



Europa Biodiversity Observation Network

Cross-cutting and bioeconomy

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Workshop



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- 52 variables
- Ranked (from 30 to 7 votes) and clustered (same metric, or ecosystem, or service)

Name	Row	ES/B	Metric/Group	Ecosystem	Taxa or ES	Geo/Grain	Temp	Rationale	Policy	PolicyQ	New name	Potential Merge	Comment	Horvath (row=1, high=4)	Cesar (row=1)	N.Fernandez	Pedro Bujia	Tom Breese	Ruben Valls	Roberto Pae	Total
Insect (arthropod) diversity (taxonomic and functional) and biomass	9	B	Community composition	Multiple	Invertebrates	10 x 10 km	long term observations every third year	Ideally annual, but possibly longer time frames are more realistic	Given the widespread insect declines, it is essential to have a monitoring scheme to understand trends in diversity and biomass	Climate and Restoration Policy, Biodiversity Strategy, Common Agricultural Policy, Habitats Directive, Climate and Restoration Policy, Common Agricultural Policy	What are the impacts of anthropogenic activities, particularly agriculture, on insect populations and communities	Merge with #5		3	3		3	3	3	5	15
Insect diversity of Europe	21	B	Community composition	multiple	Other	National	Continuous (high-frequency) recording of species from digital images (insect camera traps)	Insects are a species rich group and our researchers are highly interested in		What is the effect of agriculture on insects?	Merge with #4 and Originally ES Structure			3	3		4	4	3	5	19
Insect diversity and biomass in agricultural, urban and natural habitats	9	B	Community composition	Agricultural, urban and natural habitats	Invertebrates	10 x 10 km	Annual	Comprehensive insect monitoring is largely missing	Habitats Directive, Biodiversity Strategy	To what extent is insect diversity and biomass in agricultural, urban and natural habitats declining (or recovering), and how does this affect ecosystem services (e.g. pollination, pest control, human well-being)?	Merge with #6 and #21			3	3		3	4	3	5	17
Fine scale land cover and land use data, frequently updated	38	B	Ecosystem structure and function	All	Regulation of climate	100 x 100 m - 1 x 1 km	Real-time continuous yearly	LUISCT data are needed for several ESAs and policies	LUISCT data are needed for several ESAs and policies	Eg what is the effect of CAP policy on eg climate goals? This data can be used as driver data for many analyses types?	Originally ES Supply			4	4		5	5	5	4	27
species diversity in soils	2	B	Community composition	soils	Invertebrates, fungi and microbials	100 x 100 m - 1 x 1 km	short term	soil invertebrates (biobinders) are a critical variable to assess terrestrial ecosystems that is often overlooked so specific variables are needed	Habitats Directive, Climate and Restoration Policy	What is the effect of climate, land-use change and agricultural intensification on soil communities across Europe?	Merge with row 3 a Perhaps not possible at 10m			4	3		3	2	3	5	18
Taxonomic and functional diversity of soil biota	3	B	Community composition	Multiple	Invertebrates, fungi and microbials	< 100 x 100 m	Annual	Soil biodiversity has a key role in ecosystem processes and is negatively affected by multiple anthropogenic stressors. Besides invertebrates, the metric might include fungi and microbials	Climate and Restoration Policy, Biodiversity Strategy	What is the effect of agriculture (restoration strategies) on soil diversity	Merge with row 3 and #28 and #30			4	4		5	5	5	3	26
Taxonomic and functional diversity of aquatic organisms/organisms	9	B	Community composition	Aquatic ecosystems (including marine, freshwater, and transitional)	Invertebrates	100 x 100 m - 1 x 1 km	annual	Diversity of aquatic organisms is an indicator of anthropogenic stressors. It needs to consider taxonomic diversity, functional diversity, and diversity of sensitive species (e.g., EPPO in freshwater). Several taxonomic groups can be included, from microbials to fish and other vertebrates.	Birds Directive, Habitats Directive, Water Framework Directive, Common Fisheries Policy, Marine Strategy Framework Directive	What is the effect of anthropogenic drivers on aquatic diversity	Merge with row 4 and #21			4	4		4	4	5	5	25
Abundance index trend of species	24	B	Species populations	Multiple	Amphibians	10 x 10 km - 50 x 50 km	special grain depends on the abundance level	Population abundance is responsive for species in focus. Stress should be given to survey relative abundance, and not population size		What are the species status?				3	3		4	4	5	4	19
