

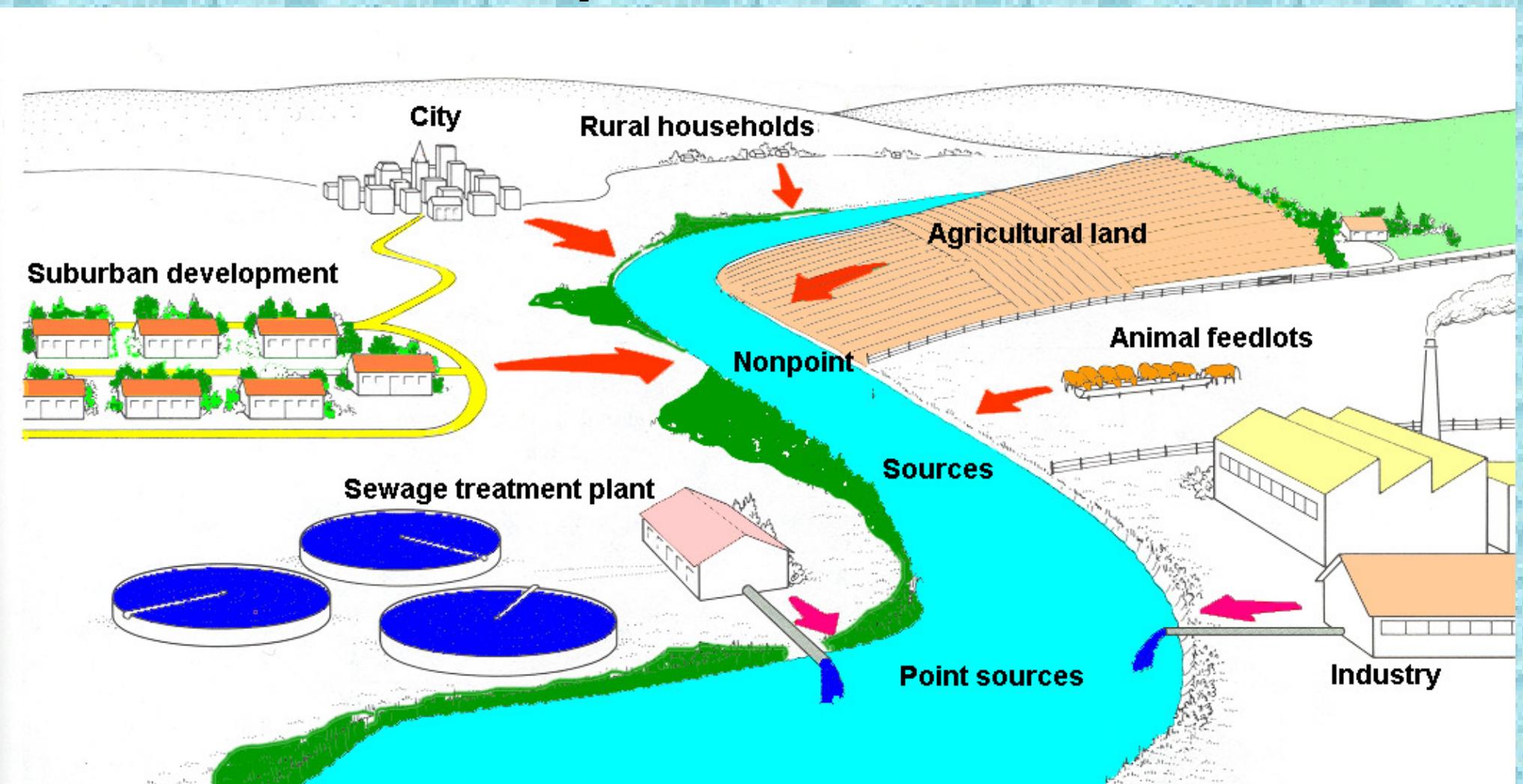


# Drainage and Environment, Results of the Monitoring of Non Point Source Pollution

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# Water pollution sources

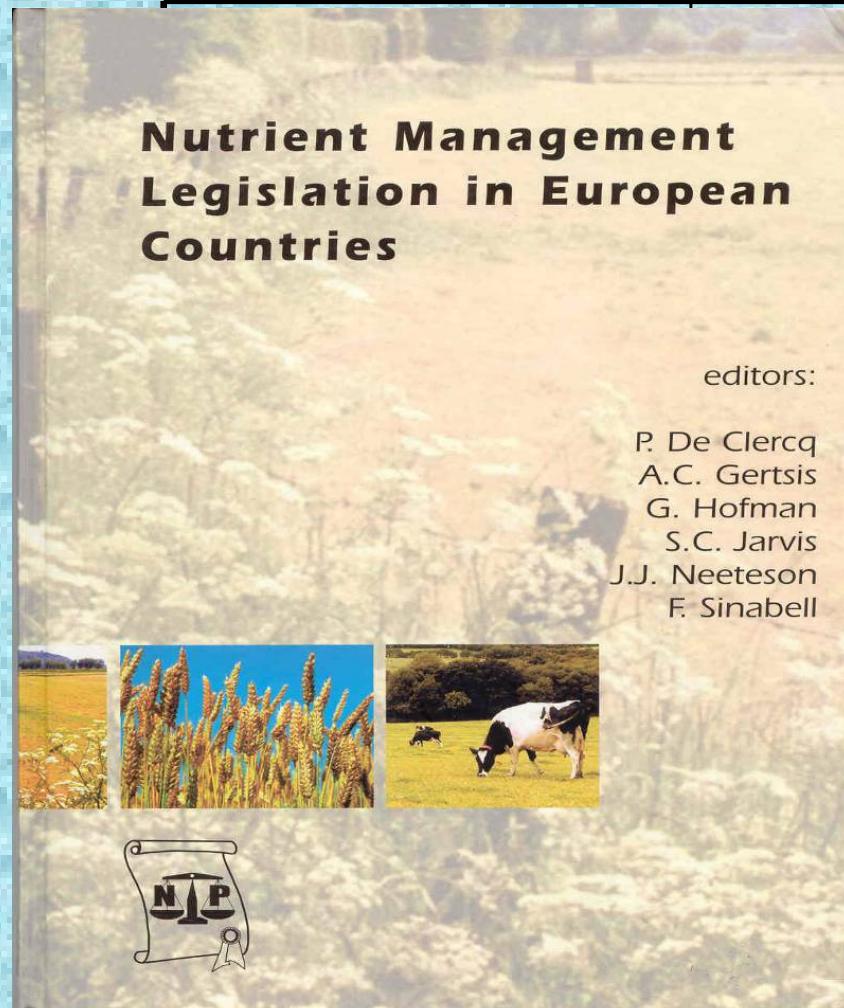


Point source pollution

Non-point source pollution

- hard to determine the nature, extent, transport and fate of contaminants from agriculture<sup>2</sup>

