European Commission

European Committee of the Regions

# Stakeholder Workshop

# “Towards a Zero Pollution Monitoring and Outlook”

Day 2, 25 May 2022

# Agenda

| | |
|---|---|
| **09:00** | **Welcome and opening – purpose of day 2** |
| **09:15** | **Session 1: Nutrient losses and Integrated Nutrient Management Action Plan (INMAP)** |
| 11:00 | Break |
| **11:30** | **Session 2: Nutrients in the Zero Pollution Monitoring and Outlook** |
| **12:30** | **Session 3: Discussion and conclusions** |
| 13:00 | End of meeting |

# Welcome and opening

## Purpose of day 2

# Session 1: Nutrient losses and Integrated Nutrient Management Action Plan (INMAP)

Presentations from DG ENV

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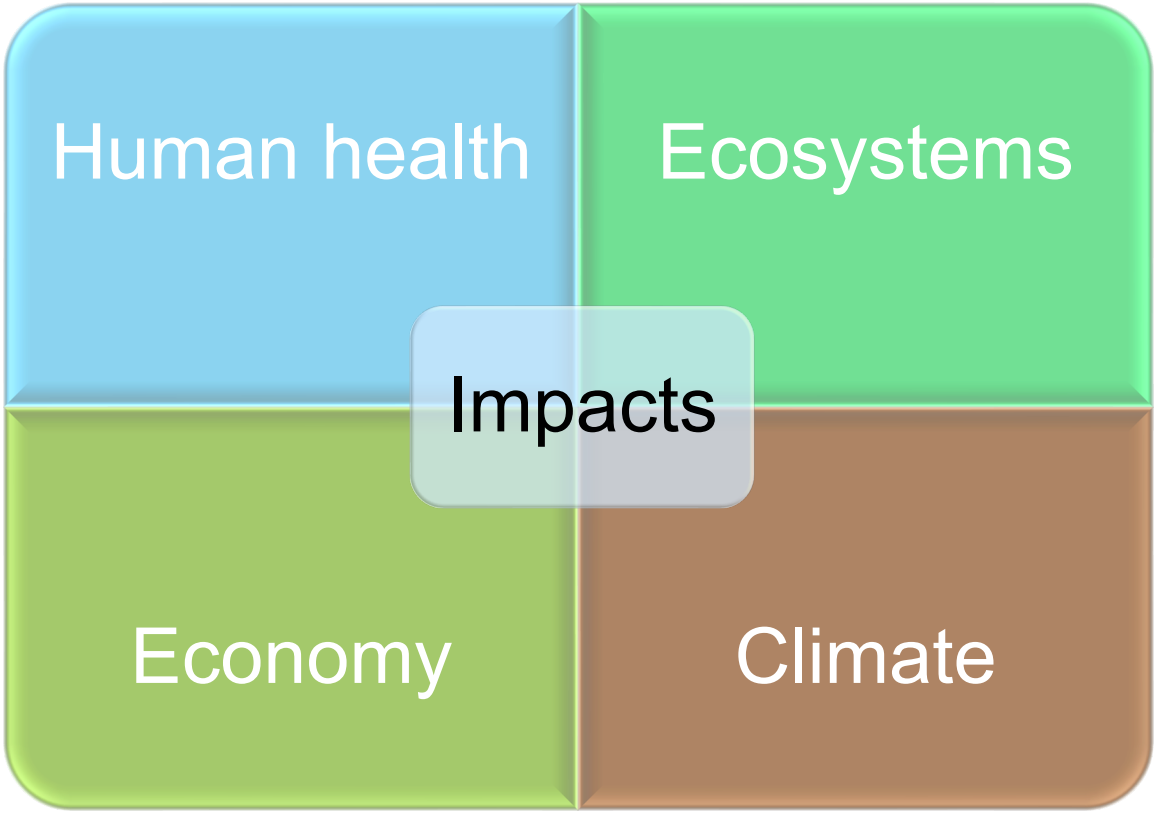
# Nutrients – action plan for better management

Stakeholder Workshop

"Towards a Zero Pollution Monitoring and Outlook"

24 & 25 May 2022

# Human activities have altered the Carbon, Nitrogen and Phosphorus cycles

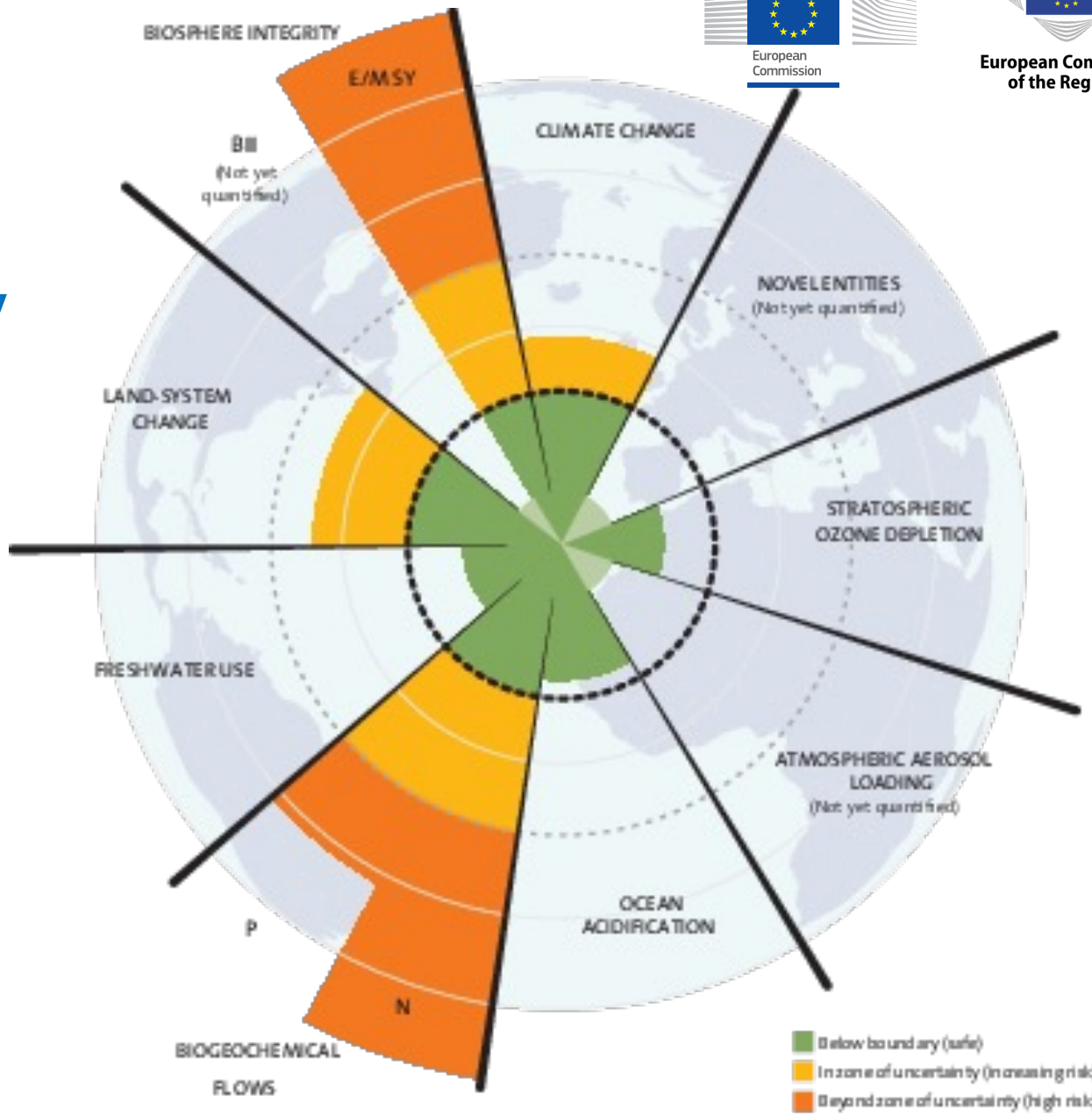



UK Centre for Ecology & Hydrology

# Nutrients have trangressed planetary boundaries

In Europe, nitrogen and phosphorus are exceeding safe planetary boundaries

- for N by a factor of 3.3
- for P by a factor of 2



# INMAP

Circular economy action plan

Biodiversity strategy

Farm to fork strategy

Integrated Nutrient management action plan

reducing nutrient losses by at least 50% by 2030

Ensuring that there is no deterioration in soil fertility

Resulting the reduction of use of fertilisers by at least 20%

# Long-standing EU legislation has tackled nutrient pollution in the fields of water, air and industrial emissions, but harmful levels persist

The INMAP will look at:

- shortcomings in specific legislation
- implementation gaps
- integrated approach on nutrient pollution encompassing air, water, soil and climate

# The INMAP will also:

- ensure sustainable application of nutrients
- address nutrient pollution at source
- increase the sustainability of agriculture and other sectors, and
- focus efforts on nutrient pollution hotspots

# Areas of intervention

- Pollution monitoring and reporting
- Reducing nutrient losses the source
- Reviewing legislation and maximising compliance
- Sustainable food production and consumption
- Nutrient recycling
- Research & development, international cooperation

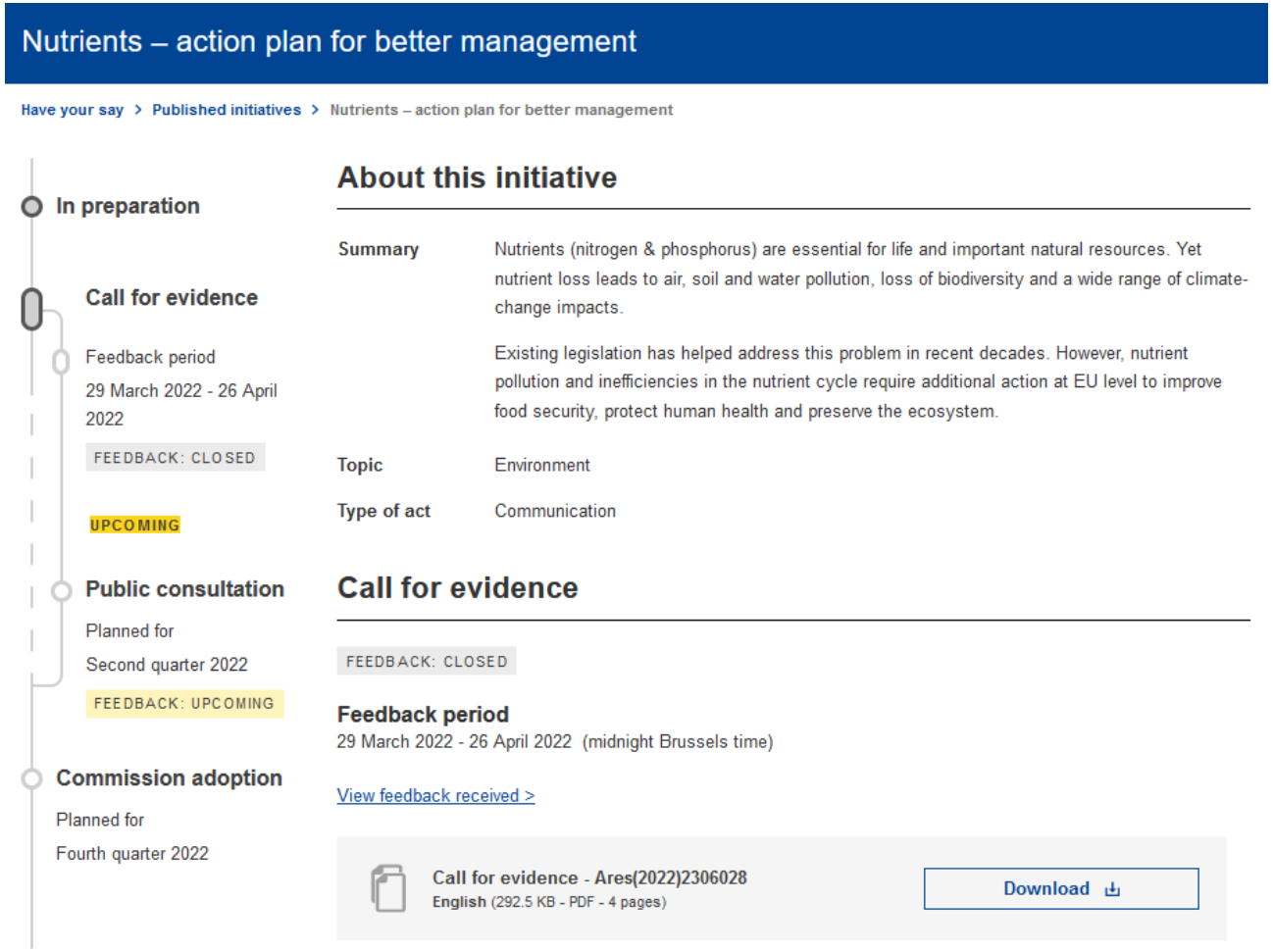
# Stakeholder consultation

## Call for evidence

- 70 feedbacks received

## Open public consultation

- opened in EN on 23 May,
- in all languages from 1 June and then for 12 weeks



# What actions should the Integrated Nutrient Management Action Plan focus on?

- Reinforced coherence between existing policies
- Reinforced controls of existing legislation
- Reinforced implementation and enforcement of existing legislation
- Introduce new legislation
- Non legislative measures (guidance, recommendations, exchange of best practices )
- Financial incentives
- Tax on polluting activities
- Raising awareness about nutrient pollution
- Increasing knowledge transfer on environmentally friendly practices
- Research and innovation

# Which of the following would be the most effective ways of boosting nutrient recycling?

| |
|---|
| Information campaigns to citizens, consumers, local authorities, companies and farmers |
| Better separating waste streams |
| Ensuring better enforcement of existing legislation |
| Remove legal obstacle to nutrient recycling |
| Funding streams to support investment in infrastructure |
| Tax on conventional chemical nutrients in fertilisers |
| Target on nutrient recycling for different waste streams |
| Setting legally binding targets for nutrient recycling |
| Investing in research and development |

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# Nutrients – action plan for better management

Stakeholder Workshop

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# Knowledge for the Integrated Nutrient Management Action Plan (INMAP)

