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SUMMER SCHOOL

UAM

Ecological state of the lake during restoration measures

Hydrological balances

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Contents

- Study area
- Methods and instruments
- Parameters measured
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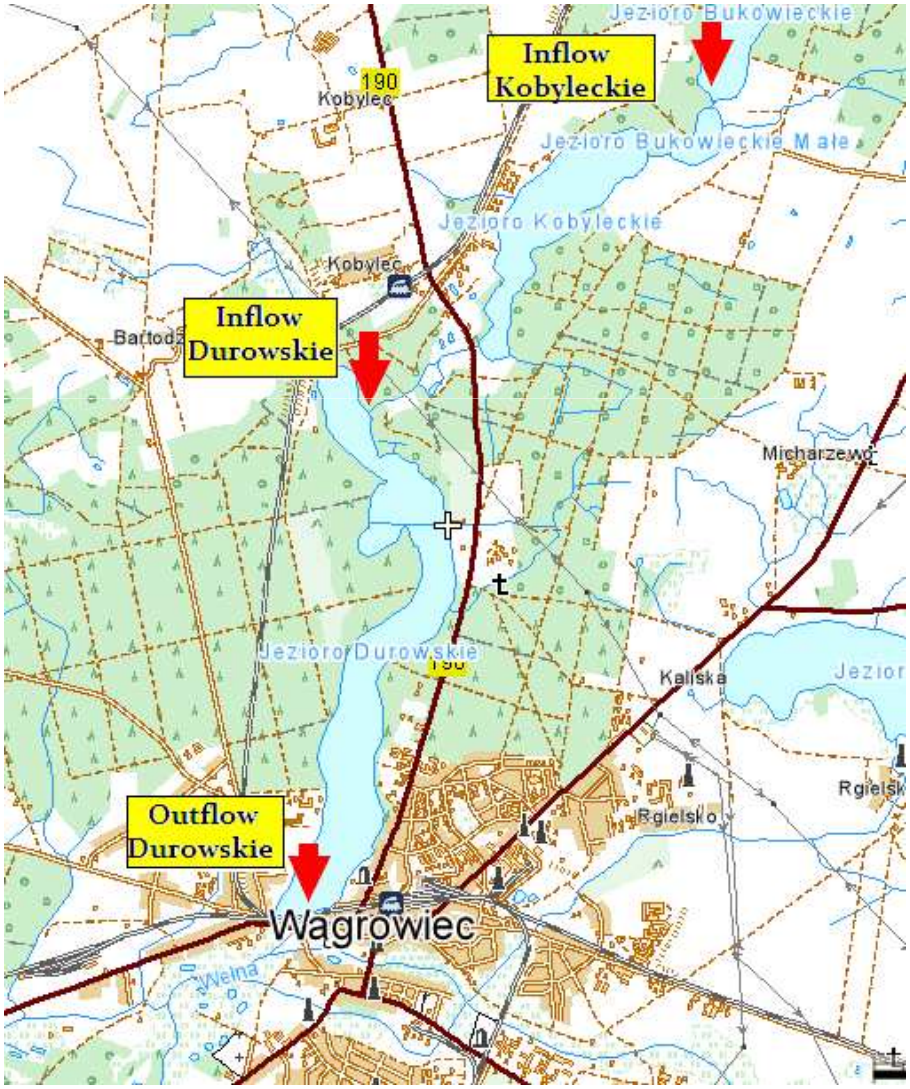
Sampling Areas



1. Inflow Durowskie
   – N 52°50’40”;
   E 17°12’30”.
2. Outflow Durowskie
   – N 52°48’29”;
   E 17°11’30”
3. Inflow Kobyleckie
   – N 52°51’25”;
   E 17°13’35”

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Methods and instruments

- Multiparameter measurement device
- Flow meter
- Measuring rod
- Spectrophotometer

Measuring of parameters at **inflow Durowskie**

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In situ measurement, Wagrowiec

- Conductivity
- pH
- Temperature
- Oxygen saturation & content
- Dimension of the inflow and outflow stream
- Flow velocity

