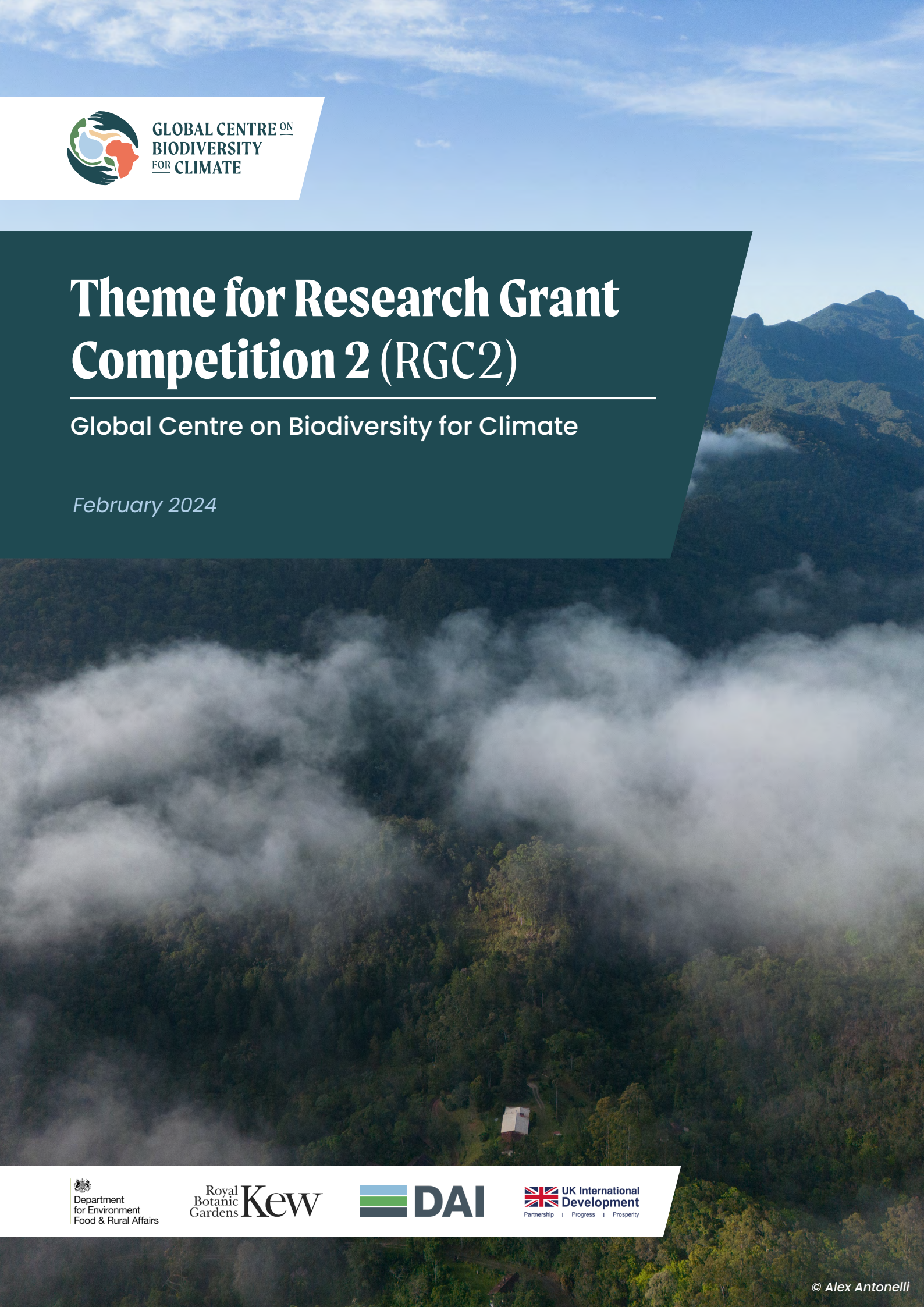
GLOBAL CENTRE ON BIODIVERSITY FOR CLIMATE

Theme for Research Grant Competition 2 (RGC2)

Global Centre on Biodiversity for Climate

February 2024



Department for Environment Food & Rural Affairs

Royal Botanic Gardens Kew

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Theme – Unlocking Nature: Driving innovation in how biodiversity can support climate resilience and sustainable livelihoods through practice and governance

As biodiversity decreases, global population continues to grow, with a predicted population of 9.7 billion by 2050, this is associated with an increasing demand for natural resources needed for food, clothing, transport, infrastructure, energy, water and housing. It is crucial to create a consumption system within the planetary boundaries to address climate change, biodiversity loss and to ensure a sustainable future for the poor.

