



IUCN SSC Species Monitoring Specialist Group and Re:wild

Database of Biodiversity Data Sources for Conservation Monitoring

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For more information and the criteria used for selecting data sources see: Stephenson, P.J. & Stengel, C. 2020. An inventory of biodiversity data sources for conservation monitoring. *PLoS ONE*, 15(12): e0242923. <https://doi.org/10.1371/journal.pone.0242923>

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Table 1. Global biodiversity data sources of potential value in monitoring biodiversity state.

Those data sources where at least some data (or mapping of data) appear to be instantly, openly and freely available are flagged with a star (*).

Those data sources on priority sites (AZE sites, G200 ecoregions, KBAs, etc) will usually need to be used in tandem with other data sources to be relevant to monitoring certain indicators (e.g. number/abundance of threatened species in priority areas).

Note that some data sources would need updating before they could be of use.

Data source managers are encouraged to send any additional information or updates to SpeciesMonitoringSG@gmail.com.

Data source	Lead agency	URL	Description
Alliance for Zero Extinction Sites	Alliance for Zero Extinction	https://zeroextinction.org/	Information on AZE sites and the species they contain, each of which is the last remaining refuge of one or more Endangered or Critically Endangered species as defined in the IUCN Red List of Threatened Species. Summary data in maps; full data available on request.
AmphibiaWeb*	University of California, Berkeley	https://amphibiaweb.org/index.html	Information on amphibian declines, natural history, conservation, and taxonomy.
Aqua Maps*	FishBase and SeaLifeBase	https://www.aquamaps.org/search.php	Generates model-based, large-scale predictions of natural occurrences of marine and aquatic species. Derived from GBIF, OBIS, FishBase, SeaLifeBase & AlgaeBase.
Barcode of Life Data System*	Centre for Biodiversity Genomics, Canada	https://www.boldsystems.org	BOLD is a cloud-based data storage and analysis platform. It consists of four main modules, a data portal, an educational portal, a registry of BINs (putative species), and a data collection and analysis workbench. One of the main reference libraries used to identify sequences from eDNA and therefore support the tool's use in monitoring. Allows access to private data; public data transmitted to GBIF.
BioCASE (Biological Collection Access Service)*	Botanic Garden and Botanical Museum, Berlin	http://www.biocase.org/index.shtml	Links together specimen data from natural history collections, botanical/zoological gardens and research institutions worldwide to identify historical sites of species occurrence.
Biodiversity Habitat Index	CSIRO	https://www.bipindicators.net/indicators/biodiversity-habitat-index	Translates the observed spatial distribution of habitat loss and degradation into expected impacts on retention of terrestrial biodiversity. Data available on request.
BioTIME*	University of St Andrews, UK	https://biotime.st-andrews.ac.uk/download.php	Raw data on species identities and abundances in ecological assemblages through time. Contains over 12 million records of almost 50,000 species from over 600,000 locations from land and sea territories. It helps to understand and predict biodiversity change by filtering data by biomes and taxa.

Data source	Lead agency	URL	Description
Birdlife Datazone*	BirdLife International	http://www.birdlife.org/datazone/home	Distribution and abundance of bird species worldwide, mostly presented as content of IUCN Red List. Population data only show general trend (as per Red List). Distribution maps need to be requested.
CGMFC-21: Continuous Global Mangrove Forest Cover for the 21st Century*	Salisbury University	http://faculty.salisbury.edu/~sehamilton/mangroves/	Mangrove cover annually; needs updating.
Continuous Plankton Recorder Survey	Marine Biological Association	https://www.cprsurvey.org/	Established in 1931, it claims to be the longest running, most geographically extensive marine ecological survey in the world. Monitoring plankton communities across basin scales over time helps recognise changes in marine environments. Data accessible on the website through a request process.
DATRAS*	ICES: International Council for the Exploration of the Sea	https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx	This platform stores data collected primarily from bottom trawl fish surveys coordinated by ICES expert groups. Data available for 45 years and continuously updated by national institutions. Currently only covers the 20 ICES member states in the northern hemisphere.
DEIMS-SDR (Dynamic Ecological Information Management System - Site and dataset registry)*	Centre for Ecology and Hydrology, Natural Environment Research Council, UK	https://deims.org/	Data from long-term ecosystem research sites.
Domestic Animal Diversity Information System (DAD-IS)*	FAO	http://www.fao.org/dad-is/dataexport/en/	Data on domestic strains of animal per country for monitoring Aichi Target 13.
eBioAtlas Database	IUCN and NatureMetrics	https://ebioatlas.org/	In development: Project recently launched to develop a global database of fish, birds, amphibians and land animal occurrences identified by eDNA at sampled freshwater sites around the world. Data on species diversity of potential use in monitoring community trends over time. The database will be freely available to non-commercial users.
eBird*	Cornell Lab of Ornithology	http://ebird.org/	Citizen science bird observations.

Data source	Lead agency	URL	Description
eMammal*	Smithsonian Institution	https://emammal.si.edu/	Data management system and archive for camera trap research projects.
Ecologically or Biologically Significant Marine Areas*	Secretariat of the Convention on Biological Diversity	https://www.cbd.int/ebsa/	As with KBAs and protected areas, the use of these area in monitoring is to identify sites of importance for conservation.
Ecosystem (or Ecoregion) Intactness Index*	University of Queensland	https://espace.library.uq.edu.au/view/UQ:f51cace	Intactness scores for the world's terrestrial ecoregions; needs updating.
EDGE Database	Zoological Society of London	https://www.edgeofexistence.org/search/	Data available on request on species considered Evolutionarily Distinct and Globally Endangered (EDGE), such as population numbers and trends, range, threats, etc. Currently focused on vertebrates and corals.
FishBase BRUVS Portal*	FishBase consortium	https://fishbase.ca/bruvs/search.php	Dataset of diversity, abundance, size and biomass of pelagic fishes collected using BRUVS (baited remote underwater videos) with 140,000 geo-referenced records for 303 taxa from around 70 surveys and 34 global locations.
Global 200 Ecoregions*	WWF-US	https://www.worldwildlife.org/publications/global-200	Data on 238 terrestrial, freshwater, and marine ecoregions that harbour exceptional biodiversity and are representative of ecosystems.
Global Biodiversity Information Facility*	GBIF	http://www.gbif.org/	Houses over 1.6 billion species occurrence records from over 54,600 data sets (as of October 2020).
Global Environmental Flow Information System*	International Water Management Institute	http://gef.iwmi.org/	Interactive maps provide information related to Environmental Flows for current conditions and different Environmental Management Classes of a river system based on river health indicators.
Global Marine Environment Datasets – GMED*	GEOBON	http://gmed.auckland.ac.nz/index.html	Climatic, biological and geophysical environmental layers of both present day, past and future environmental conditions. For use with species distribution modelling software like Maximum entropy (MaxENT) and for any other marine environment visualisation exercise.
Global Forest Change*	University of Maryland	https://earthenginepartners.appspot.com/science-2013-global-forest	Results from time-series analysis of Landsat images characterizing forest extent and change. Also of use in monitoring forest loss.
Global Forest Watch* (including GFW Climate, GFW	World Resources Institute	http://www.globalforestwatch.org/	Near-real-time data and tools for monitoring forests. Offers weekly GLAD deforestation alerts that show where tree cover loss is happening in the tropics. Includes several related tools: GFW Climate (data on forest carbon); GFW Commodities (data on forest change, concessions, mills, etc to assess

