Closing the mineral cycles at farm level – Good practices to reduce the nutrient loss in Lombardy

Causes and effects of nutrient loss in the region and good practices

(Regione Lombardia, 2013)

Milan, Italy

Wednesday 5th November 2014

Presentation overview

- Aim and objectives of the project
- Approach taken in the project
- Overview of Lombardy
- Impact of nutrient losses on farm, economy and the environment
- Achievements made by the region to address nutrient losses
- Good practices at farm level

General information on the project

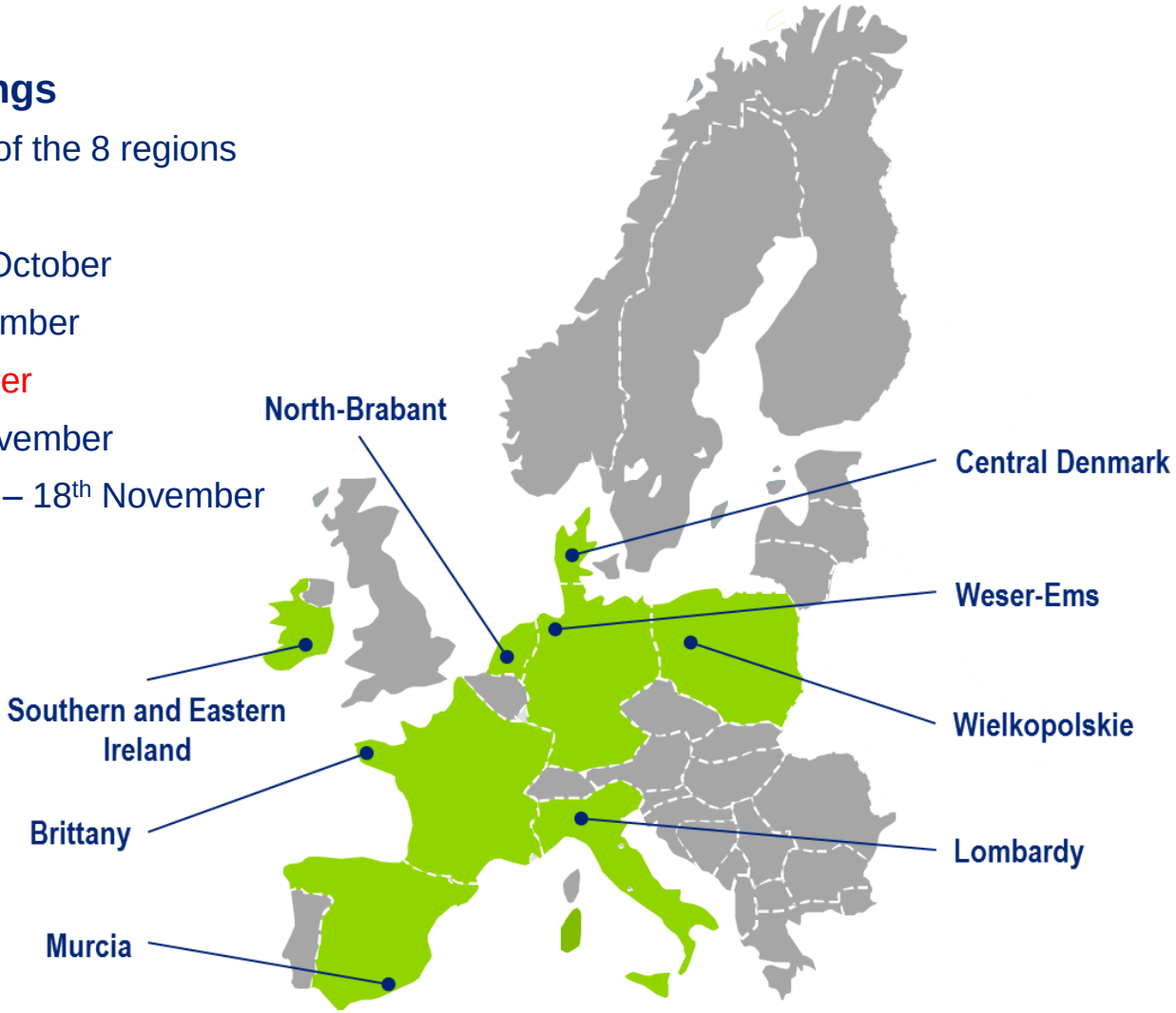
- Project team:
  - BIO by Deloitte (co-leader)
  - Ecologic Institute (co-leader)
  - AMEC
  - DTU
  - Universita degli studi di Milano
  - Wageningen UR, LEI