pollinator trait diversity in agricultural landscapes	37	B	Community composition	Agricultural landscapes (including rural areas, cropland and managed grassland)	Invertebrates	1 x 1 km - 5 x 5 km	long term		Common Agricultural Policy	Are some pollinator groups threatened in this particular crop area?	Originally in Species Traits			3	5		3	5	5	4	25
Abundance of invertebrate disease vectors (ticks, mosquitoes etc)	31	B	Species populations	Multiple	Invertebrates	10 x 10 km - 50 x 50 km	Real-time, short term	Important to assess risk of disease transmission to humans	Not Applicable	What is the risk of disease transmission to humans?				4	5		4	5	5	3	24
Soil biodiversity (in general, as it remains underexplored in literature of ecosystems), specifically a focus on hypogaeous fungi would be great (as a very limited number of groups is actively involved in this group of fungi)	32	B	Species populations	"Multiple"	Microbes/Fungi	< 100 x 100 m	real-time (for total soil biodiversity) OR yearly (for hypogaeous fungi)	In general soil diversity [at any level], including its ecosystem functions remain poorly studied and in best cases remain either at the local level (point sampling) or are being modified	Habitats Directive, Climate and Restoration Policy, Biodiversity Strategy, Common Agricultural Policy, 2030 Biodiversity Strategy	Effect of soil biodiversity on their respective ecosystem functions	Merge with #21 and #28 and #29		3	2		5	5	5	4	19	
Zooplankton biomass and diversity	6	B	Community composition	Marine	Other	10 x 10 km - 50 x 50 km	real-time for bloom events (harmful algal blooms) to monthly sampling to detect trends	There are several Essential Ocean Variables (EOVs) that are elaborated by the GOOS and MBON (see Miloslavics et al. 2019a, 2019b, 2021, 2022, 2023). How do they fit in EuropeanON? Is this part of the concept?	Birds Directive, Habitats Directive, Water Framework Directive, Common Fisheries Policy, Marine Strategy Framework Directive	Status, trends and functioning of the Marine environment			4	4		3	4	5	3	19	
Measures and role of connectivity for habitats	13	B	Ecosystem functioning	multiple	Other	1 x 1 km - 5 x 5 km	yearly		Habitats Directive, Climate and Restoration Policy, Biodiversity Strategy, Common Agricultural Policy, Water Framework Directive, Climate and Restoration Policy, Common Agricultural Policy				4	3		3	3	5	5	23	
Stratified sampling of plant species diversity	7	B	Community composition	multiple	Plants	100 x 100 m - 1 x 1 km	6-year cycle, with one-third of data points surveyed every 2 years	Very representative of ecosystem condition + land use intensity, great in-situ data for training of EO data	Habitats Directive, Climate and Restoration Policy, Biodiversity Strategy, Common Agricultural Policy, Water Framework Directive, Climate and Restoration Policy, Common Agricultural Policy	How does land use & cover relate to plant species diversity and type?			5	3		3	3	5	3	22	
Harmful algal blooms threatening recreational services, e.g. bathing water quality, and practical services, e.g. public drinking water supply	46	B	Relational values	Lakes and coastal quality	Regulation of freshwater and coastal water management	1 x 1 km - 5 x 5 km	real-time, weekly or monthly in short-term and management	Blooms develop over a few weeks and may last for a few weeks, we need data on their response to climate change and nutrient management	Common Fisheries Policy, Common Agricultural Policy	What is the impact of harmful algal blooms on bathing water quality and drinking water supply	This should be Regulating on			5	5		4	4	3	3	19
Importance of sea biodiversity	29	B	Relational values	multiple freshwater and terrestrial	Regulation of (domesticated) organisms and biological processes	10 x 10 km - 50 x 50 km	yearly long term	Functionality at community and ecosystem levels are very much dependent on the presence and proliferation regulation of apex predators directly relating with humans and can be a good measure of the food web, ecological and cultural connection potential	Habitats Directive, Water Framework Directive, Common Fisheries Policy, Common Agricultural Policy, Common Fisheries Policy	ecosystem functionality to human benefits			4	3		5	4	5	4	25	
Taxonomic composition underlying the WFD biological indicators to enable calculation of additional								Phytoplankton blooms are very dynamic on	Habitats Directive, Water Framework Directive, Climate and Restoration	How does phytoplankton blooms respond to											

