World Flora Online, Strategic Plan 2022-2030

Adopted by the WFO Council on 22 March, 2024

Introduction

A widely accessible flora of all known plant species has been recognized as a fundamental requirement for plant conservation. The development of the World Flora Online (WFO) was therefore stimulated and encouraged by the Global Strategy for Plant Conservation (GSPC), first in 2002 when the GSPC was adopted by the United Nations Convention on Biological Diversity (CBD), and subsequently when it was updated in 2010.

The first WFO-related target was included in the 2002-2010 GSPC: to develop "*a widely accessible working list of known plant species as a step towards a complete world flora*". This target was achieved at the end of 2010, with the publication of 'The Plant List' (TPL, www.plantlist.org). Drawing from knowledge gained in producing TPL, WFO was projected to meet the updated first target of the 2010-2020 GSPC: to produce "*an online flora of all known plants*".

The WFO portal (www.worldfloraonline.org) was launched in 2017 at the 19th International Botanical Congress, in Shenzhen, and the first edition of the WFO Plant List (replacing the outdated TPL) was published in May 2021 (www.wfoplantlist.org). Of all GSPC targets, only Target 1 had been achieved, through the work of WFO.

The scope of the GSPC is as defined by the Decisions of the CBD, to include all vascular plants and other well-known plant groups, such as bryophytes. During the upcoming period (up to 2030) it is not proposed to broaden the WFO to include other groups, such as algae or fungi.

Alignment with the Montreal-Kunming Global Biodiversity Framework, 2022

The Montreal-Kunming Global Biodiversity Framework (GBF) was adopted by the 15th Conference of the Parties to the CDB (December, 2022)[1]. Of GBF's 23 targets, six explicitly require species level information and so have particular relevance for WFO: Target 4 (threatened species), 5 (harvesting and trade of wild species), 6 (alien species), 9 (management and use of wild species), 10 (sustainable use of managed areas), and 21 (biodiversity information).

As an open access, comprehensive and authoritative resource of global and national expertise, WFO includes documentation and inventories for countries on floras and the status of known plant species and natural habitats, and as the authoritative global resource for up-to-date information on accepted names for plant species, WFO will support monitoring and reporting of these targets. In particular, WFO will make a significant contribution to the achievement of Target 21: to "*Ensure that the best available data, information and knowledge, are accessible to decision makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent, in accordance with national legislation*".

[1] https://www.cbd.int/doc/c/179e/aecb/592f67904bf07dca7d0971da/cop-15-l-26-en.pdf

This GBF target for 2030 provides an entry point for the WFO to contribute to the achievement of the GBF objectives to ensure that the best available data are accessible to support biodiversity conservation at all levels.

In 2023, the CBD's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) at its Twenty-fifth meeting held in Nairobi, 15–19 October 2023 adopted a recommendation on the future of the Global Strategy for Plant Conservation for the period up to 2030, linked to the GEF targets. A set of draft 'complementary actions in plant conservation', aligned with the GBF targets were recommended for adoption by the CBD's upcoming COP in October 2024.

The Complementary Actions related to Plant Information Systems for the updated GSPC include the following:

21 (b) Support the development and use of existing comprehensive, authoritative and accessible expertise and online information systems, documentation and inventories, as well as access to biological collections (e.g. through digitization) at the local, national and international levels, making available to all countries information on their floras and the status of known plant species and associated ecosystems, while ensuring the free, prior and informed consent of indigenous peoples with regard to access to traditional knowledge and taking into consideration the ongoing work and processes carried out under relevant organizations, such as the Food and Agriculture Organization of the United Nations and its Commission on Genetic Resources for Food and Agriculture.

21 (c) Explore ways to consider various knowledge systems, including traditional knowledge, innovations, practices and technologies, to support plant conservation action.

21 (d) Promote the continuous updating of the World Flora Online, including its identification support tools, information on plant distribution and the updating of regional floras.

Action 21(d) in particular provides a powerful specific mandate for the WFO to continue its work and contribute to the achievement of the GBF.

The development of the WFO Vision

When the WFO project was launched in 2012 it clearly defined its vision. It was agreed that it was not intended to be a critical, monographic revision of each of the world's plant species. Nor was it envisioned to be a detailed local flora with vouchered distributional data. It was proposed to be a synoptic flora with a defined, descriptive data set containing largely pre-existing information on the world's plant species. Limited resources, by and large, make it unrealistic to develop new or collated descriptions. Although these may be required in the future, it has been necessary first to collect and mobilise existing data. Once the foundation is available, new technologies can be employed to analyse, manipulate, and enhance WFO. In the vision outlined for the period up to 2020, it was recognized that in the future it would be important to explore mechanisms, including capacity-building at national level, to fill the gaps in existing knowledge. This aspiration remains a part of the ongoing vision of the WFO.