- More information on project website:
  http://www.ecologic.eu/10532
  http://mineral-cycles.eu/

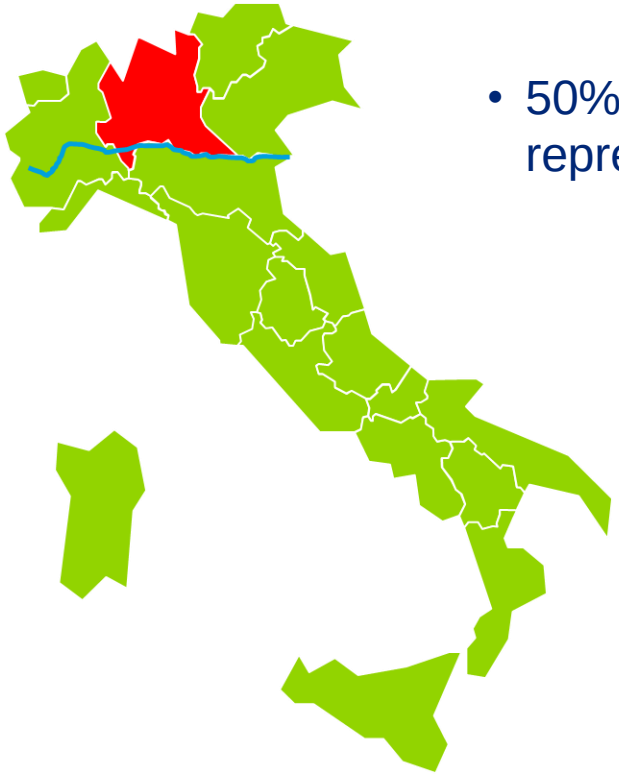
Aims, objectives and overall approach

- **Identify most promising measures** to improve use of nutrients and reduce negative impacts

- **Dissemination of the findings**
  - Leaflets developed for each of the 8 regions
  - Four regional conferences
    - Portlaoise, Ireland – 28th October
    - Murcia, Spain – 04th November
    - Milan, Italy – 05th November
    - Poznan, Poland – 13th November
  - Final conference in Brussels – 18th November



Overview of Lombardy



Map of Italy showing
the region of Lombardy in red
and the Po River in blue

- 42% of regional surface area dedicated to agriculture, representing 7.7% of national agricultural surface area
- 50% of regional agricultural holdings dedicated to breeding, representing 10% of national livestock holdings
  - 51% of national pig population
  - 25% of national beef & dairy cattle population
  - 26% of total national livestock production
  - 70% of regional UAA dedicated to crop production – mostly cultivated with maize
  - 20% of total national cereal production
  - Large water resources, including 5 of the largest Italian lakes and numerous rivers

Challenges in Lombardy

- **Nitrogen transfers mainly related to agricultural activities while phosphorus transfers mainly related to urban activities**

- **High nutrient load in freshwater and coastal water**
  - Nitrate in ground and surface water
  - Eutrophication in lakes
  - Indirect marine eutrophication (discharge of nutrient from the Po River into the Adriatic Sea)
  - Algae blooms in Adriatic costal area

- **Emissions of ammonia in the air**
  - 26% of national emissions of ammonia
  - 98% due to agriculture
  - Soil and water acidification

- **Causes for nutrient losses**
  - Excessive use of fertilisers
  - Improper fertilisation application
  - Other risks factors (climate, soil)

(Regione Lombardia, 2008)

Impacts of nutrient losses

- **On farming businesses**
  - Additional mineral fertiliser purchase
  - Costs for fertiliser application (tractor fuel, spreading equipment, labour)
  - In order to maintain soil fertility and crop yields

(Regione Lombardia, 2008)

- **On the wider economy**
  - Costs for nutrient removal (treatment of wastewater & of water for drinking purposes)
  - Cost of algae removal
  - Threat to public health
  - Threat to tourism and fishing activities

- **On the environment**
  - Threat to water bodies & forests
  - Threat to biodiversity & ecosystem balance

