

Overview

Necessity of the high-resolution ammonia emissions:

- air pollution and impact modeling;
- air pollution hotspots determination;
- development of emission reduction measures based on scientific knowledge.

Challenges of the high-resolution ammonia emissions mapping:

- main source specificities;
- emissions are highly variable in space.

Goals

- High-resolution ammonia emissions mapping, taking into account main agricultural activities: grazing and housing of livestock, storage and spreading of manures, and fertilizer application
- Methodology testing on the pilot region

Methodology, main steps

- Assessment of ammonia emission by stage of manure management and farm category (domestic sector and agricultural enterprises);
- Electronic maps creation by type of land-use (agricultural lands, arable land, pasture etc.);
- Point source mapping (agricultural enterprises);
- Converting of area by type land-use to EMEP 0.1x0.1 degree grid;
- Preparation of proxy for emissions converting to EMEP grid
- Emissions mapping.

Methodology, assumptions:

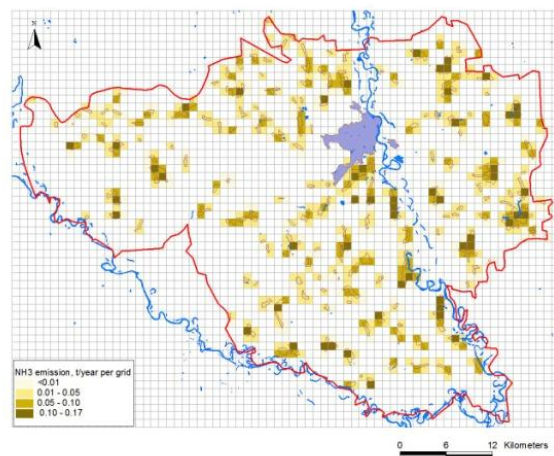
- Emissions from each manure management stage occur on specific area
- Distance of domestic livestock grazing depends on town area
- Distance of livestock grazing in agricultural enterprises is about 3 km

Input data

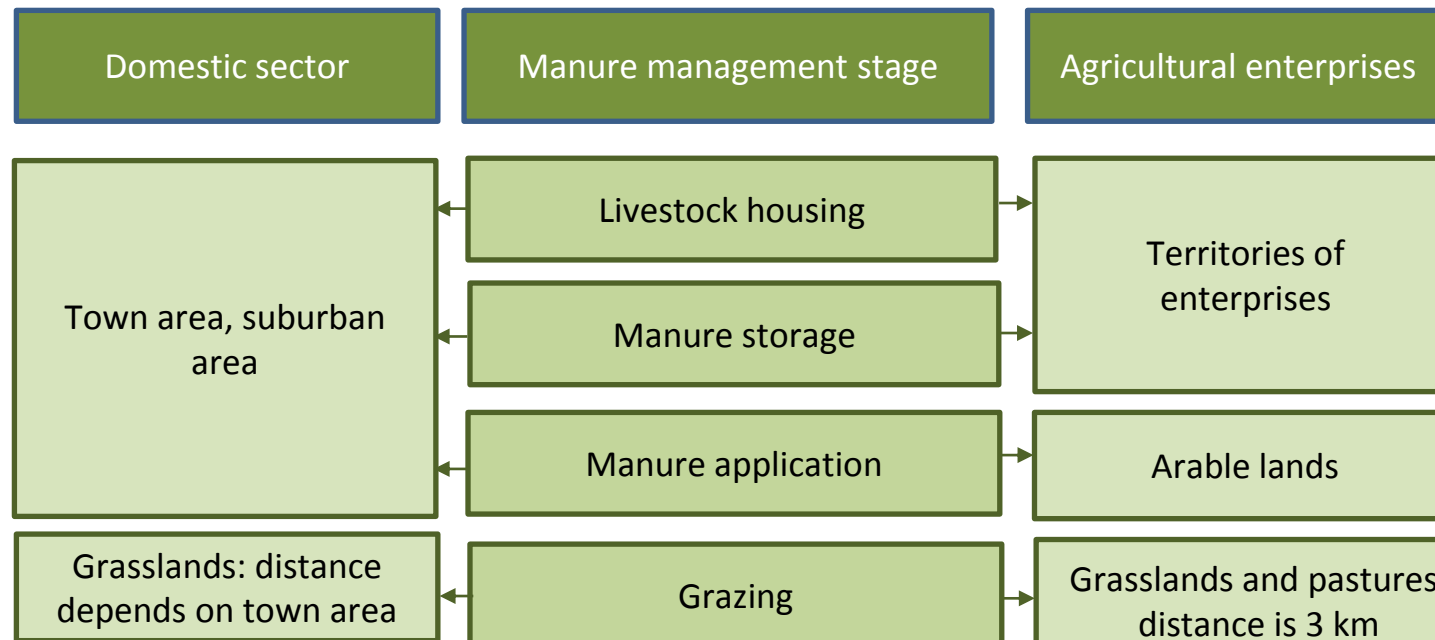
- Agricultural statistics: livestock by farm category (domestic sector and agricultural enterprises) and livestock category (dairy cows, beef, pigs, broilers, and layers);
- Area of towns and cities;
- Data on agricultural practices: manure type, housing system, days of pasture etc.
- Land-cover data (vegetation map, Google maps, etc.)
- Ammonia emissions factors