The data infrastructure of the WFO was determined to ensure that it could be a framework capable of accommodating regional floristic data (at national or lower level) to provide information in both regional and global contexts. Hoped for enhancements included more complete synonymy; geographic distributions to at least country level, drawing on national floras, checklists, and monographs; habitat data; identification tools, principally interactive keys, images, and descriptions; conservation status; and other enhancements as

practicable, e.g., vernacular names. Much of these data already exist in digital or printed format, and they have been used to populate WFO. Such work needs to continue in the period following 2020.

The vision for the WFO recognizes that the project is much more than an information technology project, and plant taxonomists have and will continue to play a crucial role in:

- resolving nomenclature and taxonomy to ensure that the WFO can include as close as possible to a 'consensus classification' of the world's plants, and;
- generating new floristic and monographic work to update old information and fill in the considerable gaps that exist.

The primary technical challenge of the WFO has been to develop an open and transparent, web-based data collection, manipulation, and storage facility. Secondly, the system must provide open access to this accumulated data resource for the scientific community and other users of botanical data. The system is required to support research and conservation as an authoritative information system to facilitate the implementation of the CBD, and in particular, the elements related to plant conservation.

The WFO Consortium sees the WFO as a critical resource for the conservation and sustainable use of plants by providing the information necessary to establish a baseline on the plant diversity of each region or country. WFO is also needed to identify the organisms under study, evaluate their distributions, and help improve both regional and global estimates of status of threatened or endangered taxa supporting their long term survival. WFO's open access website provides free access to the recorded information on the world's plants and allows for data to be extracted and used to support a wide variety of purposes, particularly related to facilitating plant conservation planning and action.

While the WFO already provides a valuable and comprehensive baseline on the world's plants, further work is required to ensure that accessibility is improved to meet the needs of users, including verification of the correct names and synonymy, up-to-date geographic distributional information, comprehensive descriptions, verified images (as far as possible and feasible) and conservation assessments. Furthermore, the plant diversity of some countries, regions, and of specific plant groups is still inadequately known and understood.

WFO and Taxonomic Expert Networks (TENs)

The World Flora Online (WFO) Consortium has welcomed engagement by the global botanical community to create and join the Taxonomic Expert Networks (TENs) to help improve the WFO taxonomic backbone and curate a global consensus classification. The WFO Taxonomic Backbone aims to include all effectively published plant names, with every name being assigned a unique WFO identifier, regardless of its taxonomic and nomenclatural status. From the Taxonomic Backbone a single classification of taxon names and their synonyms is built to which descriptions, images, geographic distributions and other content can be attached. TENs are encouraged to adopt a Family level approach in curation of the Taxonomic Backbone but recognise that in some cases a different taxonomic rank may be more appropriate depending on the size of the group in question.

The WFO Strategic Plan

Vision

The ongoing vision of the WFO will therefore be to contribute towards ensuring that access to comprehensive and authoritative global and national expertise, and online information systems, documentation and inventories is available in all countries on floras and the status of known plant species and natural habitats.

For the period 2023 to 2030, the specific elements of the Vision of the WFO Strategic Plan are as follows:

- To build on the two decades of endeavor on the WFO to provide the most comprehensive and accurate knowledge base on the plants of the world;
- To ensure that the data content of the WFO continues to be enhanced, improved and substantially increased, and that new data (such as on recently discovered species) can be added in a timely and sustainable manner;
- To improve and develop the means by which data are stored and accessible so that they will be increasingly usable and available for plant conservation planners and practitioners;
- To develop and refine the means and efficiency by which data are added to the WFO;
- To provide an increasingly authoritative consensus classification on the world's plants;
- To provide a platform for plant taxonomists to share their expert knowledge on the diversity of the world's plant species;
- To promote the recognition of plant taxonomy as an innovative field of science, appreciating continuing methodological innovations (e.g. integrative morphological and molecular approaches to species delimitation) that lead to the generation of quality information on plant species;
- To be reactive to the needs of users for additional information on plants, providing an accessible platform for existing and novel data (for example, on vernacular names and other cultural knowledge of plants);
- To improve and enhance the user interface so that WFO data will increasingly be used to support plant conservation planning and actions;
- To continue to build the global cooperative WFO community and build capacity for plant taxonomy and floristics throughout the world;
- To safeguard and enhance the cooperative and collaborative ethos of the WFO organization whereby shared ownership of the project is recognized as a fundamental part of its ongoing operations, focus and governance.

Mission

The Mission of WFO is to support the conservation, restoration and sustainable use of plant diversity and natural habitats by collating, compiling, developing, organizing, make accessible and disseminating accurate and up-to-date scientific information on all known plant species of the world, and to ensure that this information is available using FAIR principles.