## Stakeholder Workshop: “Towards a Zero Pollution Monitoring and Outlook”

*24-25 May 2022, Brussels, Belgium*

“

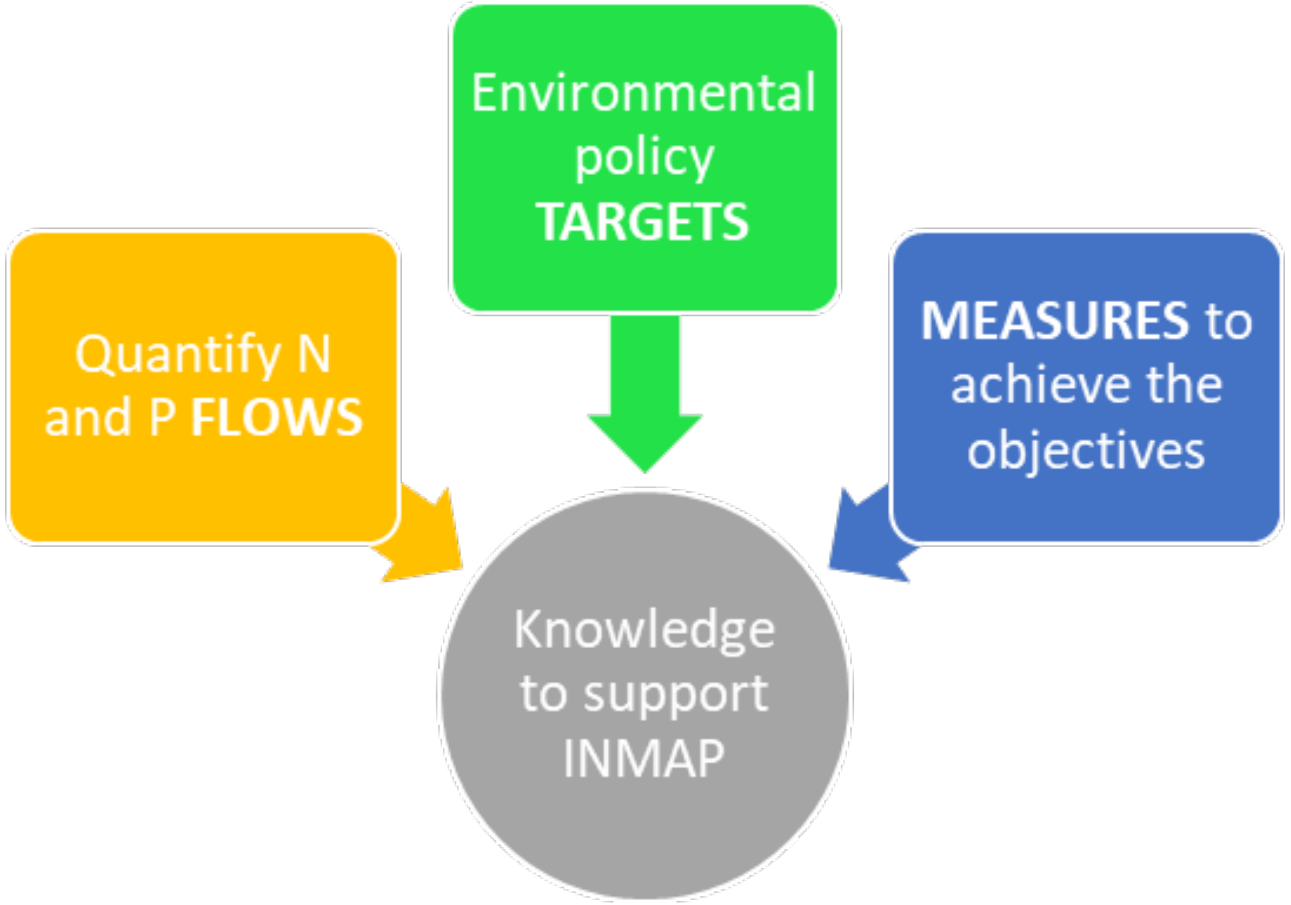
# Background

EU Biodiversity Strategy (BDS), Farm to Fork Strategy (F2F), Zero Pollution Action Plan:

- “goal of zero pollution from nitrogen and phosphorus flows from fertilisers through **reducing nutrient losses by at least 50%,** while ensuring that there is no deterioration in soil fertility”.
- in 2022 the Commission will develop with Member States an **Integrated Nutrient Management Action Plan (INMAP)**

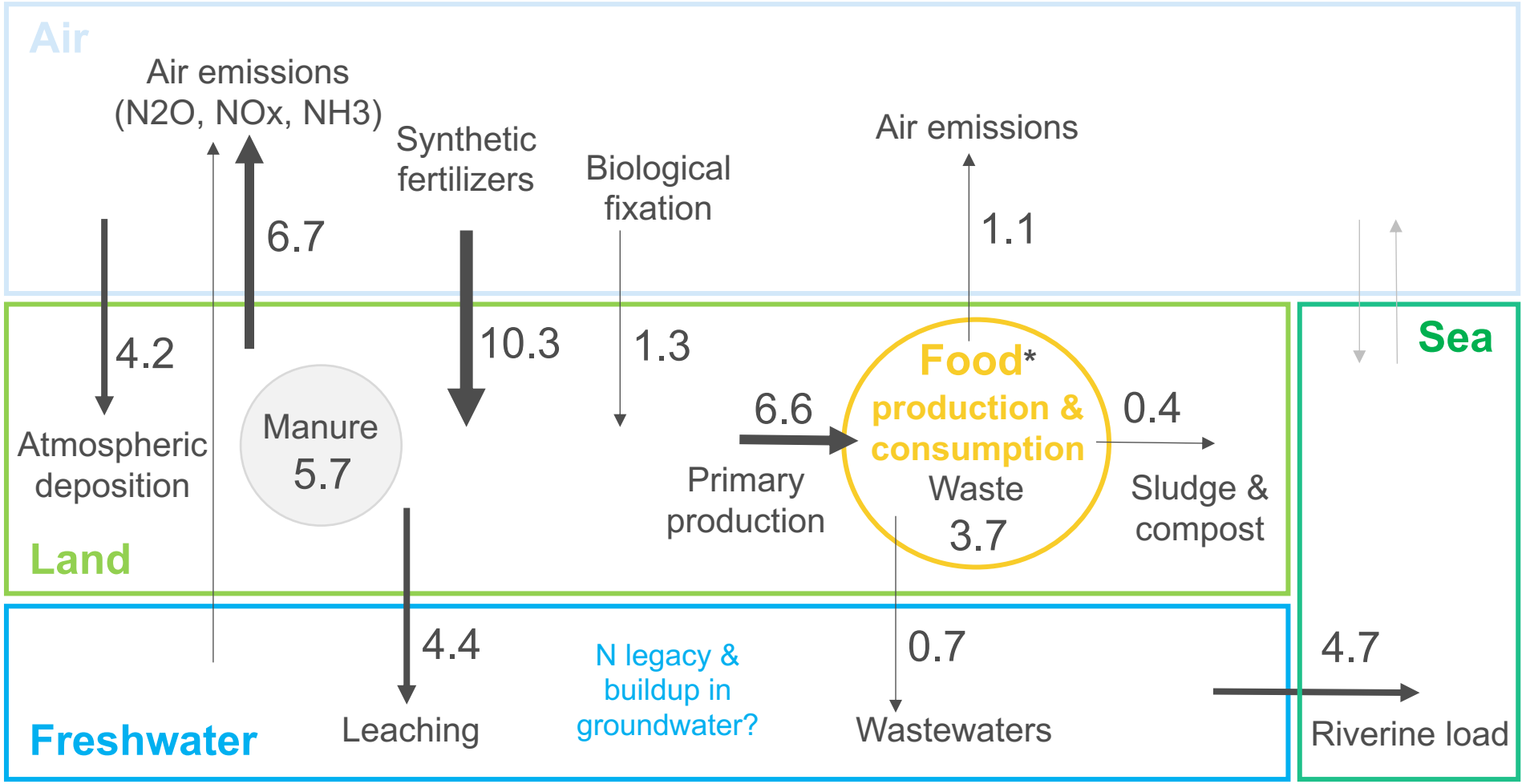
# Knowledge for INMAP

Gather scientific knowledge and evidence to support the discussion and preparation of the Integrated Nutrient Management Action Plan (INMAP)



# FLOWS – How much are current nutrient fluxes in EU?

# Major nitrogen fluxes in EU27 (TgN/y)




EU27 as in January 2021, values refer to 2015 or closest year, only major fluxes are depicted



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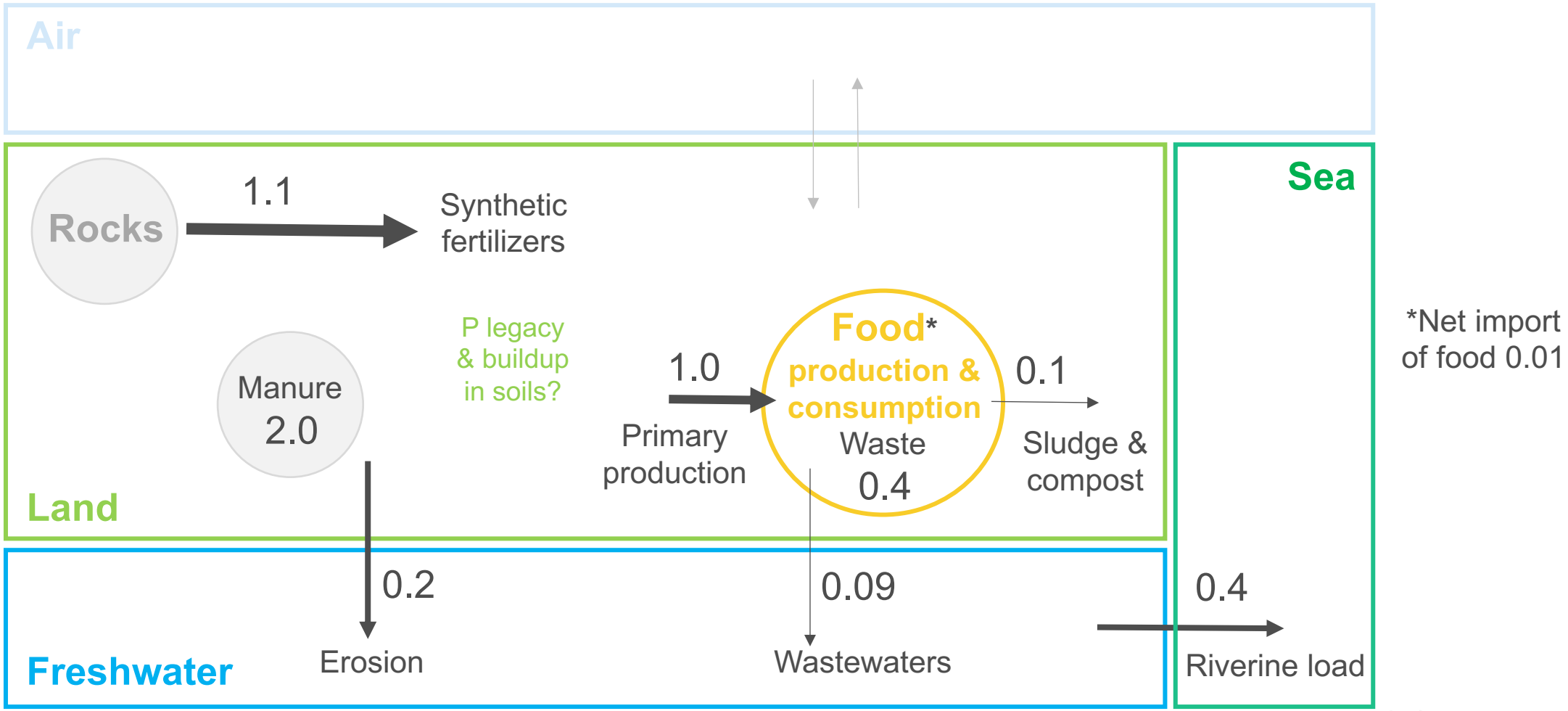
# Major phosphorus fluxes in EU27 (TgP/y)

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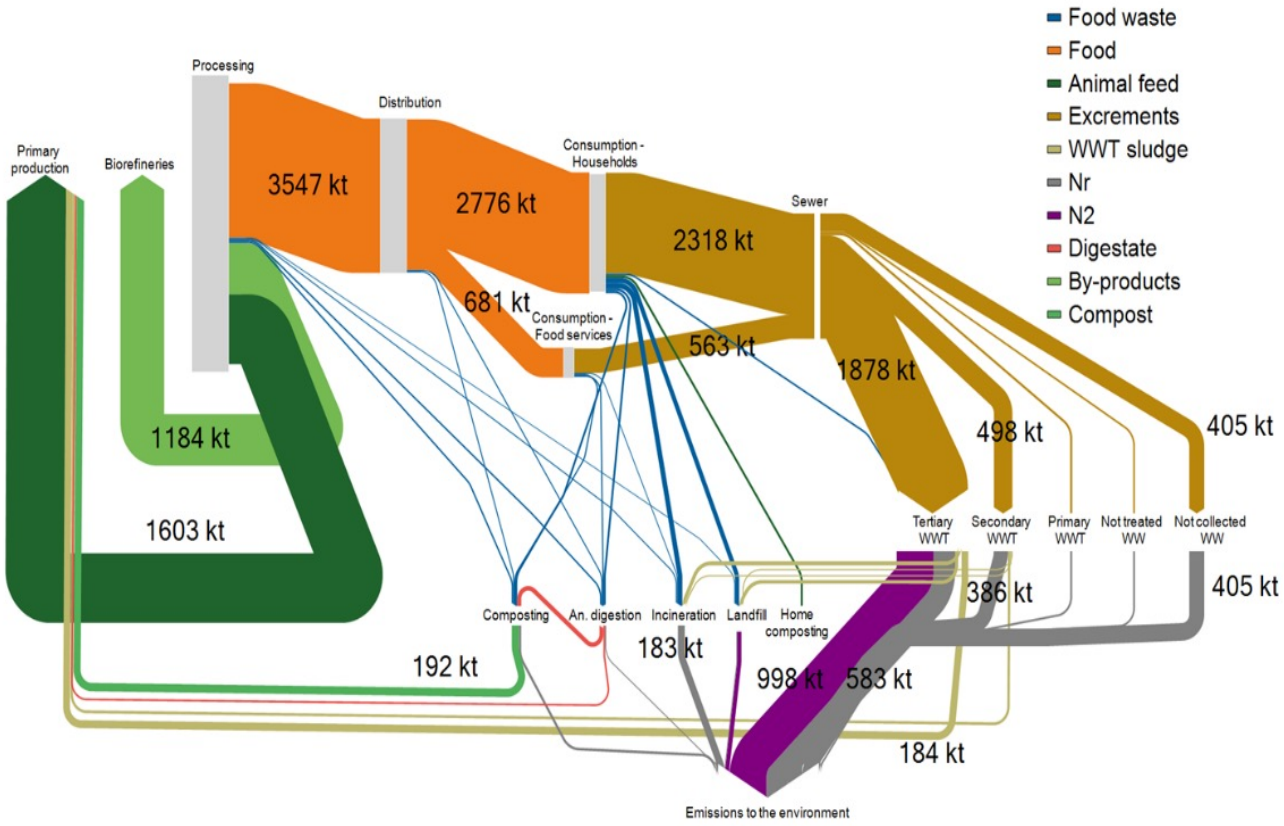
# Nutrients loss in the food system (EU27)