Measuring of parameters at
outflow Durowskie

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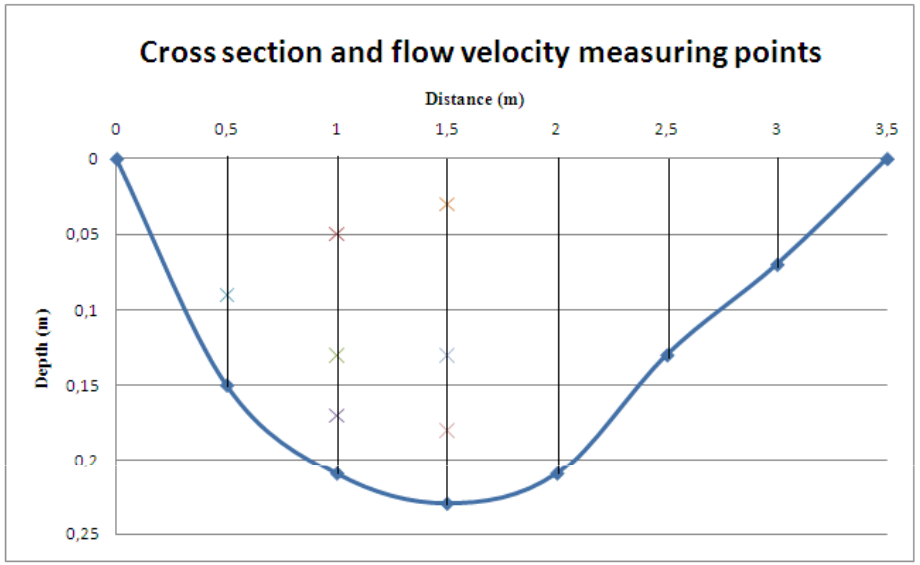
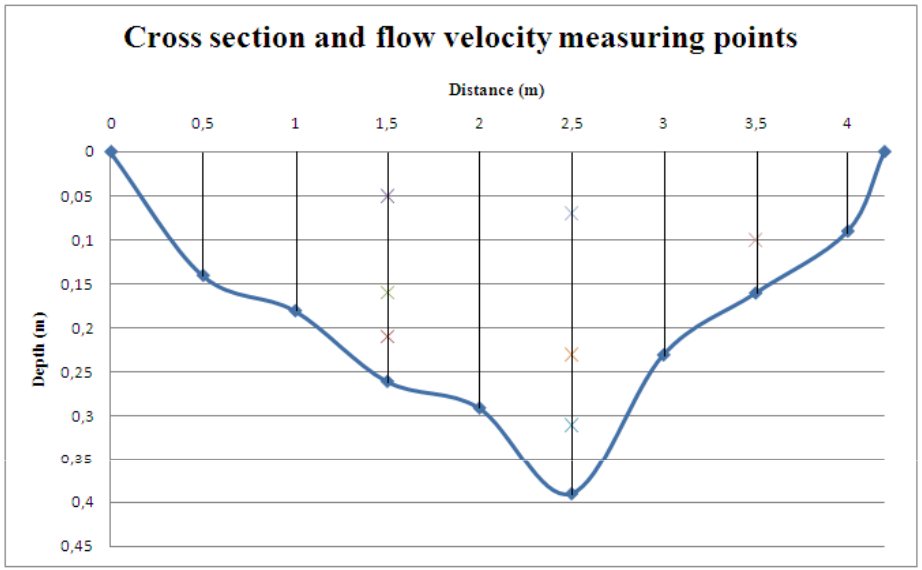
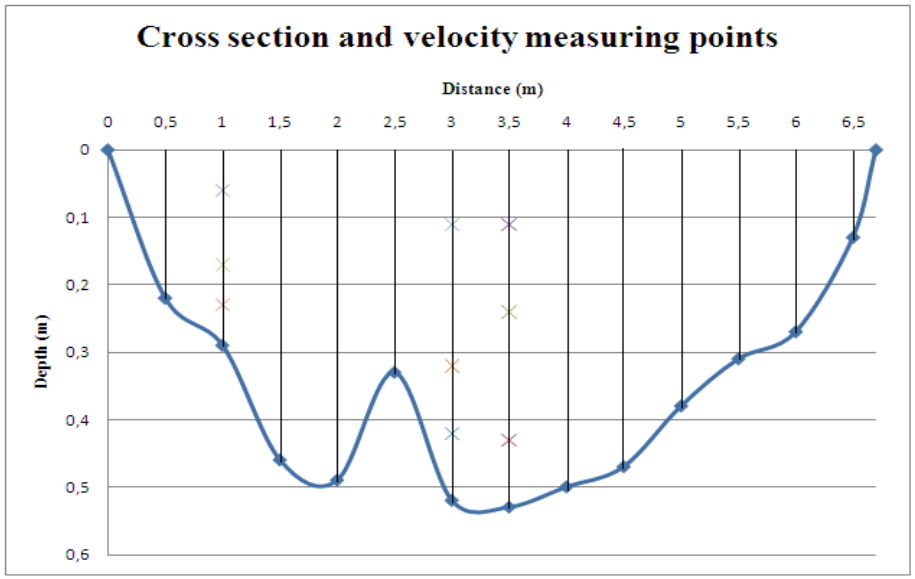
Dimension of the inflow and outflow







