Agronomic use of livestock manure and management of nitrogen fertilization for the protection of water resources

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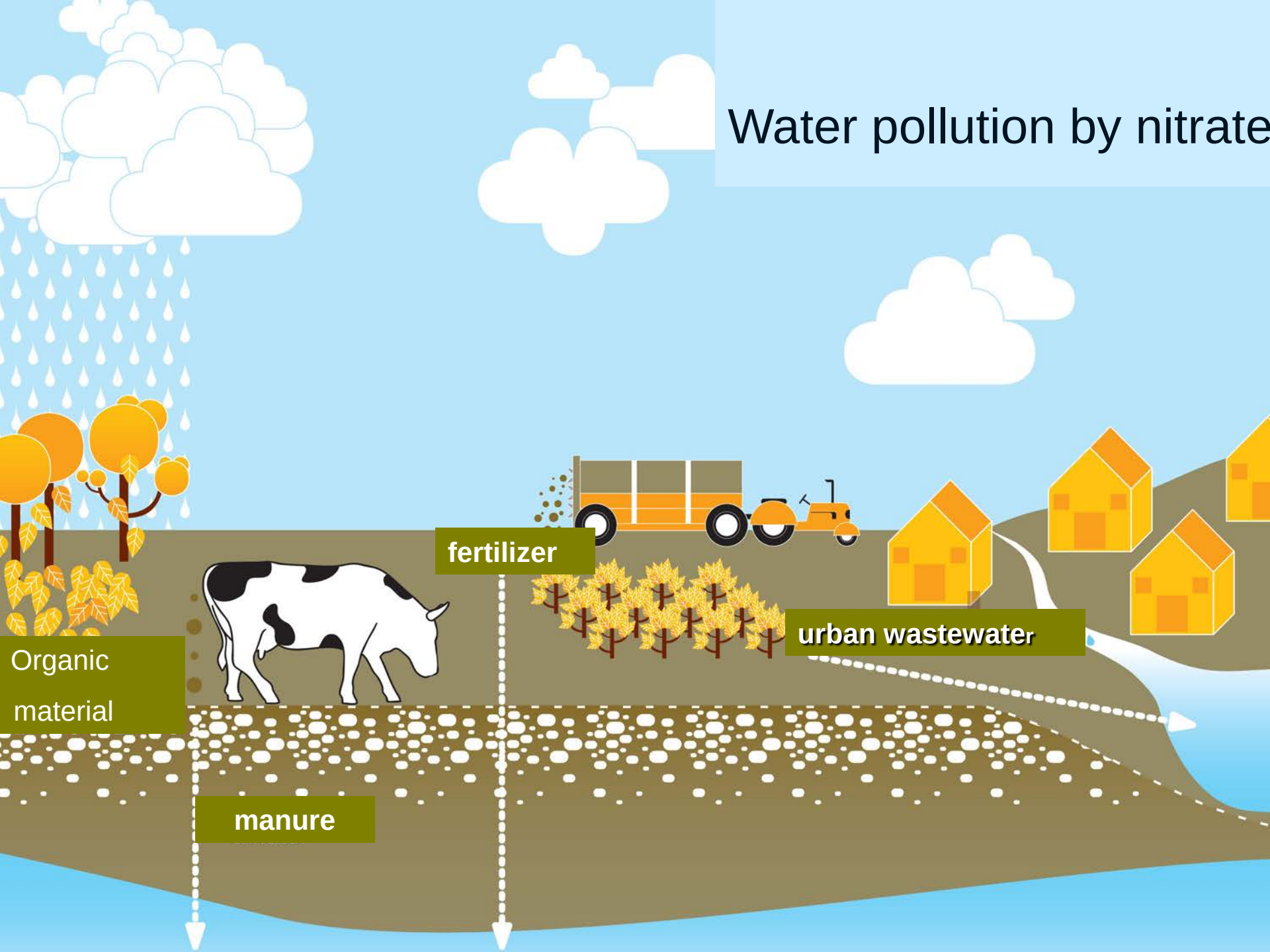
Water quality

- The main causes of negative impacts on water status are interlinked.
- These include land use; economic activities such as industry, agriculture and tourism; urban and demographic development; climate change;

Water pollution by nitrate



Context

- The sources of nitrate pollution are diffuse (multiple discharges which are difficult to locate).
- In agricultural systems the water pollution by nitrates is connected to the introduction of intensive farming methods, with increased use of chemical fertilisers and higher concentrations of animals in small areas.

