International Perspectives in Water Resources Planning in Eastern Europe

May 16 - June 1, 2001

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Resources and web pages taken from IIHR – Hydroscience & Engineering

University of Iowa Study Abroad Programs

International Perspectives in Water Resources Planning in Eastern Europe

May 14 - June 01,2001

An initiative of IIHR-Hydroscience and Engineering
The University of Iowa College of Engineering, Iowa City, USA
in collaboration with
Budapest University of Technology and Economics (Hungary), Warsaw University of Technology (Poland), and Technical University of Civil Engineering Burcharest (Romania).

Purpose

The University of Iowa International Perspectives in Water Resources Planning study abroad program focuses each year on a country or a world region for an intensive and in-depth exposure to historical, cultural, social, economic, ethical, environmental, and political conditions that impact water resources projects in order better to prepare students for careers that are becoming increasingly global in nature. The 2001 program takes place in Eastern Europe.

Academic Program

The course will start with preparatory lectures by experts on the history, culture, and water resources projects of Eastern Europe. Lectures will be held on The University of Iowa campus during March - May 2001, but video taped for viewing by off-campus participants. The course finishes with post-visit written reports by participants. During the visit abroad, participants will interact with local students and attend seminars by local experts. The seminars will emphasize the planning, socio-economic and environmental impacts, rehabilitation programs and problems, legal, cultural and

institutional aspects of water resources projects. Participants will visit technical, historical, and cultural sites.

Specific Activities Tentatively Planned

Workshops and lectures will be held at various universities with participants from academia, government agencies, and industry. Activities are planned to encourage interaction of course participants with local university students. The technical focus will include field visits to major hydraulic structures on the Danube and Vistula rivers, including large-scale flood prevention and mitigation projects and hydro-power plants in all three countries to be visited; irrigation systems in Hungary and Romania; mitigation projects for air, water, and land protection in Poland and Romania; and water treatment plants, maritime ports, and the Danube Delta in Romania. In addition, tours of various historic sites and other points of interest are planned and there will be some free time for pursuing personal interests.

Instructors and Credit

The course will be conducted by Professor Witold Krajewski (IIHR and Department of Civil & Environmental Engineering) and Dr. Marian Muste (IIHR) of The University of Iowa. Each participant can earn 0-3 semester hours of credit depending on agreement with the instructors regarding assignments and methods of evaluating student's work.

Cost

The estimated total cost for the program is $2,300, including fees, round-trip airfare, lodging, meals and travel expenses abroad, and all educational and administrative costs. Participants are expected to pay for their travel to and from Eastern Europe and a portion of their local expenses. Financial aid may be applied toward program costs. Students may also apply for a grant from IIHR for up to $1,150.

Eligibility

The course is designed for seniors and graduate students who wish to become engineers, economists, planners, legal and management specialists, and environmental, social and political scientists. It is also suitable for professionals and young faculty members working in these fields. The course provides preparation for the increasingly international scope of practice and service in water resources planning and management.

Application Procedure and Deadline

Completed applications must reach The University of Iowa's Office for Study Abroad by February 28, 2001. The complete application includes the application form, available from The University of Iowa Office for Study Abroad, the most current transcript of grades, a letter of recommendation and a non-refundable application fee of $50. Applications will be reviewed as they are received, so early application is encouraged. Available financial aid will be distributed, and applicants informed by 23 March 2001.

Previous Courses

Some student reactions to the previous courses in India and in Taiwan and Japan are as follow:

"It has made me a better person...The lectures gave us an entirely new outlook on the issues related to water resources in India..."

"Meeting with students was an invaluable experience, one of the most important parts of the trip..."

"This experience will be invaluable to me in my professional career...altogether a worthwhile investment of time and money."

"I hope this class will continue. I thoroughly enjoyed the trip and recommend the course to anyone.

Send completed application and requests for further information to

Office for Study Abroad
28 International Center
The University of Iowa
Iowa City IA 52242
Phone: (319) 335-0353; Fax: (319) 335-2021
E-mail: study-abroad@uiowa.edu

Also visit

IIHR at its Web site:
http://www.iihr.uiowa.edu/

International Perspectives in Water Resources Planning in Eastern Europe

May 16 - June 1, 2001

The International Perspectives in Water Resources Planning Course is an initiative of IIHR and The University of Iowa College of Engineering, Iowa City, USA.

