdeen, University of Strathclyde, University of Southampton, Pacific: Cook Islands Seabed Minerals Authority, University of the South Pacific, Pacific Community

### Background

The climate change crisis has increased the demand for natural resources, such as lithium, cobalt, and manganese, due to their role in the green energy transition as important components for batteries of electric vehicles. With vast reservoirs of minerals present in the deep sea, mining in our oceans is already being discussed and could start within the next decade, however, little is known about the biodiversity and Marine Genetic Resources (MGRs) present in these deep-sea regions. DEEPEND looks to develop a long-term project to understand the true value of biodiversity in deep-sea regions at risk from mining and climate change. It utilises molecular approaches to provide fundamental knowledge on biodiversity, explore pharmaceutical applications of deep-sea microbes and invertebrates, inform policy on seabed mining, deliver development outcomes, enable understanding of future climate scenarios, and provide long-term research and development value.

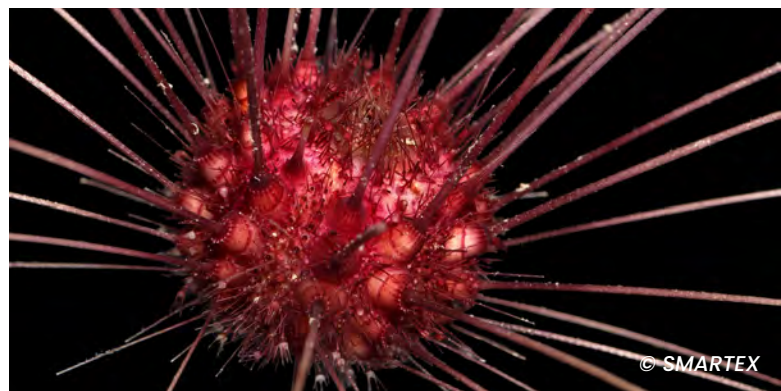
### Activities

A dynamic exploration of biodiversity and the wider value of the biodiversity in terms of MGRs has been conducted for both protected and at-risk deep-sea regions, contributing to a baseline to compare the potential impacts of seabed mining with terrestrial mining and the potential value of protecting areas from mining activities. Partnerships with a range of Pacific Small Island Developing States (PSIDS) were formed, expanding networks and collaborations in the region. Existing collections, housed at the Natural History Museum and the National Oceanography Centre, were utilised for this pilot phase and plans were developed for future collections from Pacific deep-sea habitats. The project ran workshops for local stakeholders in the Cook Islands and at the Fifth Session of the Intergovernmental Conference on the Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ), with members of the project team also being involved in the BBNJ process.

### Achievements

The project has achieved a remarkable set of scientific results, including:

- More than 50 actinobacterial strains isolated from abyssal sediments.
- 20 isolates exhibited exceptional antibiotic activity, including against ESKAPE pathogens (a group of six highly virulent and antibiotic resistant bacterial pathogens).



- Genome sequencing and analysis revealed novel uncharacterised genes producing over 3000 molecules, providing a resource for future biodiscovery.
- Anticancer screening of some samples has shown activity against human melanoma cell lines.

**Success Measures:** 1 operationally relevant knowledge product • 15 research partnerships formed or strengthened • 100s of individuals engaged in DEEPEND activities across a variety of events • 3 policy relevant knowledge products

# TIPAs Project

## Realising the potential of plant bioresources as nature-based solutions in African biodiversity hotspots

**Countries:** Ethiopia, Guinea, Sierra Leone

**Partners:** UK: Royal Botanic Gardens Kew; **Ethiopia:** Addis Ababa University, Ethiopian Biodiversity Institute; **Guinea:** Herbar National du Guinee, Guinee Ecologie, Institut de Recherche Agronomique du Guinea, Centre Forestier Nzerekore; **Sierra Leone:** Njala University; **EU:** The Alliance of Biodiversity International and CIAT

### Background

More than 31,000 useful plant species have historically been documented to fulfil needs and services for humans, yet our current food systems provide over half of the global calorific intake as just three crops: rice, wheat, and maize. Sustainable use of the diverse library of underutilised species and bioresources – including timber, medicines, and valuable chemicals – represents an untapped opportunity to alleviate poverty, develop value chains, and tackle food insecurity using methods underpinned by nature conservation. Such nature-based opportunities, with potential to positively impact local and indigenous livelihoods, buffer climate change, and provide biodiversity co-benefits, lie predominantly in high-biodiversity tropical countries. Collaborating with three strategic countries, this project seeks to accelerate Kew's efforts to identify and characterise tropical areas of high plant biodiversity that merit consideration for conservation prioritisation while investigating methodologies for effective, lasting conservation strategies and their implementation. It also aims to demonstrate both the economic and ecosystem service benefits of plant bioresources at local and national levels to maximise policy impact for each country.

### Activities

Over the past year, the project has undertaken a series of activities, including:

- Curating a georeferenced occurrence record dataset of Ethiopian endemic plants and performing Red List assessments for plants from Ethiopia, Guinea, and Sierra Leone.
- Testing the conservation value and bioeconomic justification for Guinea's new suite of Tropical Important Plant Areas (TIPAs) guided Protected Areas through plant-focused case studies.
- Identifying sites for future application of TIPAs methods in Sierra Leone.

To meet relevant Global Biodiversity Framework targets, it is important to ensure global plant datasets are sufficient. The Kew TIPAs project and new AgriTIPAs methodology will continue to support its partner countries in assessing hotspots of wild and agricultural biodiversity and in reporting these internationally.



© Kew-TIPAs Project

## Achievements

The project contributed to the generation of new knowledge and evidence, increased capabilities among collaborators, and delivered globally significant findings. Major achievements include:

### New knowledge and evidence:

- The development of the 'AgriTIPAS methodology' for identifying sites of high plant agrobiodiversity and understanding bioclimatic and socioeconomic drivers of agrobiodiversity rich areas, delivering a complementary map of Important Agricultural Areas in Ethiopia.
- Two out of four phases of a Payments for Agrobiodiversity Conservation Services scheme were trialed in Ethiopia.
- In-country activities to support sustainable botanical management and practice were successfully led in Guinea:
  - One forest service-led and four community-led plant nurseries of both threatened and useful plants were established to support community member livelihoods and reforestation.
  - To trial the use of community-level education programmes, Community Awareness and

School Training programmes successfully taught the identification and sustainable use of plant bioresources in and around TIPAs sites.