Context

- The 1980s saw a progressive worsening of water quality owing to the growth of intensive livestock farming (chickens, pigs) and of intensive crops involving the use of chemical weedkillers and overfertilisation
- Diffuse pollution significantly affects across the EU :
- 50 % of surface water bodies
- 33% of groundwater bodies

(Report 2015)

Council Directive 91/271/EEC

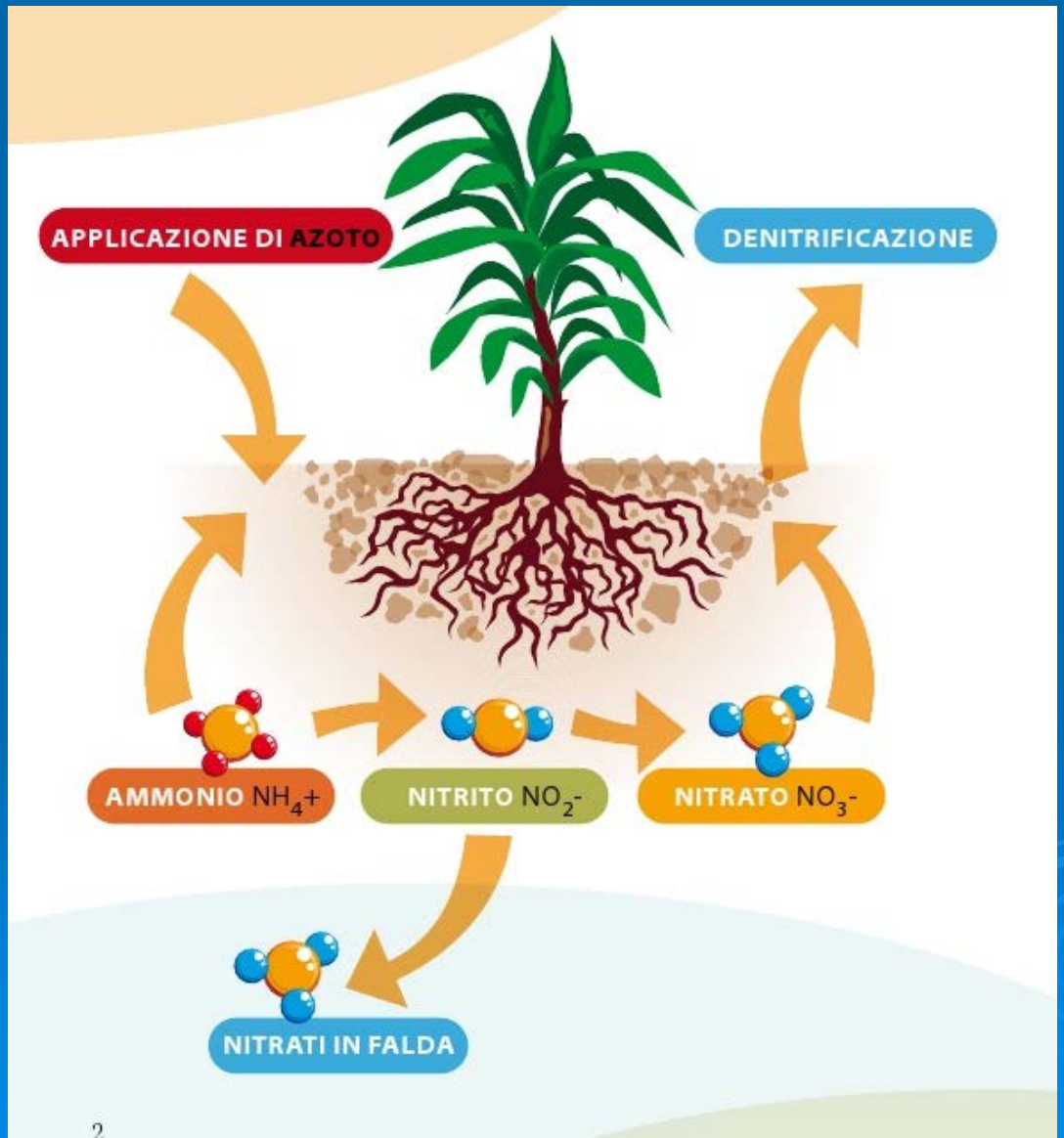
- Council Directive 91/271/EEC concerning urban wastewater treatment : this law seeks to ensure the proper treatment of wastewater so as to protect human health and the environment.