Each year the course focuses on a given area of the world for which the cultural, socioeconomic, historic and political conditions are studied in order to observe the interdependence of this aspects with the strategies for water resources management. This year the region chosen for the course was Eastern Europe and it was held in three countries: Romania, Hungary and Poland.

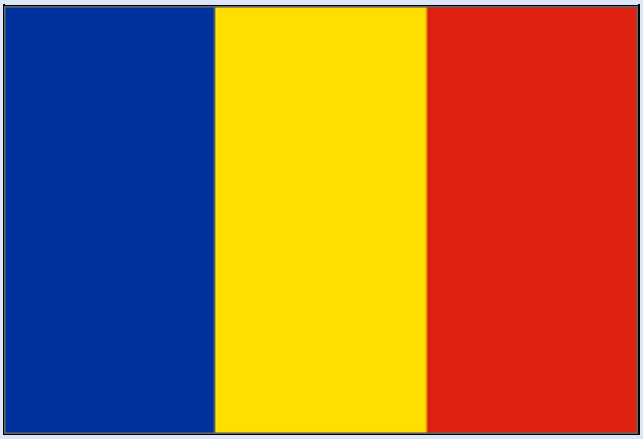
The course was organized in collaboration with Technical University of Civil Engineering Bucharest (Romania), Budapest University of Technology and Economics (Hungary), Warsaw University of Technology (Poland), and .

Here we present the itinerary of the Course (marked with red on the map) with some general explanations about the places visited and the problems analyzed. Follow the detailed tour by clicking on the name of the country.

ROMANIA HUNGARY POLAND

International Perspectives in Water Resources Planning in Eastern Europe

ROMANIA



1. Bucharest	**2. Constantza**	**3. Tulcea**	**4. Sinaia**
4. Brasov	**5. Arges County**	**7. Drobeta T.S.**	**8. Timisoara**

Map taken from Hammond Atlas

Extending inland halfway across the Balkan Peninsula and covering a large elliptical area of 237,499 square kilometers (91,699 sq. mi.), Romania occupies the greater part of the lower basin of the Danube River system and the hilly eastern regions of the middle Danube basin.

The Black Sea Coast (245 km long) and the Danube Delta (the largest in Europe) border Romania on the South-east.

May 2001

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In this page we will cover only issues related to our technical visits and cultural experiences, but this is a country rich in history, culture and art. There are several sites on Internet where more information about Romania can be found. Some of these sites are:

http://www.rotravel.com/romania/history/ and http://www.slider.com/Regional/Europe/Romania.htm

International Perspectives in Water Resources Planning in Eastern Europe

ROMANIA

May, 16

Bucharest

Visit to the Technical University of Civil Engineering of Bucharest

In our visit to the Technical University of Civil Engineering of Bucharest (UTCB) we received some general information about the history and structure of UTCB. This introduction was directed by Professor Constantin Iamandi and Professor Dan Stematiu.

The Technical University of Civil Engineering of Bucharest (UTCB) was founded in 1949 as the only one University in Romania dedicated exclusively to Civil Engineering. There are six faculties at the UTCB:

- Civil, Industrial and Agricultural Buildings
- Hydrotechnics
- Railways, Roads and Bridges
- Buildings Services
- Technological Equipment
- Geodesy

For more information about UTCB click here to visit its web page.

More detailed explanation about Water Resources planning in Romania and the work of UTCB in different areas of research was given by different speakers: Professor D. Stematiu talked about dams in Romania; Professor Anton Anton gave a presentation in water networks for water supply agriculture and industry; Professor R. Ciortan talked about waterways and harbors in Romania. Dr. Gabriel Racoviteanu gave a general overview of water supply and waste water treatment in Romania.

Dr.Pedro Alvarez and Dr.Marian Muste from University of Iowa, introduce the participants of the course and explain the objectives of the visit.

Dr. G. Racoviteanu talks about the Water Supply and Waste Water in Romania

From Right to left, Professor Anton Anton, Professors Dan Stematiu, Adrian Popovici, Constantin Iamandi, talk about the current major areas of interest for research in Romania.

