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GBIF Strategic Plan 2012-2016

Seizing
the
Future

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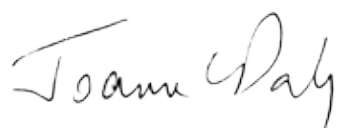
Foreword

As we plan a third phase for GBIF, the global community is acknowledging their failure to address the growing global biodiversity crisis. The target set by world leaders at the World Summit on Sustainable Development in 2002 to substantially reduce biodiversity loss by 2010, has not been met. The recent Third Global Biodiversity Outlook (GBO-3) provides unambiguous insights into the alarming declines in biodiversity, succinctly summarizing that "... the state of biodiversity in 2010 should serve as a wake-up call for humanity".

One reason why the target was missed is the lack of adequate information at national scales to monitor and measure trends. The global community agreed to a new set of biodiversity targets for 2020 at the Convention on Biological Diversity 10th Conference of the Parties (CBD CoP10) in Nagoya, Japan, in October 2010. Together with related international agreements and aspirations on sustainable management of the planet, the issue of how to access the necessary scientifically credible and globally compatible data will become increasingly urgent

over the next decade – the UN Decade for Biodiversity. This is the context within which the GBIF community must implement a further phase of GBIF, 'seizing the future' to benefit science and society.

GBIF's 2012–2016 Strategic Plan is based on the understanding that our core business - building and maintaining a global biodiversity research infrastructure to enable the free flow of biodiversity information - has never been so necessary, and more so now than when GBIF was conceived. We must rise to this challenge of not just investing in providing the much-needed public mega-science infrastructure, but of reaping the scientific and societal benefits of the past 10 years of investment. By the end of 2016, GBIF should have demonstrated an unquestionable rationale for 'Biodiversity Information Facilities' becoming a permanent infrastructure in every country and region. Both science and society stand to benefit enormously from a fully operational 'Global Biodiversity Information Facility' accessible to all.



Dr Joanne Daly
Governing Board Chair



Dr Nicholas King
Executive Secretary

Executive Summary

GBIF serves the primary, scientific biodiversity information indispensable for managing the global environmental systems on which all of life depends. As a unique, government-initiated global endeavour, GBIF brings people, countries and organizations together as both Participants and beneficiaries to accomplish our vision and mission. Now in our 10th anniversary year, GBIF celebrates a remarkable achievement. We have built an informatics platform, network and processes for mobilizing the knowledge discovered during humanity's biological exploration to date. The 2012-2016 Strategic Plan builds on this foundation in order to 'seize the future', enabling this ongoing knowledge discovery to be shared, both today and tomorrow, by using three integrated Strategic Imperatives to propel GBIF forward.

1. Advance the digital content

Ensure scientific fitness-for-use, impact, comprehensiveness, and access to new data domains.

GBIF will implement new mechanisms to further improve the reliability of the data it mediates, and better assess the use, benefits and impact of these data. In parallel, GBIF will also continue to promote and enable the digitization and publishing of hundreds of millions of additional primary biodiversity data records. Looking to the future, GBIF will enhance the capability of accessing the increasing wealth of genomic and ecological data describing ever more of the immense richness of biodiversity still to be discovered.

2. Advance the informatics infrastructure

Ensure the most effective distribution, open access, discovery and use, of GBIF-mediated data.

GBIF's infrastructure – the IT platforms, data standards, protocols, tools, and services – is central to GBIF being the foremost global

resource for biodiversity information, and will keep up with technological evolution. In the next five years and across species, genomic and ecological realms, GBIF will enhance seamless data access, integration, analysis, visualization and use. At the same time, GBIF will also foster community development of informatics standards, tools and services, together benefiting research, e-training and other applications throughout the global biodiversity informatics community.

3. Advance the engagement

Ensure that GBIF benefits the widest global audience - increasing participation and partnerships, capacity and networking.

The GBIF community – Participants, partners, and users – is indispensable for bringing the huge wealth of biodiversity records into currency. By providing interoperability standards for such primary data, other major biodiversity informatics initiatives within and outside the community can build upon the investment in GBIF. Five critical areas to reach the widest audience will be: better engaging the global GBIF community, strengthening Participant engagement and capacity, attracting new Participant countries, developing new strategic partnerships, and better assessing stakeholder and community needs.

Seizing the Future

Achieving these Strategic Imperatives will allow GBIF to further realize our enormous potential in deploying biodiversity knowledge for human and planetary well-being. This Plan provides the strategies for expanding GBIF's impact. Plans for implementation will be detailed in companion documents to follow in 2011 and beyond. These include plans on governance, financial arrangements, and broadening the funding base, alongside GBIF's biannual operational Work Programmes.