Sensitive areas

Council Directive 91/676/EEC (Nitrates Directive)

The Nitrates Directive aims to protect waters in Europe by preventing nitrates from agricultural sources from polluting groundwater and surface waters by encouraging the use of good agricultural practices.

Nitrogen leaching



Council Directive 91/676/EEC (Nitrates Directive)

The Nitrates Directive is an integral part of the Water Framework Directive and is one of the key instruments for protecting water against agricultural pressures.

Directive 2000/60/EC (Water Framework Directive)- WFD

The European Union (EU) has established a common framework for water protection and management, which aims to protect and restore aquatic ecosystems, and to guarantee long-term, sustainable water usage for individuals, businesses and the natural world

Directive 2000/60/EC (Water Framework Directive)- WFD

Objectives :

preventing and reducing pollution,
promoting sustainable water usage,
protecting the environment,
improving the state of aquatic eco-systems
reducing the effects of floods and droughts

The WFD requires Member States to achieve ‘good status’ for surface and groundwater’ by 2015

Council Directive 91/676/EEC (Nitrates Directive)

The implementation of the Directive will be carried out in a number of stages

Member States shall:

- *A) identify surface water and groundwater affected by pollution or at risk of being so, based on procedures and criteria detailed in the Directive (specifically when the concentration of nitrates in groundwater or surface water reaches 50 mg/l or when the surface water is eutrophic or is at risk of being so);*

Member States must monitor water quality (monitoring network), applying standardised reference methods to measure the nitrogen-compound content.

Council Directive 91/676/EEC (Nitrates Directive)

Member States shall:

- *B) designate vulnerable zones (NVZ), which are all known areas of land in their territories which drain into surface waters and groundwater which are affected by pollution or at risk of being so.*

The Nitrates Directive provides a possibility for Member States to be exempted from the requirement to designate vulnerable zones if the action programmes are applied to the whole of their national territory;

Council Directive 91/676/EEC (Nitrates Directive)

Member States shall:

- *C) set up compulsory action programmes to be implemented by all farmers who work in vulnerable zones. These programmes must contain the measures which aim to limit the land application of mineral and organic fertilisers containing nitrogen, as well as land application of livestock manure.*

Council Directive 91/676/EEC (Nitrates Directive)

- 170 kg *of nitrates per hectare and per year is the maximum quantity for the land application of livestock manure (in NVZ)*
- 340 kg *of nitrates per hectare and per year is the maximum quantity for the land application of livestock manure (non NVZ)*

MEASURES TO BE INCLUDED IN ACTION PROGRAMMES

- Periods when the land application of fertilizer is prohibited, taking into account the characteristics of climatic conditions (in Tuscany from 1/12 to 28/02)
- The capacity of storage vessels for livestock manure: this capacity must exceed that required for storage throughout the longest period during which land application in the vulnerable zone is prohibited

Other rules

- Transport manure in closed containers
- Accompanying document
- The biggest farms have to transmit to the local authority an agronomic use plan

MEASURES TO BE INCLUDED IN ACTION PROGRAMMES

- Limitation of the land application of fertilizers on the base of a balance between:
  (i) the foreseeable nitrogen requirements of the crops,

  (ii) the nitrogen supply to the crops from the soil and from fertilization,

corresponding to:

- - the amount of nitrogen present in the soil when the crop starts
- - the supply of nitrogen through the net mineralization of the reserves of organic nitrogen in the soil,
- - the amount of nitrogen from livestock manure,
- - the amount of nitrogen from chemical and organic fertilizers .