Data source	Lead agency	URL	Description
Commodities, GFW Fires)			supply chain risks); GFW Fires (near real-time information on forest and land fires).
Global Mangrove Watch*	Aberystwyth University (U.K.), solo Earth Observation (soloEO; Japan), Wetlands International, UNEP-WCMC, Japan Aerospace Exploration Agency (JAXA).	https://www.globalmangrovetwatch.org/ https://gma-panda.opendata.arcgis.com/	Data and maps on mangrove extent and biomass in the tropics and subtropics (contributing to Ramsar Global Wetlands Observing System).
Global Seabird Data Portal*	World Seabird Union	http://axiom.seabirds.net/maps/js/seabirds.php	An interactive map that displays seabird colony, population, and diet records throughout the world. Under development.
Globe Observer*	NASA	https://observer.globe.gov/get-data	Citizen science platform supported by NASA's Global Program that provides data from more than 120 countries on: land cover; tree observations; mosquito habitat mapper; and clouds observations. Accepts upload of new observations.
iNaturalist*	California Academy of Sciences and National Geographic Society	https://www.inaturalist.org/	Citizen science nature observations.
International Waterbird Census Database*	Wetlands International	http://wpe.wetlands.org/	Current and historic estimates, trends and 1% thresholds for over 800 waterbird species and 2,300 biogeographic populations worldwide.
IUCN Red List of Ecosystems*	IUCN	https://iucnrl.org/	Status of a number of ecosystems.
IUCN Red List of Threatened Species*	The Red List Partnership – 10 organisations led by IUCN	https://www.iucnredlist.org/	Extinction risk of species with data on range, population trends, habitat use, life history traits, use and trade, threats, conservation actions currently in place and conservation actions needed.
Living Planet Index*	WWF, Zoological Society of London	http://www.livingplanetindex.org/data_portal	Trends in over 27,000 populations of more than 4,700 vertebrate species.
Map of Life*	Yale University, University of Florida	https://mol.org/datasets/	Accesses data on plants and animals from multiple sources (local inventories, regional checklists, expert range maps such as IUCN Red List, gridded surveys, point observations and Wikipedia).

Data source	Lead agency	URL	Description
Movebank*	Max Planck Institute for Ornithology	https://www.movebank.org/	Animal tracking data.
Ocean Health Index*	National Center for Ecological Analysis and Synthesis (NCEAS) and Conservation International	http://ohi-science.org/ https://oceanhealthindex.org/	Annual national scores for biological, physical, economic, and social aspects of ocean health since 2014.
Ocean Tracking Network Data Portal*	Dalhousie University, Canada	http://members.oceantrack.org/	Data from the tracking of aquatic animals
PlantLife Important Plant Areas Database*	PlantLife International	http://www.plantlifeipa.org/home	Data on Important Plant Areas, including species, habitats, IPA criteria, threats, land use, and protection, as well as textual accounts of the sites.
Seabird Tracking Database	BirdLife International	http://www.seabirdtracking.org/	Largest collection of seabird tracking data bringing together data from species and families. Aim is to help further seabird conservation work and support the tracking community. Access to the data via a request process.
SWOT – The State of the World’s Sea Turtles*	Partnership including Oceanic Society, IUCN SSC Marine Turtle Specialist Group, Duke University's OBIS-SEAMAP	https://www.seaturtlestatus.org/online-map-data	Data collated on marine turtles (e.g., nesting data, satellite telemetry data, species distributions, Regional Management Unit boundaries, genetic data, etc.). No time-series population data.
ThreatSearch*	Botanic Gardens Conservation International	https://tools.bgci.org/threat_search.php	Database of conservation assessments of plants.
TurtleNet: Turtle Nesting Distribution Abundance and Migration*	Queensland’s Department of Environment and Science & the Convention on the Conservation of Migratory Species of Wild Animals	https://apps.information.qld.gov.au/TurtleDistribution/	Interactive portal that shows nesting and feeding sites and migration routes of marine turtles.

Data source	Lead agency	URL	Description
Water Quality Index for Biodiversity	United Nation's Environment Programme's Global Environment Monitoring System for Water (GEMS/Water)	https://www.bipindicators.net/indicators/water-quality-index-for-biodiversity https://www.unep.org/explore-topics/water/what-we-do/monitoring-water-quality	Data on water quality over time, apparently collated by UNEP from national reports.
Waterbird Populations Portal*	Environment Agency – Abu Dhabi	https://wpp.wetlands.org/	The Waterbird Populations Portal (WPP) online database provides current and historic estimates, trends and 1% thresholds for over 800 waterbird species and 2,300 biogeographic populations worldwide.
Water-related Ecosystems*	UN Environment	https://www.sdg661.app/	National, sub-national, basin and sub-basin aggregated data on water extent.
Wetland Extent Trends (WET) Index database	UNEP-WCMC	https://www.bipindicators.net/indicators/wetland-extent-trends-index https://www.sciencedirect.com/science/article/abs/pii/S0006320715301476	Time-series data (available on request) on change in area of natural wetland
Wildlife Insights database*	Wildlife Insights/CI	https://wildlifeinsights.org/team-network https://app.wildlifeinsights.org/explore	Camera trap data on nearly 1,000 species.
World Database on Key Biodiversity Areas	Managed by BirdLife International for the KBA Partnership	http://www.keybiodiversityareas.org/home	Information on KBAs (available on request for non-commercial purposes).
Zoological Information Management System (ZIMS)	Species 360	https://www.species360.org/products-services/zims-for-husbandry/	Data available to members on animal accessions and dispositions, animals wanted and available, behavioural observations, feed logs, etc. Generates information needed for CITES and other permitting uses. Data on generation time important for IUCN Red List assessments.

