# East Europe Regional Demonstration

Progress Report

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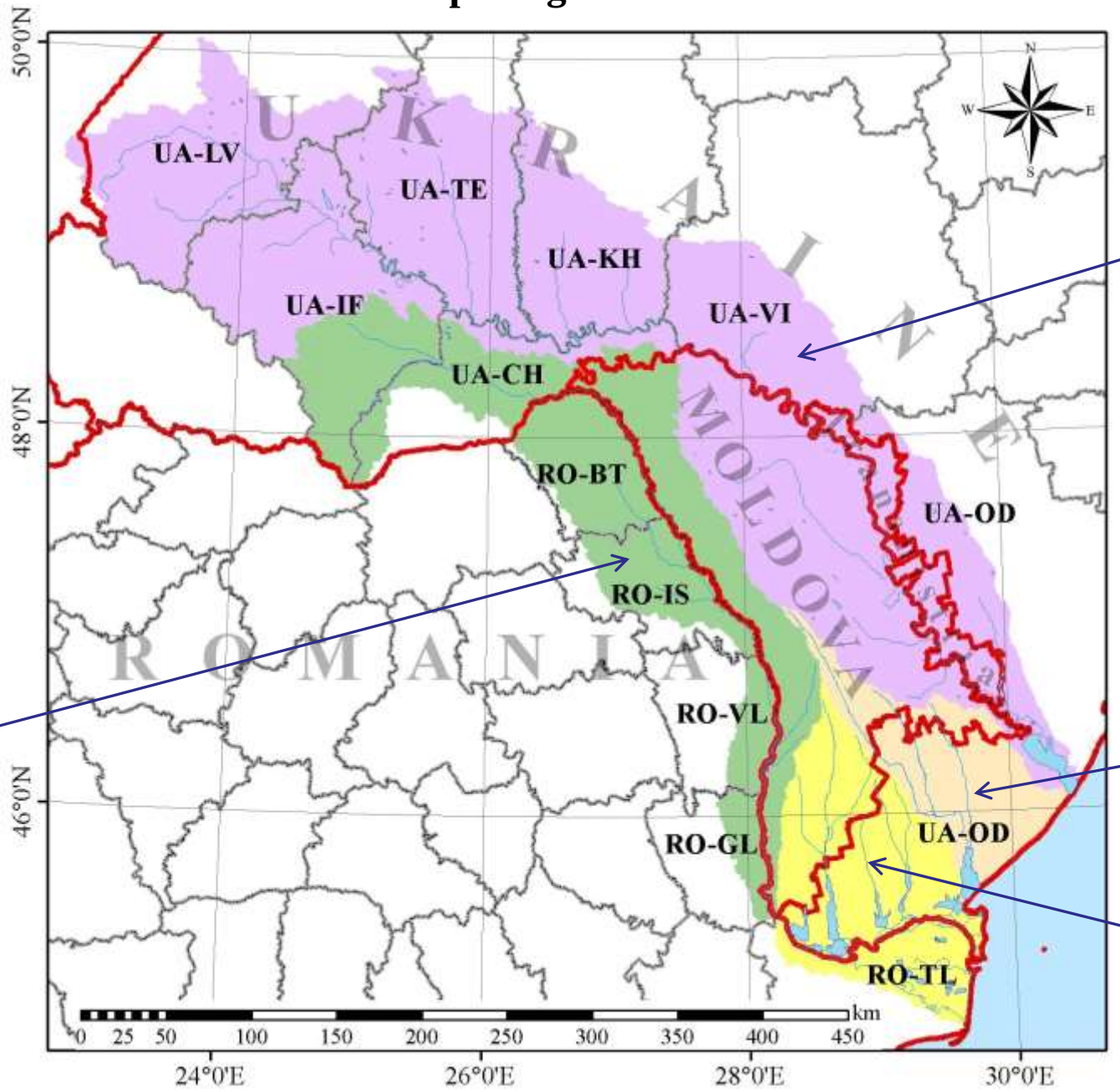
**Brussels, 2nd October 2019**