Fertilization plan

Balance

Nc+Nf+An+(FcxKc)+(KoxFo)=(YxB)

Nc= amount of N from precedent crop

Nf= amount of N from mineralization of the organic fertilizer of the previous year

An= Natural flows (rain) (10 Kg/ha)

(FcxKc)= N from chemical fertilizer

(FcxKc)=N from organic fertilizer

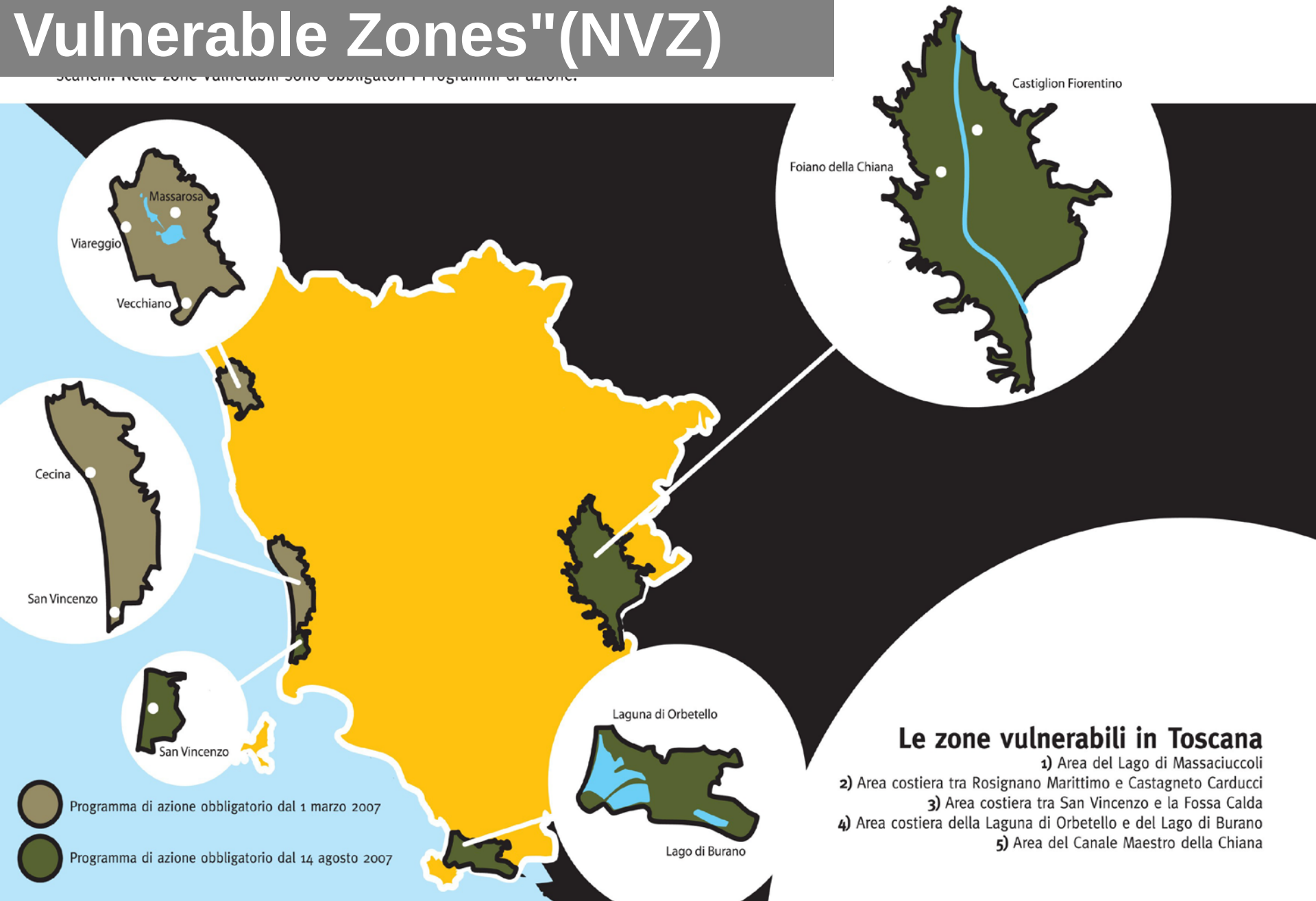
(YxB) = the foreseeable nitrogen requirements of the crop