- Ecotourism potential in Guinea was explored.
- The economic potential of conserving and promoting *Neocarya macrophylla* as a plant bioresource in Guinea was explored.

### Strengthened capabilities:

- 11 interns from Ethiopia, Sierra Leone, and Guinea visited Kew for research projects.
- A Red List training workshop was held in Addis Ababa, Ethiopia, for around 20 participants.
- A major international conference was held (Defra, IUCN, PlantLife International, Bird-life International, The KBA Secretariat, UNEP-WCMC, the Alliance of Biodiversity, CIAT, etc.) to identify how plant biodiversity data can play a greater role in nature conservation, achieving Global Biodiversity Framework targets and Sustainable Development Goals, and improving local and indigenous livelihoods.

**Success Measures:** ~£250,000 private funding leveraged to support activities • 8 case studies demonstrating change • 17 operationally relevant knowledge products • 18 partnerships formed or strengthened • Over 1000 individuals engaged in activities, including across a 'payments for agrobiodiversity conservation' scheme • 3 policy relevant knowledge products



# Investing in Impact Evaluation

## Understanding What Works: Impact Evaluation for Conservation, Climate and Development

**Countries:** Global

**Partners:** International Initiative for Impact Evaluation (3ie)

### Background

Understanding the current state of knowledge on the effectiveness of interventions is the key first step in identifying critical evidence gaps which should be prioritised to support future conservation policy, decision-making, and financial investment. Investing in impact evaluation aims to systematically identify, review, and summarise existing evidence on what works for conservation, climate, and development interventions and to define a clear approach to address identified priority evidence gaps.

### Activities

The project has focused on 2 main activities:

- Updating an existing Evidence Gap Map (EGM) on Land Use Change and Forestry interventions. An EGM identifies and describes the evidence base measuring the effectiveness of programmes against different outcomes.
- Producing a framework from which an EGM can be created for Climate Change and Biodiversity.

In recent years, there has been an increase in the number of international frameworks to address the climate change and biodiversity crises that underpin the GCBC. Developing an evidence base on effective interventions to address these crises is critical, and 3ie have looked to develop an EGM framework that will act as the starting point for strategic and coordinated evidence generation and synthesis activities.

### Achievements

The updated land use change and forestry EGM includes 557 impact evaluations of interventions and 39 systematic reviews. Currently available online, EGM found that 85% of studies were concentrated across Sub-Saharan Africa, Latin America and the Caribbean, and East Asia and the Pacific. Also, protected areas, community/decentralised forest management, payment for environmental services, and agricultural extension and training to promote sustainable/climate smart agriculture remain the most commonly evaluated interventions.

This work highlights major methodology issues with the majority of systematic reviews examined and stresses the need to incorporate rigorous evaluation at the programme design stage and coordinate efforts to produce high-quality and comparable studies. The EGM also highlights a number of implications for policymakers and researchers planning work. The project has produced a framework for a Climate Change and Biodiversity which will inform the production of the final EGM.

**Success Measures:** 2 policy relevant knowledge products

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		Intermediate outcomes				Environmental outcomes				Human welfare outcomes			
		Acquisition of knowledge /skills	Adoption of new practices or technology	Land and forest management	Productivity of land	Forest condition	Forest coverage	Carbon storage and sequestration	GHG emissions	Basic materials	Health	Income and household expenditure	Food security
AREA PROTECTION & MANAGEMENT	Interventions												
	Protected areas	●	●	●	●	●	●	●	●	●	●	●	●
LAW & POLICIES RELATED TO FORESTS AND OTHER LAND	Community/ decentralised forest management	●	●	●	●	●	●	●	●	●	●	●	●
	Public sector legislation	●	●	●	●	●	●	●	●	●	●	●	●
	Private sector codes & legislation				●	●	●				●		
	Civil society legislation					●	●						
	Monitoring & enforcement												

KEY ● High confidence reviews ● Medium confidence reviews ● Impact evaluations ● Ongoing evaluations ● Ongoing reviews

# Environmental Pollution Programme

## Working Together for a Pollution Free Future for Nature, Climate and People

**Countries:** Vietnam, South Africa

**Partners:** **Vietnam project:** The Global Alliance on Health and Pollution (GAHP), Ho Chi Minh City University of Natural Resources, Environment Together, Department of Natural Resources and Environment of An Giang Province, Institute of Agricultural Environment (Hanoi); **South Africa project:** JNCC, Institute of Natural Resources, Durban University of Technology, University of Kwazulu-Natal, Rhodes University

### General Background

The Environmental Pollution programme aims to reduce biodiversity loss, climate change, and human health impacts by tackling pollution and its effects in low- and middle-income countries. During Phase One of the GCBC, this work took place across **two separate projects** that focused on different pollution issues in their country of operation: Vietnam and South Africa.

### Environmental Pollution Vietnam

#### Background

The goal of the Environmental Pollution project based in Vietnam is to protect the health of people and the environment from unsafe agricultural practices of open burning and pesticide use.

- **Agricultural open burning:** Agricultural open burning is a common practice in Vietnam where smallholder farmers rely on burning to clear land for planting, dispose of crop residues, and manage weeds. This practice has significant environmental and health impacts including air pollution, greenhouse gas emissions, soil degradation, and public health risks. However, there is still limited knowledge and understanding of the drivers, extent, and impacts of agricultural open burning in Vietnam.
- **Pesticide use:** The widespread and indiscriminate use of pesticides in Vietnam contributes to the deterioration of the environment and poses a risk to the health of farmers and others involved in agriculture. However, the scale of pesticide use, volumes, and the specific substances used are unclear. Moreover, many farmers lack knowledge and resources to use safe pest control methods, and control or regulation of pesticide use is often non-existent.

#### Activities

**Pesticide use:** During this first year of operation, the pesticide workstream focused on the production of a report on the use of pesticides in Vietnam. To produce this report, the team initially compiled available data on pesticide use before establishing a baseline of pesticide use and Integrated Pest Management (IPM) implementation in farms.

**Agricultural open burning:** The project conducted an initial assessment of the impacts of open burning use on health and environment in selected areas through

a comprehensive literature review. National experts investigated the association between public health problems and agricultural open burnings, air pollution, and pesticide use. The collected data was analysed to identify the linkages between health effects and pollution related to agricultural open burning. The project produced GIS datasets of different types of agricultural open burning and conducted spatial analysis to overlay open burning data layers with land use data layers.