Table 2. Global data sources of potential value in monitoring pressures and threats to biodiversity.

Those data sources where at least some data (or mapping of data) appear to be instantly, openly and freely available are flagged with a star (*).

Note that some data sources would need updating before they could be of use.

Data source managers are encouraged to send any additional information or updates to SpeciesMonitoringSG@gmail.com.

Data source	Lead agency	URL	Description
Multiple threats			
BioScope: Biodiversity Input-Output for Supply Chain & Operations Evaluation*	Platform BEE (Biodiversity, Ecosystems and Economy), The Netherlands	https://bioscope.info/	Platform that provides information from 43 countries (27 EU countries and large economies outside the EU), covering the largest part of global economic activities. Focuses on the impact of business on biodiversity by studying potential drivers such as: climate change; terrestrial acidification; freshwater eutrophication; terrestrial ecotoxicity; marine ecotoxicity; freshwater ecotoxicity; agricultural land occupation; and water scarcity.
Cumulative Human Impacts on Marine Ecosystems*	Halpern lab	https://www.nature.com/articles/ncommms8615#supplementary-information	Recent change over 5 years in cumulative impacts to marine ecosystems globally from fishing, climate change, and ocean- and land-based stressors.
Ecosystem Services Valuation Database*	Foundation for Sustainable Development	https://www.esvd.net/	Database on economic welfare values related to ecosystem services measured in monetary units to provide information on the economic benefits of ecosystems and biodiversity, and the costs of their loss, to support decision-making. More than 6,700 records from over 950 studies from all biomes, ecosystems services and geographic regions. Could potentially be linked to indicators monitoring the costs of ecosystem loss.
Forest Atlases*	WRI	https://www.wri.org/our-work/project/forest-atlases	Online information systems to visualize and analyse data on forest change, land use, and land cover.
Forest Landscape Integrity Index*	WCS with numerous partners	https://www.forestlandscapeintegrity.com/	Integrates data on observed and inferred forest pressures and lost forest connectivity to generate a globally-consistent, continuous index of forest integrity as determined by degree of anthropogenic modification.
Global Database on Sustainable Land Management*	United Nations Convention to Combat Desertification (UNCCD)	https://www.wocat.net/en/global-slm-database	Data to assess spatial coverage of land degradation and sustainable land management (the use of soil, water, vegetation and animals to produce goods and services).
Global Footprint Network's National	Global Footprint Network		Time-series data on the gap between human demand on nature (Ecological Footprint) and nature's capacity to meet that demand (biological capacity) for over 200 countries and regions from 1961.

Data source	Lead agency	URL	Description
Footprint Accounts*		http://data.footprintnetwork.org/?ga=2.22111038.422986948.1602489816-449568750.1602489816#/	
History Database of the Global Environment (HYDE)*	PBL Netherlands Environmental Assessment Agency	https://themasites.pbl.nl/tridion/en/themasites/hyde/download/index-2.html	Data on human populations and land use change going back centuries.
Land Use Harmonization V2*	Global Ecology Laboratory, University of Maryland	https://luh.umd.edu/data.shtml	Modelled land use states for the globe from year 800 AD. Land use categories include: primary and secondary natural vegetation in forest and non-forest subtypes, pasture, and croplands.
PREDICTS Database (Projecting Responses of Ecological Diversity In Changing Terrestrial Systems)*	UNEP-WCMC, Natural History Museum (London)	https://www.nhm.ac.uk/our-science/our-work/biodiversity/predicts.html	Global database of terrestrial species' responses to human pressures collated from existing spatial comparisons of local-scale biodiversity exposed to different intensities and types of pressures.
Resilience Atlas*	Conservation International	https://www.resilienceatlas.org/	Tool for understanding the extent/severity of stressors affecting rural livelihoods, production systems, and ecosystems and the ways different wealth and assets impact resilience. Includes data on pressures such as forest loss and pollution.
Several data sources relate to habitat loss which can be caused by many (arguably all) of the threats listed below. In addition, many of the databases for monitoring the state of habitats (Table 1) can also be used to monitor habitat loss.			
Residential & Commercial Development			
Anthropogenic biomes in SEDAC* (see Table 4)	NASA's Earth Observing System Data and Information System (EOSDIS) hosted by CIESIN at Columbia University	https://sedac.ciesin.columbia.edu/data/collection/anthromes/sets/brows e https://sedac.ciesin.columbia.edu/data/sets/browse?title=urban+extent	Data on anthropogenic biomes and urban extent (Data source assessed in Table 4).
Agriculture & Aquaculture			
Forest 500*	Global Canopy	https://forest500.org/data	Ranks annually the most influential companies and financial institutions in forest risk commodity supply chains.

