EBV Class	EBV	Measurement and scalability	Temporal sensitivity	Feasibility	Relevance and related CBD 2020 targets
Genetic composition	Co-ancestry	Pairwise relatedness among individuals or inbreeding coefficient of selected species, within and among populations of each species.	Generation time	Available for many species but few populations, and little systematic sampling over time.	This variable provides a good measure of the genetic independence of allele frequencies among individuals and their susceptibility to lowered fitness. Targets: 12.
	Allelic diversity	Allelic richness from genotypes of selected species (e.g. endangered species and domesticated species) at multiple locations (statistically representative of the species distribution).	Generation time	Data available for several species and for several locations, but little global systematic sampling.	It is one the most used variables to measure genetic diversity, and can support the estimation of indicators such as "Trends in genetic diversity of selected species" and the "Red List Index". Targets: 12, 13.
	Population genetic differentiation	Gene frequency differentiation (Fst and other measures) among populations or of a subpopulation compared to the metapopulation of selected species.	Generation time	Data available for many species but often for a limited number of populations. Easy to augment datasets.	Beta diversity analogue; this variable captures the variation among populations. This variable can also help to identify local genetically-based adaptation and help provide a 'population adaptive index'. Targets: 12, 13, 15.
	Breed and variety diversity	Number of animals of each livestock breed and proportion of farmed area under each local crop variety, at multiple locations.	5 to 10 years	Large datasets have been compiled by national organizations and FAO for livestock breeds, but there is insufficient systematic sampling for coverage of local crop varieties.	It is an essential variable to estimate the indicator "Trends in genetic diversity of domesticated animals and cultivated plants". Target: 13.
Species populations	Species distribution	Presence surveys for groups of species easy to monitor, over an extensive network of sites with geographic representativeness. Potential role for incidental data from any spatial location.	1 to >10 years	Presence surveys are available for a larger number of species than population counts and can make use of existing distribution atlas. Some efforts for data compilation and integration exist (GBIF, IUCN, Map of Life). There is an increasing trend for data contributed by citizen scientists (Observado, iNaturalist).	Abundance & distribution of populations/taxon per se is an intuitive biodiversity metric with public resonance. Abundance & distribution contributes to extinction risk indicators and indicators of supply of ecosystem services associated with particular species. Range shifts are expected under climate change. Targets: 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15.
	Population abundance	Population counts for groups of species easy to monitor and/or important for ecosystem services, over an extensive network of sites with geographic representativeness.	1 year	Population counts underway for a significant number of species in each of the following groups: birds, butterflies, mammals, plankton, important fisheries, coral reef fishes. Most of these extensive networks are geographically restricted. Much of the data are currently being collected by citizen science networks.	
	Population structure by age/size class	Number of individuals or biomass of a given demographic class of a given taxon or functional group at a given location.	1 year	Available for some managed species (hunting and fisheries), usually geographically restricted.	

Species traits	Phenology	Timing of periodic biological events for selected taxa/phenomena at defined locations. Examples include: timing of breeding, leaf coloration, flowering, migration, oceans flow pattern shifts, intermittent flows in rivers, extant of wetlands.	1 year	Several ongoing initiatives (Phenological Eyes Network, PhenoCam, ClimateWatch, etc.), some making use of citizen science contributions.	Phenology is expected to change with climate change. Targets: 10, 15.
	Body mass	Body mass (mean and variance) of selected species (e.g. under harvest pressure), at selected sites (e.g. exploitation sites).	1-5 year	Data available for many important marine fisheries, but little data available for bushmeat and other exploited species groups.	There is evidence that mean body mass of some species may be changing in response to pressures such as harvesting. Targets: 6, 7.
	Natal dispersal distance	Record median/frequency distribution of dispersal distances of a sample of selected taxa. In marine species larval lifetime it may be a useful surrogate.	>10 years	Banding/marking and observation data available for some birds, mammals, turtles, fish, temperate trees	Required in order to assess the impact of habitat fragmentation on species, project the spread of invasive species, project the impact of climate change on species and to combine with abundance data to assess extinction risk. Targets: 5, 6, 9, 10, 11, 12, 15.
	Migratory behaviour	Presence/ absence/ destinations/ pathways of selected migrant taxa.	1 to >10 years	Banding/ marking/ tagging and observation data available for some birds, mammals, turtles, fish and butterflies.	Migratory behaviour is expected to change under climate change and habitat fragmentation. Riverine migrations are expected to be susceptible to damming etc. Targets: 5, 6, 10, 11, 12.
	Demographic traits	Effective reproductive rate (e.g. by age/size class) and survival rate (e.g. by age/size class) for selected taxa at selected locations.	1 to >10 years	Data available for some fisheries, birds, mammals, reptiles, plants, and other taxa, but little trend data available.	Necessary to combine with other factors for assessing extinction risk and vulnerability to threats. Targets: 4, 6, 8, 9, 12, 15.