Introduction

# Location of East Europe Regional Demonstration in the Black Sea basin

# East Europe Regional Demonstration




**Dniester Catchment**
Length: 1 362 km
Basin area: 72 326 km$^2$

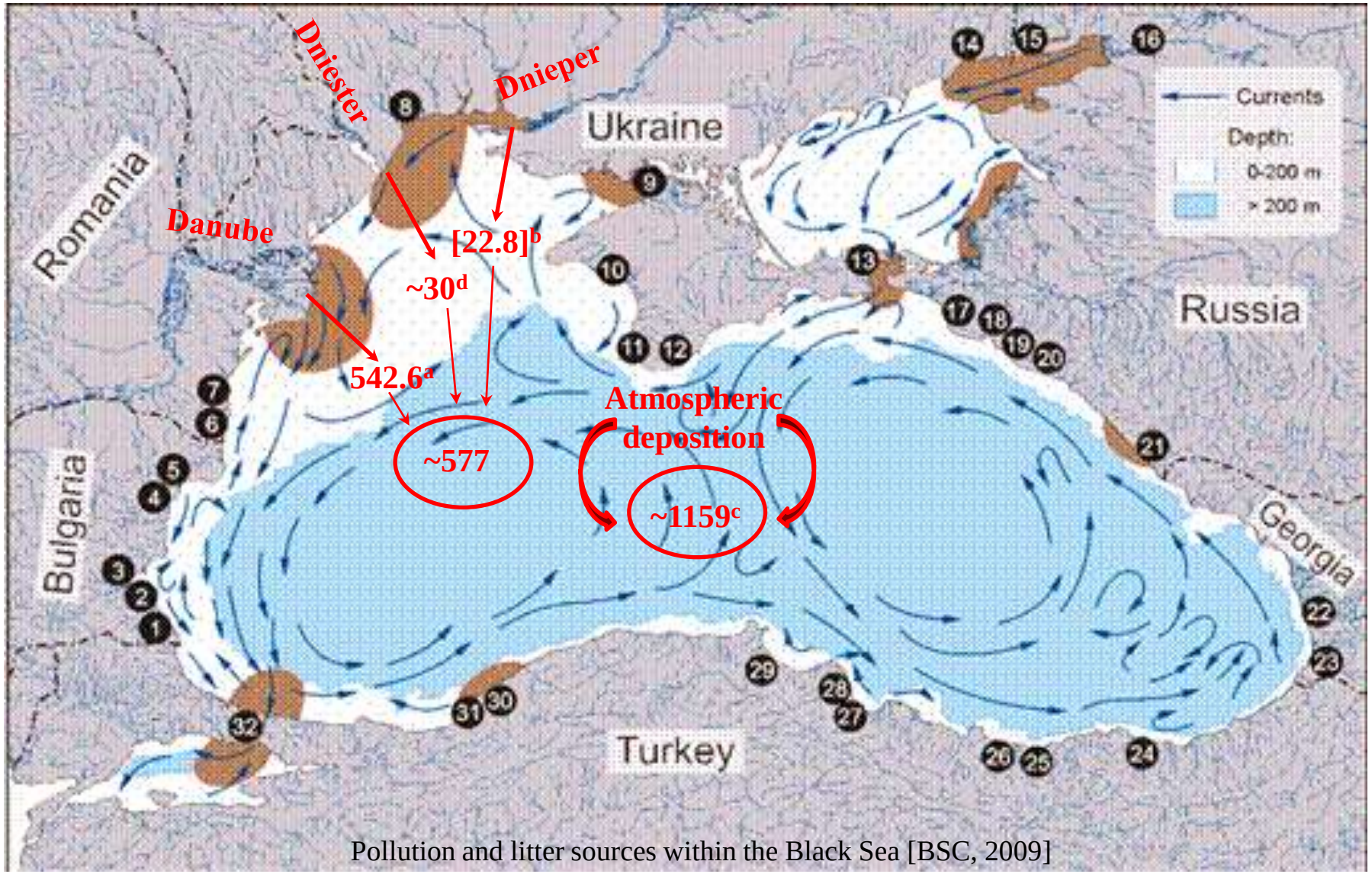
**Prut Catchment**
Length: 967 km
Basin area: 27 540 km$^2$

**Interfluvial Area**

**Danube Delta**

# Riverine and atmospheric total N input (Gg N $y^{-1}$) to the Black Sea

[[a]TDA, 2007 and Oguz *et al.*, 2008; [b]BSEP, 1999 and UNDP, 2003; [c]Medinets, 2014; [d]Medinets et al., 2015]




Pollution and litter sources within the Black Sea [BSC, 2009]

# Goals and Steps

***To reduce the negative impact of $N_r$ on ecosystems and improve understanding of the global N cycle***

All N flows will be considered to quantify sources, paths and sinks

Benefits and threats related to N will be identified

Recommendations will be developed

to reduce nutrient losses/ improve N management for range of stakeholders including governmental organizations, private sector, academia, civil society organizations and UN agencies

to update current national legislation (in Ukraine and Moldova) in line with the EU Directives;
to amend transnational agreements related to nutrient management and environment protection

# Data collection

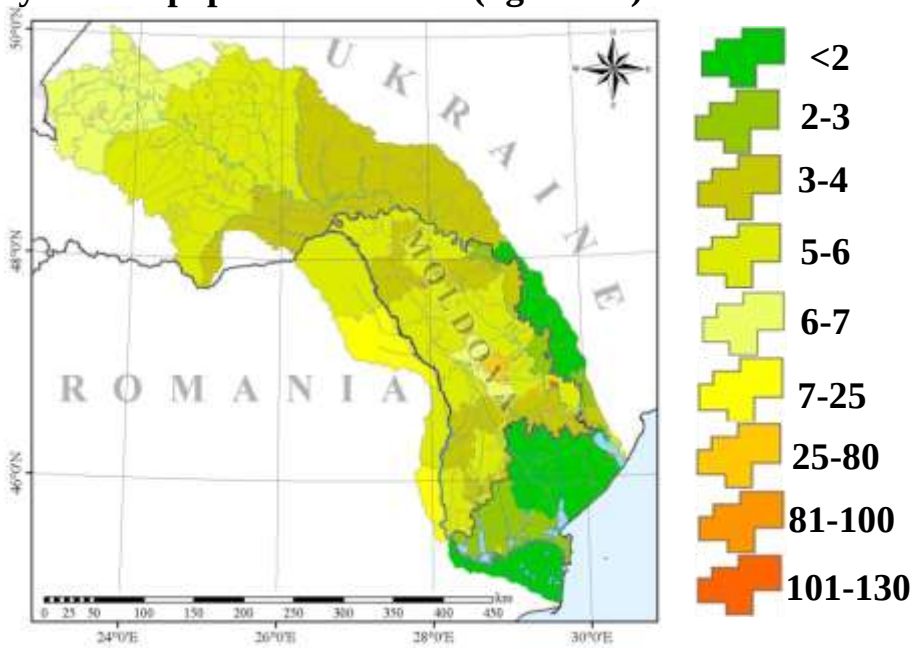
Flows quantification

| | |
|---|---|
| **Sources:** | **National Statistics / EuroStats/ Environmental agencies**<br>**Project reports/ peer-review papers**<br>**CEIP/ CLRTAP EMEP**<br>**EDGAR**<br>**National GHG Cadasters/ UNFCCC**<br>**FAO/ GRDC**<br>**BSC/ ICPDR** |
| **Scale:** | **District (NUTS 3; where available)**<br>**Macroregion (NUTS 2; where available)**<br>**State** |
| **Period:** | **2013-2017 (studied years) with 2015 (as target year)**<br>**2010 (check-point year; where available)**<br>**2005 (base year; where available)** |