Data source	Lead agency	URL	Description
Global data on forest plantations resources*	FAO	http://www.fao.org/3/Y2316E/y2316e0b.htm	Area under plantation and species used. Needs updating.
OECD Agriculture Statistics*	OECD	https://www.oecd-ilibrary.org/agriculture-and-food/data/oecd-agriculture-statistics_agr-data-en	Agriculture data for OECD countries and non-members, including forecasts on the evolution of agricultural markets and commodities, estimates of policy support, and indicators of environmental performance of agriculture.
Trase*	Stockholm Environment Institute, Global Canopy with Vizzuality and the European Forest Institute	https://trase.earth/about	Maps the links between consumer countries via trading companies to the places of production, showing how commodity exports are linked to agricultural conditions
Transportation & Service Corridors			
Global Roadkill Network Data	Global Roadkill Network	http://globalroadkill.net/programs/progress.html	National data on road kill. Under development; not yet ready for use.
IWC Global Ship Strikes Database	International Whaling Commission	https://iwc.int/ship-strikes	Information on reported ship strikes, both historic and current.
Biological Resource Use			
Bushmeat Database	CIFOR	https://www.cifor.org/bushmeat/resources/bushmeat-database/ https://www2.cifor.org/bushmeat/resources/bushmeat-data-map/	A repository of papers and reports providing access to data on an important driver of species loss.
CITES Trade Database*	Maintained by UNEP-WCMC on behalf of the CITES Secretariat	https://trade.cites.org/	Massive database showing trade records by country. Can also be used to assess conservation actions relating to trade.
Related databases: Big Cat Trade Dashboard*	UNEP-WCMC	https://app.powerbi.com/view?r=eyJrIjo1YzU1ZjZkOGYtZTU0OC00YzNhLTk1ZjMtNmM3YzU2N2ZkYzqzliwidCI6IjlmYWFiODU4LWQxZjQtNDhhZi04NmY2LTQ4NjE5NmQ1OTY5ZCIsImMiOiJh9	Data for big cat species in dashboard format. If this is going to be updated regularly, it could be of interest in visualizing trade trends for key species.

Data source	Lead agency	URL	Description
ETIS – Elephant Trade Information System*	CITES	https://www.cites.org/eng/prog/etis/index.php	Information system to track illegal trade in ivory and other elephant products around the world.
Estimates of Global Fishery Bycatch and Discards*	FAO	http://www.fao.org/3/t4890e/T4890E02.htm	Qualitative and quantitative data on the character and magnitude of discards occurring in various fisheries of the world.
Fisheries and Aquaculture database*	FAO	http://www.fao.org/fishery/statistics/collections/en	Multiple fisheries datasets. The ones relevant to fishing and monitoring overfishing include: Global Production, Global Capture Production, Global Tuna Catches by Stock, Global Aquaculture Production, Atlas of Tuna and Billfish Catches, Global Number of Fishers, Fishery Commodities and Trade, Consumption of Fish and Fishery Products.
Global Fishing Watch*	Oceana, SkyTruth, Google	https://globalfishingwatch.org/map-and-data/	Tool to visualise, track and share data on global fishing activity in near real-time.
ICES Datasets*	International Council for the Exploration of the Sea	https://www.ices.dk/data/dataset-collections/Pages/default.aspx	Datasets on the marine environment, including fish stocks and catches.
Marine Trophic Index*	Sea Around Us (University of British Columbia)	http://www.searoundus.org/data/#/marine-trophic-index	The mean trophic level for all Large Marine Ecosystems - a measure of whether fish stocks are being overexploited or sustainably managed.
The ROUTES Dashboard*	USAID ROUTES Partnership including the Center for Advanced Defense Studies (C4ADS), Freeland, International AirTransport Association (IATA), TRAFFIC and WWF.	http://www.routesdashboard.org/	Graphics on wildlife trafficking through airports.
Vulnerable Marine Ecosystems Database*	FAO	http://www.fao.org/in-action/vulnerable-marine-ecosystems/vme-database/en/vme.html	Global inventory of fisheries measures to protect vulnerable marine ecosystems in areas beyond national jurisdictions.

Data source	Lead agency	URL	Description
Wildlife Trade Portal	TRAFFIC	https://www.wildlifetradeportal.org/#/login	Database related to illegal wildlife trade allowing access to the open-source area of TRAFFIC'S wildlife trade incident database. Suited for threat/pressure indicators research. Data accessible through a request process.
Natural System Modifications			
Global Dam Watch*	Global Dam Watch	http://globaldamwatch.org/	Portal to data from three databases on dams: GLObal geOreferenced Database of Dams (GOOD2), Global Reservoir and Dam Database (GRanD), and Future Hydropower Reservoirs and Dams (FHReD).
Invasive & Problematic Species, Pathogens & Genes			
Global Register of Introduced and Invasive Species (GRIIS)	Led by the IUCN SSC Invasive Species Specialist Group for the Global Invasive Alien Species Information Partnership.	http://griis.org/	Annotated and verified national inventories of introduced and invasive species (under development).
Invasive Species Compendium*	CAB International	https://www.cabi.org/ISC/	Range of science-based information to support decision-making in invasive species management worldwide.
IUCN Global Invasive Species Database (GISD)*	IUCN SSC Invasive Species Specialist Group	http://www.iucngisd.org/gisd/	Data on alien and invasive species that negatively impact biodiversity.
Threatened Island Biodiversity (TIB) Database*	TIB partnership: Island Conservation, University of California at Santa Cruz, BirdLife International, IUCN SSC Invasive Species Specialist Group.	http://tib.islandconservation.org/	Global database of threatened island species at risk from invasive vertebrates.
Pollution			
Global Health Observatory Data Repository*	World Health Organisation	http://apps.who.int/gho/data/node.main.152?lang=en	Includes data on exposure to ambient air pollution, which will be just as relevant to wildlife as people. Needs updating.