	Physiological traits	For instance, measurement of thermal tolerance or metabolic rate. Assess for selected taxa at selected locations expected to be affected by a specific driver.	1 to >10 years	Some data available for corals, lizards, amphibians and insects.	May determine susceptibility to climate change impacts and may change under climate change. Targets: 4, 6, 8, 9, 12, 15.
Community composition	Taxonomic diversity	Multi-taxa surveys (including by morphospecies) and metagenomics at selected *in situ* locations at consistent sampling scales over time. Hyper-spectral remote sensing over large ecosystems.	5-10 years	Many intensive long-term research sites have excellent but uncoordinated data, and there are abundant baseline data for many locations in the terrestrial, marine and freshwater realms. Metagenomics and the possibilities of remote sensing are emerging fields.	This is a basic measure of interaction of species i.e. which species live together. It is the basis of community classification and ecosystem health assessments. Functional type composition of the ecosystem is often derived from species composition of observed communities. Targets: 8, 10, 14.
	Species interactions	Studies of important interactions or interaction networks in selected communities, such as plant-bird seed dispersal systems.	5-25 years	Some studies have monitored the structure of species interaction networks such as mutualistic networks (pollination and seed dispersal), soil food webs, host-parasite and herbivore-plant interactions. There is a lack of global or regional representativeness of these studies.	Global change is affecting species interactions, which are determinants in ecosystem functioning and services. Targets: 7, 9, 14, 15.

Ecosystem Function	Net primary productivity	Global mapping with modelling from remote sensing observations (FAPAR, ocean greenness) and selected *in situ* locations (eddy covariance).	<=1 year	A network of regional networks of *in situ* measurements exists (FLUXNET), and some global maps based on models and remote sensing are available. GCOS is also addressing this EBV.	Indicator of the energy flow through ecosystems and a measure of health/degradation; Supports biodiversity at multiple dimensions/trophic levels, regulates climate, impacts on human wellbeing, possible indicator of shifts into alternate ecosystem states; underpins all production-based ecosystem services. Targets: 5, 8, 14.
	Secondary productivity	Measurement of secondary productivity for selected functional groups, combining *in situ* , remote sensing, and models. Example functional groups include: fisheries, livestock, krill, and herbivorous birds.	1 year	FAO and national statistics on fish and livestock production.	Important for assessing ecosystem functioning and ecosystem services. Targets: 6, 7, 14.
	Nutrient retention	Ratio of nutrient output from the system to nutrient input, measured at selected *in situ* locations. Can be combined with models and remote sensing to extrapolate regionally.	1 year	Some intensive monitoring sites have nitrogen saturation monitoring in some acid-deposition areas; phosphorus retention monitoring in some impacted rivers and estuaries.	Nutrient loss or accumulation affects biodiversity and ecosystems services. Targets: 5, 8, 14.
	Disturbance regime	Type, seasonal timing, intensity and frequency of event-based external disruptions to ecosystem processes and structure. Examples: sea surface temperature and salinity (RS), scatterometry for winds (RS), trawling pressure (*in situ*), flood regimes (*in situ*), fire frequency (*in situ* , RS), cultivation/ harvest (RS), windthrow and pests (*in situ*).	1 year	Abundant data is available for several perturbations, sometimes at the global scale, although harmonization and integration is needed.	Key determinant of ecosystem function, structure and composition; changes in the disturbance regime lead to changes in biodiversity. Targets: 5, 7, 9, 10, 11, 14, 15.
Ecosystem structure	Habitat structure	Remote sensing measurements of cover (or biomass) by height (or depth) classes globally or regionally, to provide a 3-dimensional description of habitats.	<=1 year	Global terrestrial maps available with RS (e.g., LIDAR). Marine and freshwater habitats mapped by combining RS and *in situ* data.	Proxy for biomass in ecosystems; key determinant of habitat suitability for biodiversity; basis for land cover classification. Relevant for targets: 5, 11, 14, 15.
	Ecosystem extent and fragmentation	Local (aerial photo and *in situ* monitoring) to global mapping (satellite observations) of natural/semi-natural forests, wetlands, free running rivers, coral reef live cover, benthos cover, etc.	1-5 years	Global maps of forests, assessment of fragmentation for major river basins, and local to regional maps of coral reefs already exist, but comparable observations over time are limited and a distinction between natural and modified ecosystems (e.g. natural forests versus plantations) is often not made.	This is a key measure of human impacts on ecosystems. It can be used to derive indicators such as extent of forests and forest types, mangrove extent, seagrass extent, coral reef condition. Targets: 5, 7, 10, 14, 15.
	Ecosystem composition by functional type	Functional types can be directly inferred from morphology (*in situ*) or from remote sensing.	5 years	Implicitly part of current ecosystem maps. Some models (e.g. DGVMs, marine ecosystem models) are based on functional groups.	This is a basis for ecosystem classification and lends itself to remote sensing. It can be used to predict ecosystem function and ecosystem services. Targets: 5, 14, 15.