#### Achievements

**Pesticide use:** The analysis and report revealed multiple challenges including record-keeping on pesticide use and pest monitoring results, proper disposal of empty containers and surplus pesticides, and the use of banned pesticides.

The project found 482 instances of non-compliance related to IPM, pesticide use, and safe agrochemical practices between 2017–2022 across coffee, tea, and pepper farms in Vietnam. Of these, 75% were from the coffee sector.



**Agricultural open burning:** The findings from the open burning impact assessment were stark. In Vietnam, rice accounts for over 70% of total food production and creates approximately 140 million tonnes of rice straw as a waste-product, of which the percentage burned can be up to 90%. The burning of rice straw is a major source of carbon dioxide and releases 14-18% of total PM2.5 emissions in Vietnam. PM2.5 is a mixture of

chemicals that, because of their small size (less than 2.5 microns) and ability to penetrate deeply into the lungs, can induce adverse health effects. The report also investigated alternatives to open burning including rice straw rolling, wrapping, and storing, using racyzyme to enzymatically treat rice straw, and using multi-strain microbial products to quickly treat rice straw after harvesting rice.

**Success Measures:** 5 case studies demonstrating change • 5 operationally-relevant knowledge products  
• 5 research partnerships formed

## Environmental Pollution South Africa

### Background

Environmental Pollution's South African based project looks to address mutually reinforcing issues of climate change, biodiversity loss, and pollution through research and monitoring, community-led interventions, and awareness-raising campaigns through 10 separate projects outlined below.

### Activities

Over the first year of operations for the project several activities have been undertaken, including:

- Addressing the research gaps on the impacts of solid waste and wastewater on water resources
- Developing a decision support tool by integrating water quality indices with Water Quality Costing using Adaptive Neuro-Fuzzy Inference System
- Integrating knowledge systems in flood risk modelling for sustainable solid waste management and flood resilience in urban informal settlements
- Developing and testing a mathematical model for assessing water quality of the Msunduzi River
- Exploring the fate and impacts of organic pollutants associated with microplastics on the riverine fish of the Umgeni River
- Investigating the use of disposable nappies and black wattle biochar for land rehabilitation in the upper uMkhomazi Catchment
- Conducting a feasibility analysis of cost-effective biological wastewater treatment options for the dairy sector
- Assessing the utility of environmental monitoring, focussing on blue carbon storage, for informing the recovery of riverine and estuarine habitats subject to extreme pollution events, for example, the uMhlanga Estuary chemical spill in 2021
- Building community-led spring protection to ensure sustainable self-supply
- Achieving community-led solid waste pollution mitigation at the catchment scale from urban to rural areas

### Achievements

- A substantial stakeholder database was set up including 82 individuals across 40 organisations in South Africa. This will enable engagement to understand gaps in pollution research. A theory of change process, research gap 'roadmap', and pollution hotspot maps have also been created.
- An initial situational analysis has uncovered initiatives already set up in project areas working on flood resilience. This increases the stakeholders available and provides an evidence base to build on.
- A pilot study has been successfully initiated with two species of plants set up for propagation and monitoring over two years.
- A stakeholder database has been developed alongside the production of a qualitative life cycle assessment template for dairy wastewater on farms and a collection of wastewater samples from four farms to trial treatment methods in the lab.
- A Literature review of spill source inputs, sources, and potential impacts has been conducted. This found that the chemical spill caused many catastrophic environmental impacts for local ecosystems.
- Household surveys have been conducted as the start of a comprehensive community engagement approach.
- An initial workshop has been conducted with community-based monitors from three case study communities to introduce the project and gain an understanding of the solid waste and pollution issues faces across the communities. In addition, a solid waste pollution profile has been co-developed.

**Success Measures:** 10 case studies demonstrating change • 19 operationally-relevant knowledge products  
• 4 research partnerships formed or strengthened

# Central and Eastern European Conflict Timber Project

**Main sample collection areas:** Ukraine and Belarus **Additional samples also collected from:** Finland, Estonia, Latvia, Lithuania, Slovakia, Hungary, Romania, Croatia and Moldova

**Partners:** World Forest ID (WFID), Royal Botanic Gardens Kew

## Background

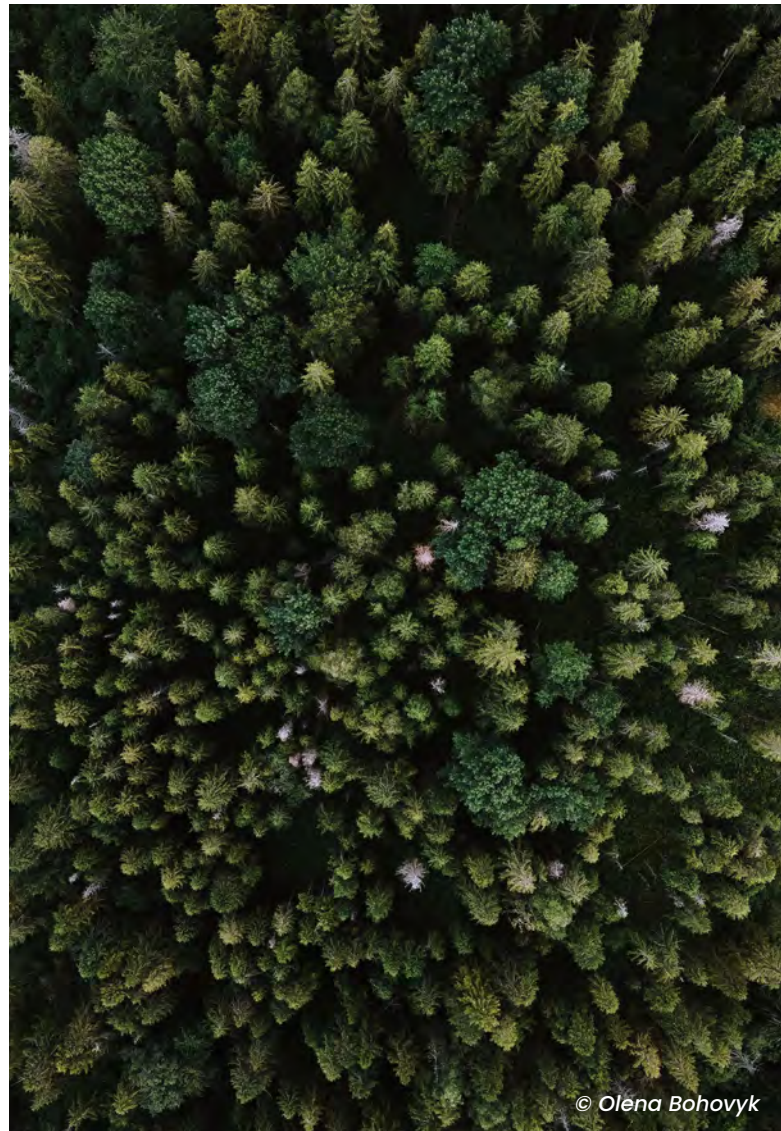
In light of the Russian invasion of Ukraine and the opportunity for Russia to finance the war or subsequent occupation through sales of timber, the Central and Eastern European Conflict Timber project seeks to build on existing voluntary measures, punitive tariffs, and sanctions on the direct import of timber to make it harder for Russia to circumvent these measures. Specifically, this project is designed to support the widespread use of scientific testing techniques to scrutinise claims about the origin of timber from this region. Current reference libraries lack samples of key species which grow in Russia, Ukraine, and neighbouring countries. This project therefore aims to build up a georeferenced database of timber samples so products in trade can be tested against these reference datasets to validate the species and location of harvest.