# The contribution of Agriculture to N and P inputs into surface water in EU countries

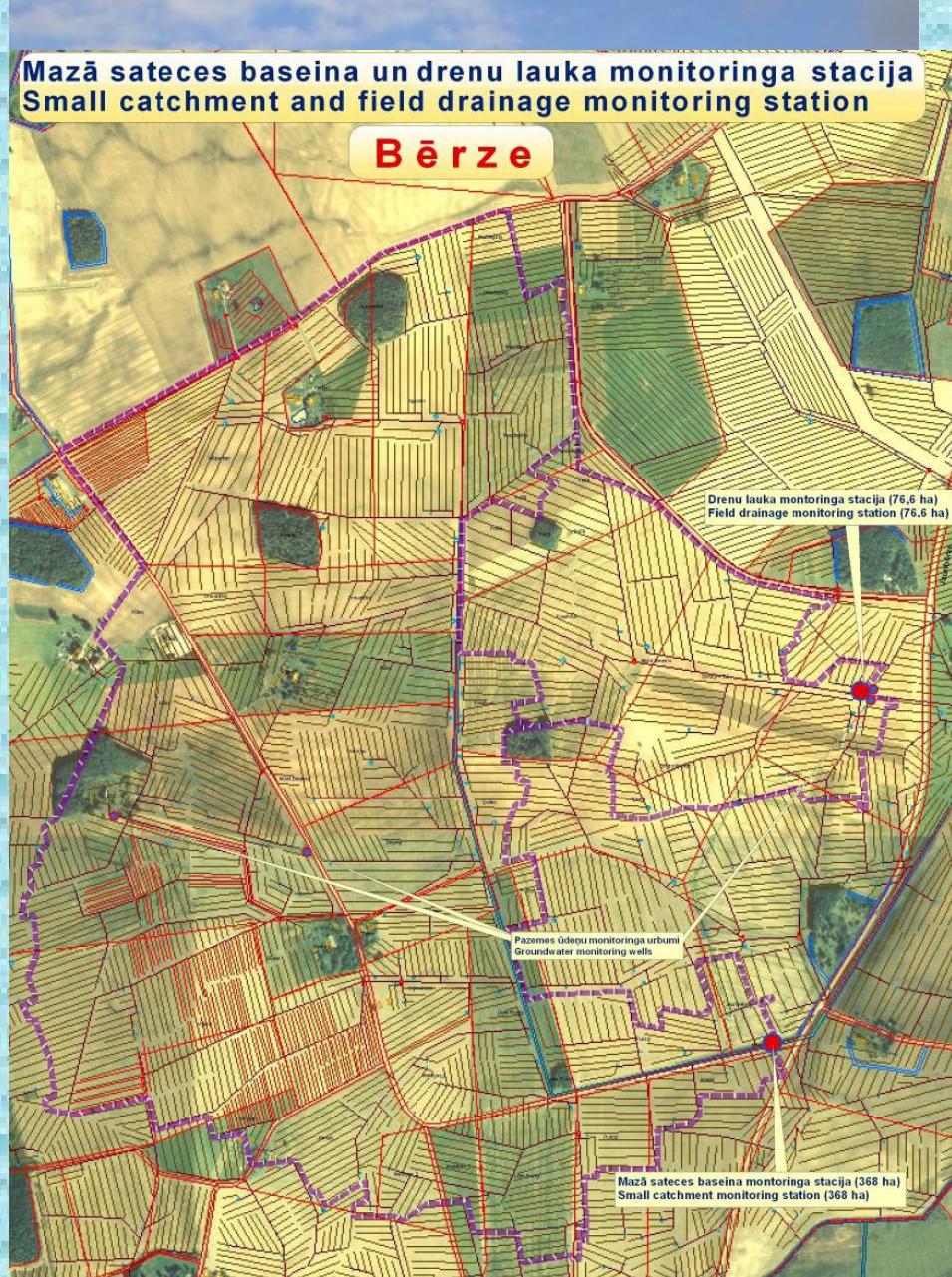


N	P
66*	
77	26
55	No data
57	48
69	31
45	No data
	89*

\* N and P from the agriculture to air, soil and water

Source: P.De Clercq et.all. Nutrient Management legislation in European countries. 2001, Wageningen. Netherlands.

# Monitoring of agricultural run-off ,Bērze monitoring site



**Small catchment station - 368 ha, field drainage station - 77 ha,**

**Constructed 1966.**

**In operation (hydrological data) since 1967.**

**Water quality sampling programme since 1994.**

**Renovated measurement structure and new equipment installed in 2006.**

# Bērze monitoring station 2005



Berze.kmz

# Berze monitoring site

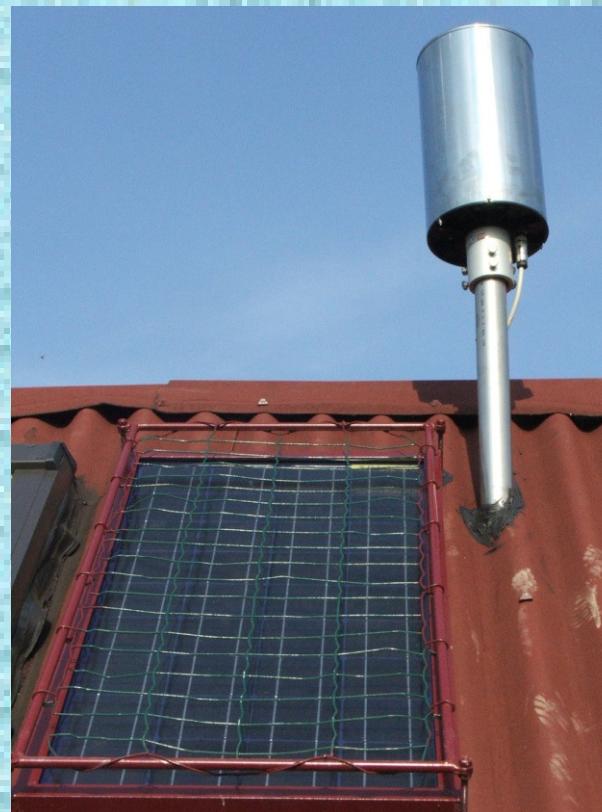
## Measurement structure V-shape Crump weir