Objectives

1. WFO will be strengthened as the best global source of data on the world's plants, supporting the conservation of plant diversity worldwide.

2. Increase the coverage and scope of WFO data to increase its utility for ensuring the conservation and sustainable use of global plant resources.
3. Enhance the relevance of WFO to governments, plant conservationists, scientists, decision makers and other stakeholders.
4. Strengthen the governance and inclusiveness of WFO.
5. Improve and invest in the software systems that allow and improve the management and dissemination of WFO data.
6. Improve the resilience and sustainability of WFO.
7. Strengthen global capacity for biodiversity documentation and contribution to WFO.

Targets

Coverage and scope

1. By 2030, taxonomic coverage by the TENs will be comprehensive, covering over 80% of all known plant species.
2. Descriptive Content of WFO will grow to include information from over 90% of all known plant species, and comprehensive for every region of the world. Indicators will be included as to whether the occurrence of species at national levels represents the native distribution of the species, as well as when they are naturalized or invasive.
3. Distribution data will be comprehensive, resolved to at least country-level distributions, supported by and with links to specimen data, and becoming an essential resource for the management of national plant lists.

Relevance

4. WFO will be recognized as the best source of global checklist data, providing the plant content for Catalogue of Life/GBIF, and be the discovery portal for biodiversity data.
5. WFO will contribute to the development, achievement and monitoring of goals of the Montreal-Kunming Global Biodiversity Framework 2022, and GSPC's plant conservation agenda of complementary actions supporting the GBF.
6. WFO will enhance the utility and use of WFO to support plant conservation, and habitat conservation, restoration, and the sustainable use of plant resources, e.g. monitoring of protected areas, food security, and combatting invasive species.

Resourcing WFO development

7. WFO will put in place a multi-year business plan outlining resource needs to achieve its objectives and potential sources.
8. WFO will recognize that the primary long-term source of support for the development and maintenance of WFO will be the members of the WFO Consortium. However, it is accepted that significant financial contributions and support will be required from external sources to allow the achievement of its targets and goals.

Governance and inclusiveness

9. WFO will double the number of Consortium members, to at least 100, with emphasis on the inclusion of research institutions from biodiverse countries.
10. The WFO Council will achieve a balanced diversity at its meetings and within its membership.
11. WFO will seek to increase the diversity of the leadership of TENs.
12. WFO Council will meet regularly, both in-person and virtually.
13. The Memorandum of Understanding will continue to provide the governance document but will be updated as necessary to meet future organizational requirements.

14. The registration of WFO as an international organisation will be agreed by Council .

Resilience and sustainability

15. WFO will recognize that the primary long-term source of support for the development and maintenance of WFO will be the members of the WFO Consortium. However, it is accepted that significant financial contributions and support will be required from external sources to allow the achievement of its targets and goals.
16. WFO will put in place a ten-year business plan outlining resource needs to achieve its objectives and potential funding sources.
17. WFO will strengthen resilience of its informatics architecture by moving off the eMonocot system into a new, modular infrastructure.

Global capacity for biodiversity research

18. WFO will promote collaborative capacity building programs for early career taxonomists, with special emphasis on working with biodiverse countries, focusing on addressing knowledge gaps, and promoting fieldwork and career development.
19. WFO will support and encourage increased activity in collaborative global level taxonomic revisionary studies.
20. WFO will provide a platform of the work of taxonomists to have global impact in field of conservation (e.g. WFO used as the basis for plant classification used in IUCN Red List Assessments

Taxonomic Working Groups

21. The network of Taxonomic Expert Groups (TENs) will be further developed to ensure taxonomic expert coverage of the majority of all plant families by 2030.
22. TENs will develop and curate the most authoritative consensus overview possible of up-to-date information on the plant diversity of the Families or other groups for which they have a mandate to represent for WFO.
23. TENs will manage backbone data using an information system that can provide an output of tabular data format for incorporation into the WFO data management software. Technical Guidelines for Taxonomic Backbone contributors will be available and updated as required. Taxonomic data that are received from TENs will undergo technical data format checks and subsequently will be incorporated as the update of the taxonomic backbone.

Communications

24. WFO will develop and implement a comprehensive communications plan to achieve:
    - Widespread use of the WFO data by conservation practitioners;
    - Greater engagement with the plant conservation community;
    - further international recognition of the importance of WFO and the data it includes;
    - Efficient reporting on WFO data and its use to support monitoring the achievement of the GSPC and GBF;
    - The use of WFO data in the provision of taxonomic backbones for many conservation-related initiatives and global biodiversity databases;
    - Successful financial and other resource generation.