Hydraulics Laboratory at UTCB:

In the afternoon, the group had the opportunity to visit the Hydraulics Laboratory of UTCB and observe some of the experiments that are conducted there.

Students and other staff from UTCB described the equipment and discussed about the ongoing experiments with the course participants.

Physical model for the study of river bed variations downstream the spillway.

Flume for qualitative study of the formation of a hydraulic jump.

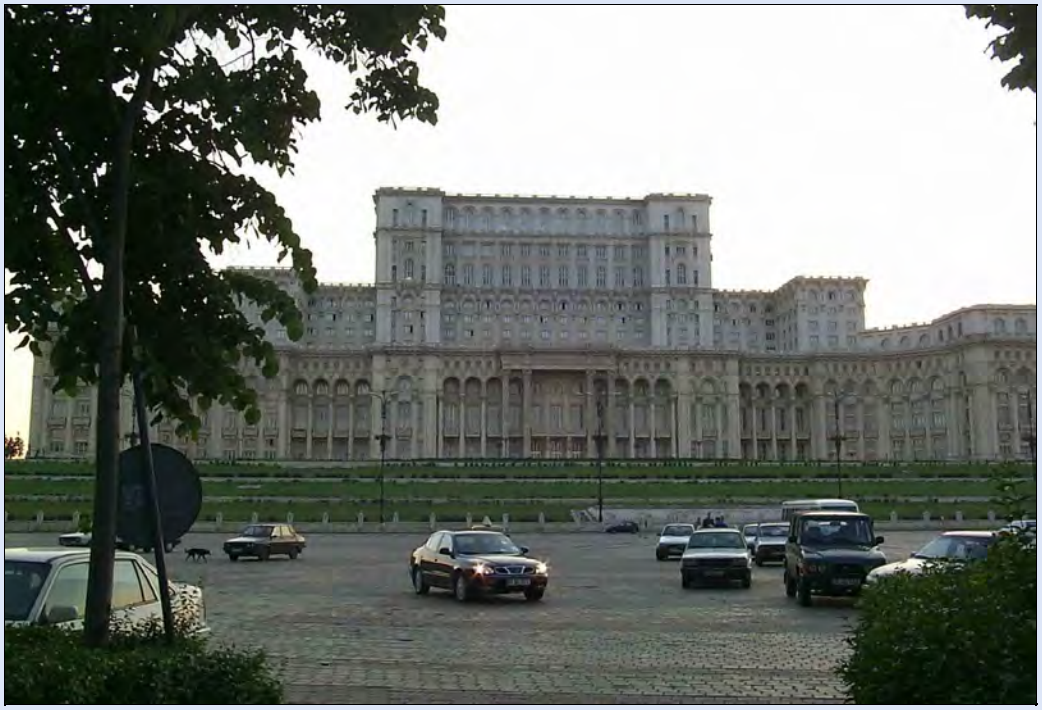
The wind tunnel is used to determine the transport of air pollution due to a given industry and the time in which the city is reached.

Walk in Bucharest historical center

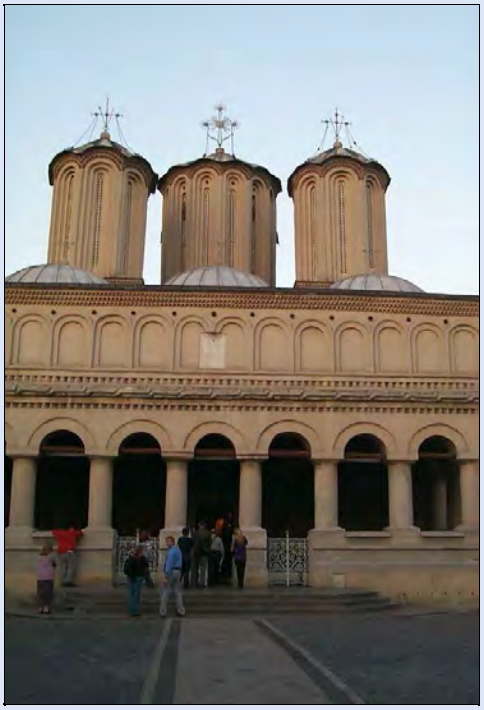
House of Opera

Central Library in Bucharest

Senate House (former Communist Party House)



The People's House or House of Parliament



Stavropoleos Church (Mitropolia)

May, 17

Bucharest

Visit S.C. APANOVA S.A and the Romanian Water Association

The group was received by the Vice President of the Romanian Water Association (ARA), Dr.Eng.Gheorghe Moraru

ARA is a professional association whose main scope is "to create the organizational framework for all the specialists in the field of water supply in Romania"(ARA,2001).