Nitrogen flows the food system (2015)




| | |
|---|---|
| N in food waste | 12% |
| N lost in environment (N2+Nr) | 49% |
| P in food waste | 10% |
| P lost in environment | 39% |



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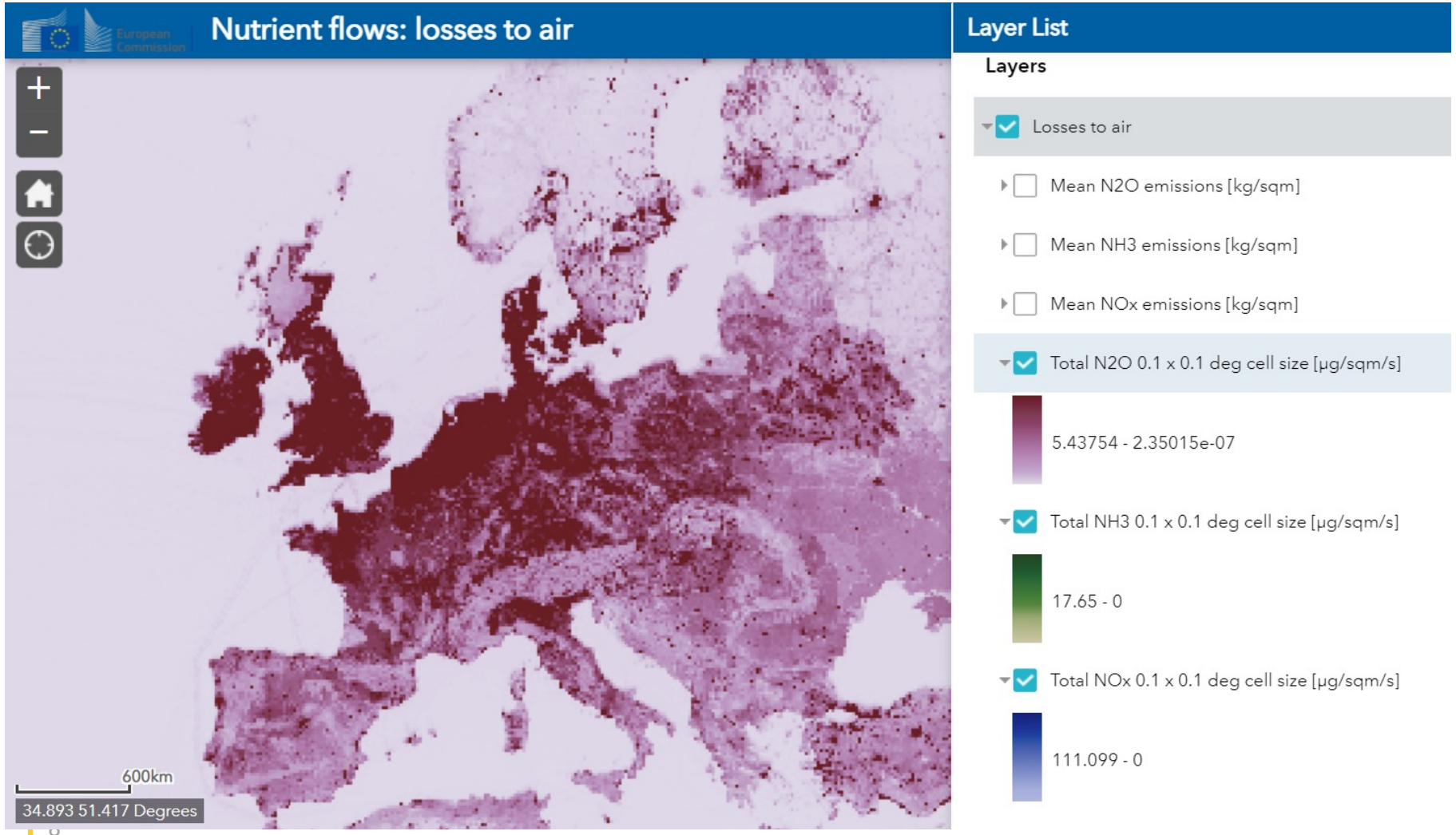
# Regional differences




- Nutrient losses to air and water
- Contribution of different sources/sectors



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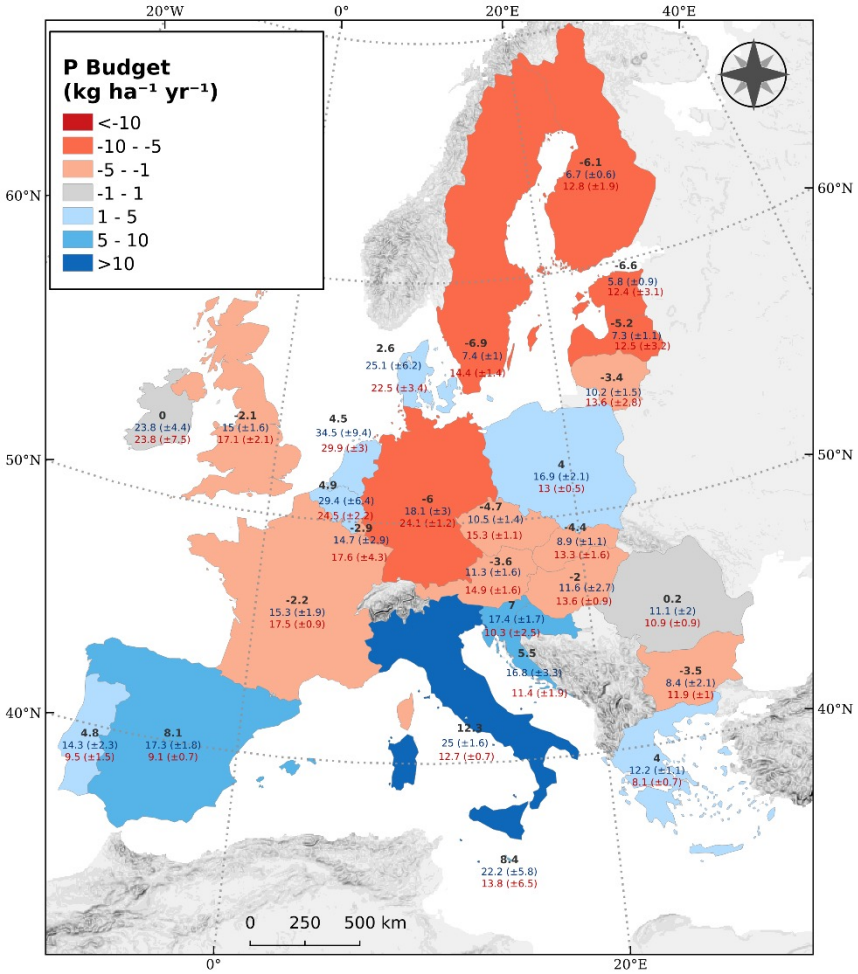
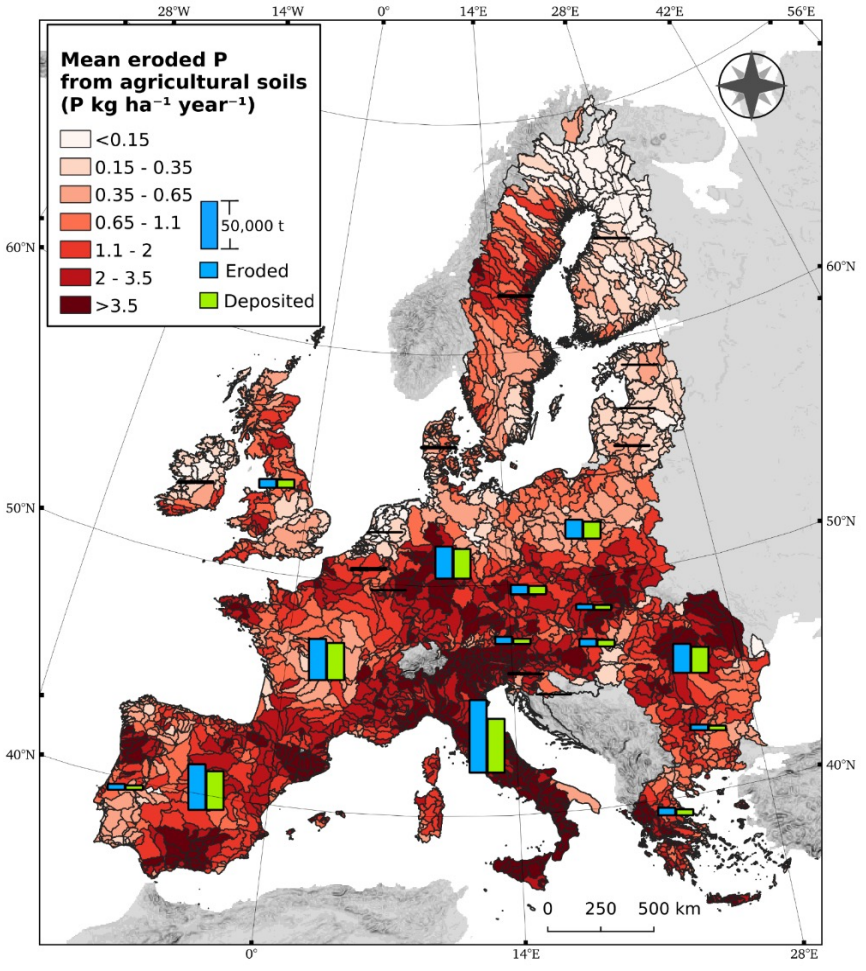
# P budget & erosion in European agricultural soils




- High spatial variation of P budget across countries/regions.
- Reduction of P should be focused on specific regions

Inputs: inorganic fertilizers, manure, atmospheric deposition, and chemical weathering
Outputs: crop production, plant residues removal, losses by erosion



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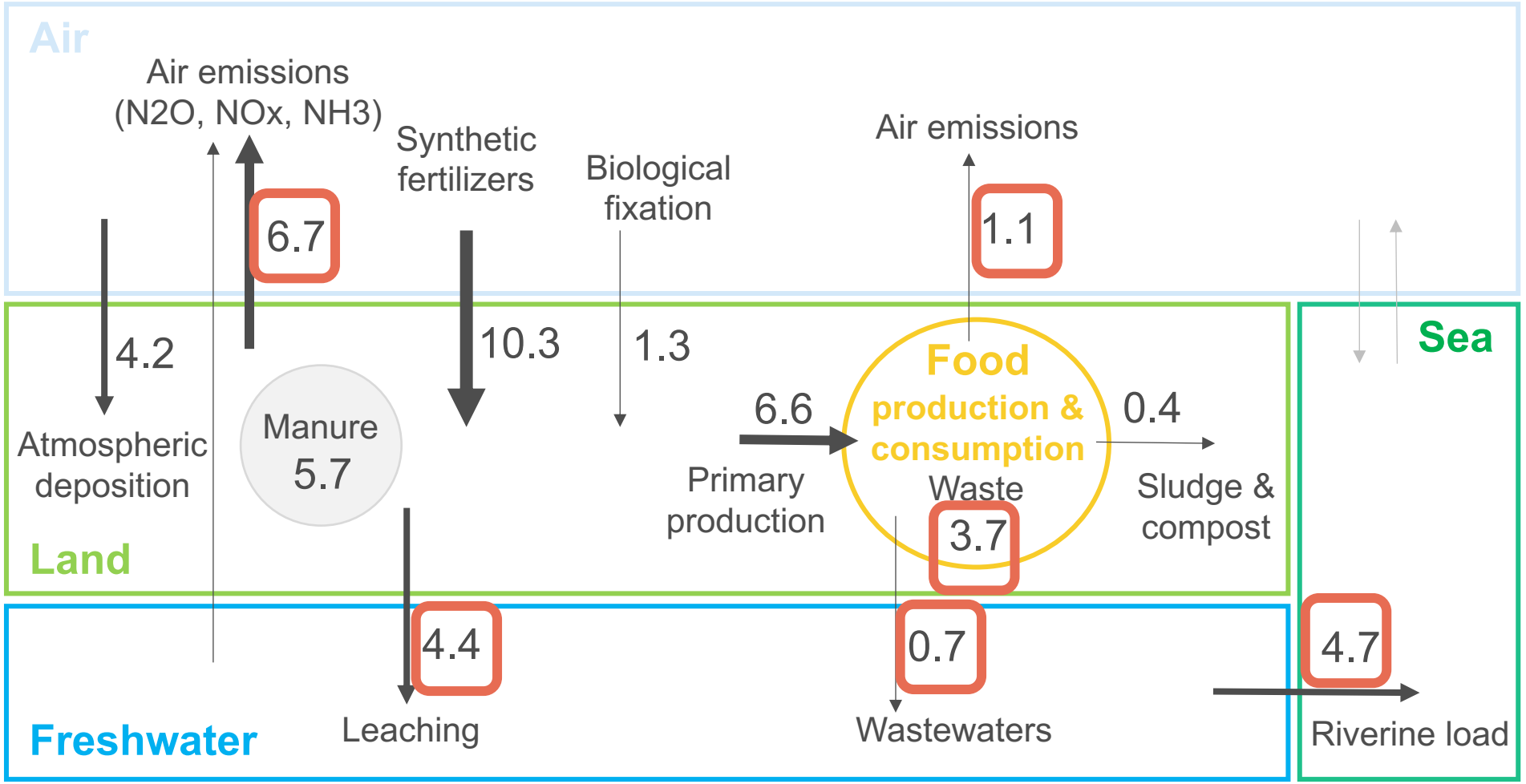
# TARGETS - How much should EU reduce nutrient fluxes?