## Activities

This project involved several expeditions in Ukraine and neighbouring countries working in collaboration with Preferred by Nature to collect new timber reference samples. The physical reference samples were sent for accessioning and storage at the Royal Botanic Gardens, Kew. A sub sample was then sent to an international partner laboratory which conducted a range of scientific tests to create the necessary reference data to validate species and location of harvest for traded samples. Combining these methods, specifically SIRA (Stable Isotope Ratio Analysis) and XRF (Trace Element Analysis), enabled World Forest ID to layer scientific data and use innovative machine learning algorithms to predict the values for tree species growing in areas where reference material has not been physically collected. This provides a more comprehensive reference dataset for industry and enforcement officials. The granularity of this system is currently being piloted by World Forest ID with a range of private sector organisations and enforcement agencies.

## Achievements

During the implementation of the Central and Eastern European Conflict Timber project, 4,533 samples (13 different timber species across 12 countries), were collected. 1,050 of these samples were selected for further scientific analyses with 22 chemical values generated for comparative intensities at a given geolocation or GPS point. Through investigating this data, World Forest ID observed evidence of interspecies and spatial variability in the samples, leading to the creation of various predictive models to trace timber origin of samples of interest.



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**Success Measures:** \$250,000 public finance leveraged as a result of the project • 5 operationally relevant knowledge products • 5 research partnerships formed or strengthened • 18 individuals trained in collecting timber samples

**GCBC In Action**

# GCBC Case Studies

During its first year of implementation, the GCBC's 15 projects developed a plethora of tools and solutions that aim to lead to positive changes in their contexts. This may include an impact on a government policy, on how sustainable biodiversity practices are implemented, or societal change.

This section presents six examples gathered directly from GCBC projects and shares lessons learnt, describes challenges faced, and provides advice for projects with similarities in their settings and contexts.

**#1** Demonstrating the value of drones and remote sensing to a rural community in the Philippines (Bio+Mine project)



**#2** Waste not, want not: Investigating the use of disposable nappies and black wattle biochar for land rehabilitation in the upper uMkhomazi River Catchment (Environmental Pollution programme)



**#3** Developing novel seaweed cultivars from wild populations (Innovative Seaweed Aquaculture project ASTEC)



**#4** Realising the potential of plants as nature-based solutions in African biodiversity hotspots: Supporting climate resilient, sustainable development (Kew TIPAs project)



**#5** Co-owning the OneFood principle with the South African government (OneFood)



**#6** TerraViva Sustainable Landscape Approach (TerraViva project)





# Case Study #1

## Demonstrating the value of drones and remote sensing to a rural community in the Philippines

**Project: Bio+Mine**

### Background

One of the key questions for management of legacy mines is to find an affordable way to monitor abandoned sites. Remote sensing provides both active and passive sensing technologies; however, a large skills gap lies between remote sensing technology and the ability to apply it locally. Nearly 40 years of analysed satellite imagery indicates that the Santo Niño site, in the Philippines, has not yet recovered to pre-mining conditions. Though the site shows improvements through time, the resolution of the satellite data is not high enough to assess how local

biodiversity has evolved. Drones and associated imaging technologies can deliver centimeter-scale resolution images, solving this issue. An aim of the Bio+Mine project is to carry out repeated high-resolution multi-drone survey of the entire study site to i) provide spatio-temporal context to support the interpretation of the other in-situ measurements, ii) collect high-resolution data to inform the decadal results from satellite data, and iii) showcase how drone technology and machine learning can be used to manage natural resources efficiently.



## Positive impacts

This project used two drone systems operated by trained graduate and undergraduate students supported by research assistants from the Philippines. Two full site surveys were performed and data delivered a new 3D digital elevation model for the area, providing a baseline for future land stability assessments. Drones also proved to be excellent tools for community outreach, attracting curiosity and engagement with the local population as well as local authorities.

## Challenges

The main challenges involved international air travel with drones (including lithium battery transport), difficulty complying with drone flying regulations, and the lack of active signals from the Continuously Operating Reference Stations network in the Philippines. Moreover, deploying drones efficiently and safely in mountainous terrain over vast areas was challenging and required experience.

## Lessons learnt and next steps

Going forward, the project aims to train and enroll local partners to fly drones and support the creation of a survey startup. The cost of acquiring new drones limits local engagement. However, work has already begun in partnership with AminoLab, the innovation branch of Dela Salle University, to develop a 2.5 million PHP (~£60,000) entrepreneurship programme capable of supporting approximately ten companies.





# Case Study #2

## Waste not, want not: Investigating the use of disposable nappies and black wattle biochar for land rehabilitation in the upper uMkhomazi River Catchment

**Project: Environmental Pollution Programme**

### Background

Residents in communal lands in the upper uMkhomazi River Catchment, in the KwaZulu-Natal Province, South Africa, do not have access to waste collection services. This results in the rise of improper and indiscriminate waste disposal including disposable nappies thrown away from the homestead, often in water courses, posing potential health and environmental risks. Faecal matter in nappies can contain pathogens and potential toxins. However, they are also a source of nutrients – particularly nitrogen, phosphorus, and potassium – that can be used for agricultural purposes. Burying nappies can enhance soil water holding capacity (through superabsorbent polymers (SAPs) contained in disposable nappies) and improve soil nutrient supply. Therefore, they can help rehabilitate degraded and nutrient-poor soils.