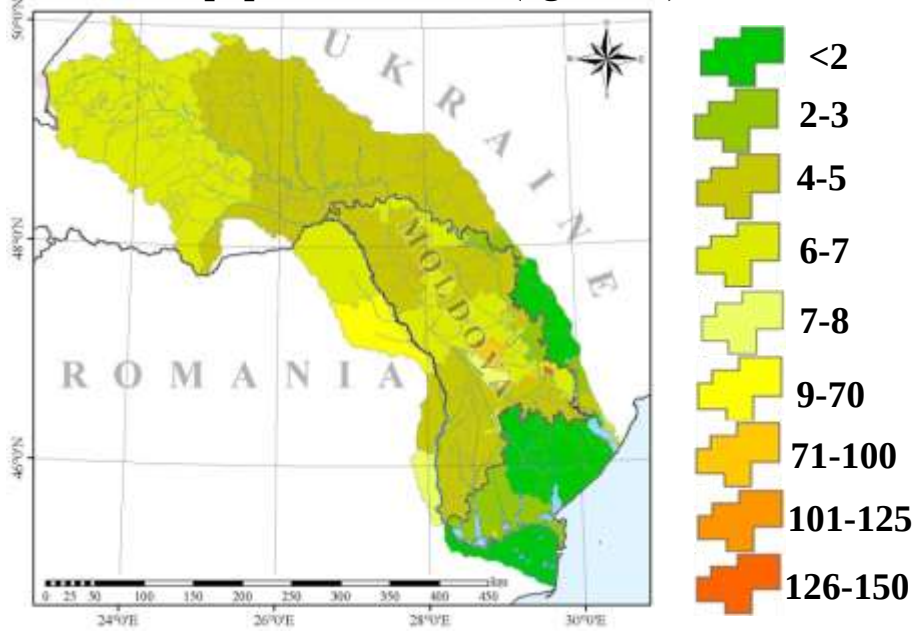
# Human population

Flows quantification

**Consumption of N (via proteins) by human population in 2015 (kg N ha$^{-1}$)**




**Direct physiological N release from human population in 2015 (kg N ha$^{-1}$)**




**Mean N consumption:** **5.2 kg N cap$^{-1}$ yr$^{-1}$ (88 g protein cap$^{-1}$ d$^{-1}$)** [this study]
**Recommended N consumption:** **2.9-3.5 kg N cap$^{-1}$ yr$^{-1}$ (50-60 g protein cap$^{-1}$ d$^{-1}$)** [WHO, 2007]

**Estimated mean N release:** **5.6 kg N cap$^{-1}$ yr$^{-1}$ (range: 4.3 – 6.8 kg N cap$^{-1}$ yr$^{-1}$)** [this study]
**Mean N excretion:** **4.7 kg N cap$^{-1}$ yr$^{-1}$** [Rose et al., 2015]

**N input from human population (lacking sewage treatment system): 33 Gg N y$^{-1}$**

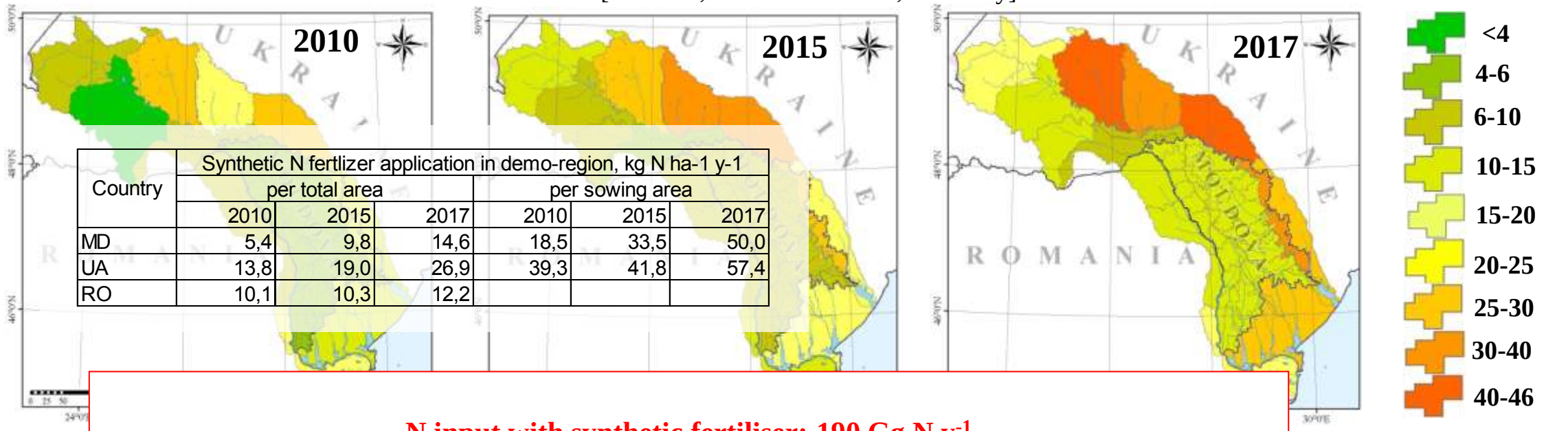
[Data source: FAO; Nat.Stats; Sutton et al., 2000; Solga et al., 2014; Medinets et al., 2015; Ministry of Health of Ukraine]