Challenge

The Convention on Biological Diversity (CBD) targets in the Kunming-Montreal Global Biodiversity Framework are set with a high aspiration within a short time frame. The GCBC aims to support countries eligible for ODA funds to shape decision-making and develop policies that better value, protect, restore and sustainably manage biodiversity in ways that tackle climate change and improve livelihoods for the poor.

Relationships between biodiversity, climate (change) and livelihoods (people) are multi-directional and each of their links can be positive or negative. Some of these links have been studied more intensively than others due to greater availability of data; but for others, evidence gaps still exist. For example, the effect of climate on the geographic ranges of different species has been examined under a wide range of scenarios using occurrence data and distribution modelling under predicted climate change conditions. Yet there is often a lack of scientific evidence to inform strategies that support local community management of natural resources.

Innovative policies and practices will be needed to not only consider the interconnectedness of climate, biodiversity and livelihoods, but also the links with policy for food, health, energy, water, land use and oceans. etc. Achieving a much closer coordination with these wider areas is a major challenge for policy makers, which not only requires the right evidence, guidance and tool kits to help with informed decision making; but also looking at the complexity of the relationships to develop mutually beneficial policies and interventions.

Approach

Innovative approaches through practice and governance to sustainably manage biodiversity have the potential to support climate resilience and sustainable livelihoods; while at the same time helping to protect and conserve traditional knowledge and maintain healthy ecosystems[1].

This paper sets out the rationale and background for the theme of the second GCBC Research Grant Competition (RGC2) and the sub-themes where there are opportunities for interventions, that can make a difference in applying a systems approach to the challenge above. The intention is to inspire novel and innovative approaches in developing project proposals relevant to the overarching theme.

The call will fund a portfolio of projects in ODA eligible countries in the three focus regions (Latac, SE Asia and Pacific, Sub-Saharan Africa) and including Small Island Developing States (SIDS), addressing the evidence gaps and from which the learning, solutions, tools and methodology can be upscaled and replicated in other regions or countries.

Within this grant call, there is scope for different sizes of projects (£110k-£250k; £251k-£500k; £501-£750k; £751-£1m) depending on the type or nature of the research to be funded. This will range from the smaller desk based and locally focused projects to larger initiatives with research replicated in different localities/ countries and upscaling/ replicating proven solutions in an innovative approach.

GCBC Ambition

The Global Centre on Biodiversity for Climate (GCBC) programme is focused on a systems approach to understand nature, climate and people as one system; and a theory of transformative change using evidence (at an individual project level and synthesised at a programme level) from funded projects.

A system is defined as a set of parts that is coherently organised and interconnected in a way that produces characteristic behaviours, known as its function or purpose – systems are greater than the sum of their parts. Systems can be simple (e.g. irrigation channel) with few parts and interconnections which are easy to identify, or complex (e.g. a tropical rain forest) with many parts and interconnections which are difficult to identify, and therefore with an overall behaviour that is hard to predict and influence. Indeed, a system can be made up of many other systems, for example a tropical forest is made up of plants, animals, soil, etc. all of which can be thought of as individual systems.

Systems thinking provides a framework for understanding root causes and drivers of behaviour, as well as the connections and feedback loops within a system which are often difficult to navigate. This approach can enable identification of actions which can be taken to catalyse incremental change (enablers) and where action can be taken within a system to create transformative change (leverage points).

A major thread across all GCBC initiatives is the need to support inter- and trans-disciplinary research, the development of diverse, collaborative, and equitable partnerships, and the creation of new ways of working, to develop solutions that can be upscaled or transferable across regions, countries and context.

The GCBC will provide robust new data, evidence and knowledge of what works, where, why and for whom which can be scaled and replicated in countries and regions. This will contribute to long-term lasting change by empowering governance (community, local and national) to improve climate resilience and livelihoods of the poor, while sustainably managing biodiversity (**Figure 1**).