- $\mathbf{Q} = \sum_{i=1}^{n} \mathbf{a_i}\, \nu_{\mathbf{i}}$

- Q - flow volume (m^3/s)
- A - sum of the area of the sub-section (m^2)
- ν - the average velocity of the water (m/s)

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Ex situ measurement, Poznan

- Loads of Nitrate
- Loads of Ammonium
- Loads of Phosphorus
- Loads of Orthophosphates (PO_4)
- Chlorophyll a

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Methods

- Nitrite nitrogen – sulfanilic acid method (520 nm)
  - Sulfanilic acid
  - Naphthylamine
  - Acetate buffer
- Ammonium nitrogen – Nessler's reagent method (410 nm)
  - Sodium-potassium tartrate
  - Nessler's reagent
- Orthophosphates – ascorbic acid method (850 nm)
  - Ascorbic acid
  - Molybdenic acid

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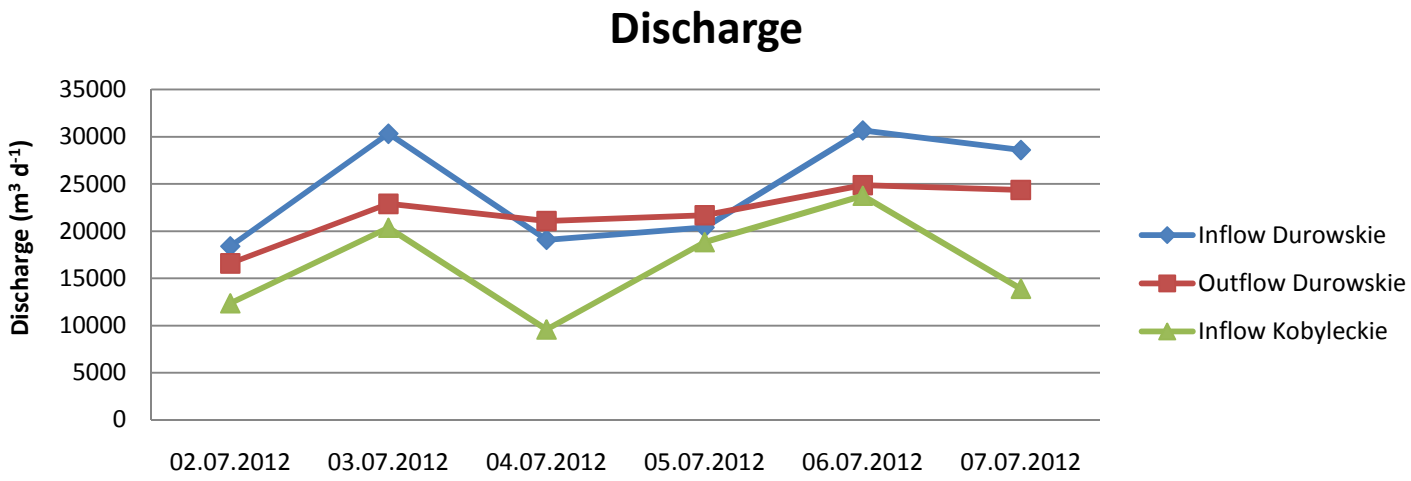
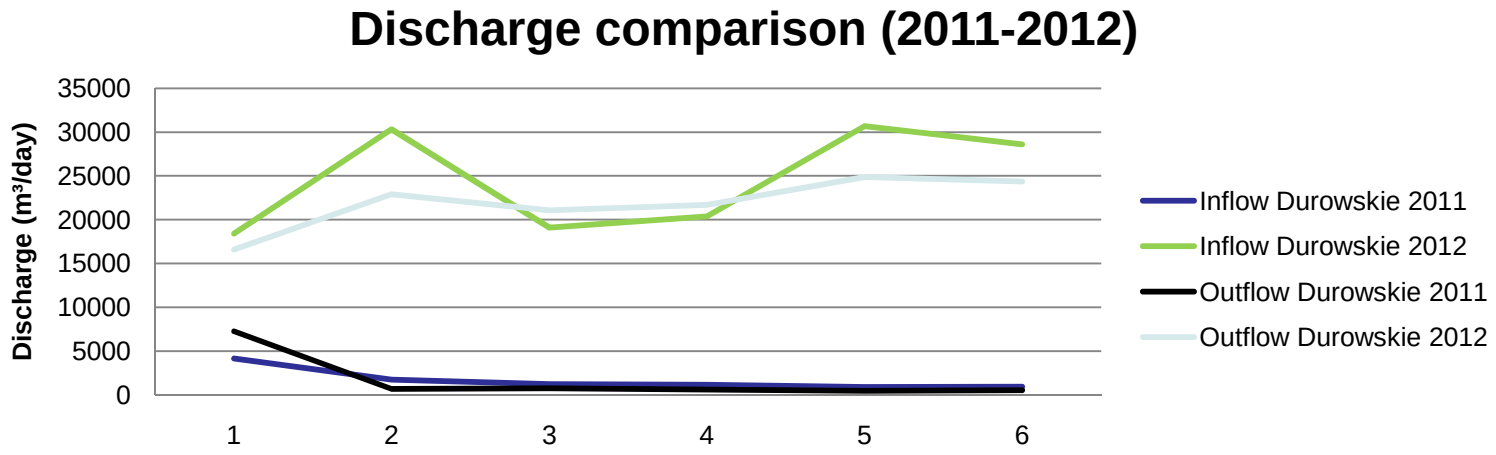
Discharge