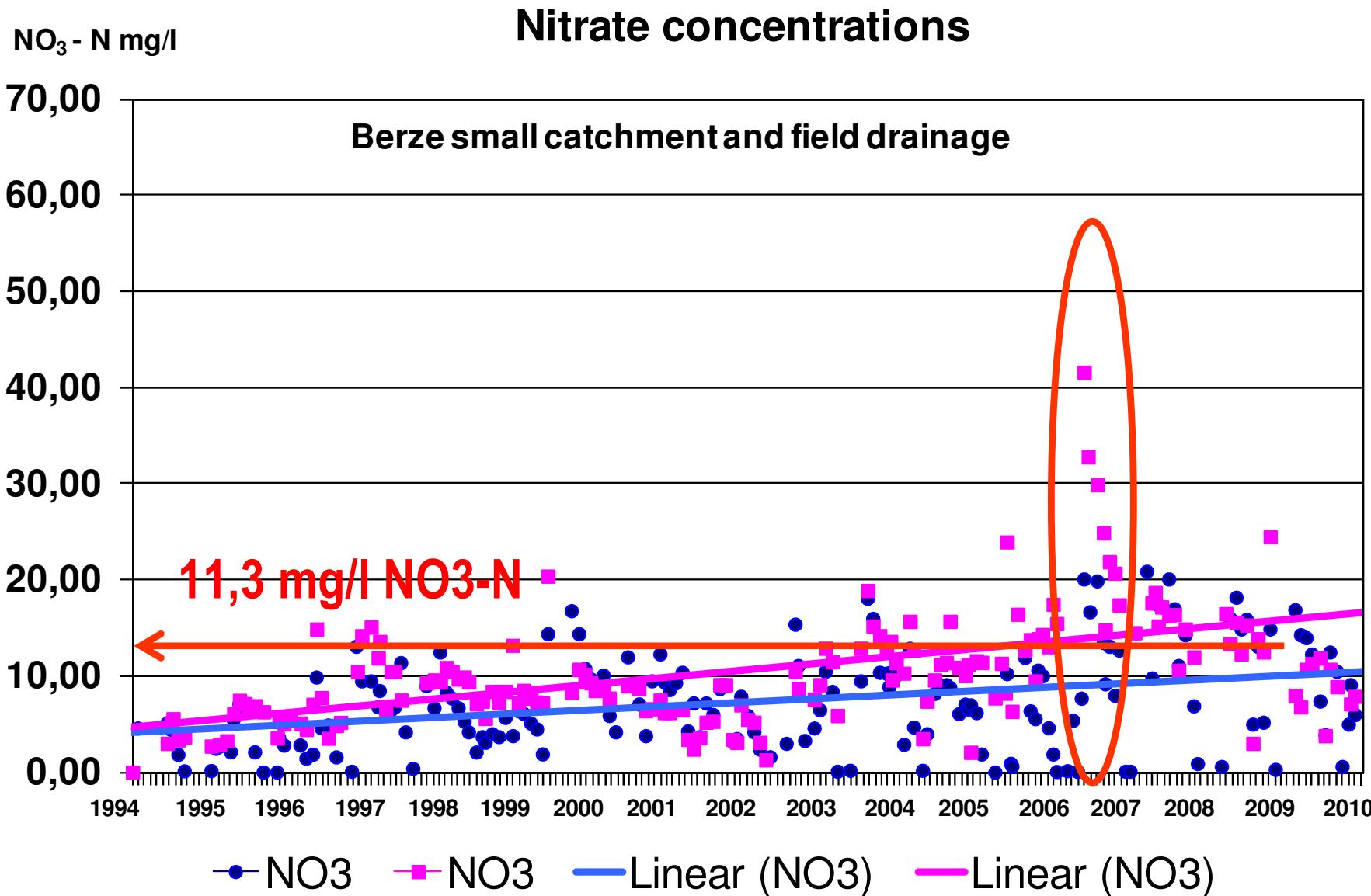
# Berze monitoring site



**Measurement equipment - YSI data loggers, powered from solar panels. GSM data transfer with mobile phone from stations to university PC.