# Distance to targets - EU policies and strategies

- → Targets of the BDS, F2F, ZPAP (-50% nutrient losses)
- → Planetary boundaries
- → EU policy environmental targets related to nutrients:
  - Nutrient emissions to air (NECD, IED)
  - Nutrient emissions to water (WFD, UWWTD, ND, MSFD)
  - New CAP
  - Regulatory framework on waste (Waste Framework Directive, Landfill Directive, Sewage Sludge Directive, …)

# Major nitrogen fluxes in EU27 (TgN/y) & Targets




BDS, F2F, ZPAP Target: **-50% nutrient losses** to the environment

EU27 as in January 2021, values refer to 2015 or closest year, only major fluxes are depicted



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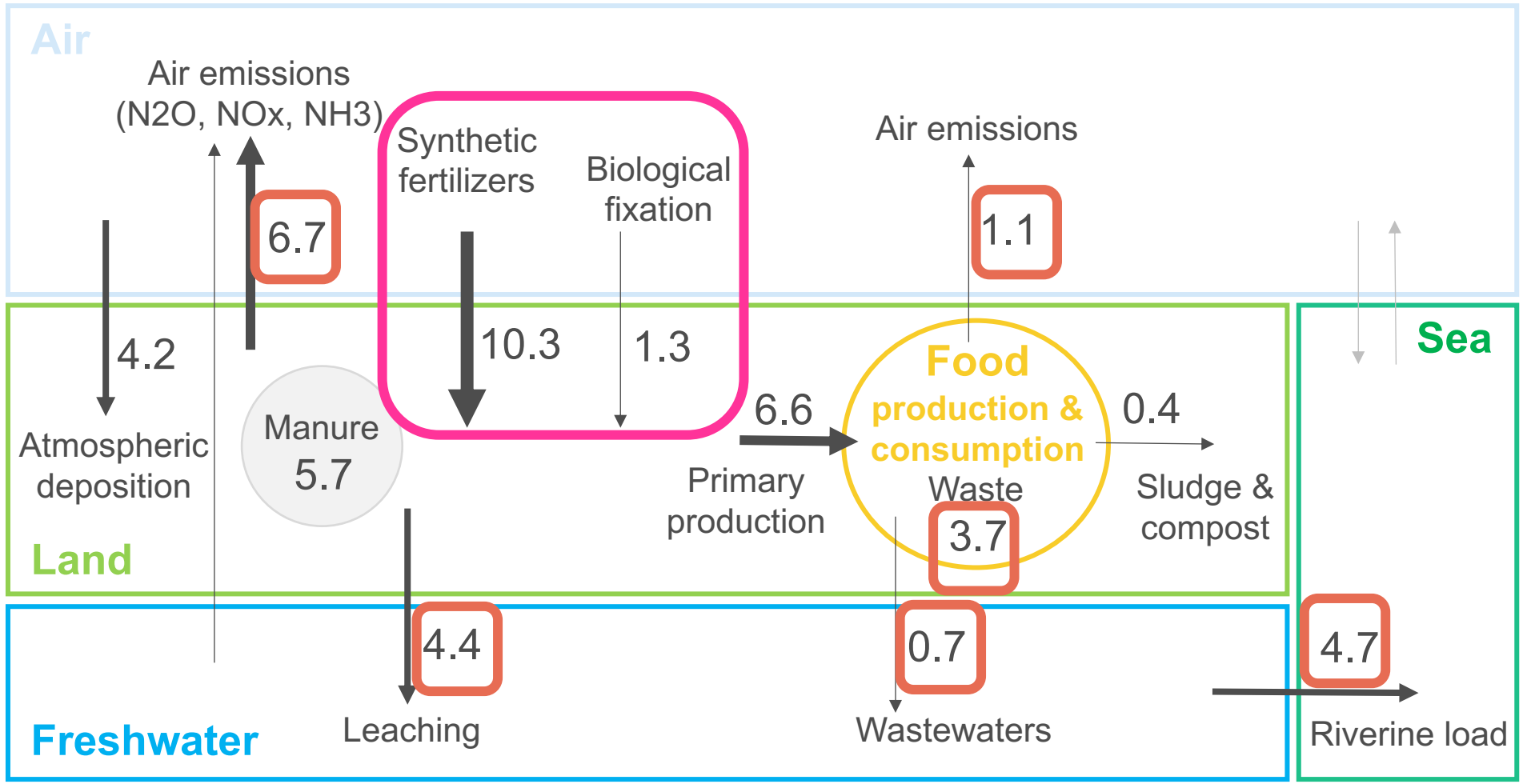
# Major nitrogen fluxes in EU27 (TgN/y) & Targets




BDS, F2F, ZPAP Target: **-50% nutrient losses** to the environment

Planetary Boundary for EU: **~4 TgN/y** input from fertilizers

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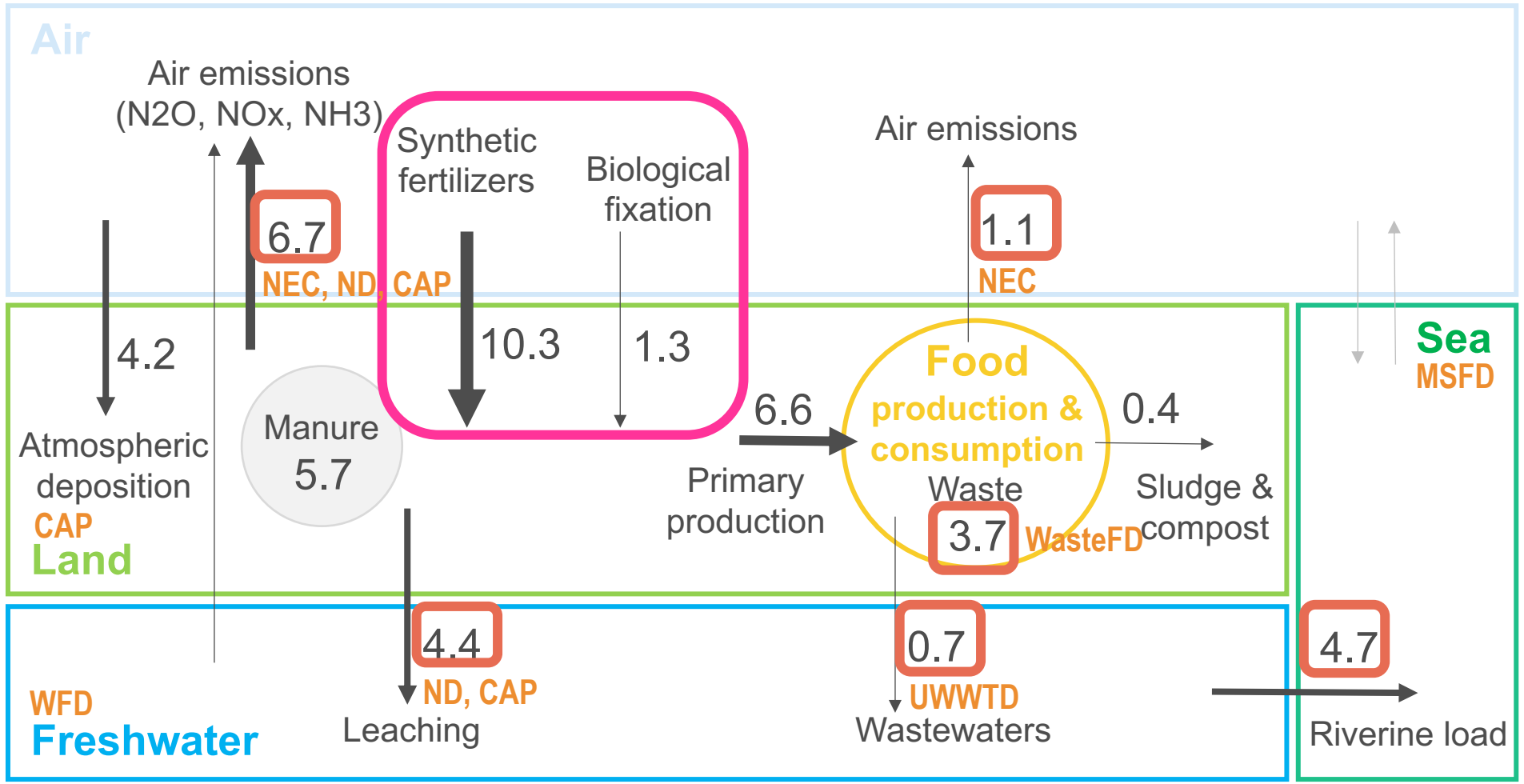
# Major nitrogen fluxes in EU27 (TgN/y) & Targets




EU27 as in January 2021, values refer to 2015 or closest year, only major fluxes are depicted

EU legislation

BDS, F2F, ZPAP Target: **-50% nutrient losses** to the environment

Planetary Boundary for EU: **~4 TgN/y** input from fertilizers



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# MEASURES - How much measures could reduce nutrient fluxes in EU?

# Measures

Identify the possible **measures** (already in EU policy and others) at different intervention points in the N and P cycle and the water-agro-food system to achieve the objectives of the BDS and F2F Strategies

→ Scientific review & modelling assessments

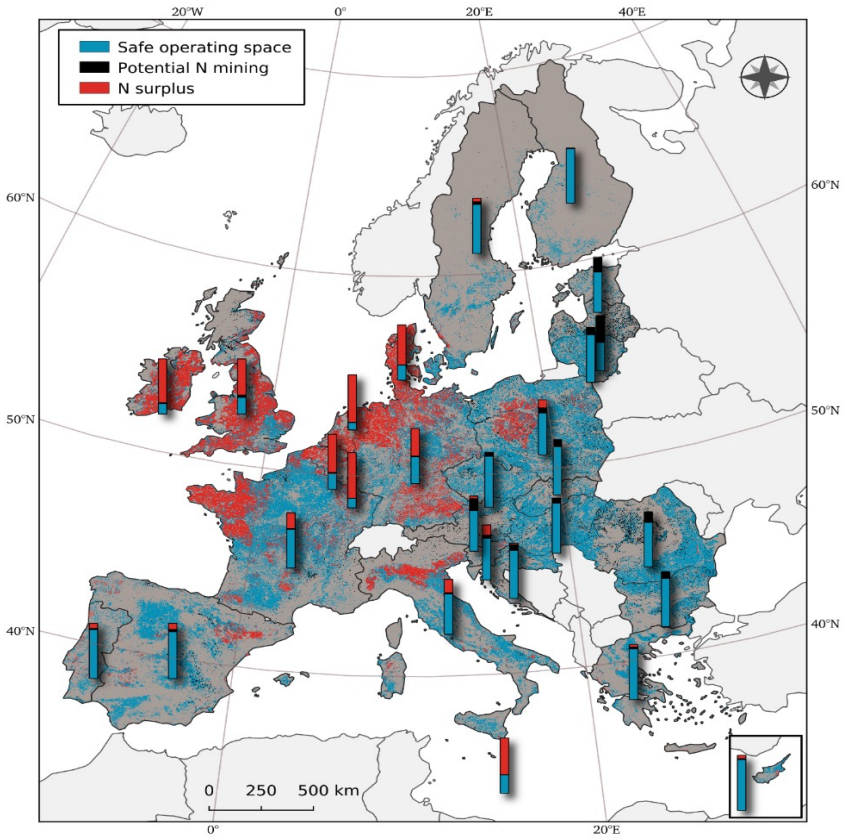
# Nutrient recycling from waste and manure

- Novel **recycling techniques** can capture and transform N and P from organic waste (manure, sewage sludge and bio-waste) into nutrient-dense concentrated and **safe (mineral) fertilisers**, and may enable to **transfer nutrients** from nutrient-excess to nutrient-demanding EU regions.
- The maximum potential of such actions is to **substitute about 10% of N and 25% of P mineral fertilisers**.

# Modelling N leaching and losses to air (DayCent)

- Reducing mineral N by 20% in **surplus** areas
- Increasing mineral N by 20 % in **mining** areas

| Flow-stock | current | change | % |
|---|---|---|---|
| **Mineral N fertilization (kt)** | 9075 | -612 | -6.7 |
| **$NO_3$-N leaching (kt)** | 4179 | -241 | -5.8 |
| **$N_2O$-N emissions (kt)** | 283 | -11 | -3.9 |
| **SOC (Mt)** | 12300 | -14 | -0.1 |




**Different relative changes in water and air N losses**

**Small feedbalk on SOC and productivity**



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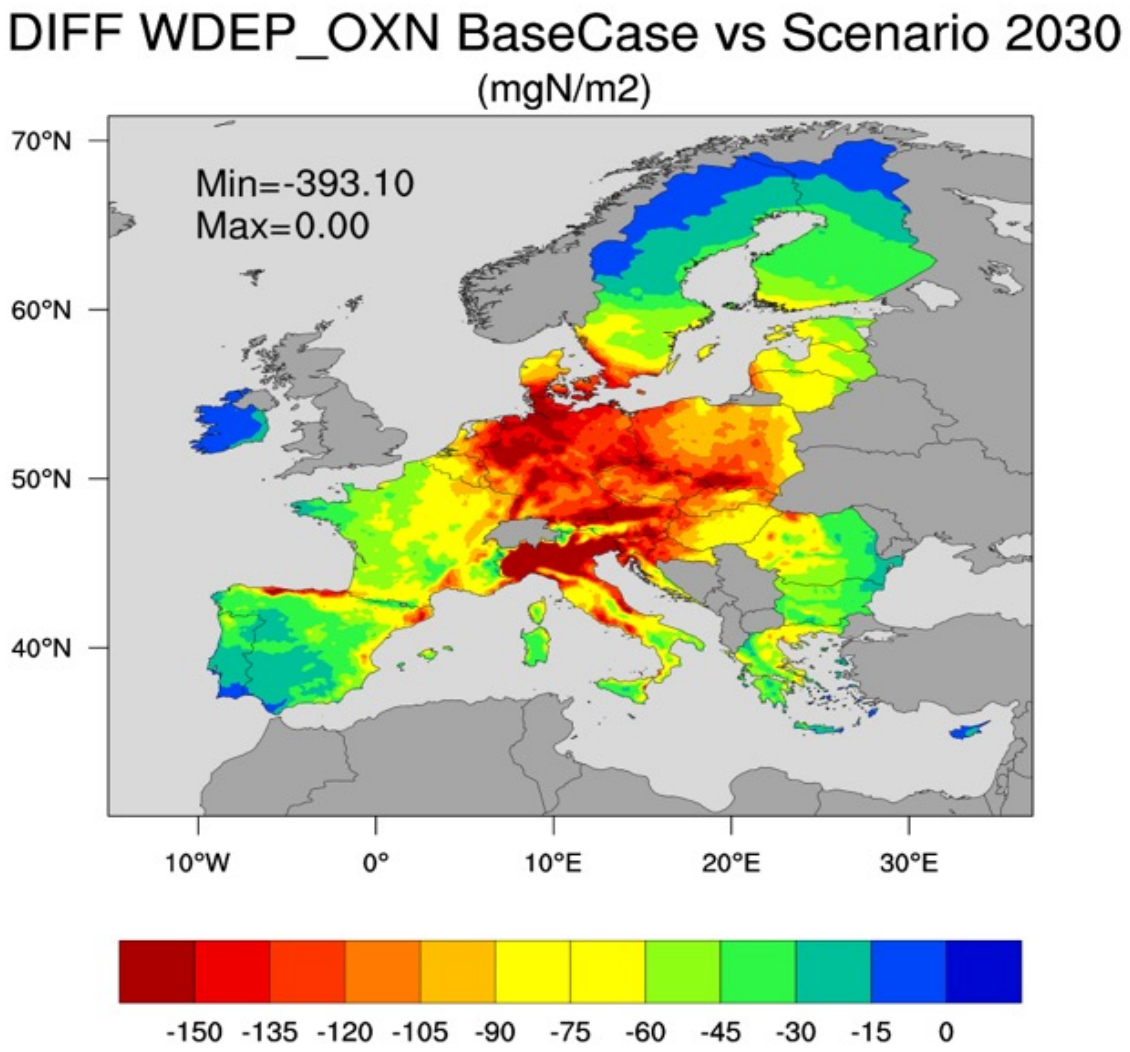
# Modelling N atmospheric deposition (EMEP)