Data source	Lead agency	URL	Description
Global Pollution Map*	Global Alliance on Health and Pollution	https://www.pollution.org/	Data on air pollution and contaminated sites.
Litterbase*	Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research	https://litterbase.awi.de/	Results from over 2,000 scientific studies on marine litter in global maps and figures. Includes data on the amount and distribution of litter and microplastics, and Interactions between aquatic life and marine litter.
Loss of Reactive Nitrogen to the Environment	York University	https://www.bipindicators.net/indicators/trends-in-loss-of-reactive-nitrogen-to-the-environment	The reactive nitrogen loss for different countries as a result of the production and consumption of food and the use of energy; data need updating and need to be requested.
Nitrogen Deposition Indicator	York University	https://www.bipindicators.net/indicators/trends-in-nitrogen-deposition	Shows where energy and food production have resulted in increased ammonia and nitrogen oxide emissions, with subsequent increase in nitrogen depositions. Data need updating and need to be requested.
Climate change			
Carbon Disclosure Project Data Portal*	CDP	https://data.cdp.net/	Carbon-related data for cities and regions including greenhouse gas (GHG) emissions, renewable energy, water resources, etc.
Climate Change Indicators*	US Environmental Protection Agency	https://www.epa.gov/climate-indicators	A diversity of climate-related data including GHG emissions, temperatures, bird wintering ranges, sea surface temperatures, etc.
Climate Change Initiative*	European Space Agency	https://www.esa-landcover-cci.org/?q=node/158	Maps on land cover, land use change and water bodies.
Climate Watch*	WRI	https://www.climatewatchdata.org/	Data on GHG emissions and countries' Nationally Determined Contributions.
Coral Reef Watch*	NOAA – US National Oceanic and Atmospheric Administration	https://coralreefwatch.noaa.gov/satellite/index.php	Satellite data to provide current reef environmental conditions to quickly identify areas at risk for coral bleaching. Includes Daily Global 5km Satellite Coral Bleaching Heat Stress Alert Area (real-time monitoring of coral bleaching heat stress)
GHG Data from UNFCCC*	UNFCCC	https://unfccc.int/process/transparency-and-reporting/greenhouse-gas-data/ghg-data-unfccc	GHG emissions by country
Global Climate Change*	NASA	https://climate.nasa.gov/vital-signs/carbon-dioxide/	Data on carbon dioxide levels, global temperatures, Arctic sea ice minimum, ice sheets and sea level.
Notre Dame Global Adaptation Index (ND-GAIN)*	University of Notre Dame Global Adaptation Initiative	https://gain.nd.edu/our-work/country-index/	An annual index of climate change adaptation composed of a vulnerability score and a readiness score.

Data source	Lead agency	URL	Description
OECD Inventory of Support Measures for Fossil Fuels*	OECD - Organisation for Economic Co-operation and Development	http://www.oecd.org/fossil-fuels/data/	Online inventory of support measures for fossil fuels, which identifies, documents, and estimates the value of support arising from more than 1,000 individual policies that encourage the production or consumption of fossil fuels.
Water Information Network System - IHP-WINS*	UNESCO	http://ihp-wins.unesco.org/	Water-related information ranging from groundwater to urban water through gender issues, from local to global scale. Includes data on level of water stress (SDG Indicator 6.4.2) and Environmental Water Stress in Transboundary River Basins.
World Weather and Climate Extremes Archive*	Arizona State University for the World Meteorological Organisation	https://wmo.asu.edu/#global	Data on world weather extremes.

Table 3. Global data sources of potential value in monitoring conservation responses to biodiversity loss.

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Data source	Lead agency	URL	Description
Land/Water Management			
Atlas of Forest Landscape Restoration Opportunities*	World Resources Institute in collaboration with the University of Maryland and IUCN (as a contribution to the Global Partnership on Forest Landscape Restoration)	https://www.wri.org/our-work/project/global-restoration-initiative/methodology-about-atlas-forest-landscape-restoration	Global approximation of where degraded forest lands have the potential to be restored. Includes maps on current forest cover, potential forest cover, forest condition, restoration opportunities and human pressure.
Restor*	Crowther Lab, ETH Zurich	https://restor.eco/map	Data platform on restoration projects where information can be sorted by biomes, countries, type of interventions, post-restoration land cover and support sought. Could help monitor number and type of responses to habitat restoration.
Restoration Evidence*	Cambridge Conservation Initiative Endangered Landscape Programme	http://www.restorationevidence.org/	Evidence for the effectiveness of ecological restoration management actions. Contains summaries of scientific research on the effects of actions to restore habitats, categorized by the target habitat or species
The Bonn Challenge Barometer*	IUCN and partners	https://infoflr.org/bonn-challenge-barometer	Action on Bonn Challenge commitments for Forest Landscape Restoration, including data on success factors, and results & benefits. Limited global coverage so far.
Species Management			
Database of Island Invasive Species Eradications*	Island Conservation, University of California at Santa Cruz, IUCN SSC Invasive Species Specialist Group, University of	http://diise.islandconservation.org/	Data from historical and current invasive vertebrate eradication projects on islands (mostly focused on invasive mammals) including: island location and characteristics, details about the eradication (focal species, methods, outcome, etc), and links and contacts.

Data source	Lead agency	URL	Description
	Auckland, Landcare Research New Zealand		
PlantSearch*	Botanic Gardens Conservation International	https://tools.bgci.org/plant_search.php	Global database of living plant, seed and tissue collections.
Zoo and Aquarium Statistics*	Association of Zoos & Aquariums	https://www.aza.org/zoo-and-aquarium-statistics	Data on species held in captivity, including populations, life expectancy, etc.
Livelihood, Economic & Moral Incentives			
Area of forest under sustainable management through FSC*	Forest Stewardship Council	https://fsc.org/en https://fsc.org/en/facts-figures	Figures on area of forest under FSC certified production.
Area of forest under sustainable management through PEFC*	Programme for the Endorsement of Forest Certification	https://www.pefc.org/discover-pefc/facts-and-figures	Figures on area of forest under PEFC certified production.
ASC Certification Updates*	Aquaculture Stewardship Council	https://www.asc-aqua.org/news/certification-update/	Monthly update on the progress of the ASC programme (number of sites, production volume, etc).
BCI Key Facts*	Better Cotton Initiative	https://bettercotton.org/document-library/	Data on numbers of farms under sustainable cotton production, tonnes and hectares produced, etc.
Gini Index*	World Bank	https://data.worldbank.org/indicator/SI.POV.GINI https://resourcewatch.org/data/explorer/GINI-Index	The extent to which the distribution of income within an economy deviates from a perfectly equal distribution.
Human Development Index*	UNDP	http://hdr.undp.org/en/content/human-development-index-hdi http://hdr.undp.org/en/data	Average achievement in dimensions of human development: long and healthy life, being knowledgeable; having a decent standard of living.
Multidimensional Poverty Index*	UNDP	http://hdr.undp.org/en/2021-MPI	Deprivations at the household and individual level in health, education, and standard of living.
RSPO Certification*	Roundtable on Sustainable Palm Oil	https://rspo.org/impacts	Data on the area of land under RSPO certified production.
RTRS Certified Volumes and Producers*	Round Table for Responsible Soy Association	https://responsiblesoy.org/?lang=en	Data on the production of soy that follows the RTRS Standard for Responsible Soy Production. Also calculates soy footprint.