ARA is a technical and scientific consul that gives advice to the ministry, water producers and water distributors regarding the appropriate use of water. It also organizes symposiums, conferences, seminars and exhibitions to professionally educate and train personnel.

For more information visit www.ara.ro

Visit to Water Treatment Plant:

We visited the major water treatment plants for Bucharest city. The diagram in the wall shows the location of the different sources of water used for water supply of Bucharest. There are two main sources: superficial water from the river Dambobitza and groundwater extracted by batteries of wells.

Romanian traditional lunch

A traditional Romanian restaurant and ... food sample

Sightseeing Navigable canal Danube-Black Sea

After lunch, we departed from Bucharest to Constantza.

On our way we observed the Nuclear Power Plant at Cernavoda, the only one in Romania. More information at The Institute of Nuclear Research of Romania and CNE-PROD Cernavoda.

We also passed over the Canal Danube-Black Sea. The longest handmade channel in the world, which is used for navigation of vessels up to 5000 tons.

Detailed information about the Canal history and operation can be found at ADMINISTRATION OF THE NAVIGABLE CANALS S.H.

May, 18

Constantza

City tour

Harbor and shore protection works in Constantza.

The major Romanian port in the Black Sea is Constantza.

"The foundations of the city were laid some 2,600 years ago, when Greek colonists built the city of Tomis on the present site of Constantza. Under Roman rule, Tomis became a prosperous city, graced with statues, temples and monumental architecture. With Constantinople as the capital of the Eastern Roman Empire, Tomis was rebuilt by Constantine the Great who changed its name to Constantiana (from which the present name of the city has been derived), in honour of his sister" (Go to source).

Nowadays, the port of Constantza is one of the more important links between Europe an Asia and serves as end point for the transit through Europe between Rotterdam and the Black Sea. More information about the harbor is available at The Constantza Port Administration.

A view of the Black Sea and the Harbor

One of the top ten Casinos in Europe.

Sight seeing

Remains of the Roman Empire in Constantza's Archeological Museum (Mosaic)

Constantza's Lady

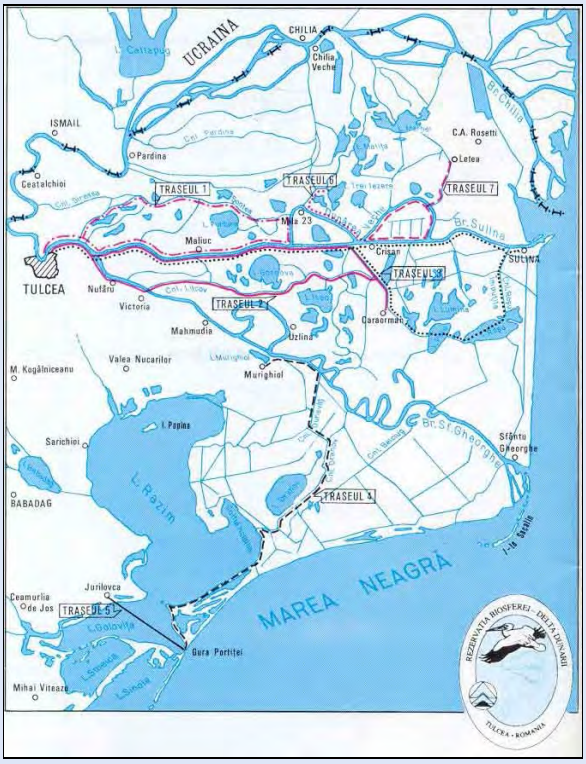
Statue of "Ovidiu" in front of Archeological Museum

Tulcea

Travel in the Danube Delta

The group visited the Danube Delta Biosphere Reserve. The expedition was directed by Ing. Teodor Gheorghiu and his family. We traveled along the Tulcea Branch of the Danube, then we entered the series of lakes in the Delta through a series of small secondary channels.