# Agriculture

## Mineral N fertilizer use per total area (kg N ha$^{-1}$)

[EuroStat; National statistics; this study]

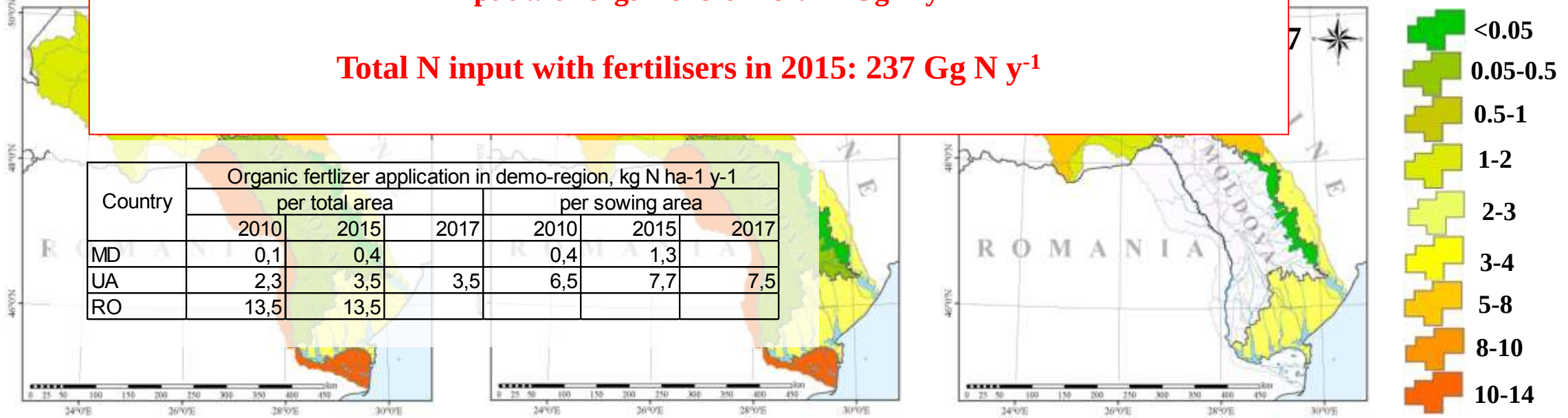
Flows quantification




| Country | Synthetic N fertlizer application in demo-region, kg N ha-1 y-1 | | | | | |
|---|---|---|---|---|---|---|
| | per total area | | | per sowing area | | |
| | 2010 | 2015 | 2017 | 2010 | 2015 | 2017 |
| MD | 5,4 | 9,8 | 14,6 | 18,5 | 33,5 | 50,0 |
| UA | 13,8 | 19,0 | 26,9 | 39,3 | 41,8 | 57,4 |
| RO | 10,1 | 10,3 | 12,2 | | | |