In the upper uMkhomazi Catchment there are ~7,500 ha of abandoned cultivated lands which have become degraded due to erosion and bush encroachment by black wattle (*Acacia mearnsii*). Clearing these trees/

bushes could improve the ecosystem health and converting the wood to biochar can provide a source of carbon to improve soil biological processes and restore degraded soils.

This project aims to assess the utility of simple, low cost, and culturally acceptable options for the use of disposable nappies and biochar from black wattle, both individually and in combination, as in-field soil amendment media in degraded and abandoned agricultural lands at selected sites in the upper uMkhomazi Catchment.

The initial experiments included two species of fodder plants (Napier Fodder and Vetiver Grass) and will be monitored over a period of two years (i.e. two growing seasons under rainfed conditions) with measurements of biomass yield, sediment capture, soil biological indicators, soil fertility, soil chemistry, soil water, pollution, and pathogens.



## Positive impacts

This is the first year of a 3-year programme. Although too early to fully determine and measure the impacts, preliminary measurements suggest that treatments that included fertiliser show greater crop growth.

## Challenges

A hot, dry spell delayed the monitoring of the vetiver grass component of the trials for the first growing season. The team planted replacement tillers and provided temporary irrigation to assist with propagation. The dry spell is likely a consequence of climate change, and more frequent and erratic dry or wet climate events could be expected in the future.

## Lessons learnt and next steps

Results from the first growing season show that this type of intervention yields positive outcomes. However, longer-term monitoring from multiple growing seasons will be needed to determine the full impact on the soil and plant growth and subsequent replicability.



© Environmental Pollution



© Environmental Pollution





# Case Study #3

## Developing novel seaweed cultivars from wild populations

### Project: Innovative Seaweed Aquaculture Project

#### Background

Seaweeds form some of the most productive systems in the marine environment. They support an immense diversity of species, provide valuable ecosystem services, and play an important role in mitigating climate change as major carbon sinks. Seaweed cultivation offers the potential for a nature-based, carbon neutral, and climate resilient solution to restore seaweed communities globally. Upscaling seaweed production offers a new, powerful approach to enhance community resilience, re-build natural seaweed communities, increase biodiversity, and enhance ecosystem services. It can also provide a socially acceptable means of restoring a communities' local environment whilst

maintaining economically sustainable livelihoods. Eucheumatoids are tropical red seaweeds frequently used in the food and cosmetics industries. Increases in pest and disease outbreaks due to accelerating climate change, loss of genetic diversity, and biosecurity issues have led to seaweed production in Malaysia declining by 45% between 2012 and 2020, with catastrophic socio-economic impacts on the communities reliant on seaweed production. To address these challenges, there is an urgent need for new temperature-resilient cultivars derived from indigenous wild stocks, which can enhance the climate resilience of cultured stocks.



## Positive Impacts

This project works with indigenous seaweed farming communities in Malaysia to collect populations from the wild for domestication trials at a research farm in Sabah. This has resulted in the discovery of new temperature-resilient cultivars that are brought into cultivation to enhance the climate resilience of cultured stocks in Malaysia. This is crucial to ensure the sustainability of the eucheumatoid industry despite the global climate change issues.

## Challenges

The major challenge during the project was the impact of the water currents on farmed seaweeds. The conventional method of tying the seaweeds onto the cultivation lines using plastic ties (called 'tie-ties') led to high levels of seaweed loss from the lines and increased fish and turtle predation. Consequently, growth rates could not be measured. To solve this problem, the wild eucheumatoids were placed into the nylon nets. Unfortunately, this method also proved ineffective as silt from the seabed covered the nets and smothered the seaweeds. Following discussions with the local farmers, new baskets were deployed with a larger mesh-size to prevent the entrapment of silt. The eucheumatoids were placed into the new nets for 2-3 weeks to enable sufficient growth before tying onto the cultivation lines. This solved the problem and reduced the effects of fish and turtle predation.

## Lessons learnt and next steps

The outcome of this project was to develop new temperature-resilient cultivars that can be used by seaweed farmers in Malaysia. A system was developed for coastal seaweed cultivation of new cultivars that can be replicated throughout Malaysia.



© Innovative Seaweed Aquaculture

Site selection, however, was found to be extremely important, particularly the levels of siltation in the water column, which can suppress eucheumatoid growth rates.



© Innovative Seaweed Aquaculture



# Case Study #4

## Realising the potential of plants as nature-based solutions in African biodiversity hotspots: Supporting climate resilient, sustainable development

**Project:** Kew TIPAs Project

### Background

High biodiversity developing countries face numerous competing pressures surrounding poverty and food insecurity. Conservation can support sustainable development while improving lives and livelihoods. Kew's research and conservation activities in Ethiopia, Guinea, and Sierra Leone focus on identifying and evidencing the value of high plant biodiversity landscapes to communities and their governments. This project supported capacity building on Red List conservation assessments, herbarium skills, and conservation research through a 2-month internship programme at Kew for 11 early-career scientists and a 1-week Ethiopian Red List training workshop for 16 participants. Community outreach programmes, such as the Guinean Schools programme that reached 100

children from 10 schools and the Guinean Community Awareness training programme that involved over 500 villagers, raised awareness of the importance of conservation and sustainable use of biodiversity. The establishment of 5 plant nurseries involved 88 members of 4 local communities adjacent to two newly established Tropical Important Plant Areas (TIPAs) sites in Guinea, helping to incentivise locals to manage and maintain reforestation projects adjacent to the TIPAs sites. The unifying purpose of these activities was to build in-country capacity to lead future plant conservation strategy, planning, and practice particularly in the context of Kew's TIPAs programme and the new Global Biodiversity Framework targets.



## Positive Impacts

The capacity building activities focused on training mainly women and girls (17 out of 27) on a wide range of skills that are expected to have a positive impact on their careers. Following completion of the first project phase, newly trained assessors in Ethiopia and Sierra Leone will lead the assessment of parts of the remaining unassessed endemic species in the current project phase. There has been a high level of engagement with the installation of nurseries and seed collection for forest trees. School teachers and students also benefited from the awareness training. Posters of threatened tree species have been produced and translated into local languages.

