



"Recultivation of Jelonek and Winiary lakes in Gniezno by inactivation of phosphorus in bottom sediments".

LAYMAN'S REPORT



Projekt Miasta Gniezna nr LIFE07 ENV/PL/000605 p.n. "Rekultywacja Jezior Jelonek i Winiary w Gnieźnie metodą inaktywacji fosforu w osadach dennych" jest współfinansowany przez Wspólnotę Europejską w ramach Instrumentu Finansowego LIFE +

Dear readers,

It is with great pleasure and satisfaction that I am delivering this information devoted to the subject of the reclamation of the lakes in the first capital city of Poland to your hands. This is the result of the implementation of a very important project for our city, which, as the only Polish undertaking of this type, has received almost one million PLN for this purpose within the framework of the Life+ programme. Owing to the financial support of the European Commission, the city of Gniezno has been able to take up such an important task.

I hope that the project entitled "Reclamation of the Jelonek and Winiary lakes in Gniezno by means of the method of phosphorus deactivation in bottom deposits" will be an inspiration for other undertakings of this type in Poland. Owing to them, our country may become even more beautiful, and its natural resources may deliver more joy to us.



Mayor of the city of Gniezno



Jacek Kowalski

The problem of overgrowth within the lakes

The lakes located in the centre of the city of Gniezno have fulfilled a recreational function for decades, providing the inhabitants with the possibility to relax and enjoy themselves in the open air. Unfortunately, unfavourable environmental conditions contributed to the existence of a real risk of their eutrophication (overgrowing), and in consequence, their complete decay. Owing to the implementation of the programme entitled "Reclamation of the Jelonek and Winiary Lakes in Gniezno by means of the method of phosphorus deactivation in the bottom deposits" they will still bring joy to the lovers of sport and nature for a long time.

Eutrophication is a natural process of aging in water reservoirs consisting in their successive overgrowing and shallowing. This process, as a result of man's impact, has become significantly sped up, mainly through the inflow of excessive quantity of biogens (including phosphorus and nitrogen biogens). The consequence of this is the rapid worsening of water quality in water reservoirs, the conspicuous result of which are algal blooms, including blue-green algae.

At a certain point, the unfavourable changes occurring in a given water reservoir assume the character of a chain reaction and cause, as a consequence, progressive degradation of the reservoir. The commencement of operations which will allow the unfavourable changes to be stopped and which will cause an improvement in the state of the lake ecosystem becomes necessary. Due to the occurrence of the above-mentioned unfavourable changes in the Jelonek and Winiary lakes, the decision has been taken in Gniezno to start the operations related to reclamation.

For this purpose, a project concerning the reclamation of both lakes was developed in the Municipal Office in Gniezno, and then submitted within the framework of recruitment to the LIFE + Programme, Component II "Environment Policy and Governance". The project of the city of Gniezno was selected for co-financing as the only Polish project from the 2007 recruitment. The implementation of the undertaking covered the years 2009-2010.

The total value of the project was estimated at EUR 431,861.00 and was co-financed by the European Commission by 50%.

Method of reclamation

Taking a decision on the main method of reclamation, it is necessary to take into account the degree of interference of a given reservoir in the ecological system, the time needed to carry out the work, and above all, the permanence of the expected effects. A complex approach to the process of the reclamation of the reservoir is fundamental.

The innovative method of reclamation applied at the Jelonek and Winiary Lakes in Gniezno was the method of blocking phosphorus directly in bottom deposits by means of appropriate chemical substances (coagulants), leading in consequence to a decrease in the quantity of this element available in the water depths e.g. for blue-green algae or phytoplankton algae which could generate blooms. The innovation consists in triggering intense, but controlled disturbance of deposits and application of the coagulant directly to bottom deposits.

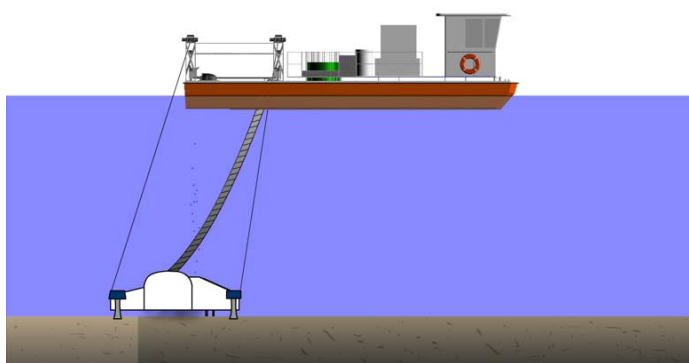
This type of actions allows the dosed chemical substance to penetrate the external layer, participating in the circulation of biogens, including phosphorus, between the deposit and the water. The author of the method applied and patented by the PROTE-Technologie dla Środowiska company is professor Ryszard Wiśniewski from the Laboratory of Applied Hydrobiology at the Nicolaus Copernicus University in Toruń, who also fulfilled the scientific supervision of the implementation of the project related to the reclamation of the lakes in Gniezno.