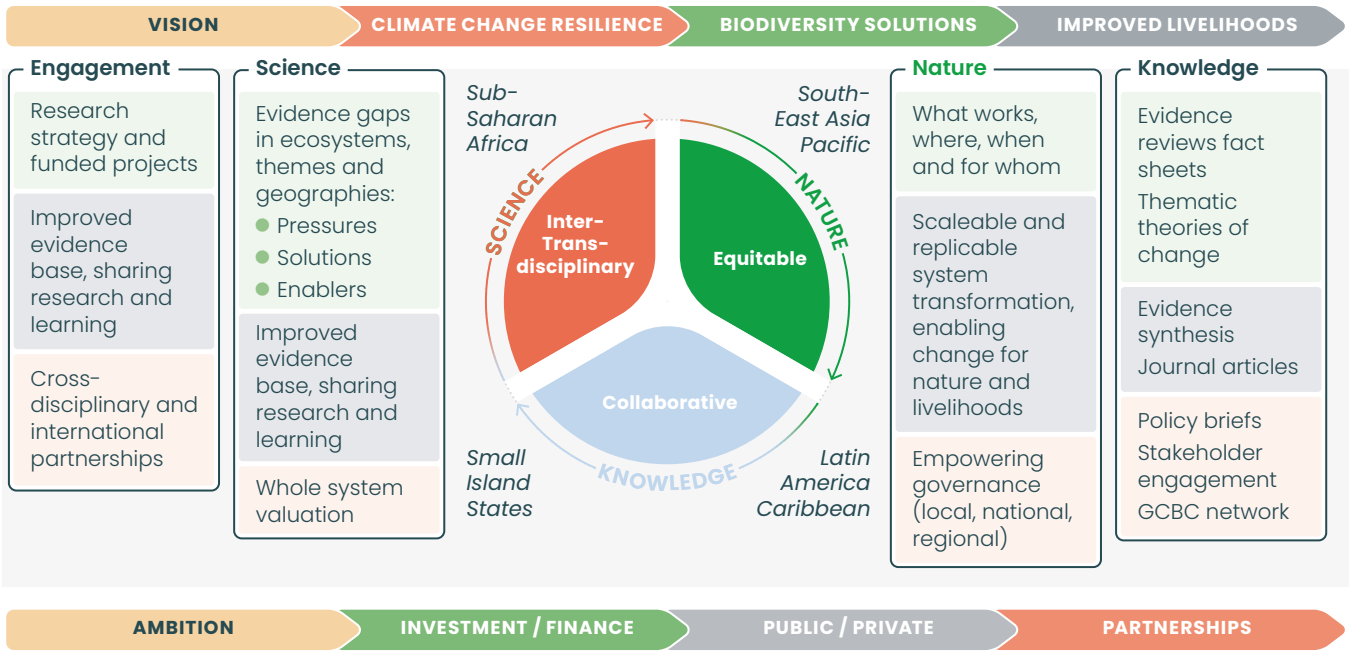

Figure 1: integration of science, nature and knowledge in GCBC programme system transformation


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GCBC Delivery Principles and Science Priorities

In order, to meet the ambition of the programme, the GCBC has set out ten delivery principles (**Figure 2**) which will be adopted in all projects and activities across the programme to deliver the systems approach needed for transformative change.

Any application for a research project through a GCBC grant call will need to embody these ten delivery principles, with the six strategic science priorities (below), in the design and throughout delivery of the project; in addition to contributing truly innovative research which progresses thinking and practice around the call theme.