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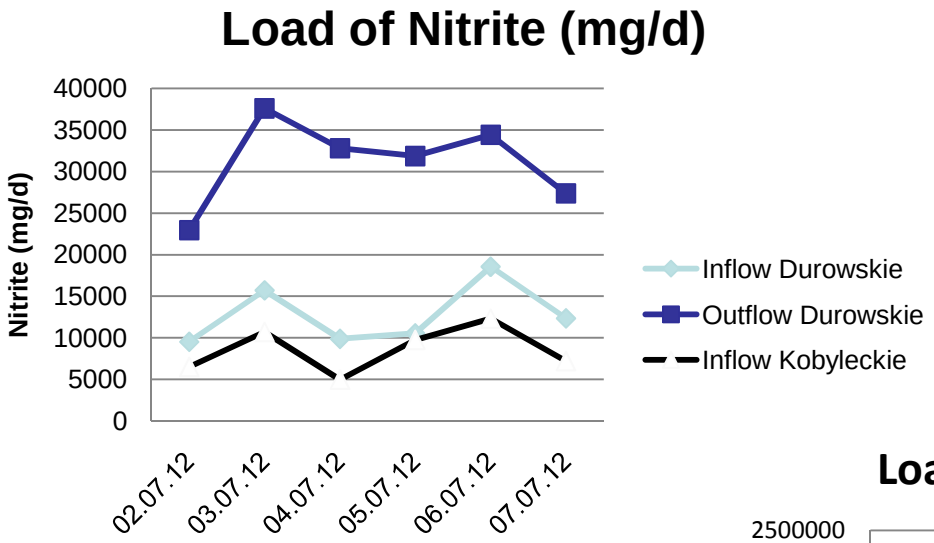
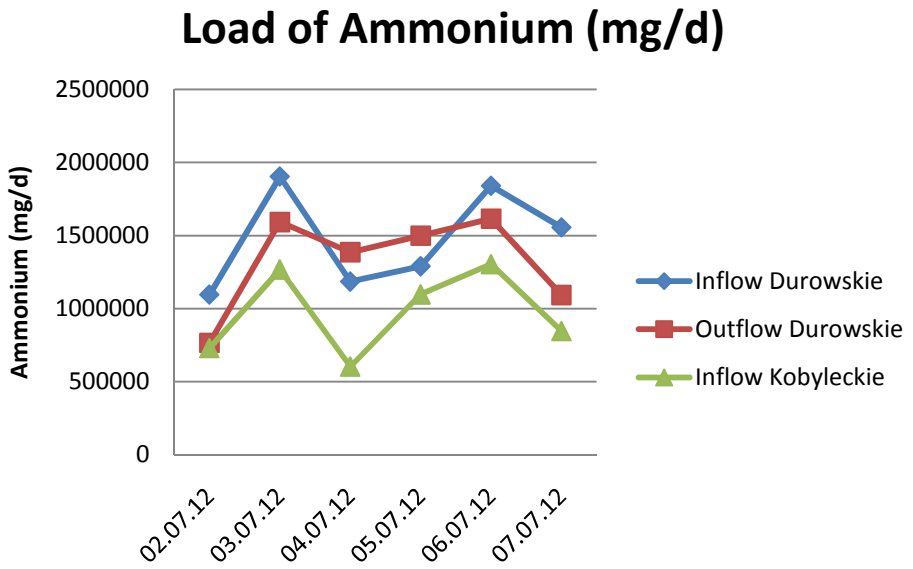
Loads of nitrite and ammonium