**



# Results: Nutrient concentrations, 1994-2010



# Measurements with nitrate zonde



**YSI 6000XLM**

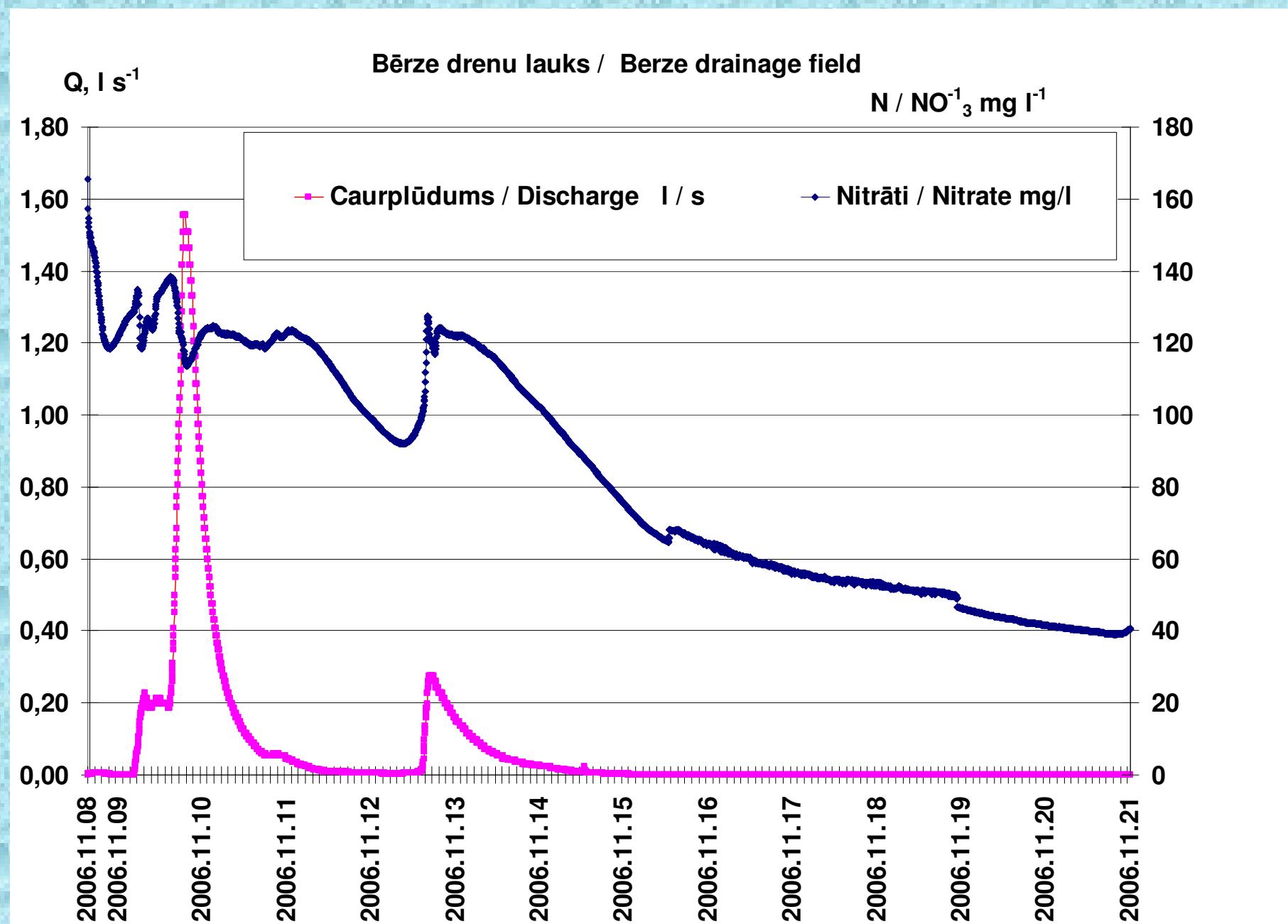
- Water  $t^{\circ}$
- Conductivity
- Dissolved  $O_2$
- Nitrate / N
- Ammonium / N
- ORP