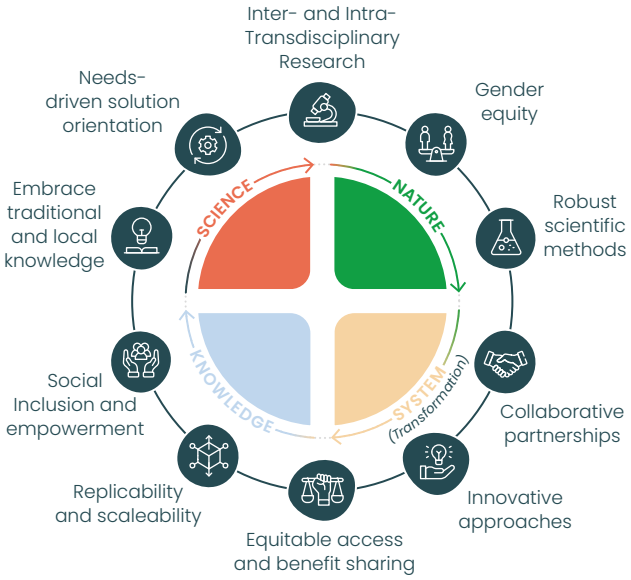

Figure 2: GCBC delivery principles

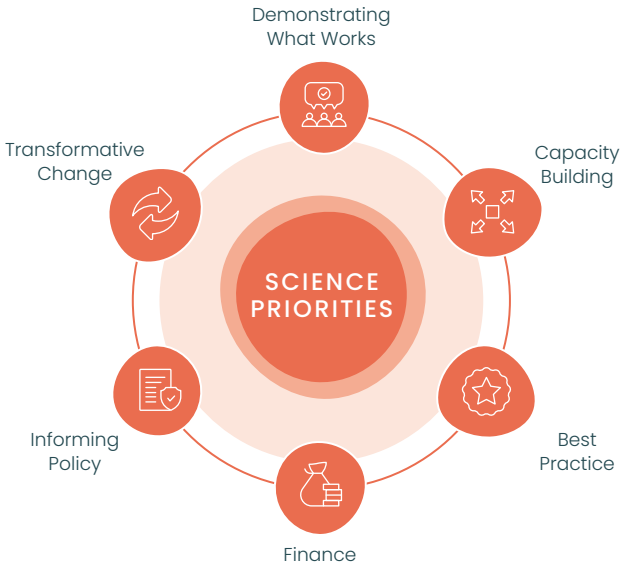

Figure 3: GCBC Six Strategic Science Priorities

Ten Deliverable Principles

Inter- and Intra-Trans-disciplinary Research	Integrating knowledge from different disciplines and with non-academic stakeholders, respecting social, economic and environmental approaches.
Innovative approaches	Using a systems approach and new technologies / data to prove what is useful in practice to enhance natural diversity while drawing value in a healthy and sustainable manner.
Robust scientific methods	Collection and analysis of data to answer the research question with confidence in the analytical decisions to define the outcome and recommendations.
Replicability and scalability	A clearly defined strategy as to how the solutions demonstrated can be sustainable, scalable and replicable to increase impact at an increased rate.
Traditional / Local Knowledge	Embrace ancestral and indigenous knowledge, languages and views on local context[2] drawing inspiration from local, indigenous and traditional practices.
Gender equity	Recognising differential impacts of biodiversity loss and environmental degradation on men and women (across different socio-economic and indigenous groups); and the barriers to their inclusion[3].
Social inclusion and empowerment	Of indigenous and local communities to ensure those less resilient to climate-related shocks are involved and empowered to adopt solutions.
Equitable Access and Benefit Sharing	Ensuring benefits from the use of the natural resources are shared equally between those using the resources in the local communities and the providers.
Collaborative partnerships	Including with government ministries and intergovernmental organisations to help take-up of successful interventions nationwide by the relevant Ministries and supporting bodies.
Needs driven, solution orientated	A realistic understanding of the identified demand, value chains and how the intervention / solution can be sustained in social, environmental and financial elements.

Rationale and Opportunity for the Thematic Call

The current lack of diversity of crops and domesticated animals limits local and global adaptive capability to climate change. Over the next century, as the human population increases and living standards improve, there will be more reliance on the sustainable use of fauna and flora as a resource for food, medicine, energy, income and many other purposes[1]. How wildlife is used will differ in different parts of the world depending on existing cultural diversity within each locality; but the sustainable use of wild species is central to the identity and existence of many indigenous peoples and local communities (IPLCs). Which species (animal, plant, fungi, insect, fish, aquatic invertebrate, tree etc) will people use to improve their livelihoods in the next century and how will they address the climatic challenge?

Understanding the evidence gaps in the potential of nature-based solutions using less utilised species to improve poor livelihoods and meet resource or service demands, while at the same time helping to protect and conserve traditional knowledge and biodiversity, is critical to finding innovative approaches to guide practice and governance. More examples and data sets are needed to promote the value of these initiatives for further investment. An opportunity also exists to develop and validate the appropriate methodologies for measuring the value of biodiversity.

Although methods and tools developed by managers and researchers for implementing sustainable management systems can be easily adapted to improve the use of less utilised species, the aim should be integrated innovation with local traditional knowledge and practices, to help protect the environment, promote the conservation of biodiversity[2] and improve livelihoods Strengthening and developing collaborations between producers, researchers, local communities, NGOs, media and governments are key factors for success in unlocking these natural resources. This will require innovation in driving integrated solutions (what works, where, why and for whom), directly addressing barriers to change, utilising high quality novel data and research outputs, and seeking good practice for scaling up and replicating elsewhere.

IPLCs hold wide-ranging knowledge associated with biodiversity which should be taken into consideration in determining appropriate practical innovative solutions for a local context. There is no 'one size fits all' solution, but context specific actions and strategies should emerge from a participatory process involving knowledge holders, addressing gender equality and social inclusion. Such a multi-stakeholder process will start with the recognition of the diversity of the concerns and needs of the actors. The combination of engaged, transdisciplinary research, with the sharing of knowledge and practices has the potential to support innovation in practice.