**N input with synthetic fertiliser: 190 Gg N y$^{-1}$**
**N input with organic fertilizer: 47 Gg N y$^{-1}$**

**Total N input with fertilisers in 2015: 237 Gg N y$^{-1}$**

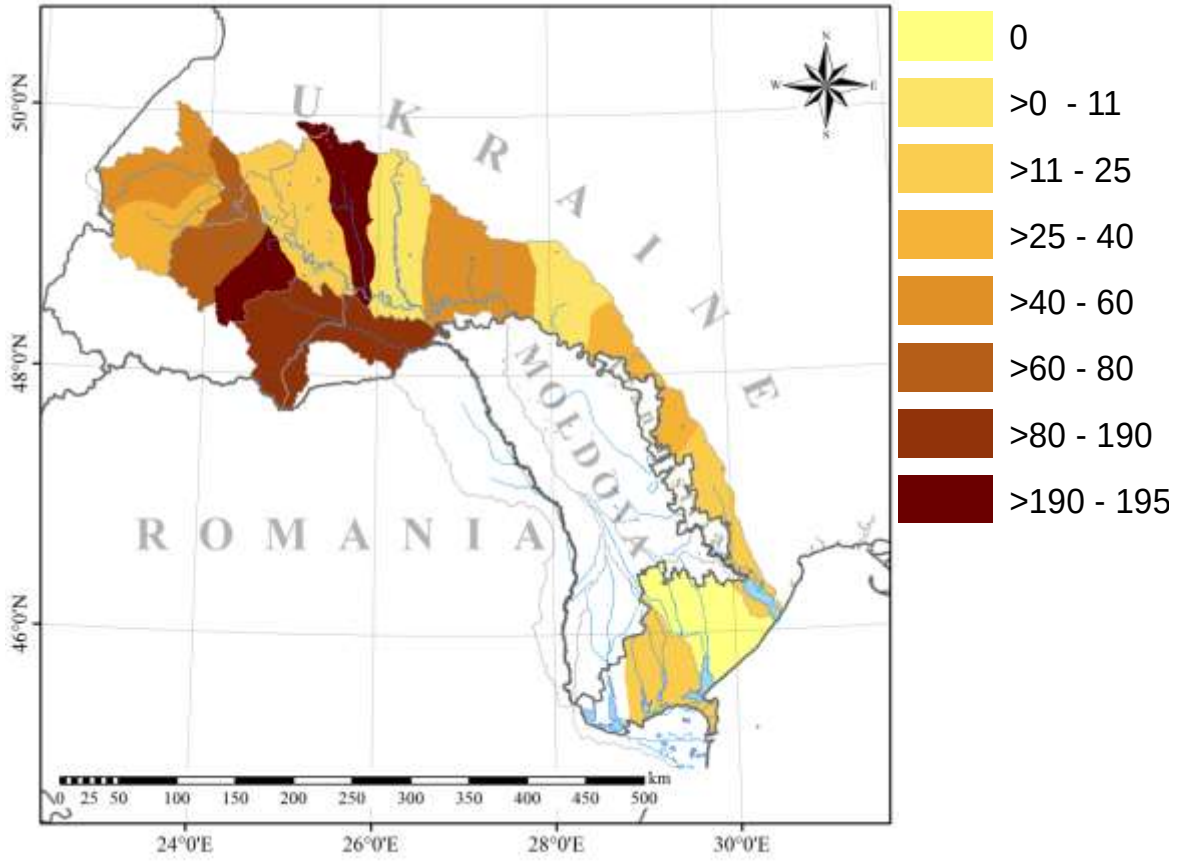



| Country | Organic fertlizer application in demo-region, kg N ha-1 y-1 | | | | | |
|---|---|---|---|---|---|---|
| | per total area | | | per sowing area | | |
| | 2010 | 2015 | 2017 | 2010 | 2015 | 2017 |
| MD | 0,1 | 0,4 | | 0,4 | 1,3 | |
| UA | 2,3 | 3,5 | 3,5 | 6,5 | 7,7 | 7,5 |
| RO | 13,5 | 13,5 | | | | |