Council Directive 91/676/EEC (Nitrates Directive)

Member States shall:

- *D) The Member States must submit to the Commission every four years a report on the application of this Directive: the Commission has provided with recommendations on monitoring methods and on the information which must be included in these reports .*

Designation as "Nitrate Vulnerable Zones"(NVZ)

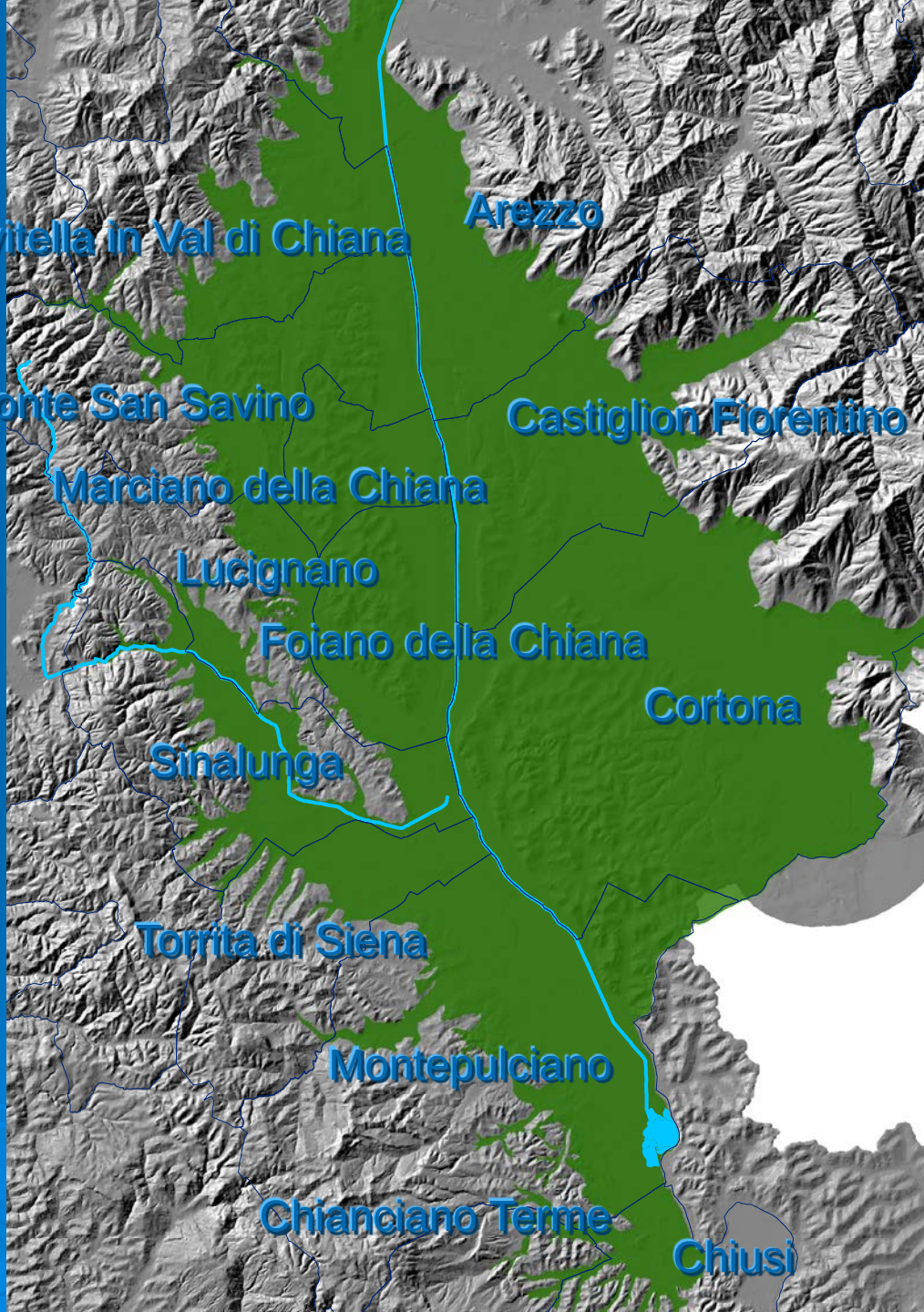


Zona Vulnerabile della Val di Chiana

D.G.R. n.521/07

Comuni interessati:

Arezzo (15 %)
Bucine
Civitella in Val di Chiana (39%)
Castiglion Fiorentino (57%)
Monte San Savino (51 %)
Cortona **(51 %)**
Marciano della Chiana **(100 %)**
Lucignano (36 %)
Foiano della Chiana (98 %)
Sinalunga (40 %)
Trequanda
Torrita di Siena (31 %)
Montepulciano (48 %)
Chiusi (21 %)
Chianciano Terme (8 %)



Regional legislation on the agronomic use of:

- Livestock manure
- Farm wastewater food
- Waste water from the oil mills

- DPGR **n. 76/R del** 17 dicembre 2012 **Testo coordinato del decreto del Presidente della Giunta Regionale 8 settembre 2008, n. 46/R (Regolamento di attuazione della legge regionale 31 maggio 2006, n. 20 “Norme per la tutela delle acque dall’inquinamento”).**

Information and training activity on the Nitrates Directive

http://risorseidriche.arsia.toscana.it/

Production of nitrogen from manure

N° capi	2010	2000
bovini	92.641	103.008
suini	147.771	171.612
ovini	416.656	554.664
caprini	12.296	17.138
equini	15.502	18.589
avicoli	2.481.684	3.463.957
conigli	83.594	537.924

Anno 2010
Nitrogen : 8.475 ton /year

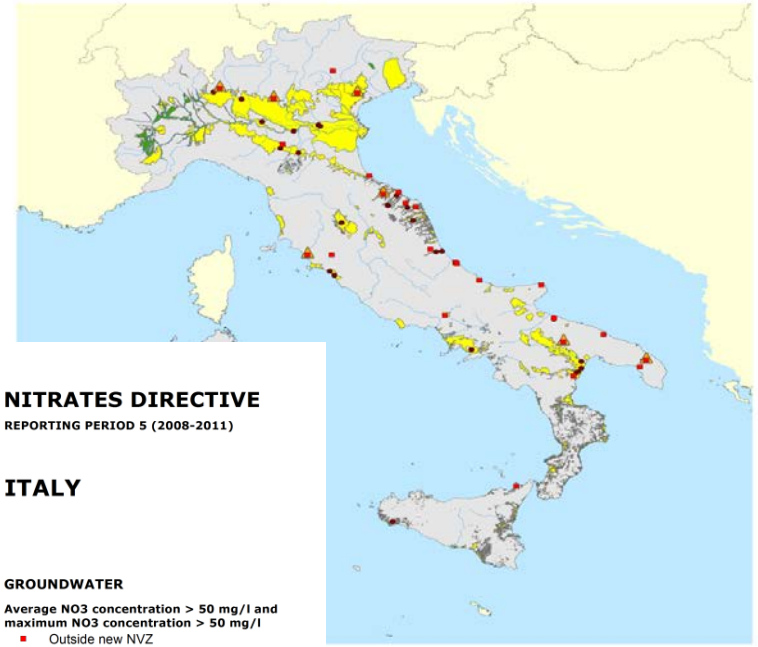
Anno 2000
Nitrogen : 10.372 ton /year

Surface and grownwater quality in Tuscany
Nitrate (2008-2011)

Surface water			% of monitoring sites
	High quality	<0.8" + ">=0.8 mg/l di N	92,40
	Moderate quality	>=2.0 and <3.6" + ">=3.6 and >5.6 mg/l di N	6,77
	Low quality	>=5.6 and <11.3" + ">=11.3 mg/l di N	0,83

Ground water			% of monitoring sites
	High quality	<10" + ">=10 and <25 mg/l di N03	79,25
	Moderate Quality	>=25 and <50 mg/l di N03	14,00
	Low quality	>=50 mg/l di N03	6,75

UE Monitoring



NITRATES DIRECTIVE
REPORTING PERIOD 5 (2008-2011)