- High amount of nitrite in the inflow caused by denitrification

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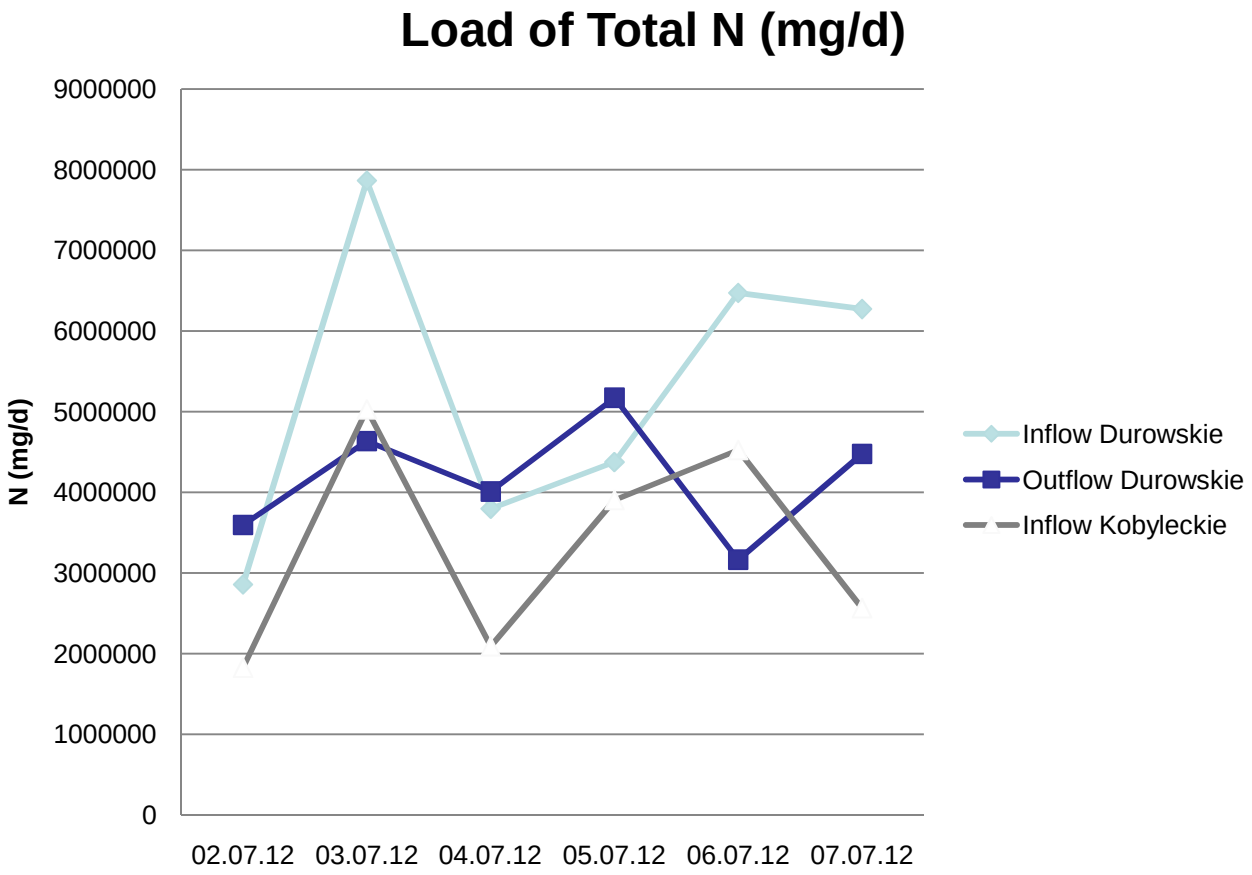
Load of total nitrogen