## Emission reductions (2030 compared with 2015)

FitFor55, average EU27

| SO2 | NOx | PM2.5 |
|---|---|---|
| 57.7% | 54.5% | 40.3% |

NEC Directive, average EU28, linear interpolation

| NH3 | NMVOC |
|---|---|
| 10% | 24% |

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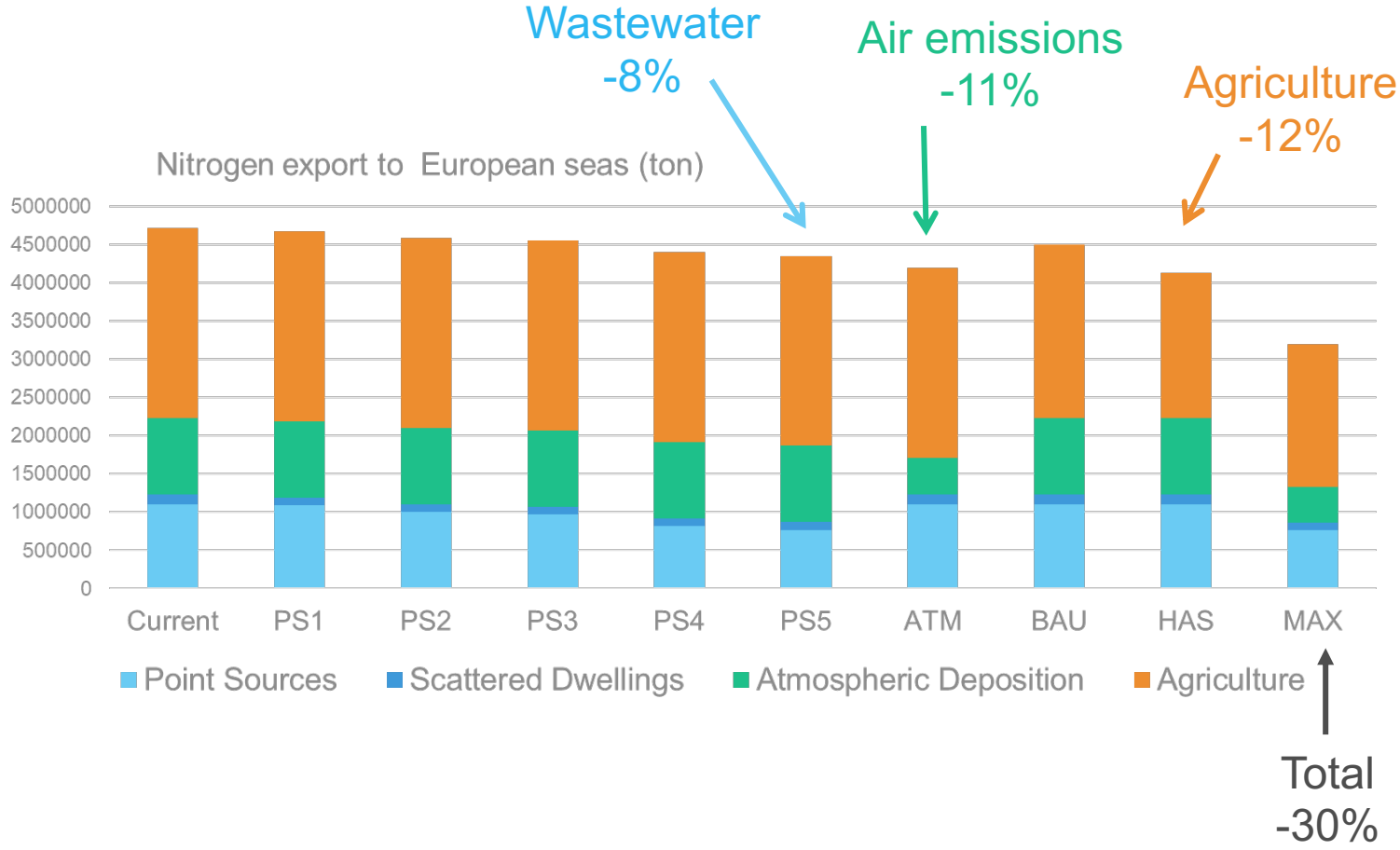
# Modelling N and P losses in surface water and sea (GREEN)

Nitrogen export to European seas under different scenarios of measures




- Measures in different sectors/sources are necessary
- Measures need to be specific to the region
- Measures can change N/P ratio in the aquatic ecosystems



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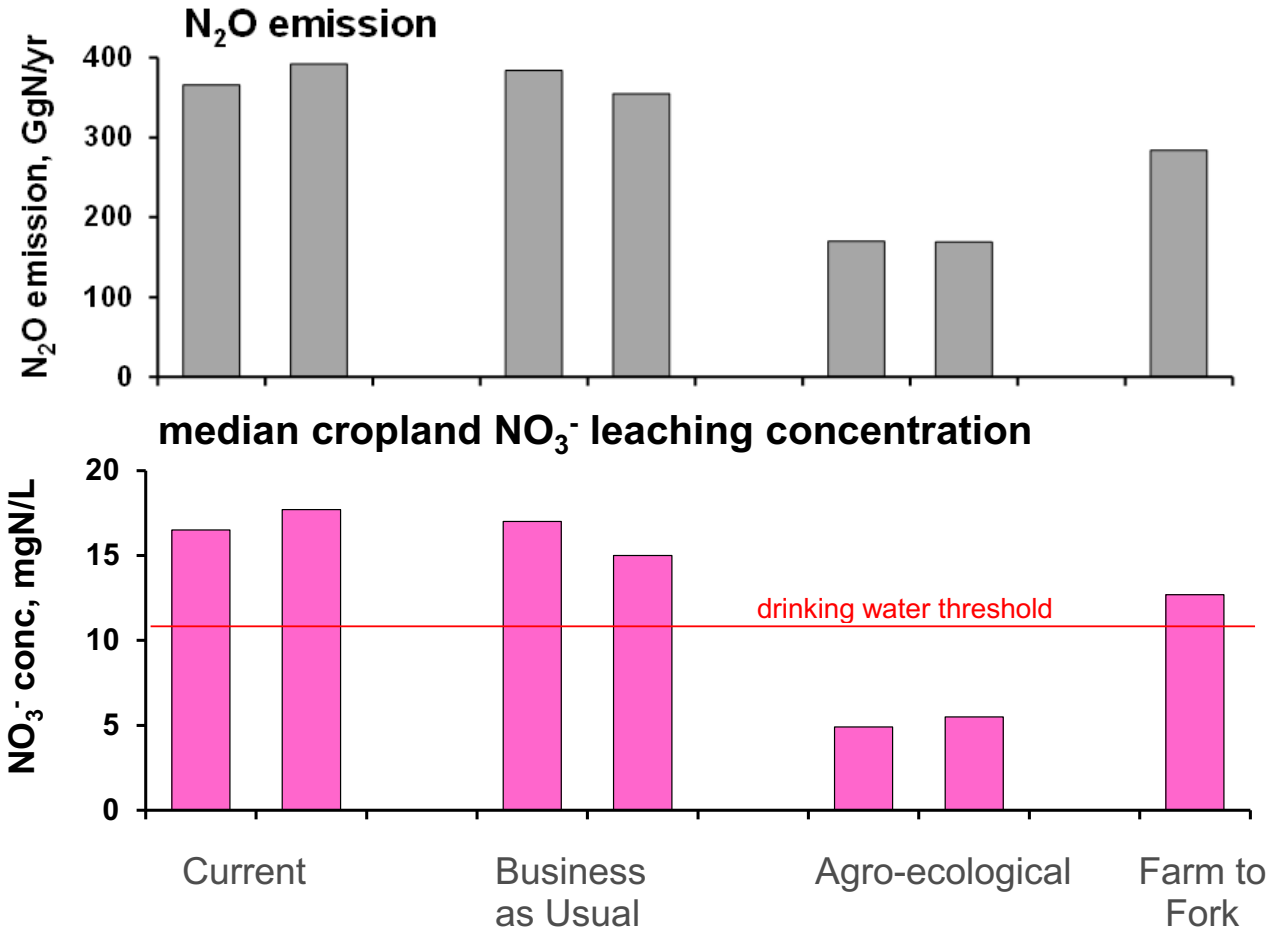
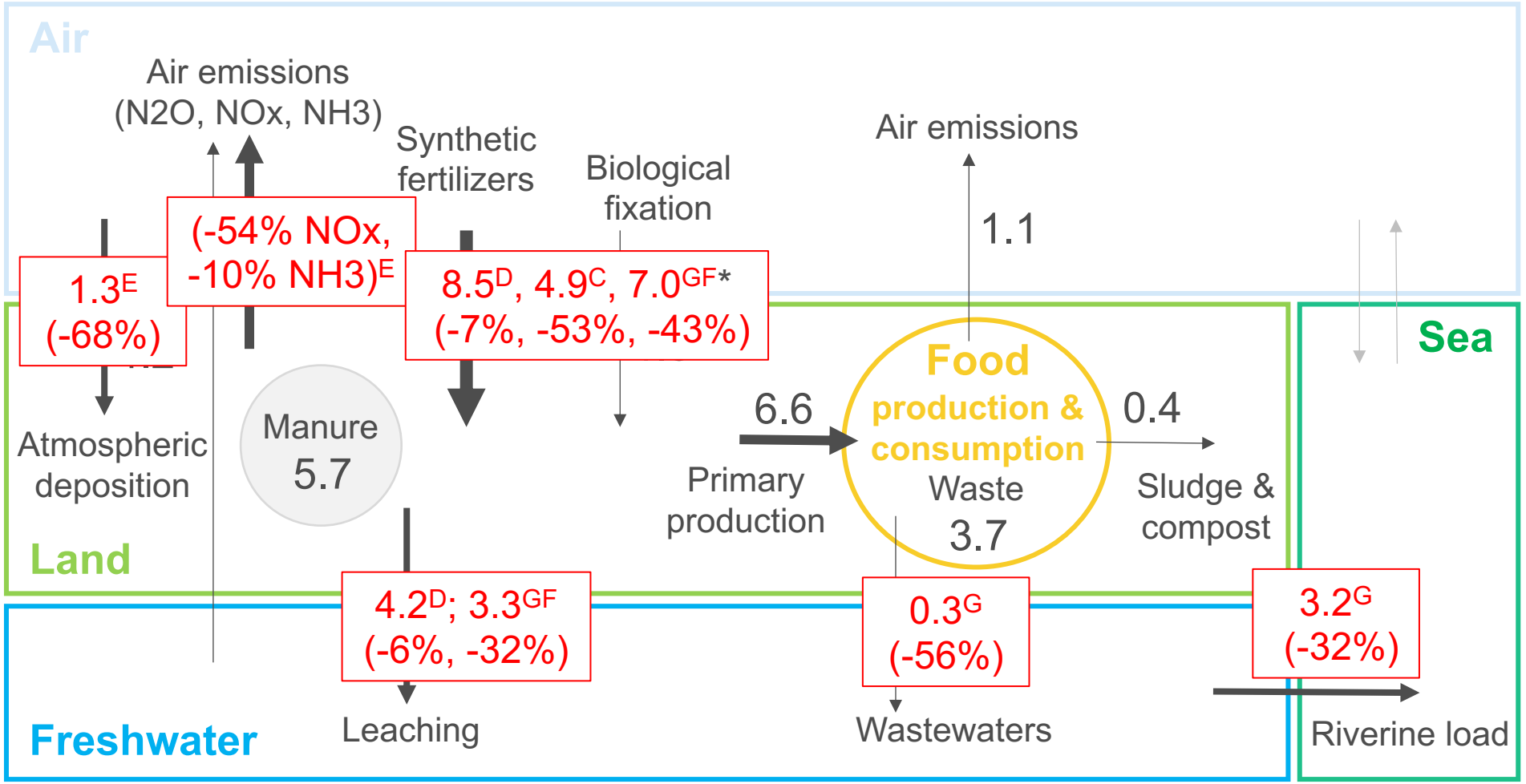
# Scenarios nutrient reduction (GRAFS)




Agro-ecological scenario:

- **Dietary change** with less animal products and efficient recycling of human excreta;
- Region-specific **organic** crop rotation systems involving $N_2$-fixing legumes (no synthetic N fertilizers);
- Reconnection of livestock with cropping systems allowing optimal use of manure. **No animal feeds import**.