Introduction

GBIF was established in 2001 as a global megascience initiative to address one of the great challenges of the 21st century – harnessing knowledge of the Earth’s biological diversity. Meeting this challenge has never been more important in human history than it is now, and it is likely to become ever more important in the future.

VISION - A world in which biodiversity information is freely and universally available for science, society, and a sustainable future.

MISSION - To be the foremost global resource for biodiversity information, and engender smart solutions for environmental and human well-being.

Knowledge of the Earth’s biodiversity underpins society’s matrix of fundamental needs: how to conserve natural resources and ecosystem function, ensure food production and security, improve human health, sustain economies, and enhance the quality of human life. The urgent need for this knowledge increases daily as conversion of natural systems accelerates environmental change, loss of natural capital, and biological extinction. On the international stage, GBIF can play a pivotal role enabling countries to meet the new targets set by the Convention on Biological Diversity’s (CBD) strategic plan. These, including Target 19, *sharing of knowledge*, were adopted at the 10th Conference of the Parties (CoP10) in Nagoya, Japan, in October 2010.¹ Such biodiversity knowledge is also required to assist countries in meeting the Millennium Development Goals.

After our first ten years, GBIF has earned increasing international recognition and trust,

now with more than 100 Participants including 55 countries and 46 international biodiversity-related organizations. By the end of 2010, the network had mobilized more than 270 million records, encompassing more than 300 institutional data publishers and 10,000 datasets. The biodiversity information GBIF mediates is unique, comprehensive and scientifically credible, so accomplishing what no single country or organization could accomplish alone.

GBIF’s fundamental strengths remain our unique vision and mission, and our proven ability to achieve them. Medical science occupies similar ground with respect to the health of one species – *Homo sapiens*. Biodiversity information, the business of GBIF, takes the pulse of the rest of life on Earth, estimated at 10-50 million species of animals, plants and microbes. But with current extinction rates, environmental degradation, and climate change, that pulse weakens daily.

GBIF’s Strategic Plan for 2012-2016 embraces this global challenge. It builds on two previous strategic phases – ‘proving the concept’ (2001–2006), and ‘towards full operation’ (2007–2011), and it is linked to these via the incorporation of critical findings and recommendations of two independent assessments commissioned in 2009: a ‘Review’ and a ‘Forward Look’. This plan recognizes that GBIF’s continued success depends on the full participation and guidance of participating individuals, countries, and organizations, and an efficient and effective implementation arm, the Secretariat. Taken together, the overarching philosophy of this Strategic Plan is to advance GBIF’s unique mission, by seizing and serving the future of biodiversity information for the benefit of science and society.

¹ CBD CoP 10 Decision X/2: Strategic Plan for Biodiversity 2011-2020: www.cbd.int/decision/cop/?id=12268

Strategic Imperatives for 2012-2016

The three strategic imperatives each have their own priority targets and specific goals, which in turn form the framework for implementation. The activities, deliverables, timelines and expected impacts related to these will be detailed in GBIF's biannual Work Programmes. Information on governance and financial arrangements, including broadening the financial base, are included in additional companion documents that will follow in 2011 and beyond.

Fulfilling GBIF's mission requires the achievement and synergy of all three imperatives, in order to advance the worldwide discovery, publishing, access, use and application of biodiversity information.

1. Advance the Digital Content

Ensure scientific fitness-for-use, impact, comprehensiveness, and access to new data domains.

GBIF will continue to implement significant advances in the quantity and quality of primary biodiversity data that it makes accessible to the global community of scientists other users and society as a whole. This imperative comprises four main objectives, each of which requires priorities and incentives for effective implementation.

1.1. Quantity: Fill the data gaps

GBIF will fill the major spatial, temporal and taxonomic gaps in biodiversity data currently being served across the network, particularly for biodiversity-rich geographic regions. Most of the records required to fill these gaps are either digitized but not yet published through GBIF, or not yet digitized and held in data-rich biodiversity institutions.

GBIF will implement two parallel approaches: (i) Expedite the discovery, digitization and publishing of legacy data, particularly those associated with large biological collections, such as the hundreds of millions of plant and animal specimens in major national, public, and private natural history museums and herbaria, primarily in North America and Europe. Less than 5% of these specimen data are digitized or published,

essentially quarantining them from the very applications they were intended to inform. Much concerns the biodiversity of African, Asian, and Central and South American countries that would immediately benefit from access to this knowledge. (ii) Capture new data resources by enabling multiple and enriched data types, such as metadata, taxonomic names, observations, etc., to be linked and accessed.