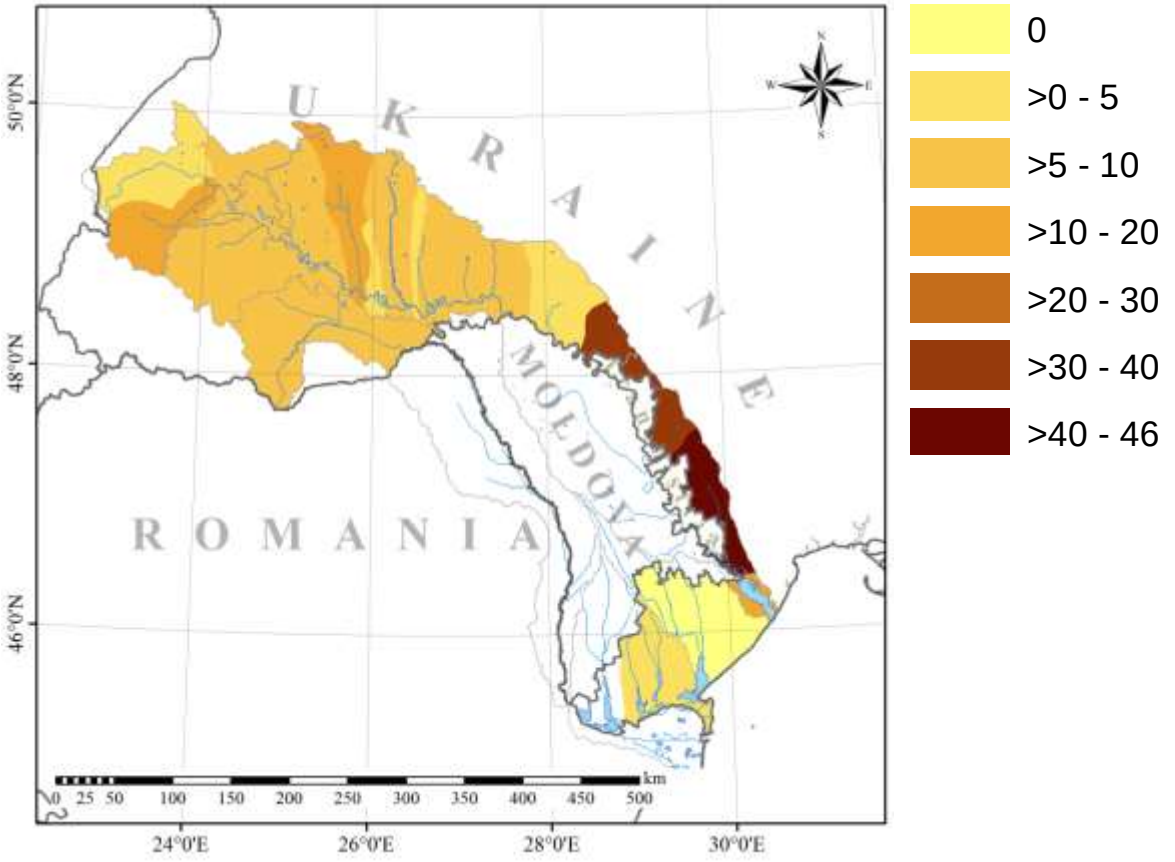
# Wastewater

Flows quantification

## DIN input with wastewaters in 2015 (Mg N $y^{-1}$)




## DIN concentration in wastewaters in 2015 (mg N $L^{-1}$)



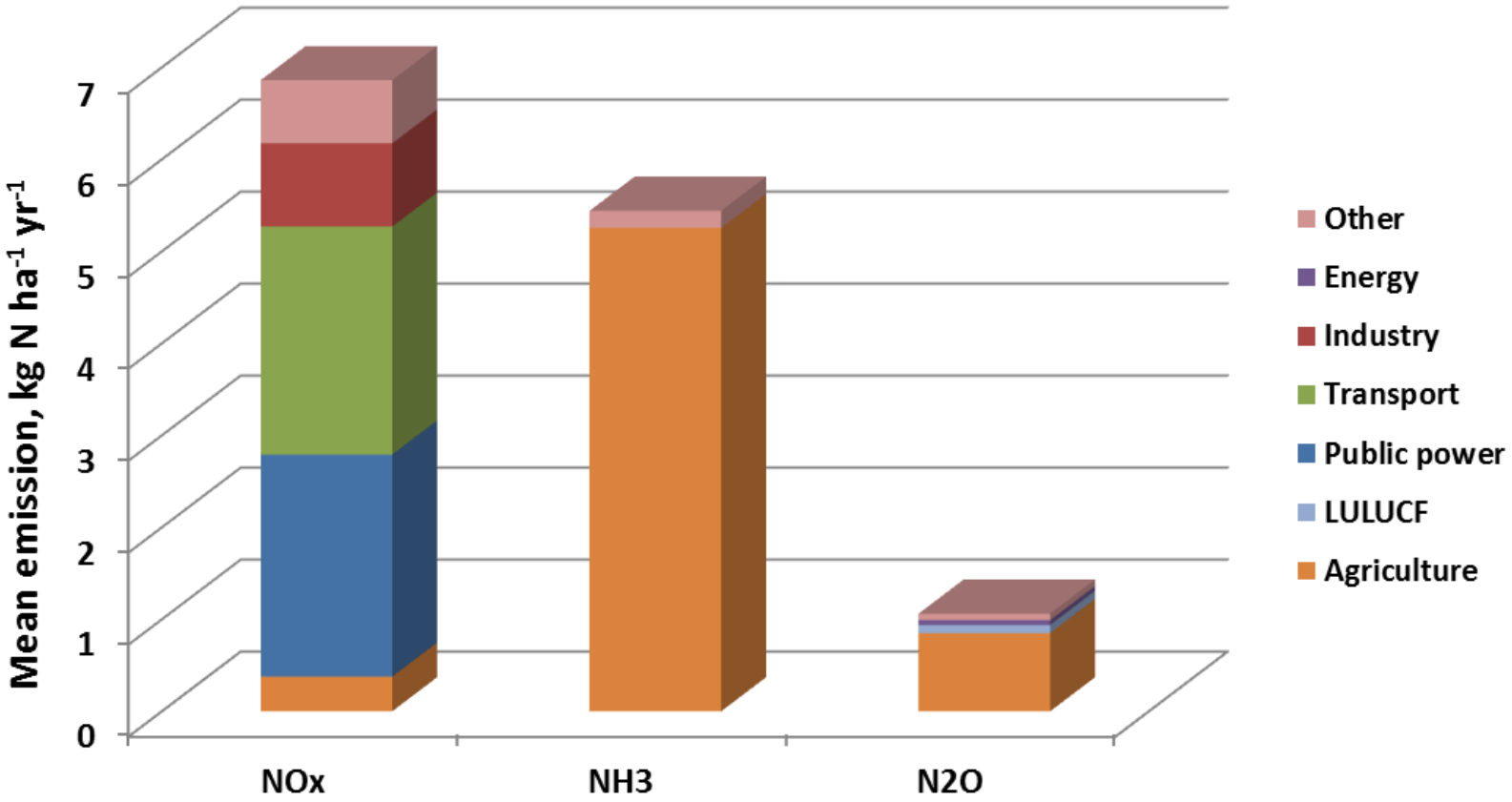

**Total DIN discharged with wastewaters: 0.7 Gg N $y^{-1}$**
(Ukrainian part of the demo)

[Water Resources Agency of Ukraine]