Policy instruments and tools will be needed and are most successful when tailored to the social and ecological contexts of the use of wild species and support fairness, rights and equity. This requires more effective monitoring of social, economic and ecological outcomes, with scientific evidence and indigenous / local knowledge to support better decision-making. In order, to be more effective, policy instruments and tools, need to be supported by robust and adaptive institutions and aligned across sectors and scales. Inclusive, participatory mechanisms enhance the adaptive capacity of these policy instruments.

Collaborative implementation of priority governance approaches targeting identified opportunities for intervention could enable transformative change from the current trends towards more sustainable approaches. Depending on the context, levers can be applied by a range of actors such as intergovernmental organizations, governments, non-governmental organizations and the private sector; but it is important to understand the power dynamics within a system to identify the correct leverage points to use[3].

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RGC2 GCBC Thematic Theory of Change

Aim

→ System transformation through local community natural resource management is informed and enabled by the demonstration of the interconnectedness of biodiversity, climate and livelihoods.

→ Evidence uptake leads to widespread implementation of policies, practices and investment strategies that deliver inclusive climate resilient, poverty reduction through conservation and sustainable use of biodiversity.

→ Research partners have stronger capacity, capability and networks to identify, fund, implement and disseminate research.

Long-Term Outcomes

New (or consolidation of existing) innovative and transformative research, evidence and scalable solutions on the conservation and sustainable use of biodiversity for climate resilient inclusive development and poverty reduction.

New or strengthened diverse and equitable inter- and trans-disciplinary research networks and partnership.

Policymakers, investors, practitioners and communities have access to the evidence and solutions through audience- appropriate knowledge products and channels.

Intermediate Outcomes

Unlocking Nature – Driving innovation in how biodiversity can support climate resilience and sustainable livelihoods through practice and governance.

Demonstrating what works

Sustainable approaches to management for agriculture, aquaculture, fisheries, natural resources, forests and land use, integrating carbon capture and the interface with other sectors.

Capacity building

Working with IPLCs, by promoting innovation, coordinated policy action and investment to reduce emissions, restore biodiversity and improve livelihoods.

Best Practice

Identify, develop and validate new innovative approaches to protect, value and sustainably use biodiversity for replication and scale across countries and regions.

Informing Policy

Lead internationally by sharing evidence and learning for innovative policies and practices through collaborative partnerships and networks to inform Governance.

Finance

Increase public and private investment in more effective climate resilient development through conservation and use of biodiversity to improve livelihoods.

System Transformation

Cost-effective nature-based solutions in defence of variable weather events and nature loss to ensure sustainable and resilient commodity production for global supply chains.

Outputs

A — Land / water use practices

Innovative solutions for replacement land / water use practices and materials to achieve climate resilience and livelihood improvement.

B — Habitat / species conservation

Balancing the need to conserve habitats and wild species in the face of extractive industries (e.g. farming, mining, logging, hunting and fishing operations) – in practice and policy.

C — Sustainable Production and Consumption

Reversing unsustainable anthropogenic consumption and exploitation patterns through innovative ways to value biodiversity more wisely.

D — Biodiversity Potential

Realising the potential from plant, fungi and wildlife resources to improve livelihoods in the face of climate change; and raise awareness of the value of biodiversity to incentivise conservation.

E — Incentives

How can and what types of incentives can contribute to the sustainable use of biodiversity for different income streams by local communities to improve climate resilience and livelihoods.

G — Ecosystem Resilience

Identifying and addressing the interactions and cumulative impacts of existing stressors and climate change on natural ecosystems, and the implications of those for managing biodiversity in a way that builds resilience of ecosystems and local livelihoods to climate change.

F — Knowledge and Data

Filling knowledge and data gaps on land use and marine systems of LMICs and building capacity of scientists and institutions to engage with the science policy interface.

Activities

→ Support research projects focused on climate resilience, biodiversity use and improved livelihoods.

→ Improve the evidence base, sharing research and learning.

→ Foster cross-disciplinary and international partnerships.

Sub-Themes in 'Unlocking Nature' Call

Driving innovation in how biodiversity can support climate resilience and sustainable livelihoods through practice and governance

The sub-themes for the competition are given below and explored with very brief detail to indicate the context but inspire different innovative approaches in line with the aims of the GCBC thematic call and delivery principles. A project should address one or more of these sub-themes, but the focus must be on new novel and inventive ways of finding solutions that will work and how these can then be upscaled and replicated more effectively, through innovative approaches to practice and governance.