Data source	Lead agency	URL	Description
MSC Certified Catch*	Marine Stewardship Council	https://www.msc.org/what-we-are-doing/our-collective-impact	Data on proportion of fisheries under MSC and details of specific fisheries.
Proportion of fish stocks within biologically sustainable levels*	FAO	http://www.fao.org/sustainable-development-goals/indicators/1441/en/	Time-series data presented on proportion of fish stocks within biologically sustainable levels.
In addition to the data sets mentioned, other organisation involved in the sustainable production of commodities also provide data on volumes of certified crops produced and the hectares under sustainable management. Examples include: Bonsucro (sugar); Rainforest Alliance (cattle, cocoa, coffee, cut flowers, palm oil, tea); Roundtable on Sustainable Biomaterials (bio-based feedstock, biomass-derived material and any advanced fuel or product); UTZ (cocoa, coffee hazelnuts, tea).			
Conservation Designation & Planning			
DOPA - the Digital Observatory for Protected Areas*	JRC	https://dopa.jrc.ec.europa.eu/en/mapsanddatasets https://dopa-explorer.jrc.ec.europa.eu/	As well as PA details extracted from Protected Planet, DOPA Explorer has tabs showing IUCN Red List species whose range maps overlap with the protected area.
Global Database on Protected Area Management Effectiveness (GD-PAME)*	UNEP-WCMC	https://pame.protectedplanet.net/	Results of management effectiveness assessments for protected areas.
MPAtlas*	Marine Conservation Institute	http://www.mpatlas.org/	Data on level of protection and implementation of the world's marine protected areas.
Protected Planet – World Database on Protected Areas*	Lead: UNEP-WCMC with IUCN and UN Environment	https://www.protectedplanet.net/	Data on the world's protected areas. Now also includes data on Other Effective Area-Based Conservation Measures.
Protected Area Connectedness Index - PARC-Connectedness	CSIRO, GEO BON, GBIF, Map of Life	https://www.bipindicators.net/indicators/protected-area-connectedness-parc-connectedness	Data on the extent to which terrestrial protected areas form “well-connected systems of protected areas ... integrated into the wider landscape”. Need to ask for data.
Protected Area Representativeness	CSIRO, GEO BON, GBIF, Map of Life	https://www.bipindicators.net/indicators/protected-area-	Data on the extent to which terrestrial protected areas are “ecologically representative”. Need to ask for data.

Data source	Lead agency	URL	Description
Index - PARC-Representativeness		representativeness-index-parc-representativeness	
Ramsar Sites Information service*	Ramsar Secretariat	https://rsis.ramsar.org/?pagetab=2	Data on number of Ramsar sites and area covered.
Legal & Policy Frameworks			
Climate Change Laws of the World Database*	London School of Economics	http://www.lse.ac.uk/GranthamInstitute/climate-change-laws-of-the-world/	Database of climate and climate-related laws, as well as laws and policies promoting low carbon transitions.
Policy Instruments for the Environment (PINE) Database	OECD - Organisation for Economic Co-operation and Development	https://www.oecd.org/environment/indicators-modelling-outlooks/policy-instrument-database/	Information on policy instruments relevant for environmental protection and natural resource management.
Species+*	UNEP-WCMC, CITES Secretariat	https://www.speciesplus.net/species	Data on species currently listed in the Appendices of CITES, CMS and other conventions (taxonomy, distribution, trade restrictions, etc).
The Policy Climate Interactive*	Climate Policy Initiative	http://www.thepolicyclimate.org/	Policy issues in key countries relevant to climate change with evidence on emissions trends, emissions drivers, and policy activity.
Research and Monitoring			
UIS Database*	UNESCO Institute of Statistics	http://data.uis.unesco.org/	Includes data on funds invested in research and development.
Institutional Development (including financing)			
Classification of Functions of the Government (COFOG)	OECD - Organisation for Economic Co-operation and Development	https://datahub.io/core/cofog#data https://www.oecd-ilibrary.org/governance/government-at-a-glance-2017/classification-of-the-functions-of-government-cofog_gov_glance-2017-94-en	Includes data on biodiversity expenditure.
Financing for Sustainable Development*	OECD	http://www.oecd.org/dac/financing-sustainable-development/	Data on official and private resource flows.
FundingTheOcean.Org	Foundation Maps	https://maps.foundationcenter.org/#/map/	Ocean conservation funding. Data for sale.

Data source	Lead agency	URL	Description
World Carbon Market Database*	Carbon Market Data	https://www.carbonmarketdata.com/en/products/world-ets-database/presentation	Includes information on carbon trading schemes.

Table 4. Global data sources with multiple uses for biodiversity monitoring

Those data sources where at least some data seem to be instantly, openly and freely available are flagged with a star (*).

Note that some data sources would need updating before they could be of use.

Data source managers are encouraged to send any additional information or updates to SpeciesMonitoringSG@gmail.com.

Data source	Lead agency	URL	Description
Aquastat*	FAO	http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en	Huge dataset on water resources and water use by country.
Aqueduct*	WRI	https://www.wri.org/our-work/project/aqueduct	Data on water risks.
A.P.E.S WIKI*	Section on Great Apes (SGA) of the IUCN SSC Primate Specialist Group and the Max Planck Institute for Evolutionary Anthropology, Germany	https://apeswiki.eva.mpg.de/index.php/Main_Page	A platform for site-level information on ape research and conservation. With a total of 149 tracked regions (66 in West Africa, 52 in Central Africa, 16 in East Africa and 15 in Asia), it gives information about apes population status, the threats they are facing, conservation policies and current research on the topic.
Biological Diversity and Ecological Forecasting Data Pathfinder*	NASA	https://earthdata.nasa.gov/learn/pa-thfinders/biodiversity	Platform on NASA's Earth Data website that provides information to assess Essential Biodiversity Variables and Sustainable Development Goals. Information is divided into four sections: vegetation characteristics and processes data; biodiversity-related spectroscopy data; human impacts data; and species distribution modeling data.
Data Basin*	Conservation Biology Institute	https://databasin.org/	A mapping and analysis platform linked to over 20,000 environmental datasets.
DataONE*	Data Observation Network for Earth	https://www.dataone.org/	Access to over 820,000 Earth and environmental data sets across multiple repositories (including citizen science data).
EarthNet2021*	Christian Reuena-Mesa, Vitus Benson, Markus Reichstein, Jakob Runge & Joachim Denzler	https://www.earthnet.tech/	Dataset containing target spatio-temporal Sentinel 2 satellite imagery at 20 m resolution matched with high-resolution topography and mesoscale (1.28 km) weather variables. Primarily for climate uses, but with applications in crop yield prediction, forest health assessments, biodiversity monitoring, coastline management or more general estimations of vegetation state.

