

ENVIRONMENTAL AND YIELDING ASPECTS OF CONVERSION TO ORGANIC FARMING - A CASE STUDY

Tyburski Józef¹, Stalenga Jarosław², Kopiński Jerzy²

¹ University of Warmia and Mazury in Olsztyn,

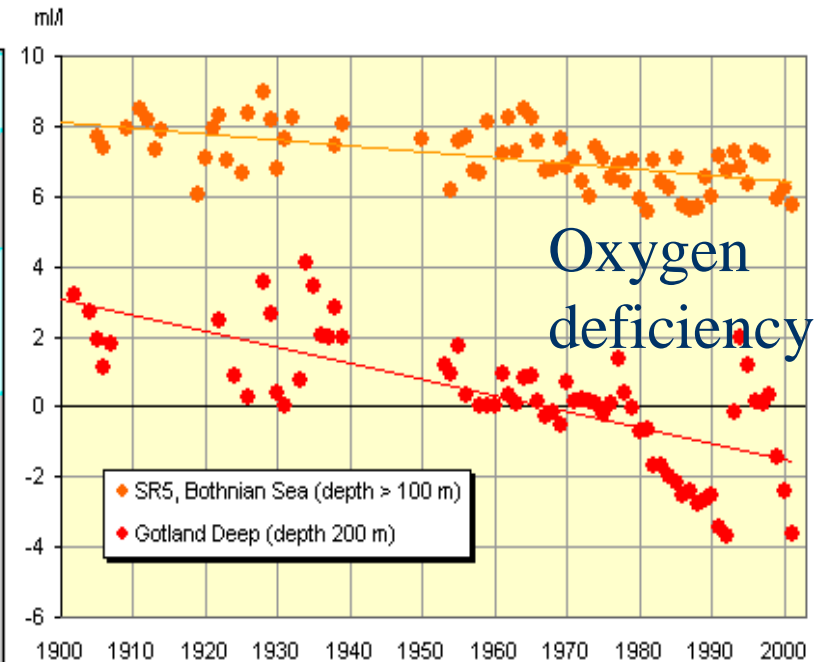
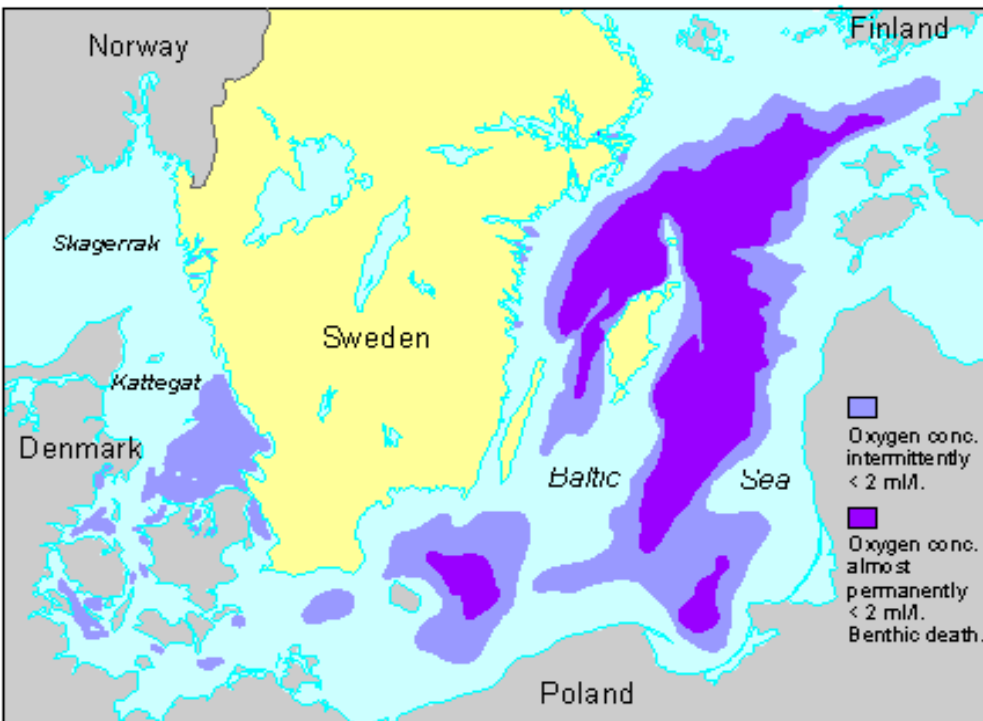
² Institute of Soil Science and Plant Cultivation – Sate Research Institute, Puławy