# Impact of the extreme climate conditions on nitrogen run-off (autumn 2006 - winter 2007.)

Dry and hot summer (19.VI.2006)



# Impact of the extreme climate conditions on nitrogen run-off (autumn 2006 - winter 2007.)

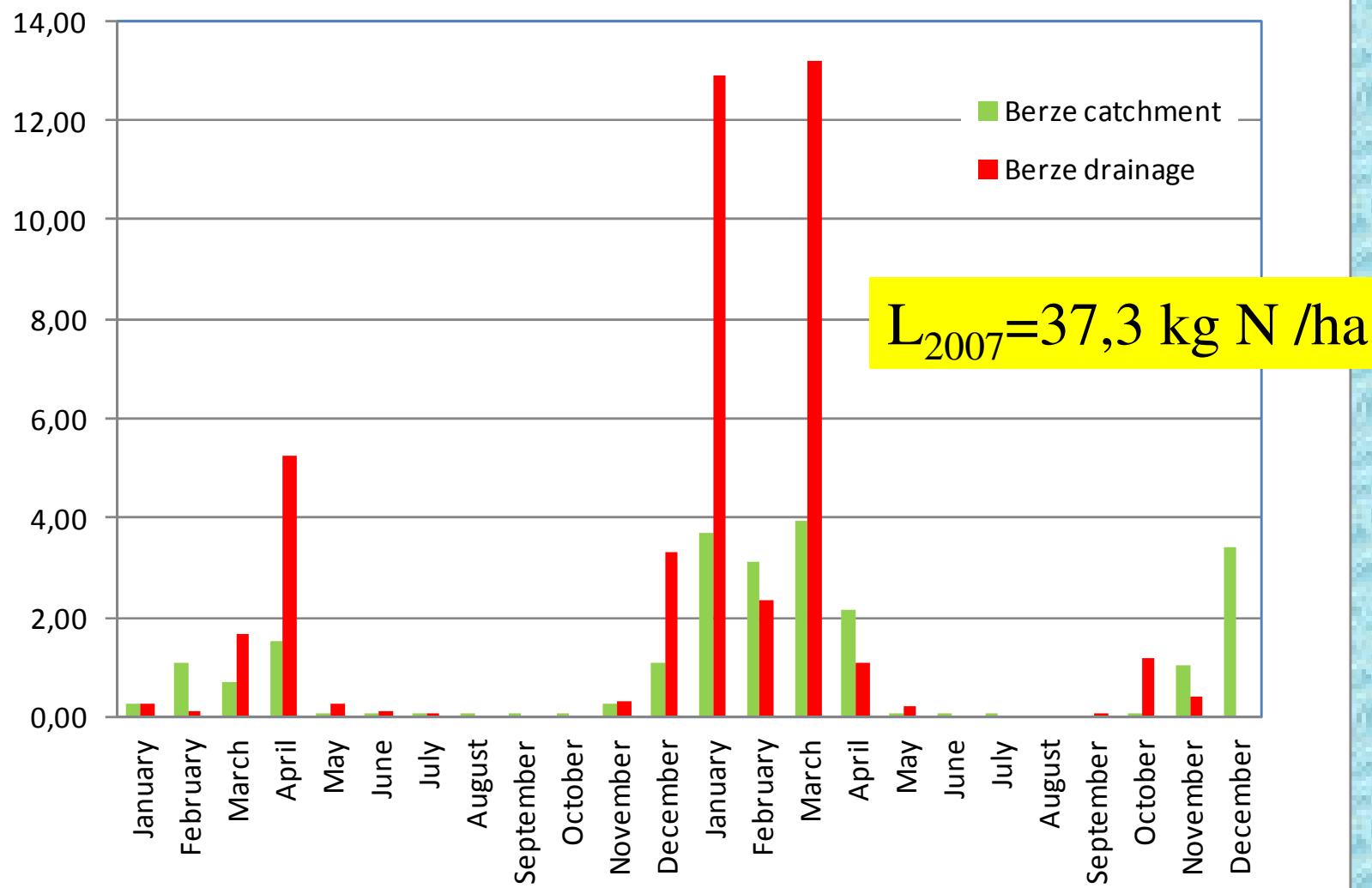


# Impact of the extreme climate conditions on nitrogen run-off (autumn 2006 - winter 2007.)

Field	Soil layer (cm)	Content of the mineral nitrogen, mg kg <sup>-1</sup> dry soil			
		2006.g. autumn		2007.g. spring	
		NO <sub>3</sub> - N	NH <sub>4</sub> -N	NO <sub>3</sub> - N	NH <sub>4</sub> -N
Silarāji	0 - 30	21.4	6.6	2.6	4.1