A	**Land / Water Use** Innovative solutions for replacement land / water use practices and materials to achieve climate resilience and livelihood improvement.
B	**Habitat / Species Conservation** Balancing the need to conserve habitats and wild species in the face of extractive industries (e.g. farming, mining, logging, hunting and fishing operations) – in practice and policy.
C	**Sustainable Production and Consumption** Reversing unsustainable anthropogenic consumption and exploitation patterns through innovative ways to value biodiversity more wisely.
D	**Biodiversity Potential** Realising the potential from plant, fungi and wildlife resources to improve livelihoods in the face of climate change; and raising awareness of the value of biodiversity to incentivise conservation.
E	**Incentives** How can and what types of incentives can contribute to the sustainable use of biodiversity for different income streams by local communities to improve climate resilience and livelihoods.
F	**Knowledge and Data** Filling knowledge and data gaps on land use and marine systems of LMICs and building capacity of IPLC scientists and institutions to engage with the science policy interface.
G	**Ecosystem Resilience** Identifying and addressing the interactions and cumulative impacts of existing stressors and climate change on natural ecosystems, and the implications of those for managing biodiversity in a way that builds resilience of ecosystems and local livelihoods to climate change.

A Innovative solutions for replacement land / water use practices and materials to achieve climate resilience and livelihood improvement.

Ensuring future food security requires a food system that is resilient to and causes less global challenges (biodiversity loss, climate change, environment degradation) faced today. The gains achieved since 1970 in agricultural crop production (threefold) and raw timber harvest (45 percent increase) are often not sustainable; with indicators of regulating contributions, such as soil organic carbon and pollinator diversity, having declined. Currently, land degradation has reduced productivity in 23 percent of the global terrestrial area, and between $235 billion and $577 billion in annual global crop output is at risk due to pollinator loss[4]. Incentives and practices are needed for farmers to invest into land management (including in pollinators, pest control and soil biodiversity) for long-term productivity and maintaining biodiversity as a social good.

B Balancing the need to conserve habitats and wild species in the face of extractive industries (e.g. farming, mining, logging, hunting and fishing operations) – in practice and policy.

Extractive industries have an impact on biodiversity through many diverse pathways and across spatial scales (site, landscape, regional and global). In mining for example, traditional, site-based conservation approaches will have limited effect in preventing biodiversity loss against an increasing mining footprint, but there are opportunities to improve outcomes (e.g. through long-term strategic assessment and planning)[5]. The continuing demand for minerals, the depletion of resources in readily accessible areas and changing technologies and economics in the mining sector, is increasing mining in remote and biodiversity-rich ecosystems previously unexplored and undeveloped for minerals.

C **Reversing unsustainable anthropogenic consumption and exploitation patterns by promoting nature-based solutions through innovative ways to value biodiversity more wisely.**

Unsustainable production and consumption needs to be halted and the opportunities of a nature-positive economy harnessed through nature based solutions. Historically, GDP does not account for the depreciation of assets, including the natural environment. Policymakers will therefore have to create mechanisms that can account for the value of natural capital and devise means by which they can optimize their country's natural capital to stop overexploitation. Sustainable production will become a key consideration for supply chain involvement and highly transparent supply chains will have a competitive advantage over other countries.

D **Realising the potential from plant, fungi and wildlife resources to improve livelihoods in the face of climate change; and raise awareness of the value of biodiversity to incentivise conservation.**

Around the world, despite many local initiatives with IPLCs, fewer varieties and breeds of plants and animals are cultivated, raised, traded and maintained. By 2016, 559 of the 6,190 domesticated breeds of mammals used for food and agriculture (over 9%) had become extinct and at least 1,000 more are threatened. In addition, there is a lack of effective protection, for many wild crop relatives that are important for long-term food security, and a significant decline in the conservation status of wild relatives of domesticated mammals and birds. As a result of the reduction in the diversity of cultivated crops, crop wild relatives and domesticated breeds, agro-ecosystems are less resilient against future climate change, pests and pathogens[4].

E **How can and what types of incentives can contribute to the sustainable use of biodiversity for different income streams by local communities to improve climate resilience and livelihoods.**

Economic incentives have generally favoured expanding economic activity, but often cause environmental harm, rather than conservation or restoration. Incorporating the consideration of the multiple values of ecosystem functions and of nature's contributions to people into economic incentives has been shown to permit better ecological, economic and social outcomes. Priced incentive measures to improve decision-making on biological resources can reduce the differences between the value of biodiversity to individuals and to society as a whole; to increase returns from activities that conserve or restore valuable biological ecosystems and increase the cost or lower the return to activities that damage ecosystems. These create a level playing field between the observable returns to destructive activities and the non-observable returns to conservation. For example, farmers receiving a government payment in return for maintaining biological diversity on their land will be more willing to use farm practices that sustain biodiversity values. Market-based, incentives can "filter" through the entire economic system such that the enlightened self-interest of property owners and people using resources put their knowledge and skill to work on behalf of conservation. Underlying eco-labelling schemes for timber products, for example, is the premise that trade in timber can provide a powerful incentive to producers to engage in sustainable forest management[6].