*The surface module
of the watercraft unit moored
on the Jelonek Lake in Gniezno.*



*The watercraft unit
with its conspicuous underwater
module suspended
in the surface watercraft dock.*



*Visualisation of the unit
of two watercrafts - surface (superior)
and underwater modules,
operating directly in the deposits.*

In order to make the practical application of the method of phosphorus deactivation in bottom deposits possible, a watercraft consisting of a unit of two modules, that is, the surface and underground modules, was used. It serves the purpose of feeding the chemical substances into the bottom deposits.

The surface module is responsible for the movement of the whole unit and for precise control and operation of the underwater watercraft. On the other hand, the underwater module is responsible for triggering the controlled disturbance of deposits within its confined space, their oxygenation and feeding of the phosphorus-blocking substance into the bottom deposits.

Treating the lakes in Gniezno as complex organisms, as well as the main method, (deactivation of the phosphorus in the bottom deposits), other methods supporting the reclamation process were applied in order to make the result of reclamation more permanent. The following methods were applied on the Jelonek and Winiary lakes:

- biomanipulation - manipulation of the stock of fish, that is, reduction of the number of fish from the family of Cyprinidae, by the introduction of predatory fish,
- macrophyte plantings - macroalgae (charophyceae) as well as submerged and emerged plants were planted within the separated areas of water reservoirs,
- provision of barley straw - barley straw bales were located at indicated areas of lakes, the decomposition of this straw causes the emission of substances called algaestats which limit the growth of algae and blue-green algae,
- seasonal mowing of the excess of plants forming reed areas - removal of significant quantities of biogens built in the plant tissues beyond the ecosystem of the water reservoir,
- the feeding of a chemical substance from the surface thus speeding up the process of the settlement of dead organic matter suspended in the water depths,
- dredging - in exceptional situations, the deposits from a separated part of the bottom of the given reservoir may require removal beyond the reservoir basin.

In consequence of the application of this method of deactivation of phosphorus directly in the bottom deposits, the following achievements were noted:

- phosphorus bonding in bottom deposits,
- reduction in the concentration of phosphates in water,
- limitation of blue-green algae blooms,
- increase in water transparency,
- settlement of macroalgae and water plants at the bottom,
- compaction of bottom deposits,
- improvement in the oxygen balance
- increase in biodiversity.

Management and monitoring

During the whole period of implementation of the undertaking, it was important to coordinate the actions and to monitor their effects. The project was implemented by the Municipal Office in Gniezno, and in particular, by the Department of Environmental Protection, Municipal Innovation and Promotion Centre and Finance Management Section.

The reclamation work was monitored on a current basis by an independent entity. At each stage of reclamation work, water and bottom deposit analyses were performed on the basis of which reports were prepared. During the whole period, the lakes were monitored in terms of possible changes occurring in the water depths.

We share our experience

The revitalisation of the lakes in Gniezno, as an innovative project, should become an example and inspiration for other actions of this type. Therefore, the city of Gniezno was willing to provide information about the entire undertaking by taking various promotional actions. A special bookmark devoted to the project was established on the website of the Municipal Office in Gniezno - www.gniezno.eu. In the vicinity of the Jelonek and Winiary Lakes, notice boards concerning the project implementation were placed. For the needs of promotion, an information poster was provided. The project was presented during numerous conferences and seminars.

We believe that the innovative method of lake reclamation applied in our project will be used to solve similar problems in other reservoirs. Not only are the beautiful lakes a sight to enjoy for pedestrians and tourists and a decoration of the city, but also they contribute to the improvement of the fitness of its inhabitants and promotion of a healthy lifestyle. These are values in which it is worth investing.

Advice on how not to cause damage to lakes

Finally, several good pieces of advice on how to take care of beautiful lakes in your city:

- Do not destroy the scarps. The turf on the scarps collects pollution flowing from the surface.
- Do not feed the water birds. Swans and ducks are adapted to the digestion of soft water plants.
- Exceptionally, during hard winters, water birds such as swans, ducks and coots may need feed such as: small vegetables, oats, cooked groats and rice. All this should be poured onto a site from which the snow has been removed.
- Do not throw the feed into water.
- Do not throw garbage into water.
- Do not discharge wastewater into the storm-water system around the lakes.
- Do not destroy lake plants.

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