	30 - 60	6.8	3.3	6.1	3.1
	60 - 90	1.3	2.7	8.2	2.7
Dzelzarāji	0 - 30	2.3	3.6	2.2	3
	30 - 60	0.5	3.1	0.8	2.4
	60 - 90	0.5	2.9	0.6	2.3
Klaipīni	0 - 30	16.6	4.1	7.1	2.9
	30 - 60	3.3	3.3	5.7	3.1
	60 - 90	0.9	3.4	5.1	2.6
Puķes	0 - 30	11.4	3.9	3.4	3.5
	30 - 60	1.7	3.1	3.1	3.2
	60 - 90	1.3	2.6	2.4	2.7
Vāverītes	0 - 30	14	4.1	3.5	3.2
	30 - 60	9.6	3.4	5.5	3.4
	60 - 90	1.9	3	4.9	3
Kāpas	0 - 30	34	3.7	5.9	3.7
	30 - 60	18.9	3.7	7.9	3.3
	60 - 90	7.1	3.2	11.3	3.1

# Monthly Nitrogen Run-off (2006 - 2007.)

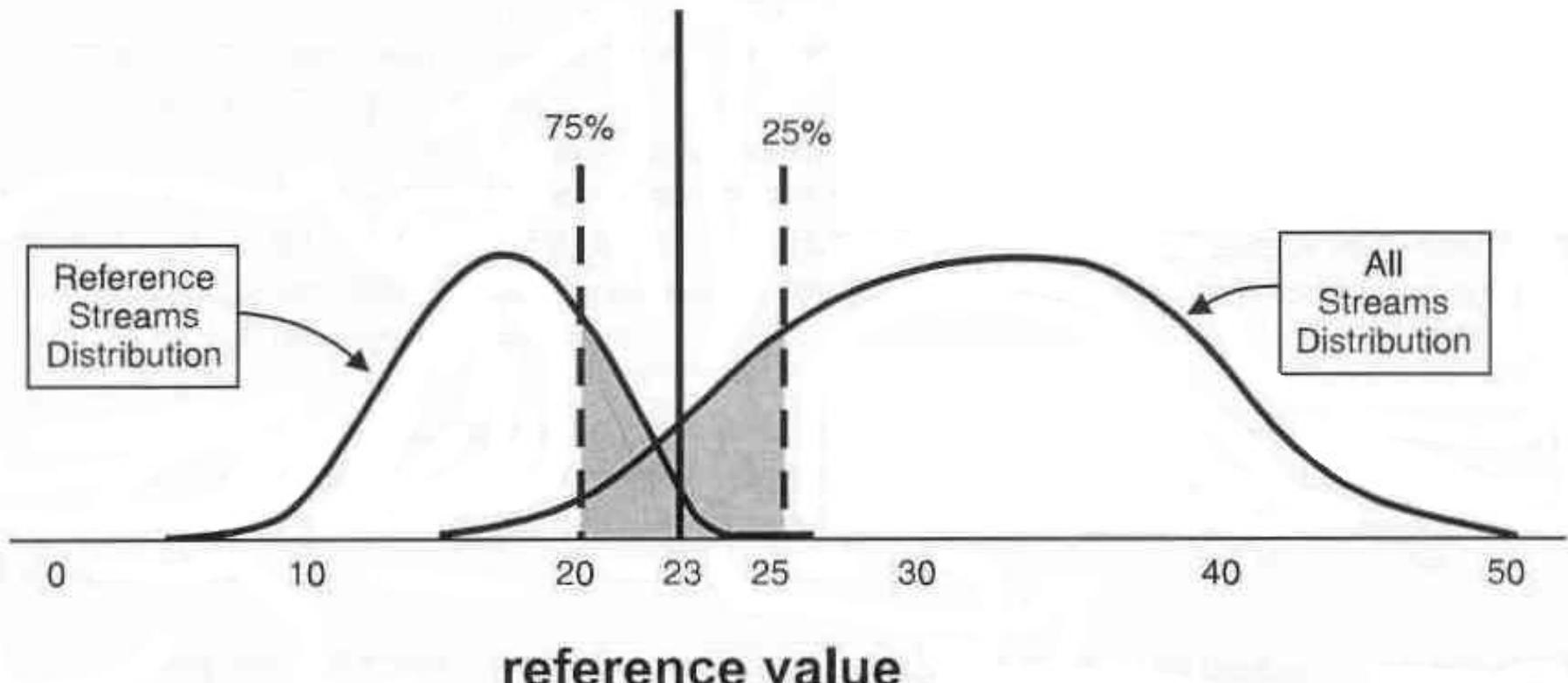
N<sub>tot</sub> kg/ha year    Nitrogen run-off, 2006-2007