# Major nitrogen fluxes in EU27 (TgN/y) & Measures




## Scenarios

Values are from several modelling assessments:

C: CAPRI
D: DayCent
E: EMEP
G: GREEN
GF: GRAFS

*a scenario with no use of synthetic fertilizers was also analyzed

EU27 as in January 2021, values refer to 2015 or closest year, only major fluxes are depicted



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# Session 2: Nutrients in the Zero Pollution Monitoring and Outlook

Presentations from EEA and JRC

# EEA - ZP Monitoring – Approach to Nutrient Assessment

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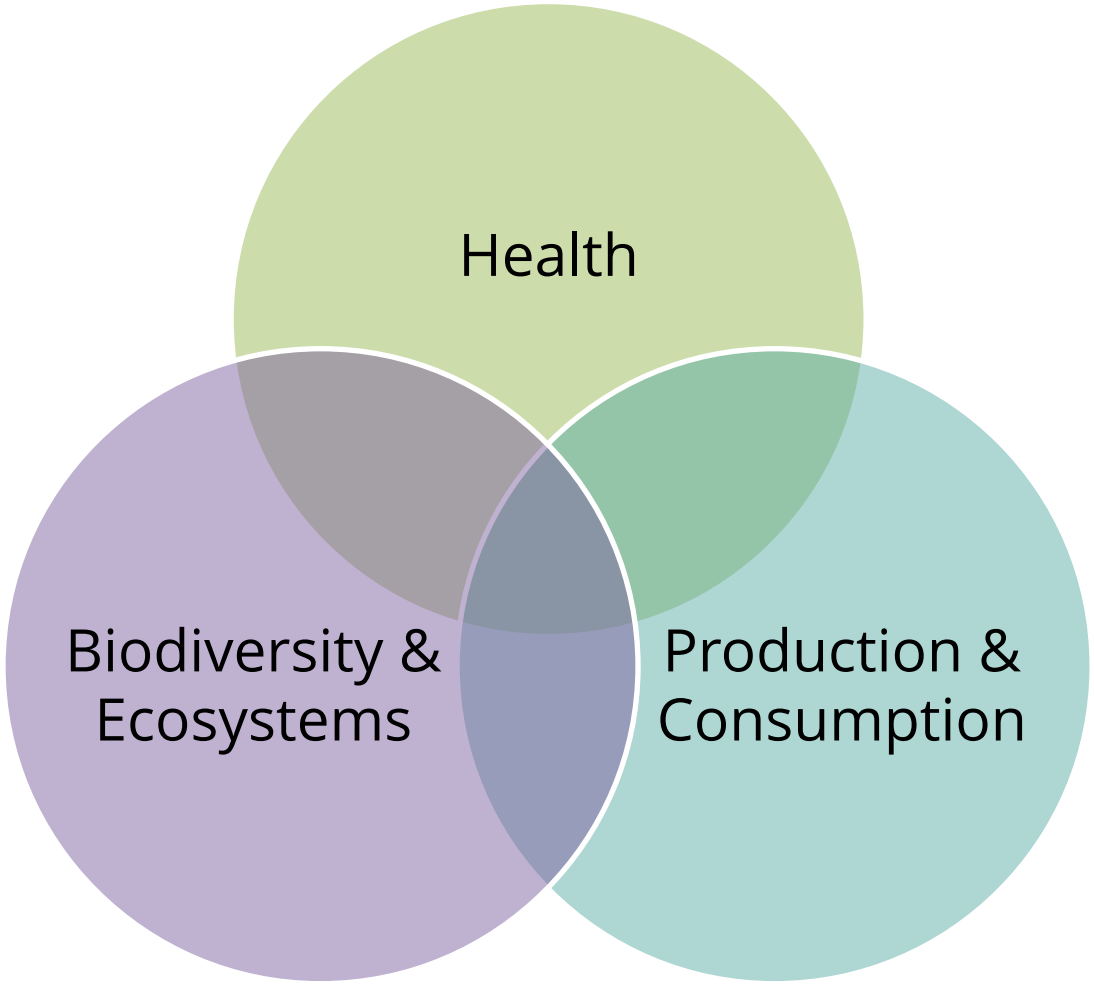
# Monitoring Assessment Components



# Structure of Web Product

ZP Main Landing Page, analysis of 6 targets, key messages, infographic

ZP & Health

ZP & Ecosystems

ZP & Production/Consumption

Thematic Analysis

Subtopics – air; water; noise; soil; chemicals.

Subtopics – air; marine; soil; Freshwater.

Subtopics – resource extraction; production; use; waste.

Indicator Specific Analysis

Cross-cutting Case Studies

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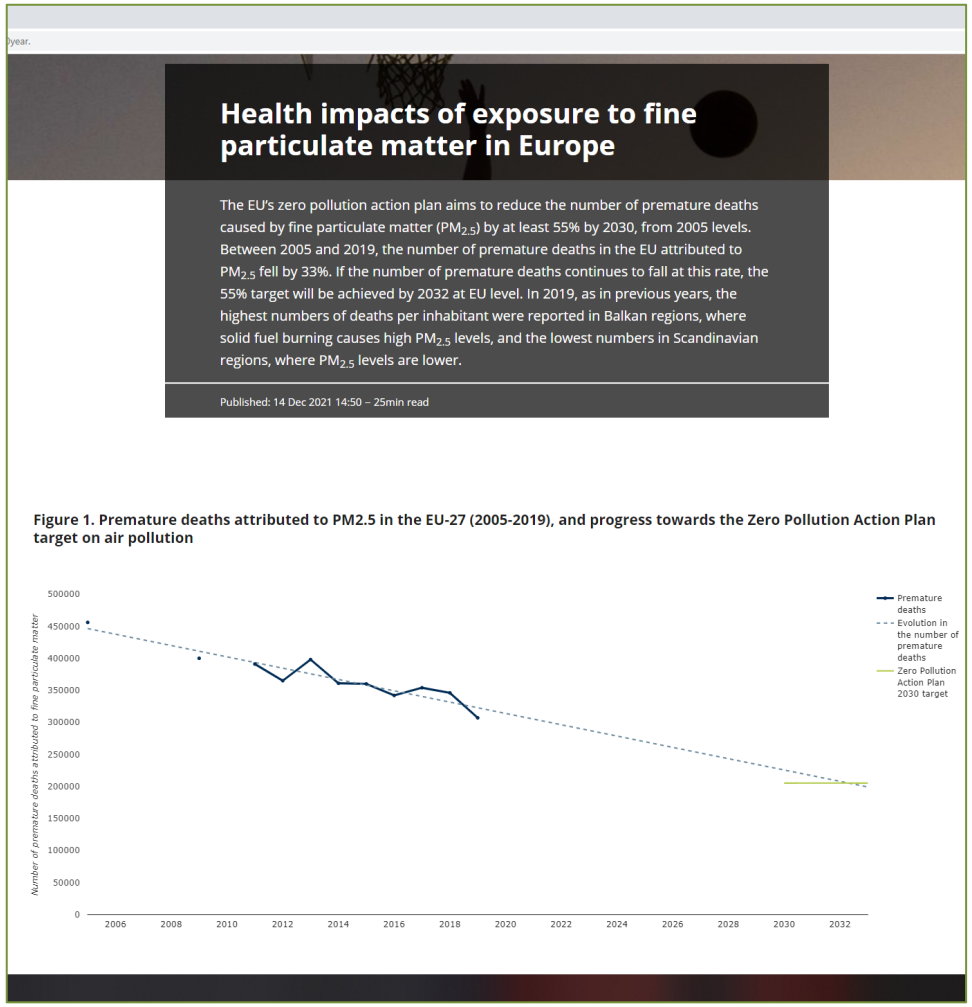
# How will we assess progress?

## Indicators



Health impacts of exposure to fine particulate matter in Europe

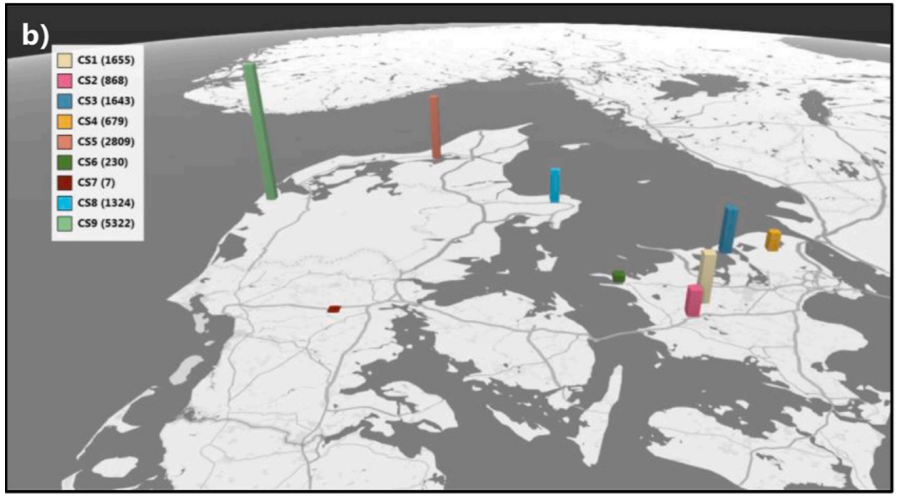
The EU's zero pollution action plan aims to reduce the number of premature deaths caused by fine particulate matter ($PM_{2.5}$) by at least 55% by 2030, from 2005 levels. Between 2005 and 2019, the number of premature deaths in the EU attributed to $PM_{2.5}$ fell by 33%. If the number of premature deaths continues to fall at this rate, the 55% target will be achieved by 2032 at EU level. In 2019, as in previous years, the highest numbers of deaths per inhabitant were reported in Balkan regions, where solid fuel burning causes high $PM_{2.5}$ levels, and the lowest numbers in Scandinavian regions, where $PM_{2.5}$ levels are lower.

Published: 14 Dec 2021 14:50 – 25min read

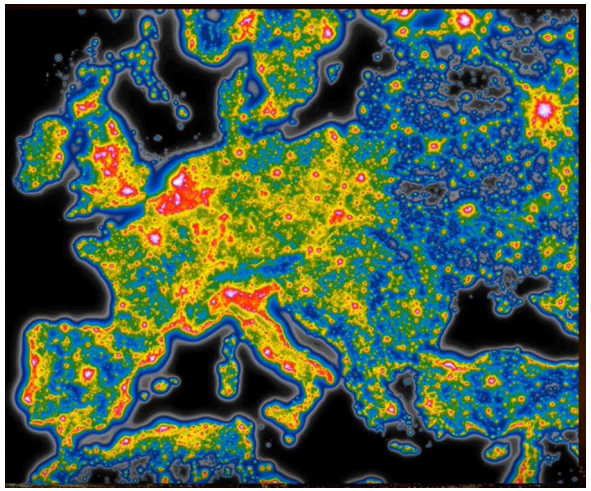
Figure 1. Premature deaths attributed to PM2.5 in the EU-27 (2005-2019), and progress towards the Zero Pollution Action Plan target on air pollution



## Signals




Impacts of pesticides on pollinators



Light pollution

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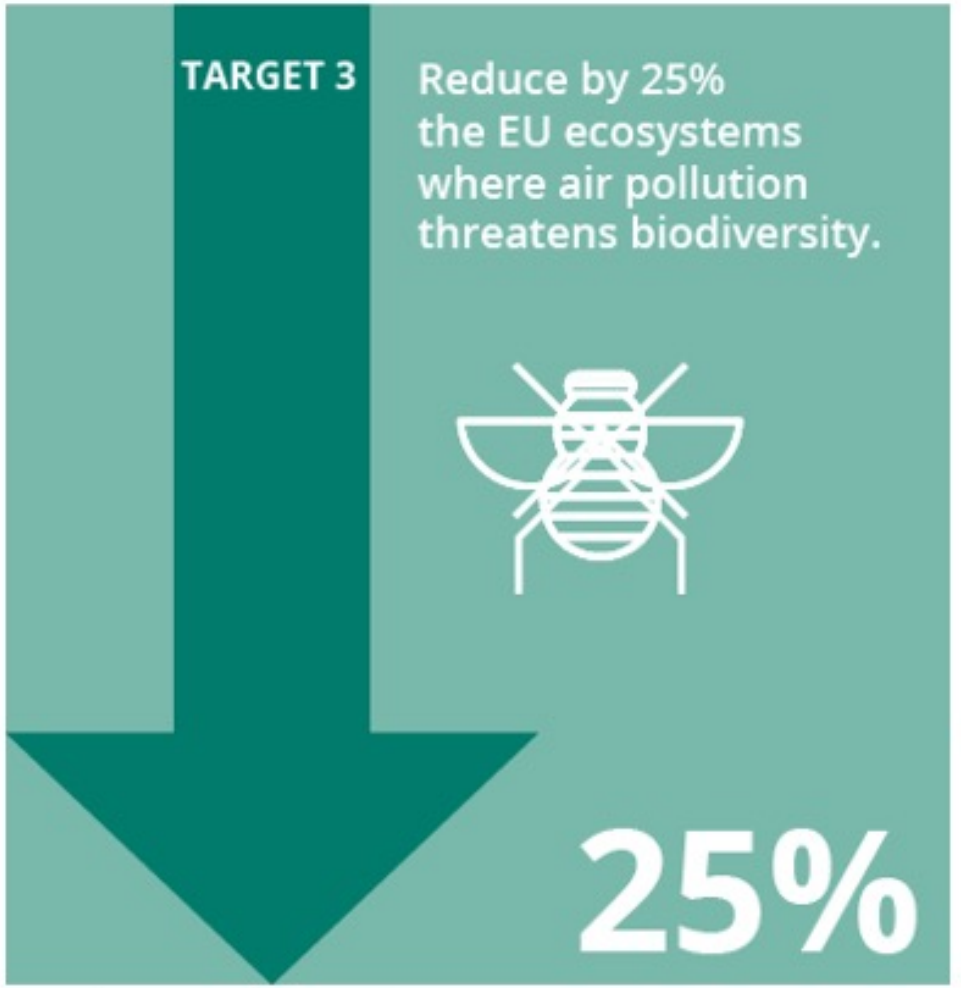
# Assessment of Nutrient Related Targets

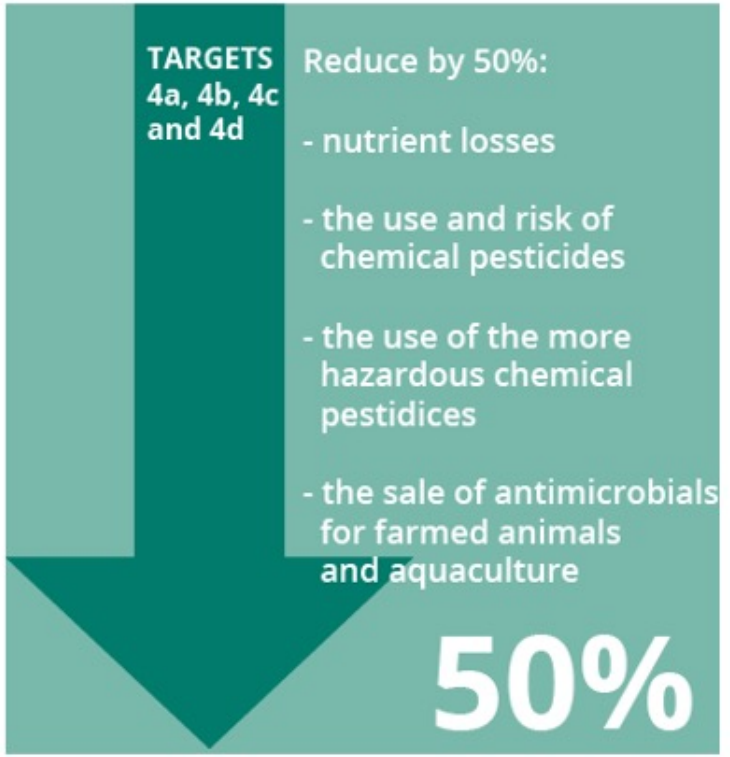
# ZP Target: Reducing ammonia impacts on ecosystems