# Emission to atmosphere

Flows quantification

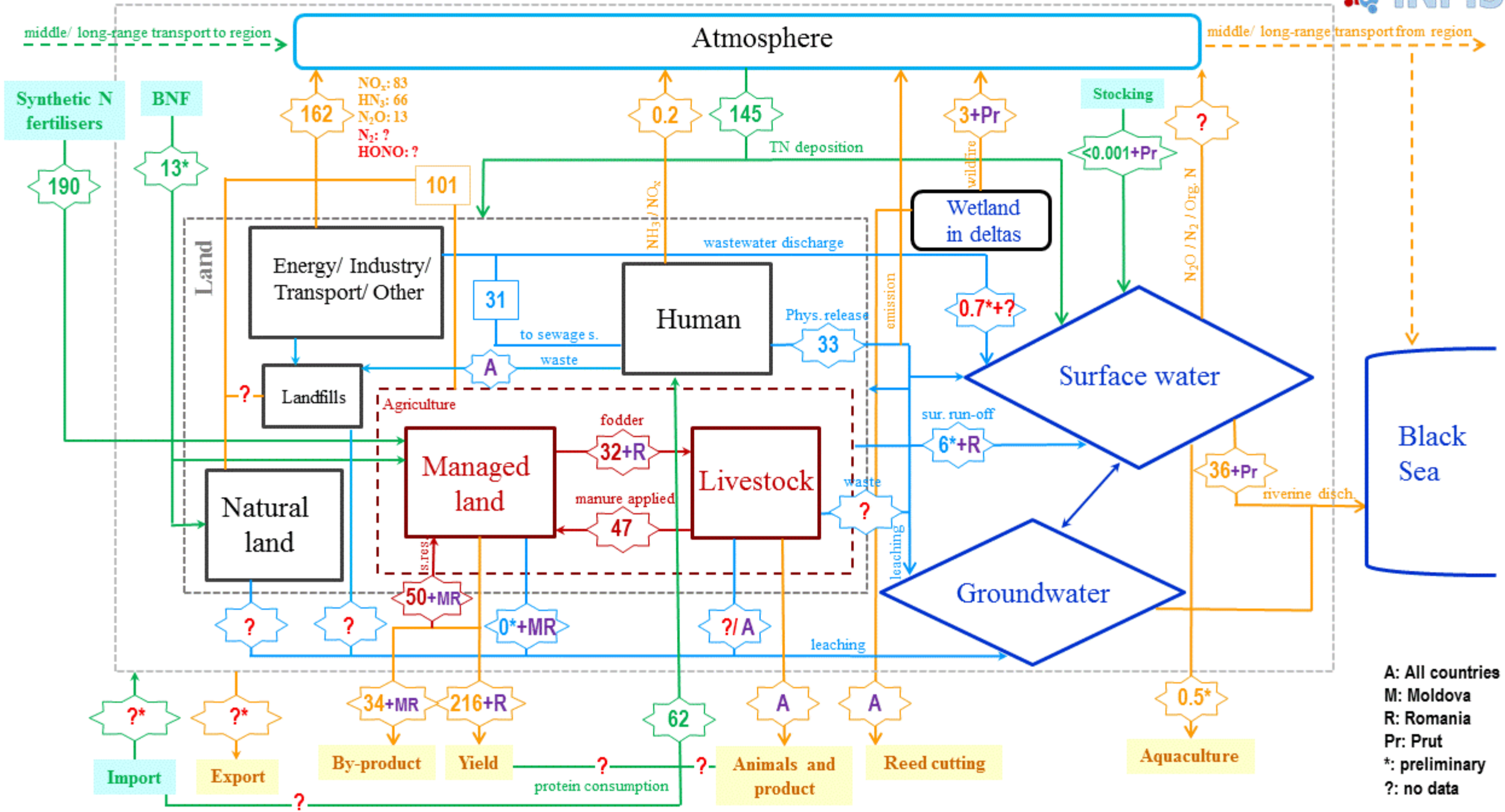
## Mean weighted N-gas emission by source sector from the EE demo region in 2015




**Total N losses to the atmosphere: 162 Gg N $y^{-1}$**

[EuroStat; EMEP, 2019; this study]

# Conceptual scheme of N mass budget in the EE demo (Gg N $y^{-1}$)



## Key N flows identified for the EE region

- Synthetic N fertilizer application
- Atmospheric total N deposition (local and as results of middle/ long-range transport)
- N removal with agricultural products
- $NH_3$ emission from agriculture
- $NO_x$ emission from transport and public power (and agriculture in rural areas)
- N removal via surface/ underground waters to the Black sea
- Untreated/ insufficiently treated wastewater from industrial, municipal and household sources (esp. direct physiological N release from human population)

Key uncertainties/ gaps

## Key N gaps/ uncertainties in the EE region

- Insufficient statistics data at district scale (NUTS 3)/ lack of case studies
- Direct N load by human population in rural areas with no sanitation [uncertain]
- $NH_3$ emission from agriculture in Ukraine (incl. manure cycle) [uncertain]
- $NO_x$ emission from agricultural and other soils [uncertain]
- HONO emission from agricultural and other soils [no data]
- $N_2$ emission (via denitrification and anammox) [no data]
- $NO_3^-$ leaching [uncertain/ no specific data]
- Surface N run-off [uncertain/ no specific data]
- Wastewaters [not sufficient data] and Landfills [no data/ impact is unclear]
- Wetland impact (incl. wildfires/ burnings) [limited data]
- Wildfires [no/ limited data]

EE Demo Workshop

Towards INMS
East Europe Regional Demonstration

# GEF/ UNEP TOWARDS INMS
# East Europe Regional Demonstration Workshop followed by Field Visit

May 29-30, 2019
Odesa, Ukraine

**Suggestions, decisions and actions approved by the 1st workshop on East Europe Regional Demonstration within UNEP/GEF Towards INMS project**