Research conducted under EU INTERREG III B project BERAS Implementation
(*Baltic Ecological Recycling Agriculture and Society*)

The environment in Baltic Sea

mirror of 85 million peoples use of

natural resources in the Drainage Basin



BERAS

Baltic Ecological Recycling Agriculture and Society



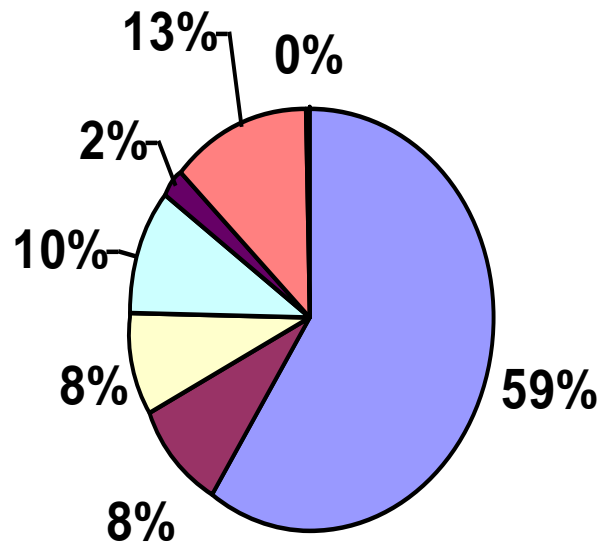
Impact of agriculture on the Baltic Sea

Gross load nitrogen BSR from human activities

Year 2000: **562 000 tonnes**

(Tot 822 000 incl backgr 260 000)

HELCOM 2005

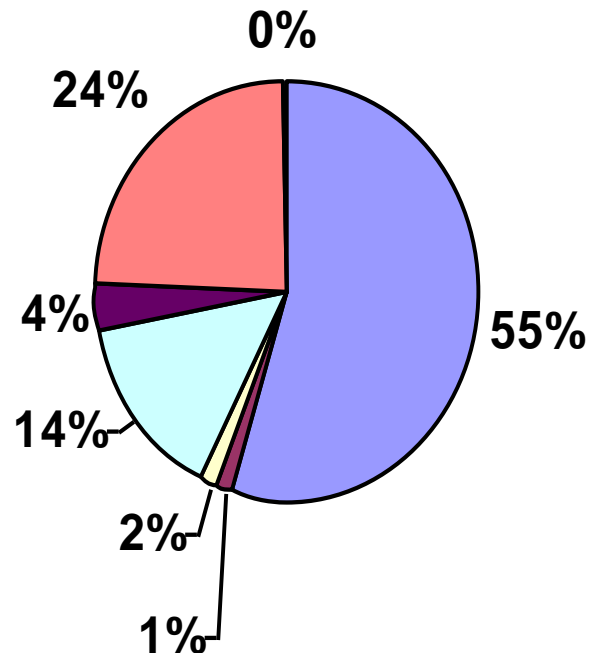


- agriculture
- forestry
- deposition
- priv ww
- industries
- munic ww
- fishfarms