Data source	Lead agency	URL	Description
	(different German Institution)		
Environmental Performance Index*	Yale University, Columbia University	https://epi.envirocenter.yale.edu/	Every 2 years, ranks countries on 24 performance indicators across 10 issue categories (air quality, water quality, heavy metals, biodiversity, forests, fisheries, climate & energy, air pollution, water resources, agriculture). Includes the Species Habitat Index - the proportion of suitable habitats for a country's species that remain intact, relative to a baseline set in the year 2001 (see https://epi.yale.edu/epi-results/2020/component/shi).
EOSDIS Earthdata*	NASA	https://earthdata.nasa.gov/	Raw land and atmosphere data for use by GIS specialists. Includes daily updates on fires.
Environment Live* (rebranded as World Environment Situation Room)	UN Environment	http://uneplive.unep.org/	Mostly human welfare related data and pollution-related data. Potentially useful time-series data include ocean pollution (shipping lanes, ports) and commercial activity (shipping lanes), as well as biodiversity state data from Protected Planet, IUCN Red List and Ramsar.
Environmental Data Explorer*	UN Environment	http://geodata.grid.unep.ch/	Data on more than 500 variables used to produce Global Environment Outlooks, on themes like Freshwater, Population, Forests, Emissions, Climate, Disasters, Health and GDP. Needs updating.
Environmental Sustainability Index*	Yale Center for Environmental Law and Policy, Center for International Earth Science Information Network at Columbia University, World Economic Forum	https://ec.europa.eu/jrc/en/publication/articles-books/environmental-sustainability-index-esi	The ESI integrates 76 variables into 21 indicators of environmental sustainability for 146 countries in 5 categories: environmental systems, reducing environmental stresses, reducing human vulnerability to environmental stresses, societal and institutional capacity to respond to environmental challenges, and global stewardship. Needs updating.
FAOSTAT*	FAO	http://www.fao.org/faostat/en/#data	Huge database with several useful environmental datasets. Includes Land Use which includes area of land under primary forest, agriculture, fisheries, livestock, etc. Some data out of date.
FishBase*	FishBase consortium	http://www.fishbase.org/	A global biodiversity information system on finfishes: taxonomy, biology, trophic ecology, life history & uses, and historical data going back 250 years. Links to several other marine data sources.

Data source	Lead agency	URL	Description
GEOBON Essential Biodiversity Variables Data Portal*	GEOBON	https://portal.geobon.org/	EBV data including changes in: forest cover (from Landsat), species diversity (from PREDICTS) and bird diversity (using countryside species-area relationship models from PREDICTS).
The Global Earth Observation System of Systems (GEOSS) Portal*	GEOSS	http://www.geoportal.org/	Various data overlays, including habitat types and threatened species.
GloVis*	US Geological Survey	https://glovis.usgs.gov/	Visualization of satellite-based remote sensing datasets.
IBAT - Integrated Biodiversity Assessment Tool*	IBAT Alliance: BirdLife International, CI, IUCN, UNEP-WCMC	https://www.ibat-alliance.org/	Platform to access and analyse data from IUCN Red List of Threatened Species, World Database on Protected Areas and World Database of Key Biodiversity Areas. Data on the Species Threat Abatement and Restoration Metric has recently been added. Companies required to pay a corporate subscription for data access.
Impact Observatory	Impact Observatory	https://www.impactobservatory.com/	Platform to visualize data on land use and land cover, carbon, and habitats.
IOC Ocean Data and Information System Catalogue of Sources*	International Oceanographic Data and Information Exchange (IODE) Programme of the Intergovernmental Oceanographic Commission (IOC) of UNESCO	https://catalogue.odis.org/	Online browsable and searchable catalogue of ocean related web-based sources/systems of data and information as well as products and services. It will also provide information on products and visualize the landscape (entities and their connections) of ocean data and information sources.
Map X*	University of Geneva, UNEP-GRID, UNEP	https://www.mapx.org/	An online platform for managing geospatial data on natural resources and the environment.
Mountain Portal*	Global Mountain Biodiversity Assessment	http://www.mountainbiodiversity.org/explore	Data on mountain biodiversity linked to Map of Life. Includes data on species ranges from various sources (including IUCN Red List, eBird, etc).
NatureServe Dashboard*	NatureServe	http://dashboard.natureserve.org/	Dashboard that presents data derived from multiple sources on biodiversity states (e.g. forest cover, water quality, genetic diversity of livestock) pressures (e.g. human footprint, forest cover loss) responses (e.g. ASEAN

Data source	Lead agency	URL	Description
			Heritage parks, GBIF records) and benefits (carbon sequestration, freshwater provision).
Ocean Action Hub*	UNDP	https://www.oceanactionhub.org/sdg-14-targets-context-and-indicators	Data on each of the SDG 14 Life Below Water indicators. Also has list of other relevant marine databases.
Ocean Biogeographic Information System – OBIS*	Intergovernmental Oceanographic Commission of UNESCO	https://obis.org/	Huge global database on marine species linked to GBIF. Over 164 million records of over 137,000 species from more than 3,300 datasets (as of October 2020).
OBIS-SEAMAP*	Duke University	http://seamap.env.duke.edu/	Spatially referenced database aggregating marine mammal, seabird, sea turtle and ray & shark observation data.
Ocean Data Viewer*	UNEP-WCMC	http://data.unep-wcmc.org	Includes data on global patterns and predictors of marine biodiversity across taxa and several species richness and cetacean distribution maps.
Ocean+ Library*	UNEP-WCMC	https://library.oceanplus.org/	An overview of global marine and coastal datasets of biodiversity importance.
PANGAEA*	Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, and the Center for Marine Environmental Sciences, University of Bremen	https://www.pangaea.de/	A data publisher for earth & environmental science. Large diversity of data sets available.
Reefbase – A Global Information System for Coral Reefs*	ReefBase	http://www.reefbase.org/global_database/default.aspx	Country-level data on coral reef resources, status, threats and management. Needs updating.
Resource Watch*	WRI and 35 partners	https://resourcewatch.org/	Data visualization platform under development (currently in Beta) with over 300 data sets on topics ranging from climate change to human migration, deforestation to air quality, agriculture to energy and more. Links to several biodiversity-related databases such as Protected Planet. Dashboards can be accessed for energy, forests, oceans, food, climate and water.
SDG Indicators Metadata Repository*	UN Statistics Division	https://unstats.un.org/sdgs/metadata/	Data and statistics for the Tier I and II indicators in the global indicator framework for the SDGs.