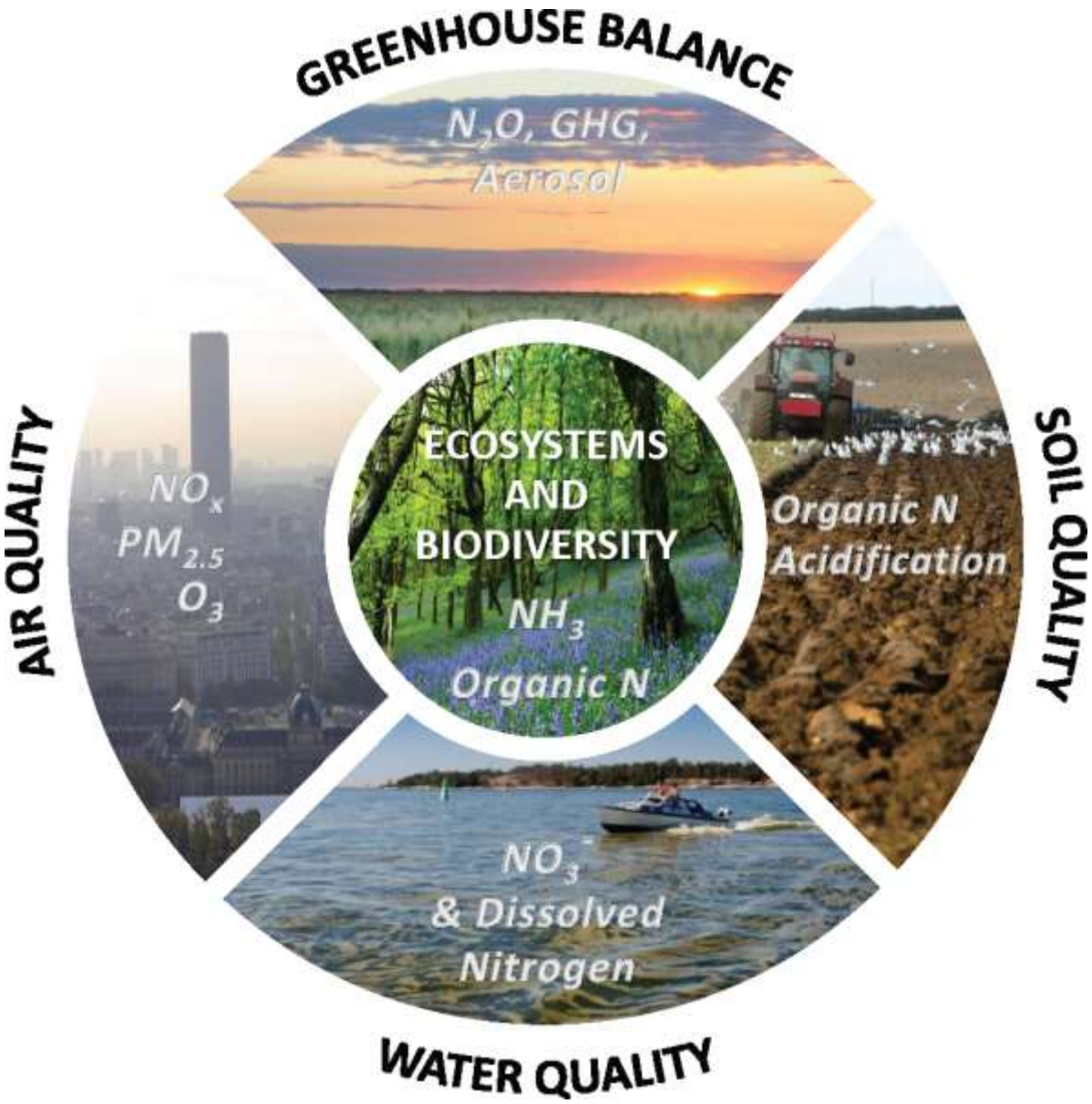
The participants agreed:

1) There is an urgent need to go forward on national N management coordination in Moldova and Ukraine considering experience of Romania that crosses domains and industries;
2) Support implementation of the UNEA-4 N-resolution by all three countries;
3) To emphasize the high significance of reactive N coming to the East Europe (EE) region via water and atmospheric inputs. Also countries should work together by improving the interregional cooperation to address challenges;
4) To focus future efforts to address key gaps and knowledge (contribution of natural sources and impact on biodiversity, different N forms, seasonality, interregional impact such as long-range transport etc.);
5) To welcome the presentations and information presented during the workshop and to consider the possibility to unify the approaches for collection and assessment of N-relevant reporting within the EE demo region for future, *inter alia*, to recommend all countries within the EE demo to pay more attention to direct and indirect determination of organic N in environment (especially concentration in waters and content in atmosphere deposition). Ideally, organic N should be included into governmental (national) monitoring programs in Ukraine and Moldova. More globally it is highly recommended to estimate share of organic N deposited from the atmosphere;
6) To promote the establishment of International N Initiative (INI) Regional hub for the Black Sea area under umbrella of the Black Sea Commission (BSC) and the EU Horizon 2030 Program for more tight coordination between the Black Sea Basin countries on nutrient problems in order to improve science-policy dialogue and engagement of policy makers and stakeholders into the INMS process and to apply for joint proposals for funding in more efficient way.
   As a first step, EE Demo network should be created within Towards INMS Project;
7) Also, we kindly request the Program Coordination Unit (PCU) of INMS Project to consider the possibility to publish regular INMS letters on the project progress and in-kind activities for both academia and stakeholders (public). This information might be mirrored in participating organization' websites and further promoted via social media;
8) To consider the utilization of all presented data in a proper way to produce synthesis analysis;
9) To highlight Delta region-specific problem of biological contamination because of fish-eating birds (cormorants and pelicans). This is of high relevance for National Parks (many of the Ramsar Convention and Natura2000 sites) located in deltaic regions in all three countries;
10) Recognized substantial uncertainty in $NO_x$ emission from soil, which is currently poorly assessed, as well as need of better quantification of that source considering ongoing reductions in $NO_x$ emissions from other ones;
11) Welcomed opportunities for further involvement of OSCE in terms of dialogue between policy-makers, academia and public;
12) Noted importance of involvement of NGOs and their contribution, need for further actions towards wider public awareness.


[INMS EEDemo, 2019]

# Next phase

Impacts




**Water quality**

**Air quality**

**Greenhouse gas balance**

**Ecosystem and biodiversity**

**Soil quality**

[ENA, 2011]

## Contacts: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