F **Filling knowledge and data gaps on land use and marine systems of LMICs and building capacity of IPLC scientists and institutions to engage with the science policy interface.**

Knowledge and data gaps, whether from a paucity of data or the inaccessibility of existing data, are challenges that need to be addressed if we are to continue developing evidence-based solutions to biodiversity, climate change, livelihood issues. Three main aspects are around: 1) The loss and/or exclusion of local and traditional knowledge is a key challenge in addressing environmental degradation and sustainable agricultural systems; 2) Large volumes of knowledge often already exist, however regular, systematic syntheses are required to bring the evidence together and make it accessible to policy and decision makers[7,8]; 3) A lack of data and evidence is still hindering evidence-based decisions in agriculture - particularly in tropical areas[9].

G **Identifying and addressing the interactions and cumulative impacts of existing stressors and climate change on natural ecosystems, and the implications of those for managing biodiversity in a way that builds resilience of ecosystems and local livelihoods to climate change.**

Global biodiversity and ecosystems are under threat from a range of human-induced stressors at local and global scales. At these different scales, stressors not only have direct adverse impacts they can also interact and modify the effects on biodiversity and ecosystems[10], leading to further insecurity around both food and livelihoods. Stressors at local scales (e.g. overexploitation, pollution, habitat clearing) can interact with stressors at global (e.g. climate change)[11] or other scales in an additive (sum of multiple effects), synergistic (greater than sum of multiple effects) or antagonistic (less than sum of multiple effects) manner[12]. Using established databases and modelling to understand the types of interaction between existing stressors and climate change is crucial for prioritising and developing effective management strategies aimed at mitigating the adverse impacts and ensuring the persistence, continued functioning of and benefits received from biodiversity and ecosystems[10,13].

GCBC Case Studies

Examples of the practical innovation and actions that can be implemented through the GCBC are highlighted in the following case studies. These are drawn from the first fifteen projects funded (£11.5m) under the GCBC (since 2022) operating in 28 countries with over 90 delivery partners. The fifteen projects have led to 128 research partnerships (70 with public organisations, 23 with private sector entities and 35 with third sector) strengthened or formed, and over 3,500 people engaged, either based in the Global South or with strong North-South partnerships, leveraging over £550k of public and private finance.

1 DEEPEND: Deep Ocean Resources and Biodiscovery

The green energy transition is Increasing demand for natural resources, such as lithium, cobalt and manganese, for electric vehicle batteries. With vast reservoirs of minerals present in the deep sea, the biodiversity value (intrinsic and economic) from seabed mining protected marine regions in Areas Beyond National Jurisdiction (ABNU) in the abyssal central tropical Pacific and abyssal north Atlantic is being determined. Baseline data of the variation in chemistry from different organisms and the same organism from different locations and under different stresses will determine how their chemistry has helped organisms survive extreme environments. **A lab protocol will allow assessment of deep-sea samples for natural products, specifically for their potential to treat endemic diseases (e.g. diabetes and Neglected Tropical Diseases such as Dengue)**. Working with new networks and capacity-building in Pacific Small Island Developing States (PSIDS) (Cook Islands, Kiribati), will expand potential collections and collaboration to support identification of sustainable solutions to ocean mineral mining and delivery of key conservation messages based on scientific data.

UK: Natural History Museum, National Oceanography Centre, University of Aberdeen, University of Strathclyde Glasgow, University of Southampton.

Pacific: Cook Islands Seabed Minerals Authority, University of the South Pacific, Pacific Community.

2 TerraViva: Restoring biodiversity, improving carbon-efficiency and building sustainable coffee landscapes

In southern **Colombia**, the coffee-growing community, have prevailing monocropping production systems, unsustainable agricultural practices, a history of social armed conflict and a lack of access to markets. By understanding the interactions of the interconnected patchwork of different land uses, ecosystems, land covers and human dimensions (governance structures, communities, socio-economic status) using participatory tools such as appreciative inquiry and the Community Capitals Framework (CCF) (systems research approach, with seven capital assets: natural, human, social, cultural, build, financial and political), a new tool has been developed. **The Common Territorial Agenda (CTA) is a replicable sustainable landscape approach for any productive landscape, to inform decisions by communities of producers to restore biodiversity, improve carbon-efficiency and livelihoods on a farm-by-farm issue.**

Colombia: Sustainable Agriculture Network (SAN); Alliance of Biodiversity International, International Center for Tropical Agriculture (CIAT), Fundacion Natura, Inter-American Institute for Cooperation on Agriculture (IICA).