Achievements

- **Programme for the protection and use of water** in Lombardy
  - Pursuant to the River Basin Management Plan
  - To restore the good quality status of water bodies in the Lombardy Region

(Regione Lombardia, 2008)

- **Nitrates Directive**
  - Measures Implemented **in the Nitrates Vulnerable Zones**

- **Rural Development Plans**
  - Promotion of actions that decrease nutrient losses on-farm & increase resource efficiency
  - Financial support to farmers

Good practices (1) – Cover manure during storage

(G. Provolo)

- Not compulsory but often required to obtain a permit for the construction of biogas plants
- Factors to consider when choosing most suitable type of cover: dry matter content of manure and precipitations
- **Higher nutrient content of covered manure**
- **Risks** of nutrient leaching and run-off if manure application is not matched with plant needs
- **Cost-savings** from reduced mineral fertiliser purchase/application
- **Costs** for the covered manure storage facilities (construction & maintenance)
- Various environmental benefits, including decrease in GHG emissions, less ammonia emissions and particulate matter, better conditions for biodiversity

Good practices (2) – Improve fertilisation management plans

(G. Provolo)

- **Optimal timing and dose** of nutrient applied
- Calculation of the **farm nutrient balance**
- **Cost-savings** from reduced purchase and application of additional fertilisers
- **Costs** for soil analyses & increased management **efforts** when applied to all sites
- Various environmental benefits (reduced nutrient emissions and transfers, better water quality, improved soil fertility)

Good practices (3) – Nitrogen removal from liquid manure/ slurry

(G. Provolo)

- Nitrogen removal up to 70 % of the initial manure content
- Using nitrification / denitrification, stripping or reverse osmosis
- Often combined with **biogas production** plant
- Careful consideration of the manure's characteristics and the energy requirements of the installation
- High investment **costs** & **requirements** for adequate skills to properly manage treatment plants
- **Risk** of phosphorus over-application to the soil
- Various environmental benefits

Good practices (4) – Use appropriate manure application techniques

(G. Provolo)

- **More efficient use of nutrients by the crops**
- New spreading techniques (e.g. **top dressing fertilisation** of crops like maize)
- Immediate **incorporation of manure into the soil** to reduce ammonia emissions
- **Cost-savings** from reduced purchase and application of mineral fertilisers
- **Costs** for equipment purchase & from reduced field capacity of the machinery
- Higher nutrient content retained in the manure: **risk** of higher amount of nutrients applied
- Various environmental benefits (e.g. reduced ammonia emissions)

Good practices (5) – Cover with catch crops

(http://plantcovercrops.com)

- Integrate cover crops into the crop rotation in order **to avoid bare soil** during the winter period
- Reduced risk of nutrient loss by leaching and run-off, reduced risk of soil erosion, improved **soil fertility** and **available nutrients**
- **Cost-savings** from reduced needs for fertiliser purchase and application
- **Costs** for seed purchase & additional seeding and ploughing
- This technique may not be suitable in some areas of Lombardy due to soil type and climate conditions

Good practices (6) – Introducing drip irrigation system

(G. Provolo)

- **Control of the amount of water** provided directly to the base of the plant & limited loss of water and nutrients
- Appropriate for fruits & vegetables and other crops (maize)
- Distribution of manure with the irrigation water is possible through **fertigation**
- **Cost-savings** from reduced fertiliser purchase and application, from lower labour requirements to irrigate
- **Incomes** from increased crop yields and improved quality of harvested products
- **Costs** for purchase of equipment (drip line, water pressurisation system, filter station, distribution system)
- Various environmental benefits (e.g. decreased nitrous oxide emissions through avoided soil anaerobic conditions)

Further good practices

- To address the high quantity of manure produced locally
  - **Reduce the amount of nutrients excreted through feeding strategies**

- To reduce impacts from nutrient leaching and emissions from stored manure and housing
  - **Improve manure collection from livestock housing units**

- To reduce the amount of organic fertilisers applied
  - **Transfer of manure**

- To limit nutrients transfer to air and drainage system
  - **Use of digested manure from biogas production**
  - **Use adequate tillage techniques to limit nutrient leaching**
  - **Acidify slurry to limit ammonium transformation in ammonia**

- To support implementation at farm level
  - **Enhance advisory services**

(Regione Lombardia, 2013)

Questions?

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