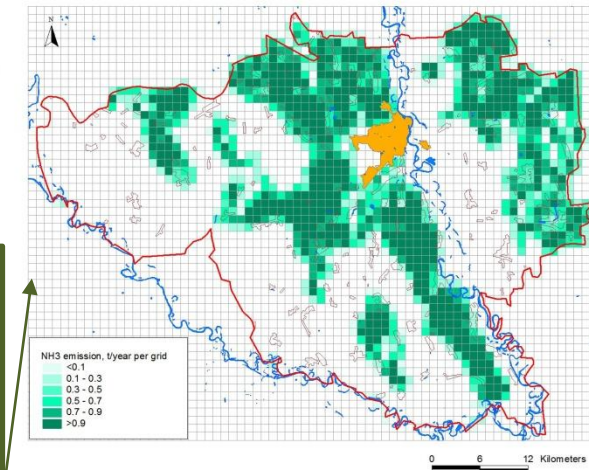
Ammonia emissions from domestic livestock



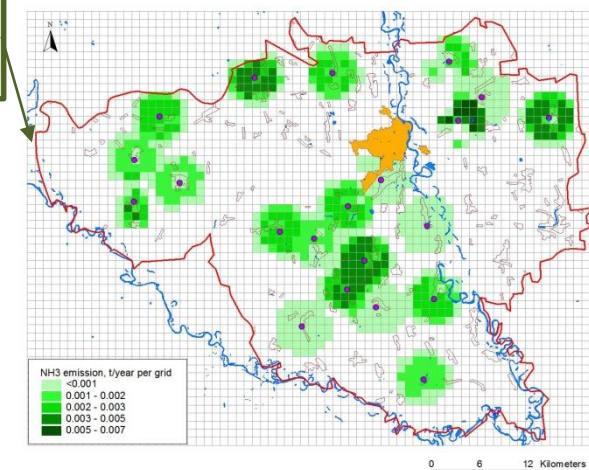
Methodology of the emissions mapping scheme



Ammonia emissions from manure application in agricultural enterprises



Ammonia emissions from grazing in agricultural enterprises



Conclusions

Methodology could be used for ammonia emissions mapping, but it requires quite a lot of resources. The main source of ammonia for the pilot region is the land spreading of manure. Emissions from manure application occur in 55% of the grid cells and vary from 0.01 to 1 t/year per grid cell. The highest emissions values are associated with livestock housing (from 3.3 to 58.9 t/year per grid cell).

Main references

- EMEP/EEA air pollutant emissions Inventory guidebook, 2019
- Modelling the spatial distribution of ammonia emissions in the UK / S. Helsten et al. // Environmental Pollution 154. – 2008. – pp. 370-379.
- National atlas of Belarus, 2002

Total ammonia emissions from livestock