- Lake Durowskie as sink system for nitrogen

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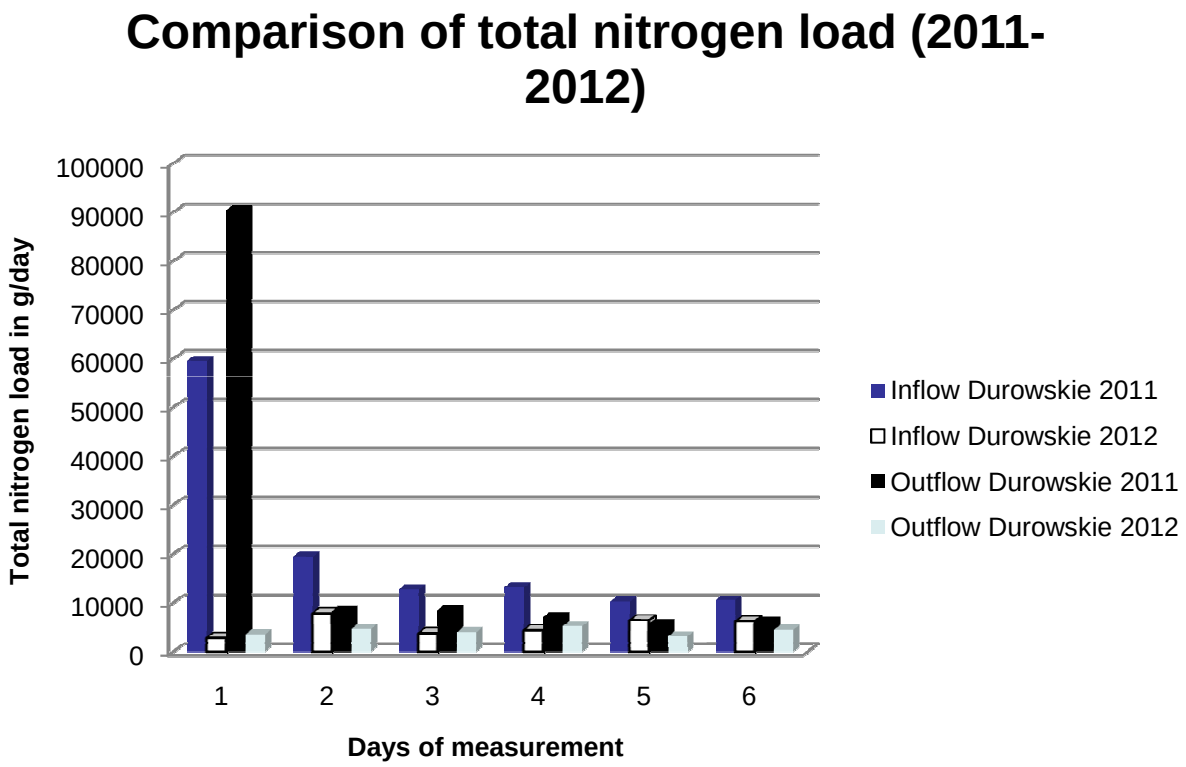
Comparison in Load of nitrogen