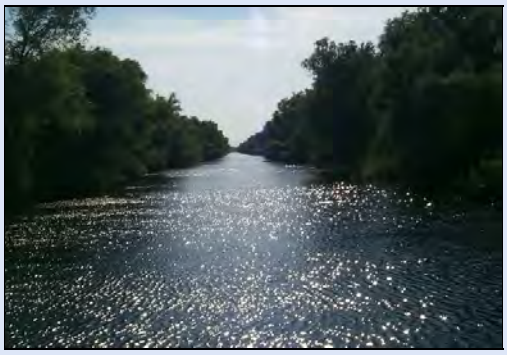
During the trip we could observe the reaches of the natural reserve and some of the flora and fauna that characterizes the region.



"It is an original place, unique of the kind: Europe's youngest land, neighbouring some of the planet's oldest mountains (Macin, a 400000-year old Hercinian massif)- a motley of water and land, permanently struggling, permanently changing, a criss-cross of channels, bank ridges, creeks, rain forests, river and marine dunes, in an ample and permanent metamorphosis." (Tiparit la R.A Monitorul Oficial)

More than 300 species of birds in the Delta area.

Branch Tulcea of the Danube



Secondary channel

Lake Isac in the Delta

Cultural night

After our trip through the Delta, Ing.Gheorghiu organized a Traditional Romanian Party with typical food, music and dancing.

May, 19

Leaving Dobrudja...

for the high lands

International Perspectives in Water Resources Planning in Eastern Europe

ROMANIA

May, 19

Urziceni - Sinaia

Visit to Royal Castle Peles and Sinaia Monastery

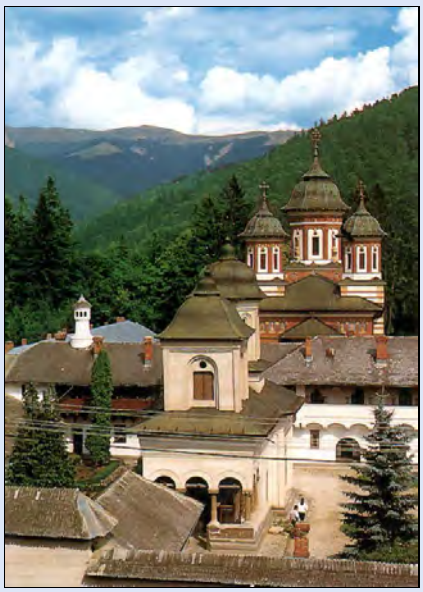
Peles Castle (Booklet reference)

King Carol I, founder of the castle

The big Armory

Peles Castle

Sinaia Monastery (Go to source)



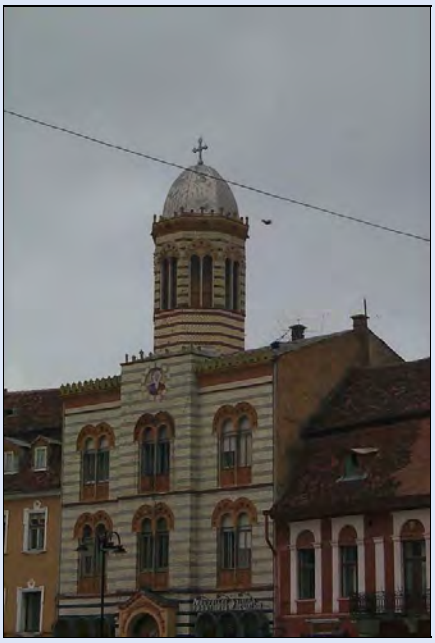
May, 20

Brasov

City tour

From Sinaia we traveled to Brasov, where we spent the night and had a short tour of the town next day.

Boulevard in main street in Brasov.



Main square . Around the square are the Orthodox and the Catholic churches.

Arges County

Visit the Bran Castle

" It's said that Bran was the castle of Vlad Tepes, Vlad Dracula, but in fact his castle lies in ruins farther west in Transylvania in the Arges Valley".

Bran was an important trading point during the middle ages; the stone wall in the picture indicates the boundary between Wallachia and Transylvania.

The houses in front of the road were the places where goods were weighted and the transit tax paid.

Visit to the Monastery at Curtea de Arges

The first Translation of the Bible to Romanian is kept in this church.