Insect diversity and biomass

Insect (arthropod) diversity (taxonomic and functional) and biomass	Community composition	Multiple	Invertebrates	10 x 10 km	Ideally annual, but probably longer time frames are more realistic	Given the widespread insect declines, it is essential to have a monitoring scheme to understand trends in diversity and biomass	Climate and Restoration Policy, Bioeconomy strategy, Common Agricultural Policy	What are the impacts of anthropogenic activities, particularly agriculture, on insect populations and communities
Anonymous Goose								
Insect diversity of Europe	Community composition	multiple	Other	National	long term observations every third year	Insects are a species-rich group and our researchers are highly interested in.	Habitats Directive, Climate and Restoration Policy, Common Agricultural Policy	What is the effect of agriculture on insects?
Insect diversity and biomass in agricultural, urban and natural habitats	Community composition	Agricultural, urban and natural habitats	Invertebrates	10 x 10 km	Continuous (high-frequency) recording of species from digital images (insect camera traps)	Comprehensive insect monitoring is largely missing	Habitats Directive, Bioeconomy strategy	To what extent is insect diversity and biomass in agricultural, urban and natural habitats declining (or recovering), and how does this affect ecosystem services (e.g. pollination, pest control, human well being)?

Ecosystem distribution and connectivity

Fine scale land cover and land use data, frequently updated	Ecosystem structure and function	All	Regulation of climate	100 x 100 m - 1 x 1 km	Real-time continuous yearly	LULUCF data are needed for several ESVs and policies	Habitats Directive, Climate and Restoration Policy, Bioeconomy strategy	Eg what is the effect of CAP policy on eg climate goals? This data can be used as driver data for many analyse types?
Measures and role of connectivity for habitats	Ecosystem functioning	multiple	Other	1 x 1 km - 5 x 5 km	yearly		Habitats Directive, Climate and Restoration Policy, Planning for green infrastructure and protected areas network	

Soil biota diversity

species diversity in soils	Community composition	soils	Invertebrates, fungi and microbiota	100 x 100 m - 1 x 1 km	short term	soil invertebrates (biodiversity) are a critical variable to assess terrestrial ecosystems that is often overlooked so specific variables are needed	Habitats Directive, Climate and Restoration Policy	What is the effect of climate, land-use change and agricultural intensification on soil communities across Europe?
Taxonomic and functional diversity of soil biota	Community composition	Multiple	Invertebrates, fungi and microbiota	< 100 x 100 m	Annual	Soil biodiversity has a key role in ecosystem processes and is negatively affected by multiple anthropogenic stressors. Besides invertebrates, the metric might include fungi and microbiota	Climate and Restoration Policy, Bioeconomy strategy	What is the effect of agriculture /restoration /pollution on soil diversity