Impact of agriculture on the Baltic Sea

Gross load phosphorus BSR from human activities

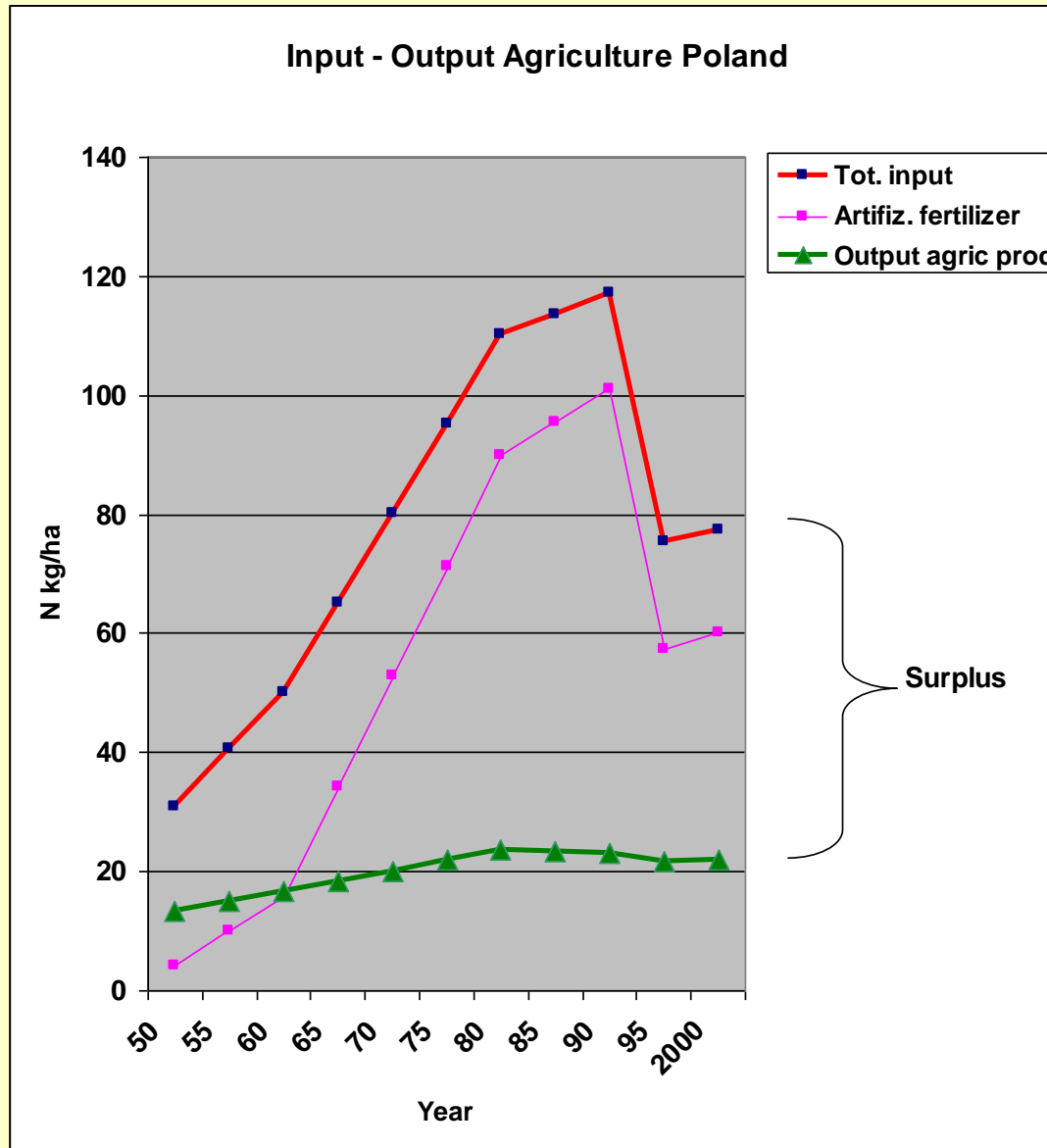
Year 2000: **29 000 tonnes**
(Tot 40 000 incl backgr 11 000)
(HELCOM 2005)



- agriculture
- forestry
- deposition
- priv ww
- industries
- munic ww
- fishfarms



The total average farm gate N balance per ha for Poland



ERA (Ecological Recycling Agriculture)

ERA Farms are characterized by:

- optimal stocking rate 0.5 – 1.0 LU per ha
- self-sufficiency in fodder 85%
- self-sufficiency in manures

N, P, K surplus in selected organic farms in Poland

Region	Stocking rate, LU per ha	Balance, kg per ha		
		N	P	K
Pomorze Zachodnie	0,69	+ 55	- 1	+ 7
Bory Tucholskie	0,73	+ 29	+ 1	- 20
Pojezierze Iławskie	0,69	+ 25	- 4	+ 10
Mazowsze	0,47	+ 8	- 3	- 8
Dolny Śląsk	0,67	+ 48	- 2	+ 3
Małopolska	0,51	+ 30	- 5	- 31
Lubelszczyzna	0,59	+ 29	- 2	- 1
Average	0,62	+ 32	- 2	- 6