A story is told that during construction of the church, what was built during the day was destroyed overnight. The chief of the construction, Manole, decided to "bury" his wife in one of the columns in order to protect the cursed church.

It is said that after he put his wife there the church could be finished. Nowadays, visitors can see a plate in one of the walls indicating the place where the wife is supposed to be buried.

Visit to Vidraru Dam and hydropower plant

Vidraru is a double arched dam, the tallest in Romania.

View of the dam and the reservoir

Project specifications

- Height of the dam: 166.6 m
-
- Storage capacity: 465 millions m^3
-
- Installed power: 220 MW

The tunnels inside the dam for control of seepage and monitoring structural stability.

The previous year a policy for reduction of fuel consumption caused the lowering of the reservoir, which recovered during spring time, but not to its full capacity.

The power house is located 100 m underground;the total head for energy production is more than 200 m.

May, 21

Arges County

Visit Poenari Dracula's Fort

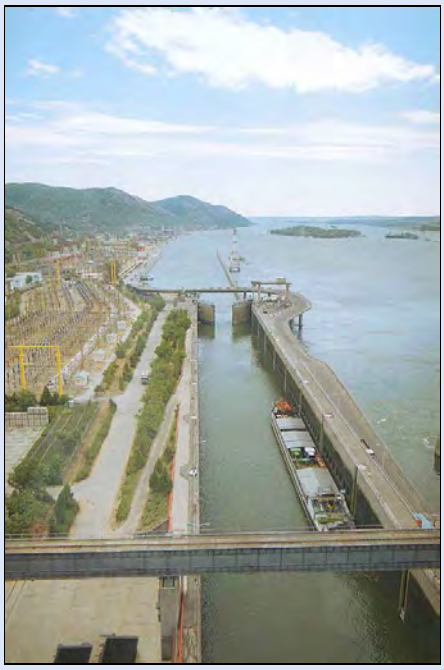
VLAD TEPES-The Impaler (DRACULA)
Prince of Wallachia 1448,1456-1462,1476 (Go to link)

The "real" Dracula's castle is located near the Power House at Vidraru Dam, on the top of a mountain. This castle was one of Vlad Tepes residences.

The brave ones that decided to "climb" the mountain to observe the remains of the fort.

Drobeta Turnu Severin

Visit "Iron Gates I" hydropower plant and navigation lock



Hydropower and navigation system Iron Gates is located on the Danube River and is shared by Romania and Yugoslavia. It was constructed between 1964 and 1972.

Sluices size (one in each bank):

- Length of lock: 310 m
- Width of the lock: 34 m
- Maximum depth of the sill: 4.5 m
- Sluice time: 62 min - 74 min.
- Maximum capacity: 1200 ton barges

There are two powerhouses, one in Romania and one in Yugoslavia, each with an installed capacity of 1050 MW.

Due to the war in Yugoslavia, the navigation in this section was stopped and at present there are not boats passing through the locks.

Powerhouse with 5 units.

Average flow of Danube in this section: 6000 m^3/s

Water level difference: 20 m- 34 m

Spillways

Visit to the Powerhouse.

Repairing one of the units.

May, 22

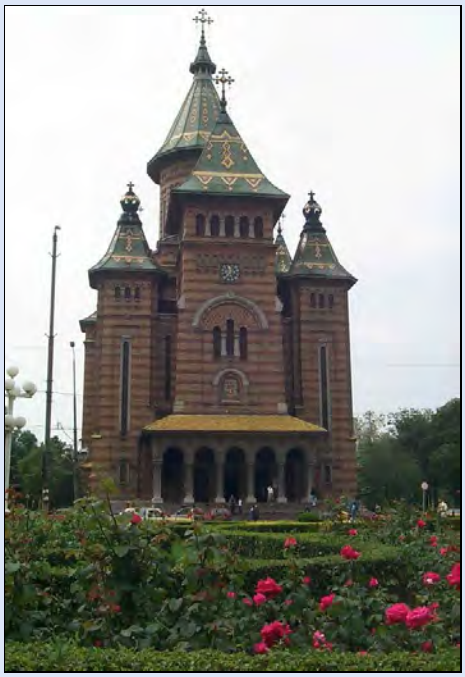
Timisoara

Visit University Polytechnic Timisoara

We were received by Professors Baia and Ion at the Hydrotechnics department. They showed us their Fluids Mechanics Laboratory and the annex for physical models.