There are plans to establish school clubs with gardens to increase awareness of threatened trees and improve the surrounding environments. Lastly, one of the nurseries has grown c. 2,500 saplings of threatened and useful plant species for community livelihoods and reforestation in the buffer zones of two TIPAs sites. Communities have formed and signed a one-year agreements with the forestry service to produce and maintain the nurseries which are expected to produce a minimum of 1,000 plants for use in assisted regeneration of the forest in these areas with long-term benefits to the local communities.

## Challenges

Generally, the lack of continued funding and adequate resources makes it difficult to provide the long-term support and partnership for true capacity building activities. However, the project benefited from Kew's >30-year track record in countries such as Ethiopia and the strong, trusted relationships developed over that time. There were also issues related to securing visas for early career developing country researchers. During the awareness training in Guinea the main challenge encountered was access

to the villages during the rainy season and the low level of education. This was overcome by significantly modifying the material to be more accessible. For the nurseries, the main challenges arose from acquiring enough seed of threatened species and propagating them successfully since few of these species have been propagated before. To overcome this, data is being collected on the techniques used for future propagation protocols.

## Lessons learnt and next steps

Key to successful implementation is long-term partnership with host countries beyond the activity of a single grant. Attendance of the training workshop followed by participation in the internship programme was a very successful combination that allowed project interns to refine their skills and start contributing to project assessment outputs and deliverables with almost immediate effect. Awareness training in both communities and schools can easily be replicated and will be continued at communities in the TIPAs

sites of Mt Béro and Diécké. The use of visual materials, translation into local languages, and participatory approaches are essential for good understanding by the communities. The approach followed to establish the nurseries is a simple and effective intervention but necessitates community involvement. Continued awareness training on the importance and benefits of biodiversity and the wider environment is necessary to ensure successful implementation.





# Case Study #5

## Co-owning the OneFood principle with the South African government

**Project:** OneFood

### Background

The OneFood project seeks to develop a Food Risk Tool to assess and mitigate multiple hazards across the entire food system and to transform the way actors (governments, researchers, industry, third sector) perceive and work on food production to ensure economic, environmental, and social sustainability. Since such a transition is impossible without full buy-in from partner country policy-makers, the project worked to secure South African government co-ownership of the concept. This was achieved by targeted engagement with government departments through a series of

scoping workshops and follow-up engagements. The project also supported in-country research and capacity development to expand the research on tools to assess the hazards present across food systems, linking multiple food sectors (e.g. farming, fishing, aquaculture, hunting) and multiple hazards (e.g. food safety hazards, pollution hazards, biodiversity hazards, climate hazards). This was done through a South African research fellowship scheme designed to support 8 postdoctoral fellows and up to 14 MSc studentships.



## Positive Impacts

The South African Government Department of Science and Innovation (DSI), the Council for Scientific and Industrial Research (CSIR), and the Agricultural Research Council (ARC) have agreed to co-fund elements of the project. They are employing a coordinator and are considering allocating a full-time staff member to lead the project concept from the South African side.

## Challenges

Since OneFood is such a broad project, there were challenges with navigating South African government departments to identify the best suited agency to take a lead and then to ensure other government departments remained engaged with the project. These challenges were overcome by having a strong stakeholder strategy informed by local expertise, a dedicated project engagement workshop at the inception phase, and a dedicated UK engagement lead to manage the diverse stakeholders and their needs. The research fellowship scheme required negotiation with government departments and

The departments are also championing the project in internal fora, leading upcoming workshops, and working with the UK project team to identify a second country to expand the concept to. DSI and ARCH have also fully endorsed the scheme and have agreed to 'own' and co-fund the fellowships. CSIR has agreed to oversee the scheme and to fund a scheme coordinator.

research councils with different priorities and personnel rules. This presented challenges in gaining agreement on the details of the fellowships and the employment and inclusivity processes that should be applied. The project is overcoming these by drawing on advice from stakeholders familiar with the South African government landscape (particularly from Foreign, Commonwealth & Development Office) and by developing pragmatic solutions to meet the requirements of the different actors and to accommodate South African government priorities.

## Lessons learnt and next steps

This intervention has demonstrated that these types of projects are best led by UK Government departments rather than academia or NGOs. This results in more traction within overseas Governments which, with support from the local FCDO's Science Innovation Network and other global initiatives that are already linked to a government (e.g., United Nations Environment Programme, Food and Agriculture Organization, etc.), leads to higher engagement and likelihood of successful delivery with partner countries.

The research fellowship scheme is an excellent way to support career development in collaborating countries and particularly to support under-represented groups.

It is important to understand the scientific and research context to ensure fellowships are pitched at a useful level (undergraduate, graduate, or postdoctoral level) and understand how the fellowships might help future career opportunities. Diplomacy and compromise are key.





# Case Study #6

## TerraViva Sustainable Landscape Approach

**Project:** TerraViva

### Background

Gaitania, a coffee-growing community of the municipality of Planadas in the southern Tolima department of Colombia, is marked by several challenges: a prevailing monocropping production system for washed Arabica coffee, unsustainable agricultural practices, a complex history of social armed conflict, and a lack of access to markets. The absence of a landscape approach also makes decisions regarding biodiversity, climate change, and livelihoods a farm-by-farm issue at the will of each producer. This project aims to foster a sustainable landscape approach in a post-conflict region.

With initial GCBC R&D funding, the Sustainable Agriculture Network (SAN) and its partners sought to understand the situational context of the Gaitania region and the interactions of governance structures, communities, and socio-economic factors with the interconnected patchwork of different land uses, ecosystems, and land cover. Research entailed mapping all relevant stakeholders that play a role in the landscape and interviewing them at length. This includes political actors, farmer organisations and cooperatives, the local environmental regulator agency, and smallholder producers from the villages which are represented by essential governance bodies called Community Action Boards.

Representatives from these communities also took part in workshops where the TerraViva consortium deployed a Community Capitals Framework (CCF) research approach which allowed the consortium to view the various elements, resources, and relationships within a community from a systems perspective.

The CCF focused mainly on the assets of a community rather than on community needs and deficits. It divides a community's assets into natural, human, social, cultural, built, financial, and political capitals and focuses on the interaction among the seven capitals and the resulting impacts across them. Guiding questions helped the community take an appreciative approach to analyse the various capitals and how they could be leveraged to strengthen or generate more assets. Additional efforts to understand the context of Gaitania's coffee production included the mapping of the coffee value chain, drone-assisted cartography, and desk research using secondary data sources. A study to determine the applicability of a payment for ecosystem services model in the context of the Colombian regulations and institutions was also carried out.