Basic farm data:

- 130 ha family farm (73 ha of arable land)
- Located on sandy soils of ca. 28 points (in a scale of 100 points),
- The soil is prone to leaching
- There is low precipitation, so
- Crops often show water deficiency
- Soils are stony and denuded
- So, it is low quality, almost a marginal land



Soils of the farm before conversion to organic system

The content of available plant nutrients on the farm was:

- medium in P, and
- content of K was low to very low (to meet crop needs mineral K fertilizers allowed in organic farming have to be used)
- soil pH values were between 4.1 and 6.1. (liming of subsequent fields was initiated in 2012).

Introduction of **soybean**
– a new crop for the region













MERLIN



ANUSZKA

A photograph of a large field of green, leafy plants, likely a crop field. A small, rectangular white sign with the word "LISSABONE" in black, sans-serif capital letters is placed in the center of the field. The sign is supported by a thin wooden stake. The plants are dense and cover the entire field, extending to the horizon. The lighting is even, suggesting an overcast day.

LISSABONE







Introduction of **organic grain maize**
– a new crop for the region









Yielding of main crops during conventional management (2004)
and after conversion to organic system, t per ha

Specification	Data for:			
	2004*	2011	2012	2013
Winter triticale	3.5	-	-	2.0
Winter rye	-	1.2	-	1.5
Cereals mix	4.0	-	1.8	2.5
Spring wheat	-	2.5	3.0	-
Grain maize	-	-	8.5	9.0
Cereal / pulses mix	-	2.0	1.5	1.5
Blue lupine	1.8	-	-	-
Soybean	-	-	2.2	2.3

* last year of conventional management

Harvested and purchased cereals and pulses and fodder self-sufficiency level

Years	Cereals			Pulses		
	harvested, t	purchased, t	Self- sufficiency, %	harvested, t	purchased, t	Self- sufficiency, %
2004*	180	20	90%	25	15	63%
2011	79	12	87%	0	10	0%
2012	88	10	90%	1	8	11%
2013	120	0	100%	10	0	100%