We visited also the Hydraulic Machinery department and their laboratory.

City tour and departure from Romania



Timisoara's Orthodox Cathedral

The Opera and the 1989's revolution square.

Good bye to Nick and our Romanian's bus

The group said good bye and "Multzumim" to Romania.

International Perspectives in Water Resources Planning in Eastern Europe

HUNGARY

1. Gyula	**2. Szolnok**	**3. Opusztaszer**	**4. Budapest**
4. God	**5. Visegrad**	**6. Sarrod**	**7. Gyor**

(Map taken from Hammond World Atlas

Hungary is mainly a flat low land surrounded by the Carpathian Mountains in Romania and the mountain systems in Slovakia and Austria. This condition makes the country highly vulnerable to flooding and dependent on the water management of the neighbor countries.

Hungary has two principal rivers: the Danube and the Tisza. Not only is water brought into the country, but also water contaminants. This is another reason why international agreements and cooperation is required to guarantee an adequate water quality.

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http://www.gotohungary.com/history/history.shtml and http://www.slider.com/Regional/Europe/Hungary.htm

International Perspectives in Water Resources Planning in Eastern Europe

HUNGARY

May, 22

Szanazug, Gyula

Water Authority of Körös Valley

Dr. János Józsa introduces the participants of the course to the Körös Water Authority personnel.

The presentation from the Water Authority was directed by Mr. Zoltán Galböts, vice-director.

The Körös catchment covers and area of 27537 km2. Approximately 50% is in the high lands of Romania, the rest is mainly low lands in the Hungarian side.

The water authority work is focused in 4 basic areas:

- Flood protection
- Water supply
- Data collection
- Pollution control

69% of all the authority area is flood plains; for this reason "Flood Protection" is the main concern for the authority.

In Hungary there are 12 water authorities organized in a catchment basis. Each authority operates independently unless an emergency condition occurs. Since Water policy is part of general "*Defense Policy*", when an emergency occurs the coordination passes from the local authority to an emergency committee that concentrates efforts in the emergency point.

Flood damage in the Fekete-Körös

"The history of the Körös Valley is at the same time the history of floods" (Kövizig, Gyula, 1999).

Flood 1970 (Vízügy, 1999)

Dam break

Fehér-Körös, Gyula, 1995

The flood protection system in the Körös Valley is comprises:

- embankments along the main river branches
- emergency retention reservoirs in some agricultural areas
- pumping stations for drainage of the retention reservoirs
- a very well organized and obedient population

A technical visit to the field was organized to observe the state and function of these elements.

May, 23

Szanazug, Gyula

Technical excursion Flood Protection basin of Kis Delta

In some cases, during flood events of high magnitude and low frequency, the water level in the river rises rapidly and it endangers important agricultural areas and populations.

One method used by the water authority to control the water level is to open the dikes by explosion in given areas and allow part of the flood to be stored in retention basins.

The white pipes are the points where the

The inlet to the retention basin is protected

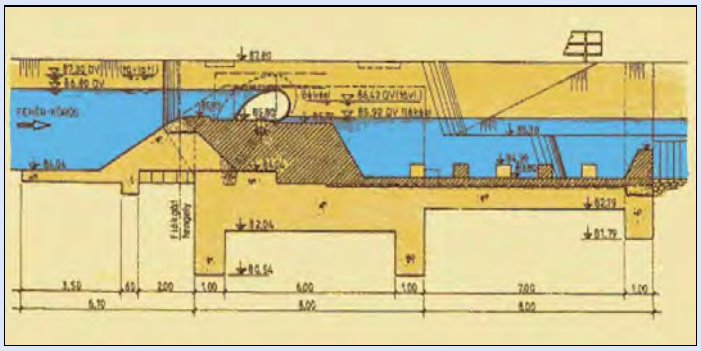
explosives are placed to breach the dike.

from erosion, with some sort of concrete stilling basin.

Once the water level in the system decreases, the stored waters need to be rapidly drained by the pumping stations and the dike has to be rebuilt before the next flood event occurs. Usually, material for the reconstruction of the dike is stored near the dike-breaching section.