1.2. Quality: Enhance fitness-for-use

An overarching priority is improving data fitness-for-use, i.e. increasing data reliability, both geographic and taxonomic, for scientific research and other diverse applications. This includes documentation of enriched metadata, user annotations, and enhanced tools and services for data cleaning, verification, publishing, and attributing data publishers. Two priority objectives are: (i) full development and adoption of persistent identifiers (e.g. Global Unique Identifiers, and others) for biodiversity data objects across domains, including individual organisms, taxonomic concepts, genomics, and ecosystems; and (ii) improving the accuracy of geo-referencing spatial occurrence data.

1.3. Scope: Accommodate data futures

GBIF will address the coming challenge and opportunity of making accessible information regarding the estimated 90% of the planet's biodiversity that is still to be discovered and shared. There may be 10–50 million species in total, with most of the undiscovered biodiversity thought to inhabit a nano-biological world in the air, oceans, soils, and inside other organisms. The currency of this knowledge will not be phenotypic data, but primarily genomic biodiversity data, with identifiers linked to animals, plants, microbes, and ecosystems.

A complementary requirement is to allow the integration of related ecological biodiversity data, as knowledge of the ecosystem function of biodiversity is critical to global and national policy and decision-making. This needs an increased focus on the relationships between species and the ecosystems they inhabit, and mobilization of data from varied sources such as climate change, health, agriculture, marine

science, environmental impact assessments, and other relevant areas.

Data interoperability and mobilization for both genomic and ecological biodiversity can only be accomplished in close collaboration with partners.

1.4. Use: Measure data impact

GBIF will improve the assessment of the impact of GBIF-network data, i.e. the degree of their incorporation into scientific research (e.g. through published papers, citation mechanisms and services), and direct and indirect benefits and impacts, such as incorporation of results into relevant policy and decision-making. Detailed evaluation of the use, effectiveness and real-world impact of GBIF-network data, supported by solid evidence, is fundamental for demonstrating the returns on continued investment by Participants, and will help in the recruitment of new Participants.

2. Advance the Informatics Infrastructure

Ensure the most effective distribution, open access, discovery and use, of GBIF-mediated data.

Informatics is an intensive global research and development enterprise in the scientific and corporate worlds. As such, GBIF's priority informatics objectives will be addressed with partners in these communities.

2.1. Expand the distributed infrastructure

GBIF will improve distributed data discovery and access infrastructure that is scalable, reliable, powerful, user-friendly, and efficient. GBIF will extend the current infrastructure components to ensure: (i) improved performance, (ii) increased discovery of data and services, and (iii) support for the bi-directional movement of data, annotation and feedback between data users and data publishers. A key example is linking data to web-based map services, to facilitate data use and enhance increased data provision.

GBIF will also provide an increasingly flexible and distributed infrastructure for Participants, to enable the construction of their own Biodiversity Information Facilities (BIFs), and the further uptake of new tools and services. Within the

overall infrastructure, the GBIF Data Portal will be refined with enhanced functionality, tools and documentation for data discovery, access, mining, verification, annotation, visualization and use.

2.2. Improve standards and interoperability

GBIF will continue to catalyse the development and adoption of biodiversity informatics standards, a role it has played with great success to date. In anticipation of the integration and serving of future data types, GBIF will work closely with partners to enable data integration and interoperability across phenotypic, genomic, taxonomic, geospatial and ecosystem domains. Two critical areas for the next five years include: (i) Knowledge Organization Systems such as vocabularies, thesauri and ontologies; and (ii) Persistent Identifiers to support a variety of web services including those for core taxonomies and nomenclature through the Global Names Architecture.

2.3. Foster community-developed standards, tools and services

GBIF will solicit, deploy and promote the best ideas from the global community for advancing biodiversity informatics and achieving GBIF's strategic imperatives for content and infrastructure. Where appropriate, GBIF will leverage the expertise in the informatics community by implementing creative and cost-effective mechanisms for fostering and incorporating community-developed standards, tools, and services.

3. Advance the Engagement

Ensure that GBIF benefits the widest global audience - increasing participation and partnerships, capacity and networking.

Key to GBIF's strategy is the further building of country participation and capacity, scientific and technological partnerships, and networked relationships among stakeholders. Paramount to this is a richer engagement across the network, and specifically within Participant countries, between all national stakeholders, biodiversity research institutions, government ministries and agencies, relevant sub-national authorities, etc.