Freshwater species diversity

All breakout rooms will close in 22 seconds.													
Taxonomic and functional diversity of aquatic	Community		Aquatic ecosystems (including marine, freshwater, and		100 x 100 m -		Taxonomic diversity, functional diversity, and diversity of sensitive species (e.g., EPTO in freshwaters). Several taxonomic groups can be included, from microbiota to fish and other			Habitats Directive, Water Framework Directive, Climate and Restoration		What is the effect of anthropogenic drivers	
										Birds Directive, Habitats Directive, Water Framework Directive, Common Fisheries Policy, Marine Strategy Framework Directive		Status, trends and functioning of the Marine environment	
Zooplankton biomass and diversity	Community composition		Marine		Other		10 x 10 km - 50 x 50 km		real-time for bloom events (harmful algal blooms) to monthly sampling to detect trends			There are several Essential Ocean Variables (EOVs) that are elaborated by by GOOS and MBON (see Miloslavac et al (https://doi.org/10.1111/gcb.14108)). How do they fit in EuropaBON? Is this part of the concept?	
Taxonomic composition underlying the WFD biological indices to enable calculation of additional EBVs, e.g. diversity indices, invasive species or red list species												Habitats Directive, Water Framework Directive, Climate and Restoration Policy, Bioeconomy strategy	How does phytoplankton blooms respond to climate change, and how should that response guide the nutrient management measures?
	4 B		Species populations		Rivers, Lakes, Transitional and Coastal waters		Plants		1 x 1 km - 5 x 5 km		weekly or monthly, long-term		Phytoplankton blooms are very dynamic on the scale of a few weeks, and seem to be increasing with climate change and nutrient pollution

Species populations

Abundance index trend of species	34 B	Species populations	Multiple	Amphibians	10 x 10 km - 50 x 50 km	spatial grain depends on the population limit	Population abundance is responsive for species in focus. Stress should be given to survey relative abundance, and not population size (too costly)	Birds Directive, Habitats Directive, Water Framework Directive, Bioeconomy strategy, Red list of species	What are the species states ?
completedness of apex predators	49 ES	Relational values	multiple (terrestrial, freshwater etc)	Regulation of detrimental organisms and biological processes	10 x 10 km - 50 x 50 km	yearly long term	functionality at community and ecosystem levels are very much dependent on the presence and population regulation of apex predators directly copeting with humans and can be a good measure of the local evolutionary, ecological and conservation potential	Birds Directive, Habitats Directive, Water Framework Directive, Common Agricultural Policy, Common Fisheries Policy	ecosystem functionality vs human footprint
Conservation status assessment of certain terrestrial species.	36 B	Species populations	Terrestrial	Other	< 100 x 100 m	Yearly and short-term		Birds Directive, Habitats Directive, Water Framework Directive, Common Agricultural Policy	Monitoring certain species needs prolonged systematic monitoring which is expensive and laborious. Locally the pool of experts to study these species is very limited besides the fact that these are usually busy with keeping up with the academic demands of their institution. Besides this a monitoring framework still needs to be developed, making the present approach an ad hoc one.
Raptors as indicators of communities and some of them as endangered	33 B	Species populations	Multiple	Birds	1 x 1 km - 5 x 5 km	It depend of the species. Most endangered: yearly; Others: each to 2 years or 5 years.	Are species umbrella in the communities and bioindicators. Some of them endangered.	Birds Directive, Habitats Directive	What is the trend of raptors? Which human factors affect their conservation?