- Reduction of nitrogen load compared to 2011

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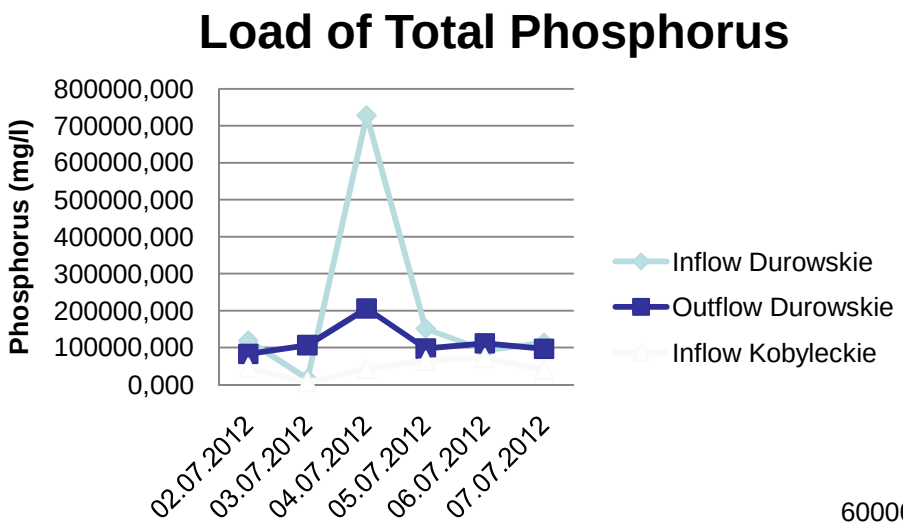
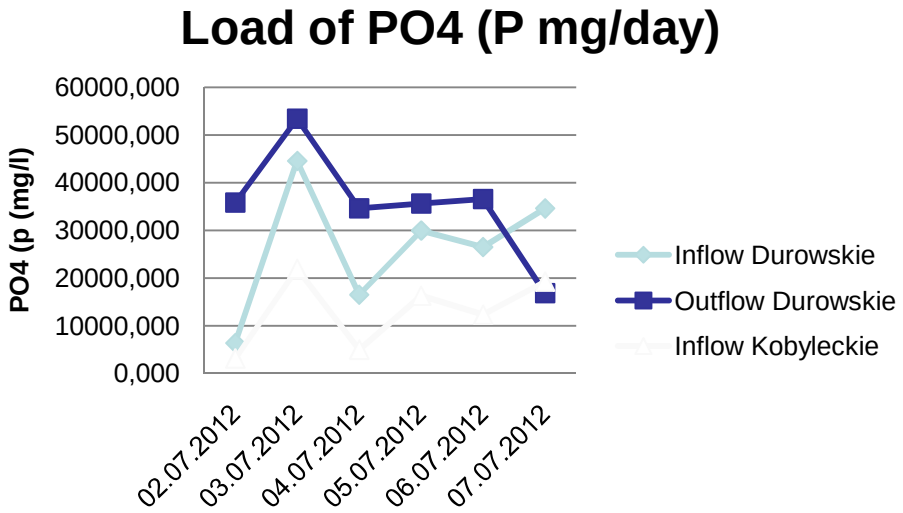
Load of Phosphorus