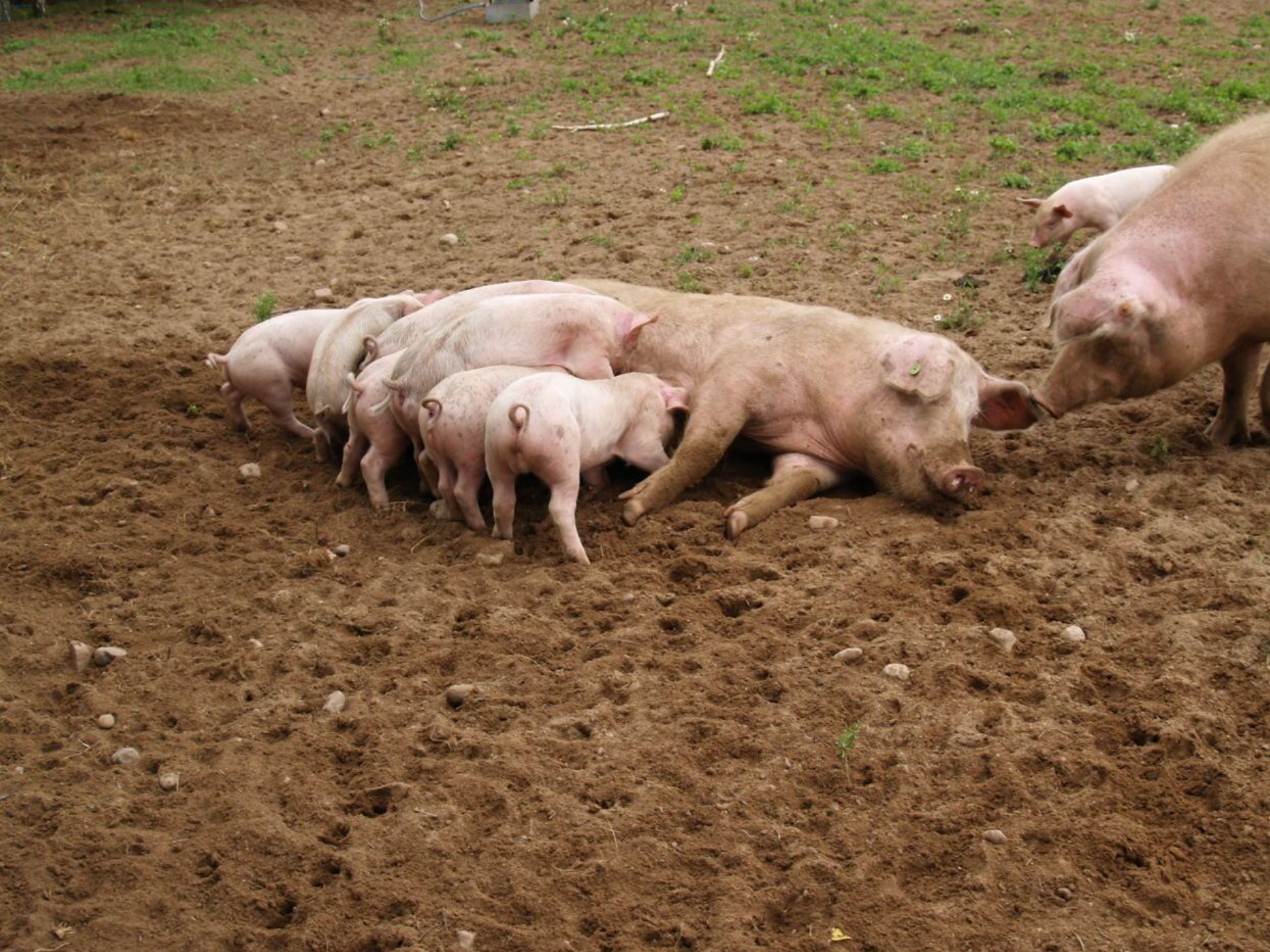
* last year of conventional management

Changes in animal husbandry

- 1/ Conventional no bedding system (slurry) was replaced by free range system (FYM)
- 2/ The Polish pig cross-bred of the Large White Polish x Polish Landrace (WBP♂ × PBZ♀) was not right for free range system
- 3/ The switch from the Polish to Danish cross-bred Danhybryd x Duroc.













Livestock production during conventional management and after conversion to organic system

Specification	Data for:		
	2004	2011	2012
No of weaners sold	-	272	-
No of heavy hogs sold	684	58	240
Total liveweight sold, t	72	13	35
Stocking rate, LU per ha	2.03	0.5	0.94

Livestock production during conventional management and after conversion to organic system

Specification	Data for:		
	2004*	2011	2012
No of weaners sold	-	272	-
No of heavy hogs sold	684	58	240
Total liveweight sold, t	72	13	35
Stocking rate, LU per ha	2.03	0.5	0.94

* last year of conventional management

Changes in the environment

- 1/ The farm fields are bordering a small 2 ha lake.
- 2/ During the time of conventional management of the farm the lake was contaminated, because of:
 - a/ use of no-bedding system and thus slurry application on the fields,
 - b/ high stocking rate and high rates of synthetic N (135 kg N per ha) with rather low grain yields (3.6 t per ha).

Slurry is very prone to losses (also in the form of surface run-off) and its utilization rate (efficiency of N uptake) is also very low.

After the conversion pigs are kept on straw bedding so FYM is produced.





Conclusion

- 1/ Feed self-sufficiency was high in the period of the conventional management and low after conversion to organic farming (sharp decline in grain yield),
- 2/ In the case of cereals mix growing, N surplus during conventional management was only slightly higher than during organic management (high yields in the first and low in the second case).
- 3/ The switch to grain maize increased yields from 2 to 8.5 t per ha and thus bettered nutrient balance contributing to improvement of environment.
- 4/ The introduction of soybeans and grain maize brought fodder self-sufficiency and
- 5/ purified the nearby lake (currently its water is clear and used for swimming)

Thank you very much for your attention