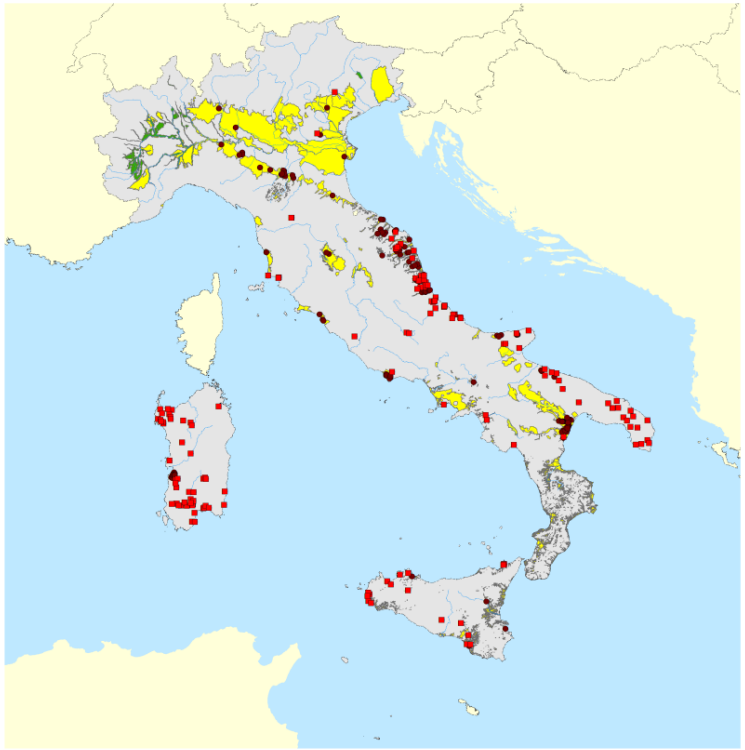
ITALY

GROUNDWATER

Average NO3 concentration 40 - 50 mg/l and maximum NO3 concentration > 50 mg/l
- Outside new NVZ with increasing trends
- Outside new NVZ
- Inside new NVZ
- Designated zones before 2008
- New designated zones in 2012

ALTERRA WAGENINGEN UR

0 40 80 120 Kilometers



NITRATES DIRECTIVE
REPORTING PERIOD 5 (2008-2011)

ITALY

GROUNDWATER

Average NO3 concentration > 50 mg/l and maximum NO3 concentration > 50 mg/l
- Outside new NVZ
- Inside new NVZ
- Designated zones before 2008
- New designated zones in 2012

ALTERRA WAGENINGEN UR

0 40 80 120 Kilometers

Cross compliance

The rules on cross-compliance shall apply to beneficiaries receiving direct payments and the annual premia from UE

Issue Water

- SMR 1 - Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources
- GAEC 1 - Establishment of buffer strips along water courses
- GAEC 2 - Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures
- GAEC 3 - Protection of ground water against pollution: prohibition of direct discharge into groundwater and measures to prevent indirect pollution of groundwater through discharge on the ground and percolation through the soil of dangerous substances (as listed in the Annex to Directive 80/68/EEC)

Rural Development Programme 2014-2020

- European Agricultural Fund for Rural Development (FEASR) support the rural development to preserve and promote the necessary changes to agricultural practices that make a positive contribution to the environment and climate

Payments shall be granted :

- to carry out operations to riduce chemical and hydrological inputs (agri-environment-climate -AEC)
- to convert or maintain organic farming practices and methods
- to organize information and training activity to farmers

Conclusions

- Although implementation of these Directives has progressed significantly, full compliance has not been reached (‘good water status’ slightly over half (53 %) of EU waters) and this prevents achievement of their environmental objectives.
- Diffuse and point-source pollution are still significant pressures on the water environment in, respectively, about 38 % and 22 % of EU water bodies.
- Eutrophication due to excessive nutrient load remains a major threat to the good status of waters as nutrient enrichment is found in about 30 % of water bodies in 17 Member States.

Conclusions

- Member States should tackle the sources of pollution by fully implementing WFD measures and water-related legislation, especially the Nitrates Directive
- Member States should adjust inadequate pricing of water resources, also in the agricultural sector. Adequate WFD-compliant pricing based on metering and cost recovery would lead to water use efficiency reducing unnecessary consumption and favouring hydrological balance
- Availability of information and training services to farmers and efficient control programmes are essential in order to ensure effective implementation of programmes in the field (RDP 2014-2020).