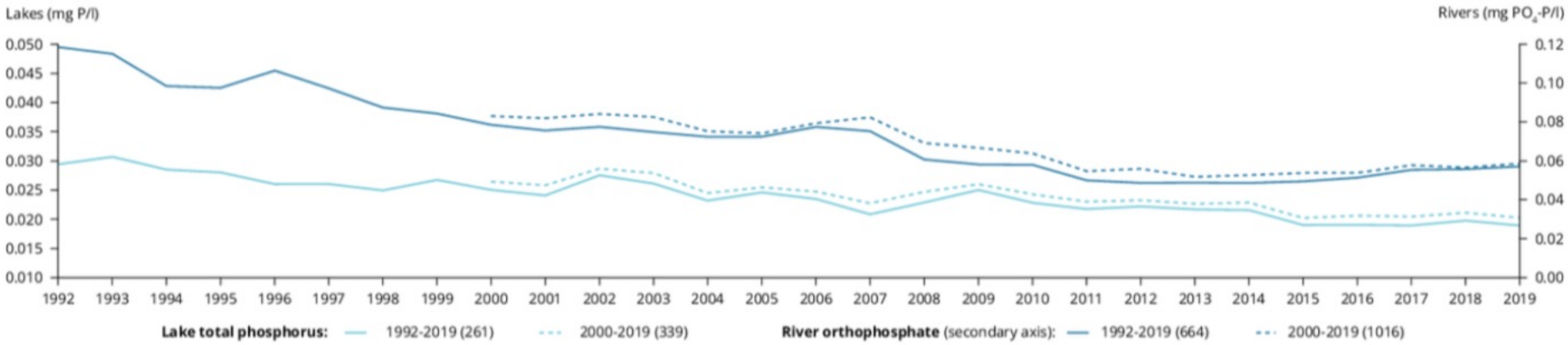
- New EEA indicator in production, to be published over the summer



# ZP Target: Reducing Nutrients Losses

- No direct indicator available
- Gross nitrogen balance
- EEA indicator on nutrients in waters

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# Zero Pollution and Health

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# ZP and Health

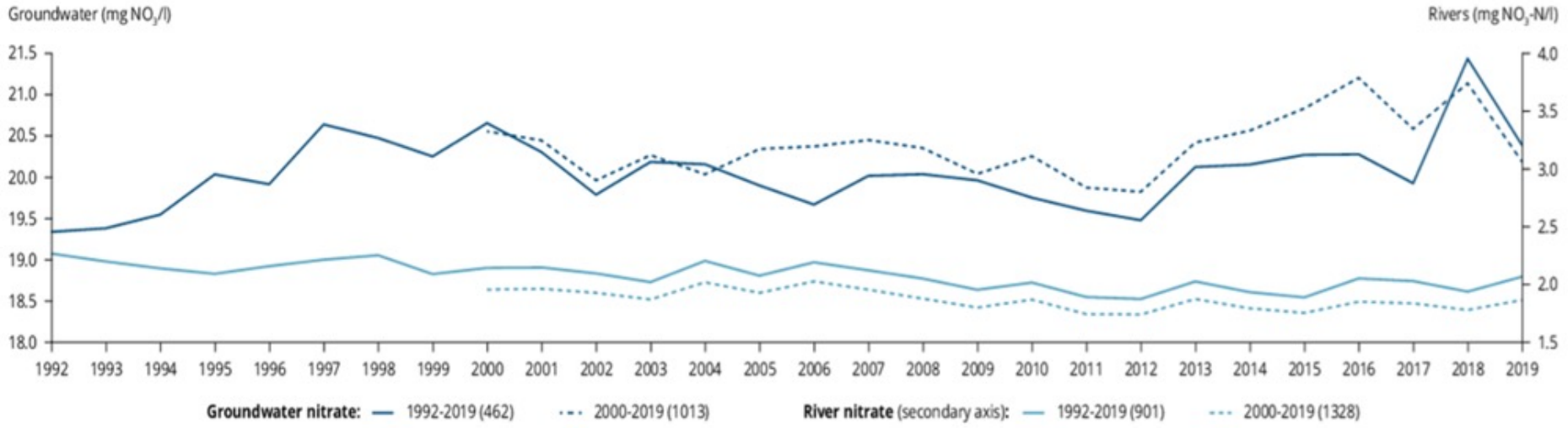
- Nutrients role in cyanobacteria growth
- Nutrient impacts on DW and bathing water
- Signal on cyanobacteria impacts on health and wellbeing.

# Zero Pollution and Ecosystems

# Fresh Water and Nutrients Data

| Fresh Water Pollution |
| --- |
| Nutrients in freshwater and groundwater (EEA indicator) |
| Oxygen consuming substances in European rivers (EEA indicator) |
| Pesticides in rivers, lakes and groundwater in Europe (EEA indicator) |
| WFD Good ecological status (EEA WISE Fresh water indicator) |
| WFD Good chemical status (EEA WISE Fresh water indicator) |
| Nitrates Directive reporting data |

**Figure 1. Nutrients in European water bodies**

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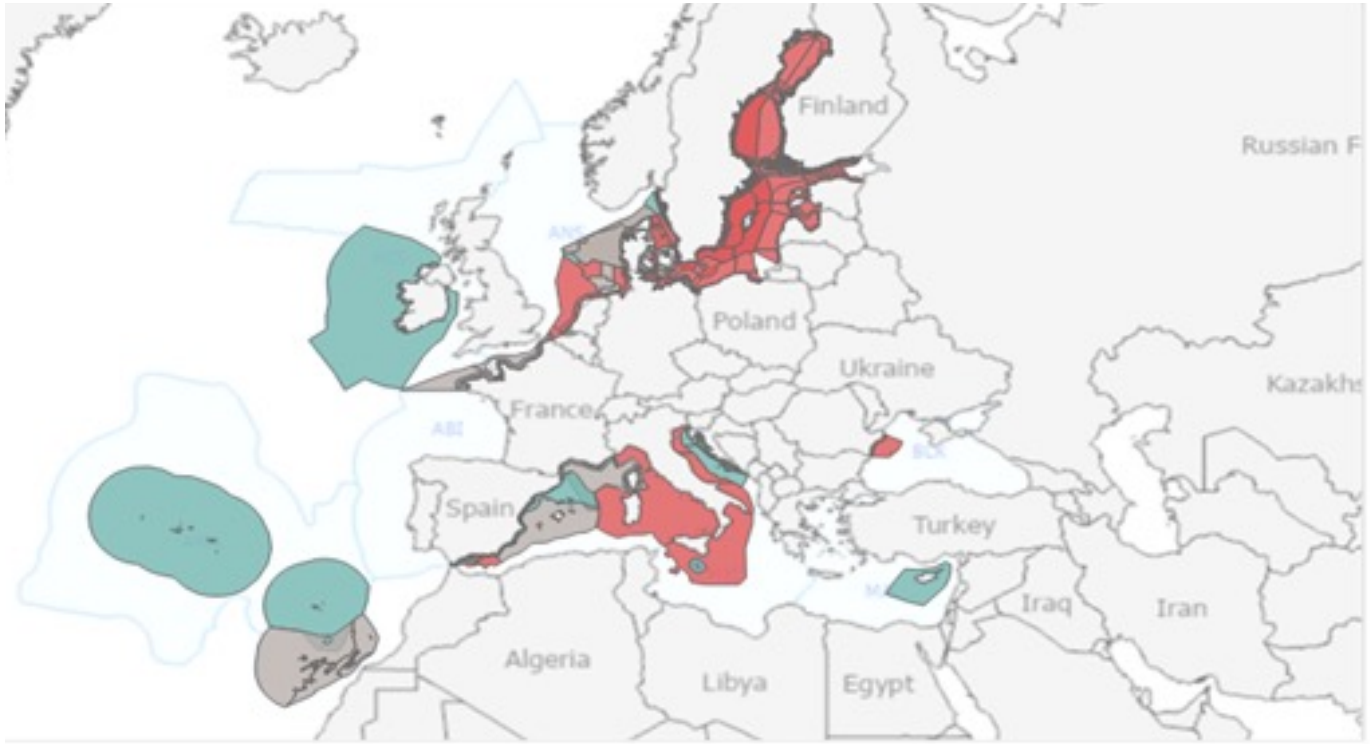
# Nutrients and the Marine Environment

| Marine Nutrients |
| --- |
| Nutrients in transitional, coastal and marine waters (EEA, published in July) |
| Cl-a in transitional, coastal and marine waters in Europe (EEA, published July) |
| D5, D8, D10 and D11 MSFD GES Dashboards – EEA WISE Marine (will be refined in June) + EEA composite indicators on contaminants, eutrophication, ML) |



# Zero Pollution and Production/Consumption

# Production and Consumption

- Consumption of mineral fertilisers
- Air pollution from agriculture (including NH3)
- Emissions to atmosphere from various production sources

# Cross-cutting stories

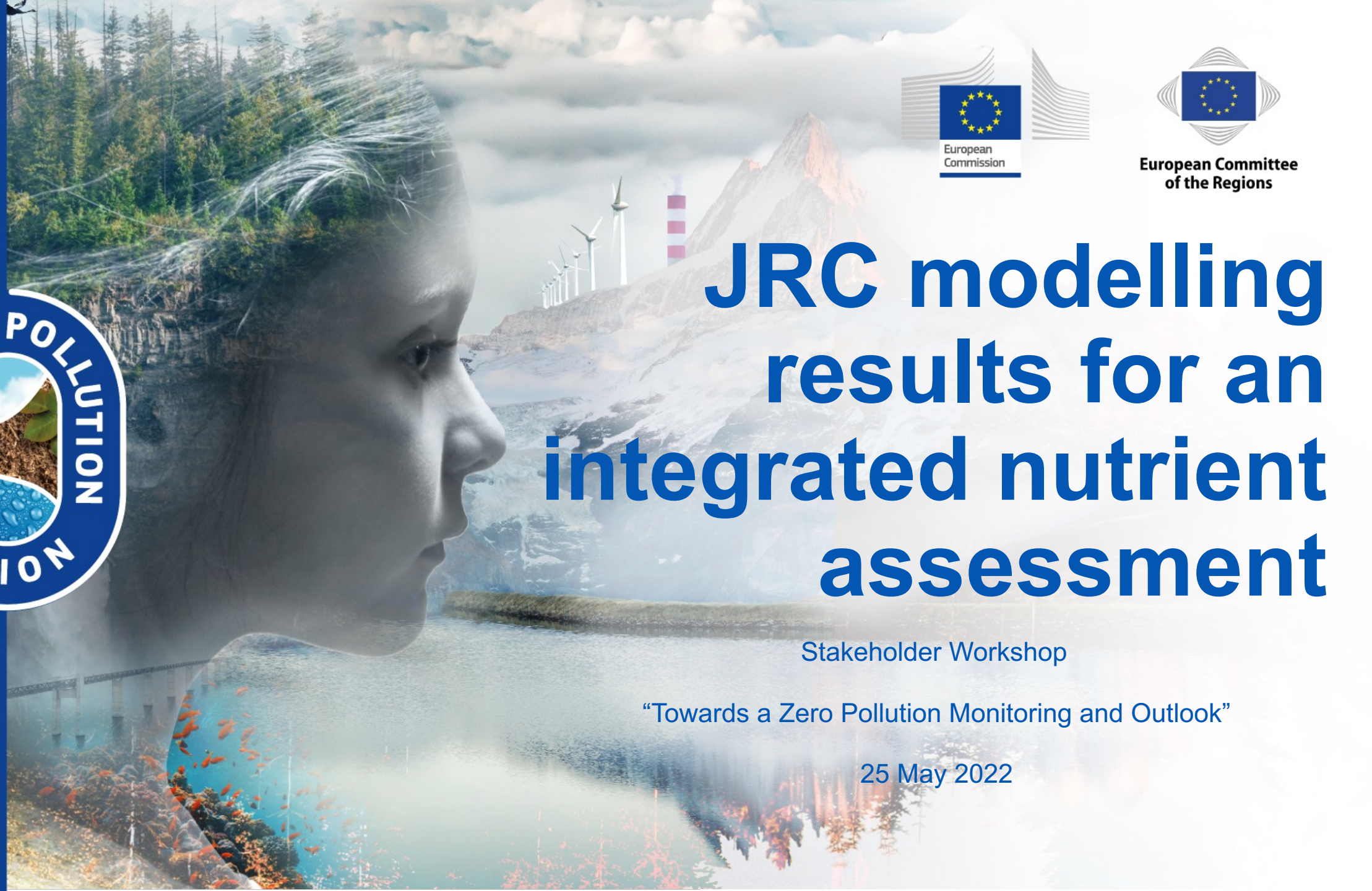
- Cross-Cutting Story on Nutrients
  - Examine links across production/consumption, ecosystems and health impacts.
- Compliance and country level reporting under the NEC Directive (ammonia, NOX).
  - Utilise findings from second (and third) clean air outlook in terms of ‘distance to target’.

# Questions?

| 25 May 2022 | www.eea.europa.eu

# Key Messages

- Combination of **measures** and **societal changes** addressing different fluxes in the nutrient cycles will be necessary to achieve the BDS target (-50% nutrient losses)
- **All environmental compartments** and feedbacks should be considered → strength of having an integrated assessment
- **Regional variability** might offer specific opportunities for nutrient reduction
- The **knowledge gaps** and **uncertainty in data** and modelling assumptions highlights the added value of adopting several modelling tools and approaches
- Only a **starting point** for discussion, further work is needed



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# JRC modelling results for an integrated nutrient assessment

Stakeholder Workshop

"Towards a Zero Pollution Monitoring and Outlook"

25 May 2022

# The Zero Pollution ambition


- One of the top priorities of the ZP action plan is, for 2030, to ‘reduce nutrients losses by 50%’
- Inorganic nutrient leakage into the environment will pollute both freshwater and marine ecosystems
- They will end up on seas and oceans, impacting ecological status, ecosystems services and creating eutrophication problems

**How close to the ZP nutrient loads reduction target can we get by 2030?**

**What are the impacts of this reduction on the status of marine ecosystems?**

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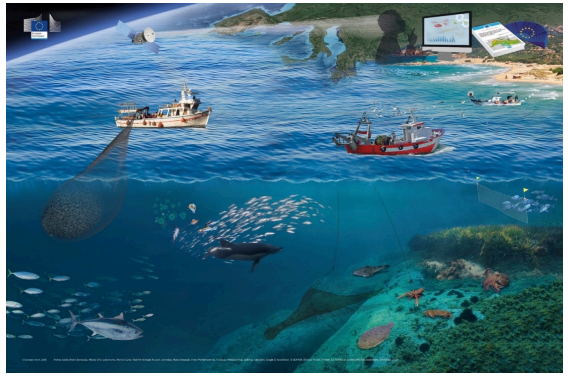
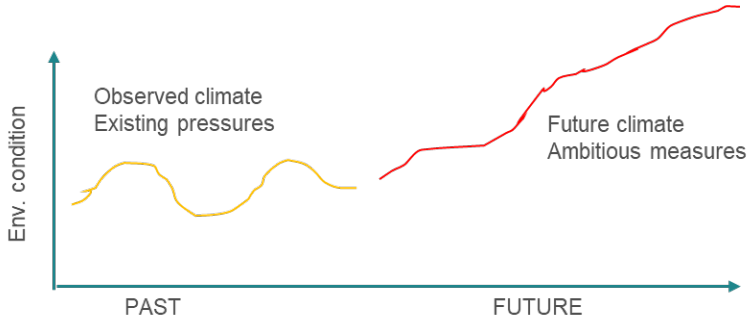
# Nutrient reduction impacts



- An integrated modelling chain developed at JRC covering: water use, land use, diffusive and point source pollution of freshwater, hydrological models, atmospheric depositions and marine hydrodynamic-biogeochemical models of the EU (JRC- Digital twin)
- Two scenarios:
  - A reference scenario: situation 2000 – 2018 (pollution and climatic conditions)
  - A future scenario (HAS): situation 2018 – 2030 (ambitious set of measures to fight nutrient leakage + climate change).