## Positive Impacts

Culminating with a participatory multi-stakeholder dialogue, the research results will lead to the creation of a Common Territorial Agenda – a long-term development vision built from the perspective of local stakeholders to enable innovative, systemic interventions by balancing environmental, social, and economic goals of the region’s stakeholders. However, the exploratory process itself has already yielded positive impacts with the community. The differentiated approach taken to build solutions – by recognising the community’s preponderant role in the decision making to build the Common Territorial

Agenda – opened spaces for smallholder producers to think broadly and collectively about the state and future of their landscape. The CCF workshops also raised local awareness of the opportunities that Gaitania’s many assets present for the community’s development and of the negative environmental and social impacts of coffee farming and production caused by the current practices implemented by smallholder farmers. Further impacts will occur once the Common Territorial Agenda is implemented and will be measurable in the long term.

## Challenges

Transportation was the greatest challenge faced during the implementation of the research project due to the distances from Gaitania to the main population center of Planadas and each of the villages. Difficulties were compounded by the poor state of the roads and variable weather. Travelling by day and having a local informant that could report on the weather conditions were important mitigating factors to address these challenges. Given the history of armed conflict in the area, additional safety measures were implemented, however, safety issues were not present during the work performed in situ. Maintaining constant contact with Community Action Board presidents to monitor potential safety

issues was also important. The project encountered participation challenges with two of the six villages targeted to take part in the pilot project. The lack of participation was largely owed to post-conflict recovery and peacebuilding efforts that included many unsuccessful international cooperation pilot projects that lacked sustainability and impactful results. Identifying the community capitals using the CCF was an important approach to differentiate this project and help with future plans. Maintaining a strong local presence in the Gaitania was also an important way to build rapport and trust with locals and community leaders.

## Lessons learnt and next steps

This research project was designed to be replicable in many productive landscapes and tested in a complex region like Gaitania precisely to increase its replicability. As landscapes are social constructs, building trust with the targeted community is pivotal to ensure continued and active community engagement. This demands local presence, constant communication with community leaders, transparency during the process,

and communication of results. Understanding the local context is also a critical factor for project success. In a community like Gaitania, historical complexities can interfere with the technical aspects of project implementation. Therefore, social awareness and sensibility are necessary for productive and respectful interactions between field staff and community members.





The background is a solid teal color. It features three large, overlapping circles of a slightly lighter shade of teal. One circle is on the left side, another is on the right side, and a third is positioned between them, partially overlapping both. The circles are semi-transparent, allowing the background color to show through.

**GCBC – 2023 and Beyond**

## The Global Centre

An underpinning principle of the GCBC is to connect research institutions and experts around the world under the common goal of developing approaches to the conservation and sustainable use of biodiversity that delivers climate solutions and improves livelihoods. The creation of a Global Centre is essential to ensure strategic focus, coherence, and engagement to maximise global impact, outreach, and uptake of solutions at speed and scale. By using a connected systems approach, the GCBC looks at solutions and good practices that can be applied at scale, be replicable, and have longevity. The research conducted through GCBC's Phase One projects looks at how more sustainable practices in countries can

lead to both positive climate outcomes and improved livelihoods for those who live there. The programme held its first research symposium in early 2023 which brought together project teams to present their work, connect, and discuss the future of the GCBC. Invaluable discussions were had on defining evidence gaps, key geographical areas, and research questions to address. The GCBC intends to host more events in the future following positive feedback, such as an annual learning event, which will be an opportunity for project teams to disseminate learning and research findings. The GCBC website will also feature a directory to allow researchers to connect or partner up for future grant competitions, continuing to grow the GCBC's reach.

## Research Calls and Focus

In the upcoming years, the GCBC will run a series of research grant calls to continue to deliver research and development projects that enable it to achieve its goals and reach its long-term impact across its priority geographic areas: Official Development Assistance-eligible countries in Latin America and the Caribbean, sub-Saharan Africa, and South-East Asia and the Pacific. Each research call will focus on a priority thematic research area or areas informed by the GCBC's Research Strategy. The findings of GCBC Phase One projects outlined in this report will support the ongoing co-development and co-design of the Research Strategy and the scoping analyses and evidence reviews around the key themes and geographies.

The first such research call was launched in May 2023 and invited project proposals that investigated:

***“The role of biodiversity in sustainable agriculture and natural resource management for climate resilience and sustainable livelihoods”.***

Successful projects will commence work on this theme in Phase Two of the GCBC, due to begin in late 2023. Further calls will be announced in due course, with the aim to address issues relating to:

- Key pressures, such as agriculture, food systems, and natural resource management, that have serious negative impacts on livelihoods, nature, and climate.
- Enablers of change – instruments, data, incentives, finance, and governance – required to benefit livelihoods, nature, and climate.
- Evidence gaps, which, if targeted, will increase the uptake of solutions and interventions to address the causes and consequences of poverty, biodiversity loss, and climate change.



# The GCBC's Theory of Change

As new evidence on the sustainable use of biodiversity for climate and the pathways for change are uncovered, the GCBC's overarching Theory of Change will continue to be refined and updated. The plan is to review its Theory of Change and logframe indicators annually, working with the Hub partners and research consortia to ensure the latest evidence is considered. As new projects enter the programme,

the scope of the GCBC's research will continue to widen. Alongside each research call put out by the GCBC, there will also be an accompanying thematic Theory of Change that will dive deeper into the impact pathway required to bring about the GCBC's desired change in that particular theme. This will feed into the existing programme-level Theory of Change that will be regularly reviewed, as above.

## Conclusions

As this report demonstrates, the GCBC has made significant progress towards its overarching aims and desired impact.

When assessed against the GCBC's Theory of Change, Phase One projects have already started to deliver a range of important outputs that will enable the programme to build up to further successes at the outcome and impact level as it develops and evolves over time. Even at this early stage the programme is showing signs of moving towards such an impact, with evidence from an early ICF KPI15 assessment (the tool used to measure the likelihood that ICF-funded programmes will lead to Transformational Change) suggesting that Transformational Change is likely.