Data source	Lead agency	URL	Description
Socioeconomic Data and Applications Center (SEDAC)*	NASA's Earth Observing System Data and Information System (EOSDIS) hosted by CIESIN at Columbia University	http://sedac.ciesin.columbia.edu/theme/conservation/data/sets/browse	Includes a large diversity of data sets (some out of date), including anthropogenic biomes of the world, global species richness for mammals and amphibians, Global Human Influence Index, Human footprint and Environmental Performance Index.
UN Biodiversity Lab*	UNDP, UN Environment	https://unbiodiversitylab.org/	Online platform to access global datasets relating to the Aichi Biodiversity Targets and nature-based Sustainable Development Goals.
Vigilife – the Global Life Observatory*	Vigilife partnership (including SPYGEN, Université de Montpellier, Beauval Nature, ETH Zürich).	https://www.vigilife.org/en/	Platform focused on using eDNA data to monitor aquatic and terrestrial biodiversity and facilitate action. Vigilife Maps (under development) will provide a platform for sharing data. Includes invasive species.

Table 5. Reports synthesising large biodiversity data sets over time.

Report compilers and data source managers are encouraged to send any additional information or updates to SpeciesMonitoringSG@gmail.com.

Report	Lead agency	URL
Atlas of Sustainable Development Goals	World Bank	https://blogs.worldbank.org/opendata/2018-atlas-sustainable-development-goals-all-new-visual-guide-data-and-development
EarthPulse	National Geographic Society	https://www.amazon.co.uk/National-Geographic-EarthPulse-Society-2010-10-18/dp/B01FIWBH6A/ref=sr_1_13?keywords=earthpulse&qid=1558797125&s=books&sr=1-13
Ecological Footprint Report	Ecological Footprint Network	https://www.footprintnetwork.org/resources/publications/
Environmental Outlook	OECD - Organisation for Economic Co-operation and Development	http://www.oecd.org/environment/indicators-modelling-outlooks/outlooks.htm
Fishery and Aquaculture Statistics	FAO	http://www.fao.org/fishery/statistics/programme/publications/all/en
Global Assessment of Animal Genetic Resources	FAO	http://www.fao.org/publications/sowangr/en/
Global Biodiversity Outlook	Secretariat of the Convention on Biological Diversity	https://www.cbd.int/gbo/
Global Environment Outlook	UN Environment	https://www.unenvironment.org/global-environment-outlook
Global Wetland Outlook: State of the World's Wetlands and Their Services to People	Secretariat of the Ramsar Convention	https://www.ramsar.org/sites/default/files/flipbooks/ramsar_gwo_english_web.pdf
IPBES Global Assessment Reports including: Land Degradation and Restoration Pollinators, Pollination and Food Production Scenarios and Models of Biodiversity and Ecosystem Services.	The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services - IPBES	https://www.ipbes.net/assessment-reports
Living Planet Report	WWF, Zoological Society of London	https://livingplanet.panda.org/en-us/
OECD-FAO Agricultural Outlook	OECD, FAO	https://www.oecd-ilibrary.org/agriculture-and-food/oecd-fao-agricultural-outlook-2020-2029_1112c23b-en

Report	Lead agency	URL
Our World in Data (regular syntheses of research data on biodiversity, forests and deforestation, etc)	Our World in Data	https://ourworldindata.org/biodiversity https://ourworldindata.org/forests-and-deforestation
Protected Planet Report	UNEP-WCMC, IUCN, National Geographic Society	https://www.protectedplanet.net/en/resources/global-reports
Renewables Global Status Report	REN21	http://www.ren21.net/status-of-renewables/global-status-report/
The State of the World's Biodiversity for Food and Agriculture	FAO	http://www.fao.org/3/CA3129EN/CA3129EN.pdf
State of the World's Birds	BirdLife International	http://datazone.birdlife.org/2020-annual-update
State of the World's Fisheries and Aquaculture	FAO	http://www.fao.org/state-of-fisheries-aquaculture
State of the World's Forests	FAO	https://www.fao.org/state-of-forests/en/
State of the World's Plants and Fungi	Royal Botanic Gardens Kew	https://stateoftheworldsfungi.org/ https://www.kew.org/science/state-of-the-worlds-plants-and-fungi
State of the World's Sea Turtles Report	SWOT - State of the World's Sea Turtles	https://www.seaturtlestatus.org/swot-report
State of the World's Water	WaterAid	https://washmatters.wateraid.org/publications/the-water-gap-state-of-the-worlds-water
Status and Trends of Coral Reefs	Global Coral Reef Monitoring Network	https://www.icriforum.org/document-types/icri-publications-reports-and-posters/
Territories of Life Reports (on territories and areas conserved by Indigenous peoples and local communities)	The ICCA Consortium	https://report.territoriesoflife.org/wp-content/uploads/2021/09/ICCA-Territories-of-Life-2021-Report-FULL-150dpi-ENG.pdf
TRAFFIC Briefings	TRAFFIC	https://www.traffic.org/publications/
Waterbird Population Estimates	Wetlands International	http://wpe.wetlands.org/lmaps
World Ocean Assessments	United Nations	https://www.un.org/regularprocess/woa2launch
World Ocean Review	Maribus	https://worldoceanreview.com/en/download/
World Resources Report	WRI	https://www.wri.org/our-work/project/world-resources-report/wrr