3 Trialling an incentive mechanism for agrobiodiversity conservation

Communities in Western Ethiopia maintain their farms as hotspots of agrobiodiversity, delivering a 'public good' for global agricultural systems. Yet farms receive few benefits for services provided. When communities become more vulnerable and less resilient, they have little alternative than to exploit wild resources including by habitat conversion and deforestation resulting in a poverty trap. The project is adapting the concept of 'payments for ecosystem services' to an agrobiodiversity context. **A novel, cost-effective conservation incentive mechanism, will reward farmers for maintaining agrobiodiversity and specifically targets the recovery of declining crop species and landraces (e.g. yams, enset)**. By enhancing livelihoods, local farmers' roles as custodians of indigenous forest will be strengthened, reducing rates of destructive exploitation of wild plants.

UK: Royal Botanic Gardens, Kew. Alliance of Bioversity International, CIAT.

Ethiopia: The Nature and Biodiversity Conservation Union, Ethiopian Biodiversity Institute, Addis Ababa University.

4 Realising the potential of plant bioresources as nature-based solutions in African biodiversity hotspots: supporting climate resilient sustainable development

Sustainable use of the diverse library of underutilised species and bioresources – including timber, medicines and valuable chemicals – is an untapped opportunity to alleviate poverty, develop value chains and tackle food insecurity, whilst being underpinned by nature conservation. **High value plant biodiversity hotspots and the pathways to develop bioresources within them in Ethiopia, Guinea and Sierra Leone are being characterised.** Research includes: a) plant-focused case studies with valuable plant-derived chemicals, crop wild relatives and underutilised crops; b) novel collections; c) field and bioinformatic modelling; and d) understanding bioclimatic and socio-economic drivers of agrobiodiversity hotspots. An ecosystem assessment toolkit will help to understand social and agroeconomic provisioning services that high biodiversity landscapes provide in the surrounding area and their impact on local communities.

UK: Royal Botanic Gardens, Kew.

Sierra Leone: Njola University.

EU: Alliance of Biodiversity International. CIAT.

Ethiopia: Addis Ababa University. Ethiopian Biodiversity Institute.

Guinea: herbier National du Guinee, Guinee Ecologie, Institut de Recherche Agronomique du Guinea, Centre Forestier Nzerekore.

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5 Biodiversity positive mining for the net zero challenge (Bio+Mine)

The Philippines is a major producer of copper, an essential metal for the energy transition to renewable energy and has the capacity to increase production fivefold. Bio+ Mine has delivered an in-depth audit of the abandoned Sto. Nino site in Benguet for geological, hydrogeological, ecological and social parameters, and developed with Local Indigenous People (IP) communities, the data cube as a tool to design nature and people positive interventions for regeneration of the mine site. Innovative technologies used include low-cost drones for remote sensing and monitoring, advanced automated mineral characterisation tools for rapid and thorough analysis of mineralogical materials as well as rapid environmental DNA techniques for sampling water, soils and water materials. Future realistic interventions for a nature positive and sustainable future use of the site by the empowered indigenous communities will be linked to devising ongoing, affordable, monitoring programmes that can assess the success of the interventions. The project will provide an exemplar to be further developed for planning post-mining landscapes elsewhere.

UK: Natural History Museum, Imperial Collect London.

Philippines: De La Salle University, Mindanao State University, Iligan Institute of Technology, University of South Wales, Sydney.

6 Nature Transition Support Programme

Aims to identify pathways towards an economy that is embedded within nature and set out a credible strategy for a whole economy transition in partner countries. The project is exploring the minimum viable data needed to effectively map natural capital and monitor changes in condition with pilots in Colombia and Ecuador, to understand a) ecosystem health - whether spatial links can be made between activities that draw down natural capital; and b) economic effects on Gross Domestic Product (GDP) resulting from Business as Usual (BaU) use of natural assets. Sectors most exposed to biodiversity loss as well as sectors that cause depletion of those resources will be prioritised. Data sets developed will be integrated into a decision framework for land use planning (e.g. agriculture, mining) as part of a strategy to mainstream nature into decision making for Governments in the two countries.

UK: UN Environment Programme World Conservation Monitoring Centre.

Colombia: Alexander von Humbolt Biological Resources Research Institute.

Ecuador: Instituto Nacional de Biodiversidad (INABIO).

US: UN Development Programme, University of Minnesota.

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