# Water Quality assessment

## Good water quality?

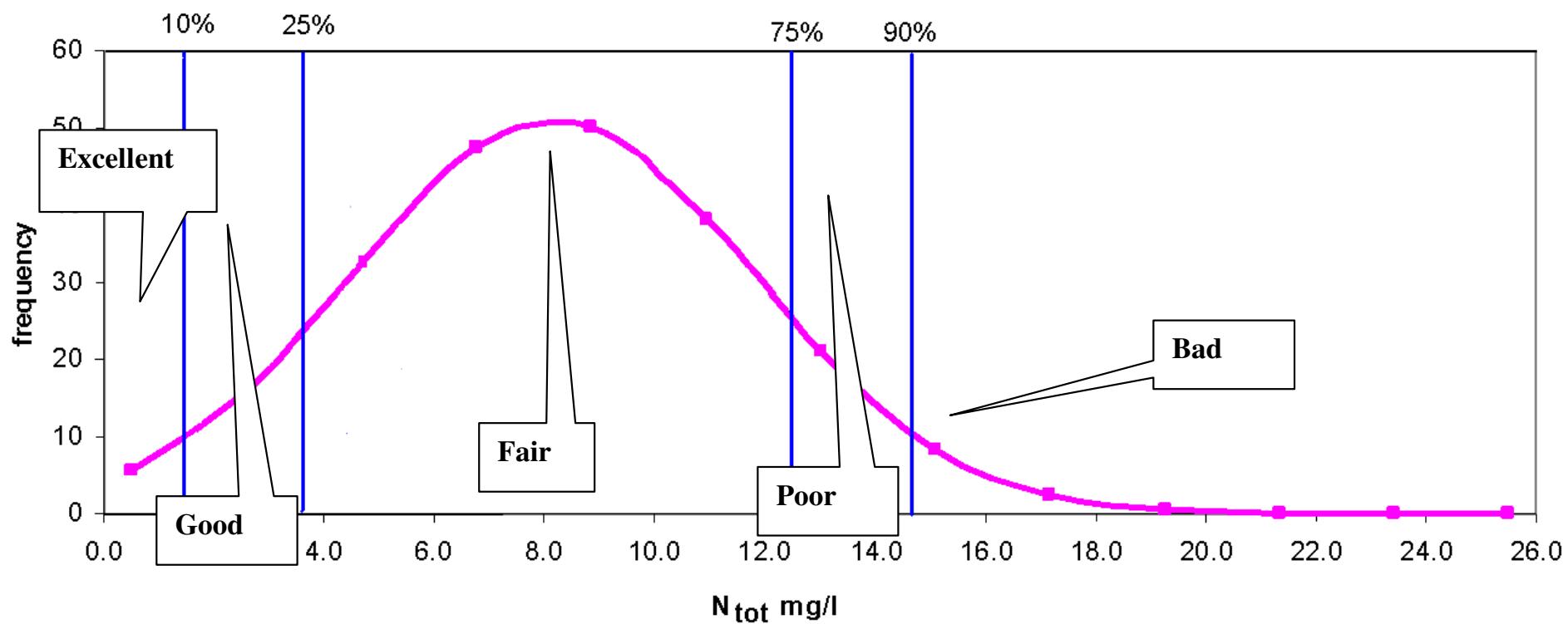
### Numeric values of the parameters / standards ?