- Lake as a source system for phosphorus

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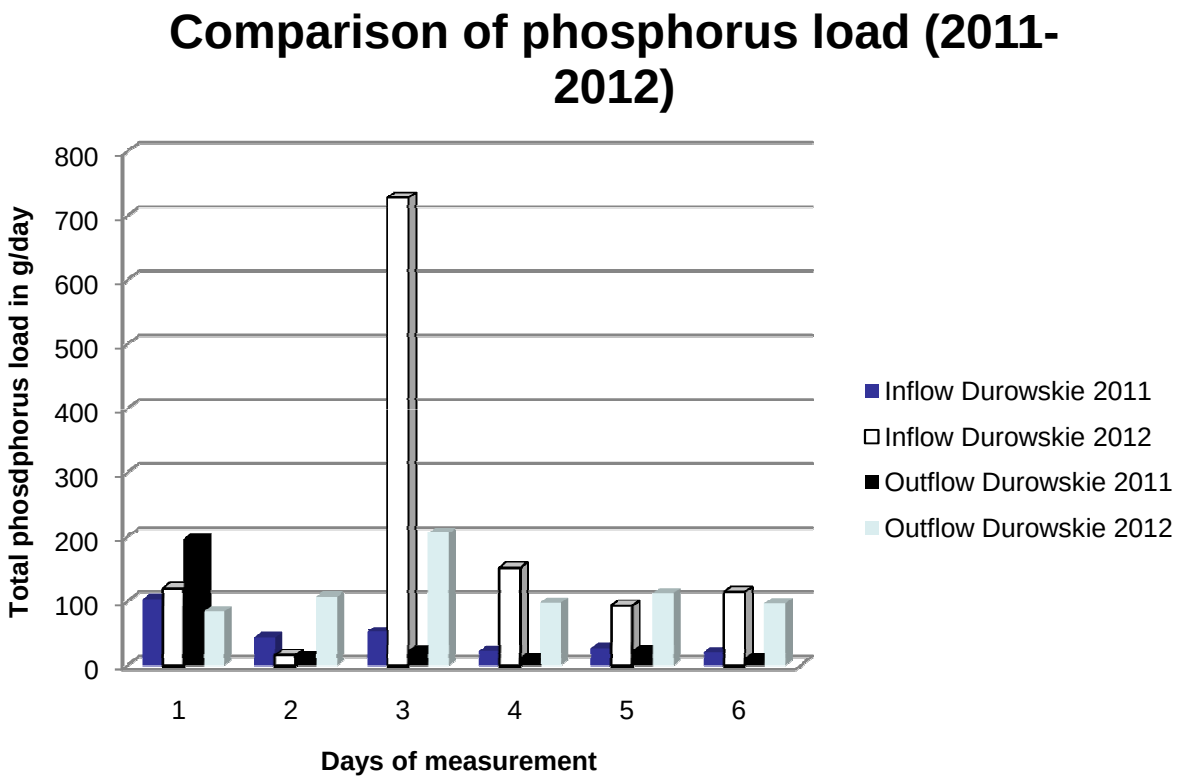
Load of Phosphorus



- Increase in phosphorus load compared to 2011

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State of water quality

	Inflow Durowskie	Class	Outflow Durowskie	Class	Inflow Kobyleckie	Class
pH	8,3	1	8,5	1	8	1
Temperature (°C)	24,53	2	24,68	2	23,98	2
Oxygen (mg/l)	11,02	1	13,51	1	8,57	1
Conductivity (µS/cm)	501,66	1	481,83	1	516,33	1
Amonium N (mg/l)	0,699	1	0,699	1	0,69	1
Total N (mg/l)	2,42	1	2,236	1	2,305	1
Total P (mg/l)	0,115	1	0,063	1	0,034	1
$P\text{-}PO_4$ (mg/l)	0,012	1	0,019	1	0,009	1
Final state	good state		good state		good state	

Class 1 : very good condition
Class 4: severe contaminated and polluted

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Conclusion

- In comparison to last year the load of phosphorus increased whereas the load of nitrogen decreased.
- However, this is a very shallow evaluation due to the lack of complete data (rainfall, evapotranspiration, capillary rise, change in storage, etc).
- From the hydrological balances' stand point, the overall water quality was found to be in a good state.

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References

- Busch N., Dieter W., 1992, *The Development of an Aquatic Habitat Classification System for Lakes*, U.S Fish and Wildlife Service Buffulo, New York
- Rozporządzenie Ministra Środowiska z dnia 9 listopada 2011roku w sprawie sposobu klasyfikacji stanu jednolitych części wód powierzchniowych oraz środowiskowych norm jakości dla substancji priorytetowych.