Pollinator diversity and pollination

pollinator trait diversity in agricultural landscapes	37	B	Community composition	Agricultural landscapes (including rural areas, cropland and managed grassland)	Invertebrates	1 x 1 km - 5 x 5 km	long term		Common Agricultural Policy	Are some pollinator groups threatened in this particular crop area ?
Economic value of Pollination in heterogeneous agricultural landscapes	51	ES	Ecological supply	Artificial; Temperate grasslands	Pollination and seed dispersal	1 x 1 km - 5 x 5 km	yearly	We still lack robust spatial quantifications of the pollination value of agricultural landscapes. Existing estimates (NatCap) often do go beyond simple thresholds of natural vegetation cover.	Common Agricultural Policy	What is the monetary value of pollination for agricultural production in Europe

Ecosystem disservices

Abundance of invertebrate disease-vectors (ticks; mosquitoes etc)	Species populations	Multiple	Invertebrates	10 x 10 km - 50 x 50 km	Real-time; short-term	Important to assess risk of disease transmission to humans	Not Applicable	What is the risk of disease transmission to humans?			
Harmful algal blooms threatening recreational services, e.g. bathing water quality, and provisional services, e.g. public drinking water supply	Relational values	Lakes and coastal waters	Regulation of freshwater and coastal water quality	1 x 1 km - 5 x 5 km	real-time, weekly or monthly in summer, short-term and long-term	Blooms develop over a few weeks and may last for a few weeks, we need data on their response to climate change and nutrient management	Water Framework Directive, Climate and Restoration Policy, Common Agricultural Policy, Common Fisheries Policy	What is the impact of harmful algal blooms on bathing water quality and drinking water supply			
Crop pest risk in European agriculture	Merge with #17				3	4	3	5	1	4	20

Plant diversity

Stratified sampling of plant species diversity	7 B	Community composition	multiple	Plants	100 x 100 m - 1 x 1 km	6-year cycle, with one-third of data points surveyed every 2 years	Very representative of ecosystem condition + land use intensity, great in-situ data for training of EO data	Habitats Directive, Climate and Restoration Policy, Bioeconomy strategy, Common Agricultural Policy	How does land use & cover relate to plant species diversity and type?
Stratified sampling of EUNIS habitats	45 ES	Ecological supply	multiple	Habitat creation and maintenance	100 x 100 m - 1 x 1 km	Every 6 years, with one third sampled every 2 years	Important variable to understand the impact of land use on vegetation type/ecosystem condition, and to train EO data sets	Birds Directive, Habitats Directive, Water Framework Directive, Climate and Restoration Policy, Bioeconomy strategy, Common Agricultural Policy	How does land use affect plant community distribution and where are the most rare EUNIS habitats?

Genetic diversity

Genetic diversity monitoring	24	B	Genetic composition	Multiple	Amphibians	1 x 1 km - 5 x 5 km	every 5 years; long term monitoring	Species and populations can cope with global change only if they maintain 95 % and 90% of their current genetic diversity, respectively.	Birds Directive, Habitats Directive, Water Framework Directive, EU Green Deal; Biodiversity 2030 Strategy; CBD post-2020 Global Biodiversity Framework	hw can we assure that the genetic dimension will be properly taken into account in any new regulation
Data on within-species genetic diversity across taxa	27	B	Genetic composition	multiple	Other	National	real time (and historic)	across all animal and plant taxa	Birds Directive, Habitats Directive	Diversity monitoring
belowground biodiversity & genetic diversity	29	B	Genetic composition	multiple	Microbes/Fungi	National	depending on the level - 5 - 10 years	to see temporal changes	Forest genetic resources strategy	forest management and climate change threats
Genetic diversity of forest tree species / Forest Genetic Monitoring	28	B	Genetic composition	Forest ecosystems	Other	National	10-year monitoring interval / national scale	Forest Genetic Monitoring is needed to ensure healthy (new established and old) forests in the future.	Habitats Directive, Climate and Restoration Policy, Bioeconomy strategy, Common Agricultural Policy	What is the effect of climate change on the evolutionary potential of forests?

Recreation

woodland and forest	Habitat creation and maintenance	< 100 x 100 m	yearly	cultural services are bit underweighted in policies	Birds Directive, Habitats Directive, Climate and Restoration Policy	what's the value of restoring/expanding NATURA2000	
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THANK YOU!



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