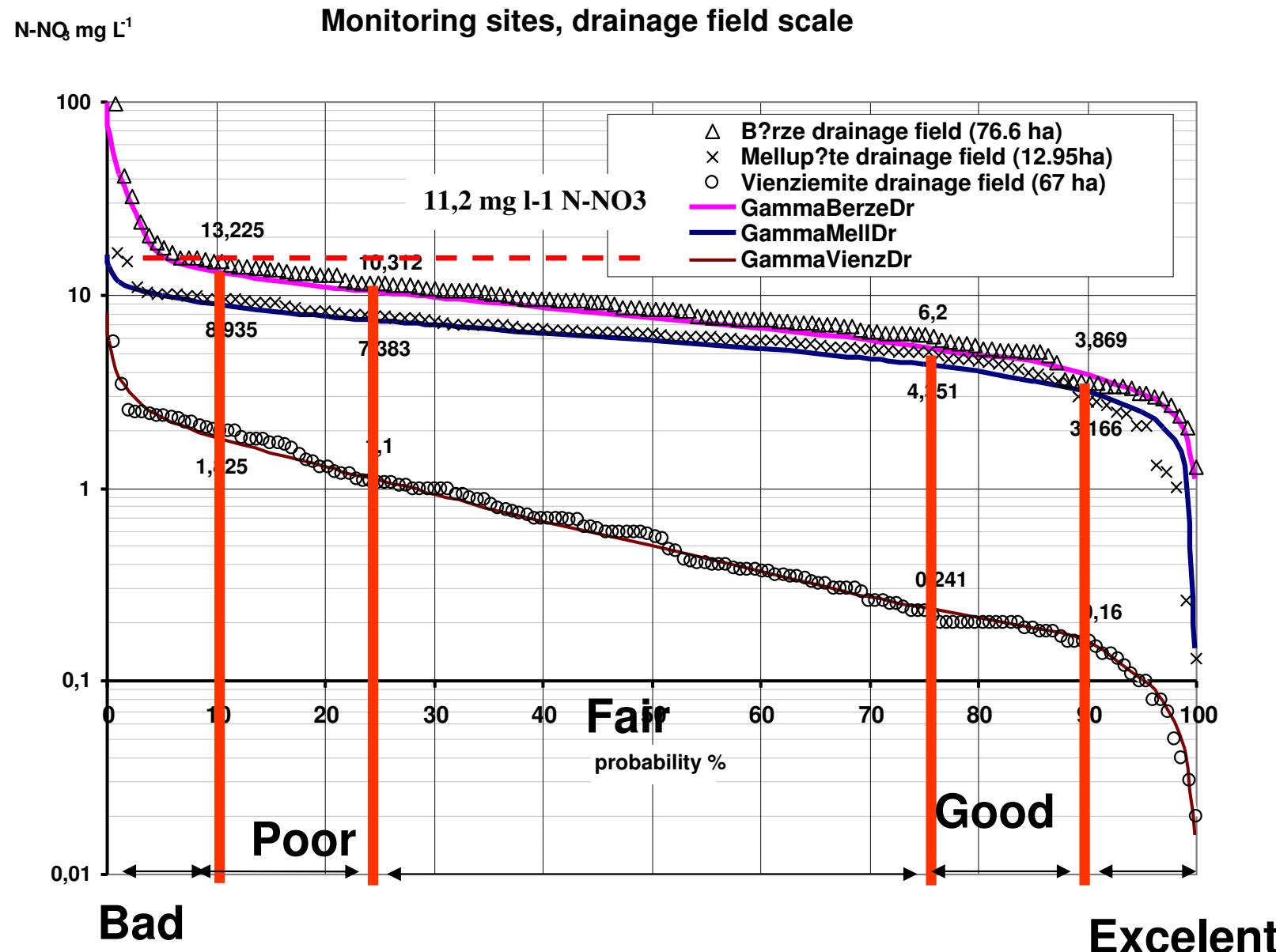
US EPA method based on percentile selection of data plotted as frequency distribution could be used.

(EU JRC publication: A.C. Cardoso et al; "Criteria for the Identification of Freshwaters Subject to Eutrophication")

# Evaluation of the Nutrient Concentrations in Field Drainage.



# Probability (Gamma distribution) Curves for the Nitrate Values Evaluation in the Small Catchments' Run-off



# Numeric Values for Water Quality Criteria

Quality class	$N_{tot}$ ( $\text{mg L}^{-1}$ )		$P_{tot}$ ( $\text{mg L}^{-1}$ )	
	Agricultural land		Agricultural land	
	Field Drainage	Small catchment	Field Drainage	Small catchment
Excellent	<4.5	<1.5	<0.015	<0.025
Good	4.5-5.5	1.5-2.5	0.015-0.020	0.025-0.050
Fair	5.5-10.0	2.5-7.5	0.020-0.075	0.050-0.150
Poor	10.0-12.0	7.5-10.5	0.075-0.135	0.150-0.250
Bad	>12.0	>10.5	>0.135	>0.250

# Conclusions

1. Water quality nutrient criteria may be developed for run-off from farm land for the field drainage and small catchment.
2. Criteria could be developed taking into account available monitoring information in different geographical scales, and may be adjusted with neighboring EU countries with similar regional climate, soil, and crop management conditions, e.g. Baltic - Nordic countries.
3. Field drainage / small catchments' water quality assessment should include full scale of water quality classes (excellent ↔ poor). Reference values for nutrients concentration (mg L<sup>-1</sup>) for water quality classification (5 classes according WFD) could be designated using following percentiles: (1) <90% excellent quality, (2) 90 – 75% good quality, (3) 75 – 25% fair quality; (4) 25-10% poor quality; (5). > 10% bad quality.

**Thank You for attention!  
Questions?**