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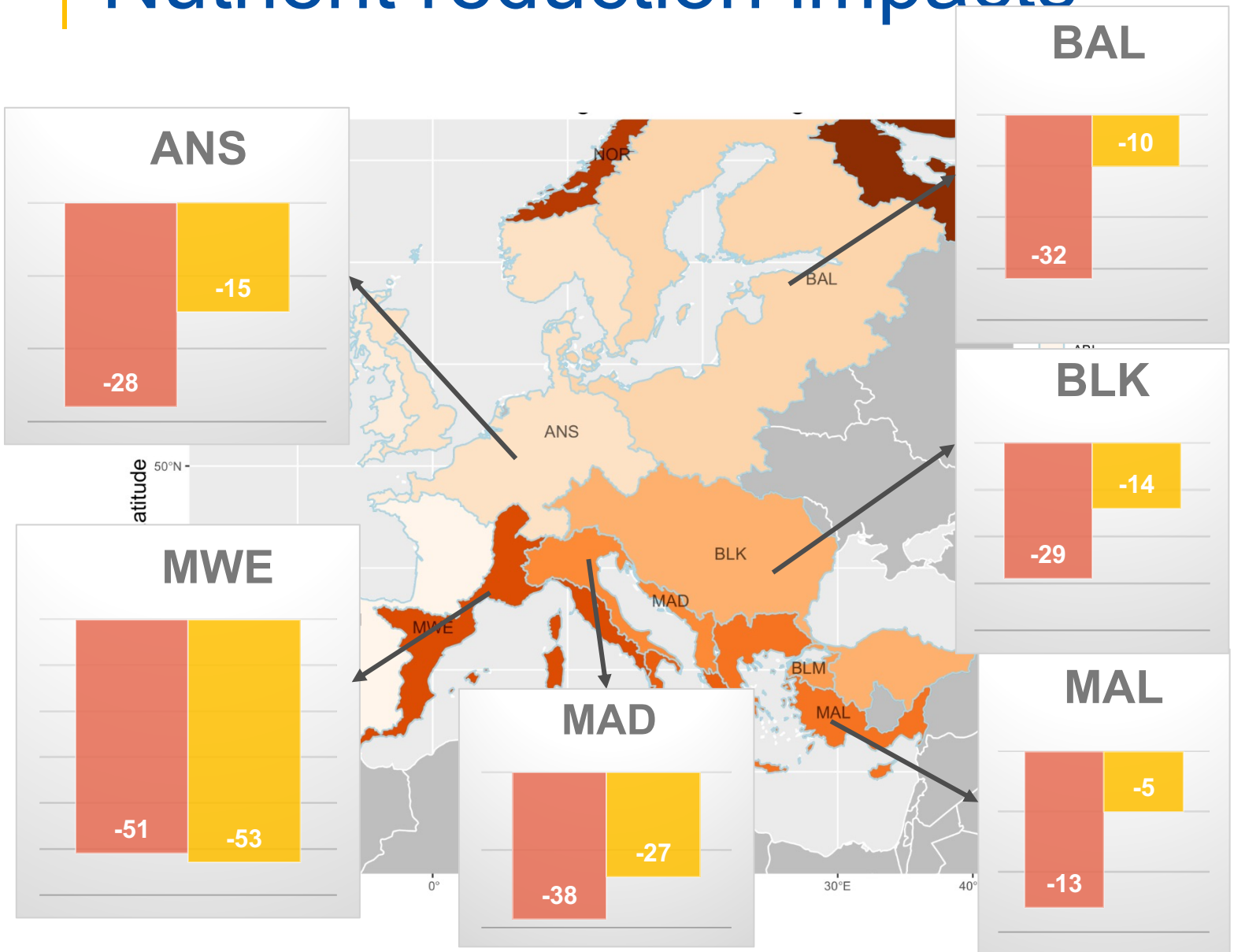
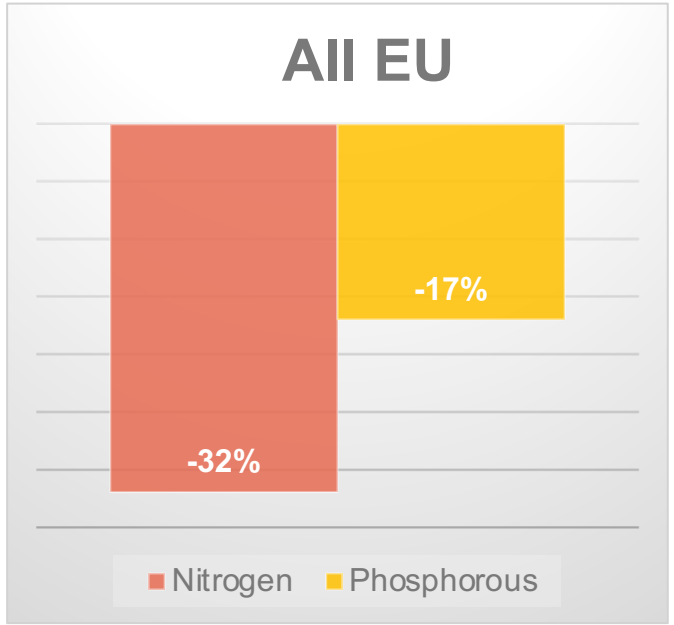
# Nutrient reduction impacts




**Only in the Western Mediterranean loss reduction reach the ZP target**

**N is reduced more strongly than P**

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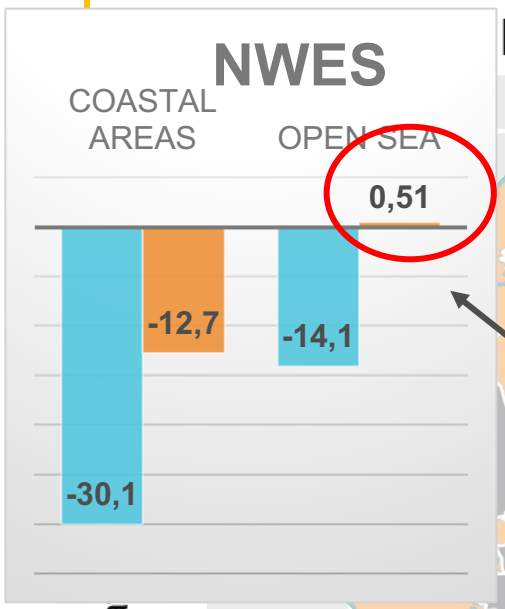
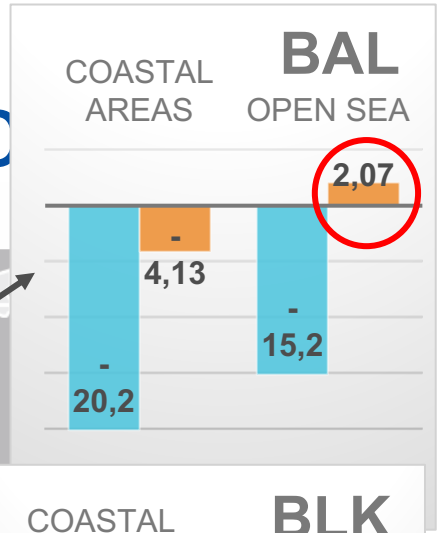
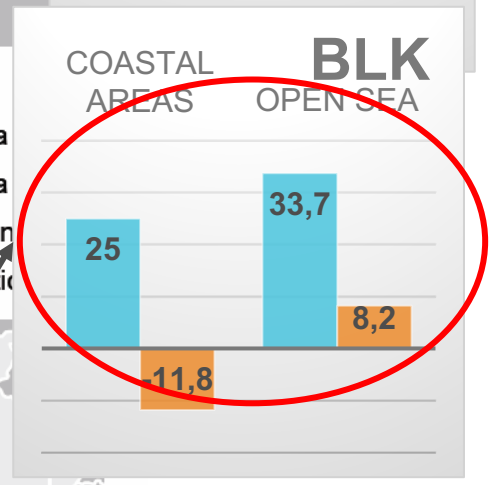
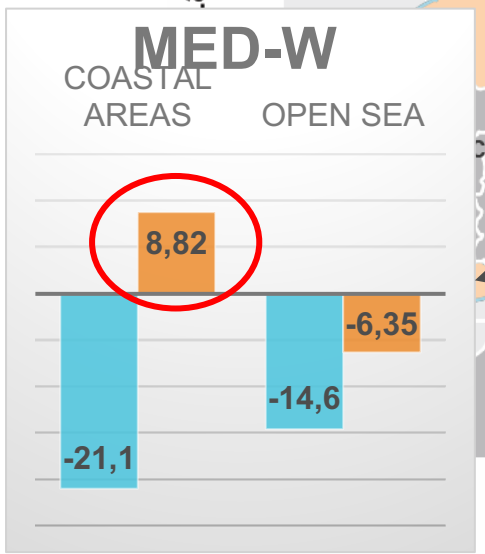
(HAS-REF)*100/REF

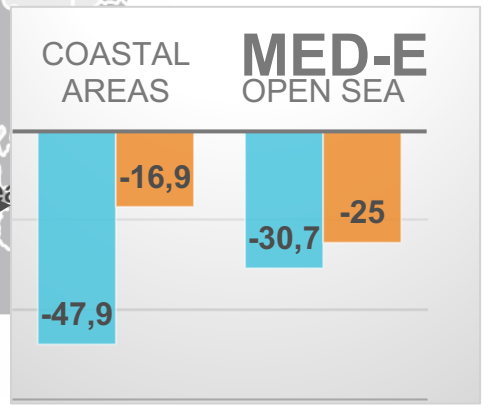
# Nutrient reduction impac

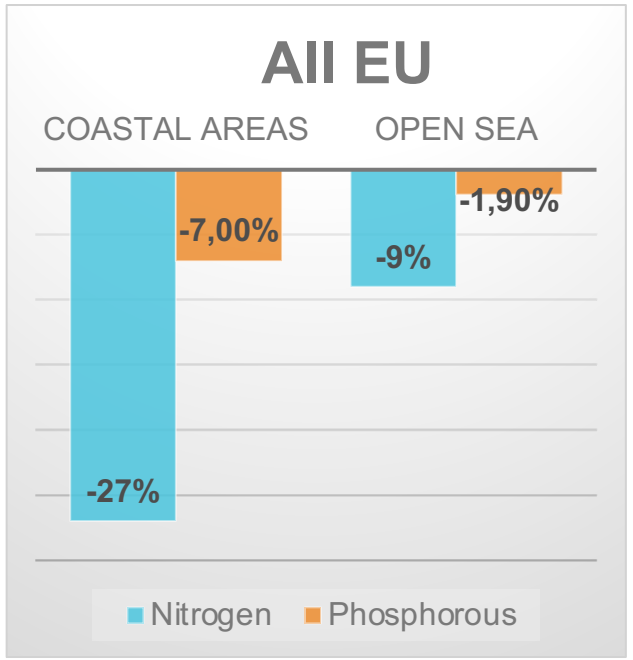






**Impact of measures much higher in coastal regions**

**HAS scenario can worsen nutrients conditions.**

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# Nutrient reduction impacts

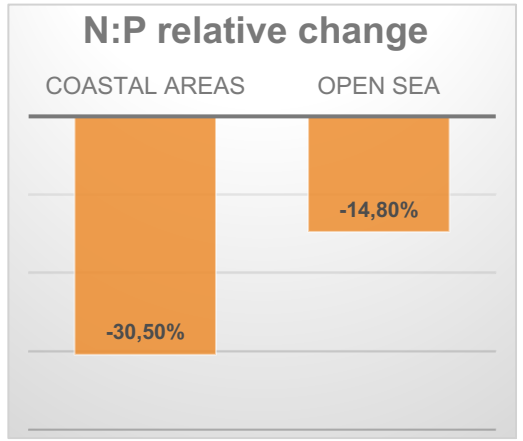
## Conclusions - 1

**It is possible to significantly reduce nutrients leak to aquatic systems by 2030.**

**To achieve ZP target we need to be very ambitious. With planned measures only in one marine region the target is achieved**

**It is equally important to consider not only the total reduction (N & P) but also the relative ratio between both nutrients.**

**This might lead to an increase of 'unused' free nutrients in some sea regions!**

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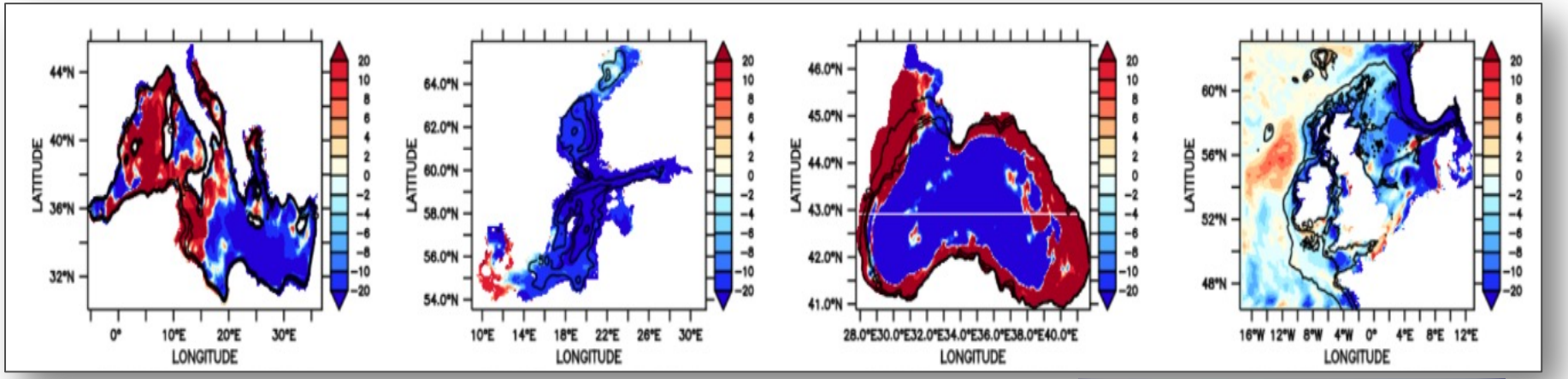
# Nutrient reduction impacts

## Conclusions - 2

**If N:P ratio is reduced, this prevents 'healthy' phytoplankton (e.g. diatoms) to growth**




**It allows opportunistic species (e.g., cyanobacteria) to bloom**

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# Session 3:
# Discussion and conclusions

# Thank you for joining us!

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