On top of this, the GCBC's Phase One projects have started to fill existing evidence gaps and, in doing so, provide guidance for the future direction of the programme mapped out in the GCBC's upcoming

Research Strategy. This focus will allow the GCBC to build on the success of its first year and continue to make strides towards identifying ways to harness the sustainable use of biodiversity to improve climate and poverty outcomes globally.

The GCBC's Global Centre component, crucial to ensuring the longevity of the programme, uptake of solutions, and encouraging new research partnerships to form and flourish, has begun to take shape. The future direction of the Global Centre will be guided by the programme's Hub Partners.

Building on this progress, the GCBC Hub and delivery partners will continue to fight the interlinked climate and biodiversity crises while tackling poverty on a global scale to meet global targets and support our planet, people, and livelihoods towards a sustainable and prosperous future.



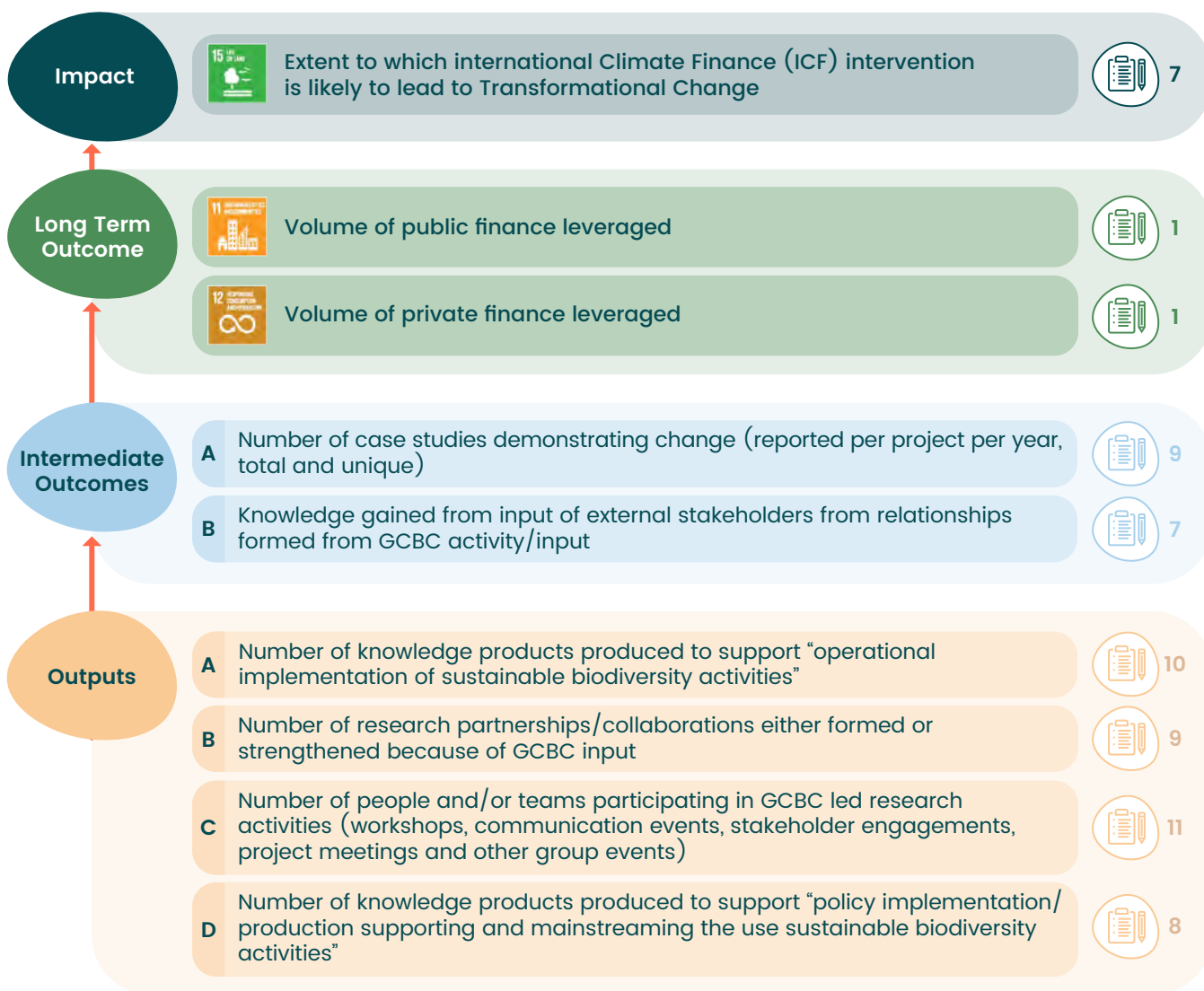
# Appendix

## GCBC Phase One indicators

The process followed for tracking the progress of GCBC against delivery of its Theory of Change.

To track how the GCBC is progressing towards the impacts, outcomes, and outputs outlined in its Theory of Change, a logical framework containing indicators was developed at the programme-level. As this is the first year that the GCBC’s logframe indicators have been reported on, robustness of reporting methods varied from project to project. This has been taken into account in the reporting of the GCBC’s Phase One results. Lessons have been learnt by the programme and will be implemented in future reporting years to ensure that results reported are an accurate reflection of work produced. As can be seen in Table 1, reporting at different levels of the GCBC logframe varied. Many of the projects funded during Phase One have been scoping studies or projects early in their development, meaning the long-term outcome indicators relating to leveraging finance were underreported. Despite this, Phase One projects reported strongly overall on other outcome indicators including ICF KPI15 – the GCBC’s key impact indicator.

Figure 5: GCBC Phase One logframe indicators



KEY Number of projects reporting

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## About the Department for Environment Food and Rural Affairs

The Department for Environment Food and Rural Affairs (Defra) is the UK Government department responsible for safeguarding our natural environment, supporting our world-leading food and farming industry, and sustaining a thriving rural economy. This broad remit means that Defra plays a major role in people's day-to-day life, from the food we eat, and the air we breathe, to the water we drink. Defra supports the delivery of His Majesty's Government's ("HMG") international poverty reduction and sustainable development priorities through a breadth of international programming.

## About the Global Centre on Biodiversity for Climate

The Global Centre on Biodiversity for Climate (GCBC) is an international research and development programme that funds research into natural solutions to climate change and poverty. The GCBC was announced at the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change with £40 million of UK official development assistance funding. Through a series of research grant calls the GCBC will establish a global network of research institutions and experts to address critical research gaps in how the conservation and sustainable use of biodiversity can address climate solutions and improve livelihoods.



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