3.1. Engage a global GBIF community

An effective GBIF global network requires the engagement of the world's biodiversity community. It also requires increasing GBIF's recognition, visibility and 'brand leadership' in biodiversity informatics. Both will be achieved by developing closer and more synergistic relationships with relevant intergovernmental processes such as Multilateral Environmental Agreement (MEA) Secretariats and UN agencies, GEOSS (GEO BON²), and IPBES³, in addition to regional cooperative initiatives, NGOs, and wider civil society. GBIF is also ideally placed to play a more central role in the biodiversity informatics infrastructure required by such processes as the CBD Clearing House Mechanism, GEO BON and IPBES.

3.2. Strengthen Participant engagement and capacity

GBIF's success in the next five years across all three strategic imperatives requires increased Participant engagement and capacity. Enhanced Participant engagement in their own national efforts, e.g. their data-rich biodiversity entities, BIFs, nodes, and maximizing national stakeholder involvement, will help them realize a greater return from their historic and ongoing investments, and simultaneously increase the realized benefits from participation in GBIF.

In building capacity, GBIF will assist Participants to establish, consolidate, and expand national, regional, and thematic 'biodiversity information facilities' (BIFs). GBIF will promote more capacity building activities between Participants, such as mentoring programmes and regional collaboration, to rapidly engage new Participants in the GBIF network and in building their own effective BIFs. Priorities include building capacity to use the informatics infrastructure, including better documentation, training and e-learning platforms; distributed helpdesk support; community networking platforms; and regional engagement and empowerment. Training is recognized as a vital component, and requires a comprehensive, web- and site-based programme ranging from data-publishing to data access, analysis and application. Training tailored to the

specific needs of the Participant node, BIF, or institution will follow from the needs assessment.

3.3. Recruit new Participant countries

GBIF will prioritize the significant expansion of country participation, particularly those that have critical in-country biodiversity, and/or hold important biodiversity data in their institutions. This requires more effective communication and demonstration of the reciprocal benefits of GBIF participation. Participants leverage their continuing investment in their own biodiversity institutions by enabling the mobilization, publishing and use of their own data; and they leverage the use of the globally-held data on their country's biodiversity through the establishment of their own Biodiversity Information Facilities (BIFs) linked to, and based upon, GBIF best practices.

3.4. Recruit strategic partners

GBIF will develop new, strategic, scientific and technological partnerships across the biodiversity, conservation, genetic/genomic and ecosystem realms, to help fulfil the first two strategic imperatives. Target partners include significant data holders such as natural history institutions; scientific users such as scientific societies whose members depend on primary biodiversity data for research and education; scientific and technological entities that can develop and provide tools for GBIF's evolving infrastructure; and major science and technology entities that can collaborate in implementing elements of GBIF's Work Programmes and global activities.

3.5. Assess stakeholder needs

GBIF will more effectively assess and monitor the needs of its global, national and regional communities, i.e. current and future Participants, the broader scientific research community, NGOs, and other critical stakeholders. Such assessments will influence the drive towards the prioritized, demand-driven approach for GBIF's activities that is required to meet the Strategic Imperatives and the needs of Participants and partners.

² GEOSS - Group for Earth Observations System of Systems; GEO BON – Group for Earth Observations Biodiversity Observations Network (www.earthobservations.org)

³ IPBES – Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (www.ipbes.net)

Seizing the Future

GBIF's 2012-2016 Strategic Plan seizes the future. It describes the three fundamental pillars – advancing data content, the informatics infrastructure, and engagement of all – that must be strengthened to enable the achievement of our mission. All three are essential and must be advanced together to maximize impact, but in a rapidly changing world we must also be prepared, like life itself, to adapt and evolve.

To advance these requires our continued focus on the mobilization of, and enabling free access to, primary biodiversity data, their fitness-for-use, and their scientific and societal impact, in addition to building the informatics, training and community networking infrastructures that enable their deployment.

As a growing global network, we must acknowledge, accept and meet our respective responsibilities to build these pillars in

partnership. Participants and the Secretariat, strategic partners and data users, each have our different roles, and by collaborating under the GBIF 'umbrella', the whole becomes more than a sum of the component parts.

In accepting these strategic challenges, we accept the dual, synergistic and fundamental responsibilities and commitments at the core of GBIF: future success depends on Participant countries and organizations, together with the Secretariat, seizing the future with both hands.

Over the next five years, this Strategic Plan will provide a solid framework within which to build our implementation plans – realistic goals and the means to achieve them. It will enable GBIF to optimally grow our impact in better serving science, and thus society and a sustainable future through improved decision-making.



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