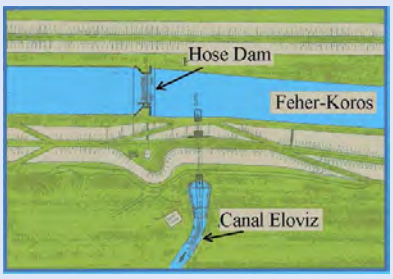
Technical excursion Hose dam of Gyula

Another important activity of the authority is Water Supply for agriculture, drinking water and other uses. Hose dams are used to control the water depth in the area near to the Water supply intake.



During high flows, the normal water depth in the channel is enough to keep the required water level at the intake; as the flow decreases and the normal depth decreases, the hose is filled with water so that the crest of the dam is higher and there is a backwater effect.

Diagram of the intake:



Water is taken from the River

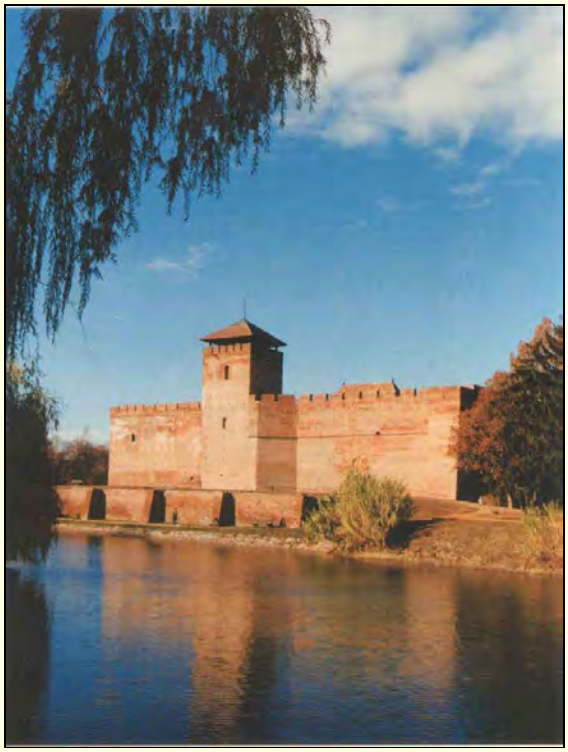
Fehér-Körös and is released into the Canal Élővíz. It is used for environmental and landscape purposes; the town wants the old channel of the river to remain active.

Intake for Water Supply

Water distribution through the town

Short stop at the town of Gyula

Here we present a paper published by the Water Authority in Gyula regarding the visit of our group.



Gyula, 05/23/2001

University of Iowa student visit at the Körös Water Directorate

A group of eight students from North American universities students from two universities besides that of Iowa is investigating the aquatic environment and hydraulic structures of Romania, Hungary and Poland. In our country, the group was guided by Dr. János Józsa, associate professor at the Budapest University of Technology and Economics along with PhD student Gábor Keve and civil engineer student Róka Palösty.

After arrival at the Szanazug Directorate guest house, the visitors learned about our Directorate's flood defense activities and facilities from lectures presented by vice-director, Zoltán Galböts, and chief engineer, László Röti. The lectures were presented in English and were illustrated by slides and video recordings. During the presentations, students and professors showed active interest in the technical, organizational, and financial aspects of flood damage mitigation projects. The answers to the numerous questions will be used by students in their course report, the final product of this travel. The course is part of their academic curriculum and it is ascribed with credit hours. After a traditional dinner, the guests returned to the rooms to recover from their weariness caused by the long day of travel. The course started a week before in the Romanian Danube River delta.

Next day, the short but intensive program continued with a site visit. The guests were shown the opening of the "Small delta" flood retention basin and the modern facilities of the Gyula dam. After a brief historical retrospect from the tower of the Gyula Castle the group continued its trip to the Ópusztaszer

and two accompanying professors was hosted at our Directorate for a short visit on May 22 evening to late morning of the next day. The visit was part of a documentation trip to Eastern Central Europe organized by the Hydraulic Institute of the University of Iowa. The group, comprising

memorial.

Sandor Nagy

Vice chief Engineer

Translation by Tamas Kramer

Visit middle Tisza River

The Tisza River is, after the Danube, the second most important river in Hungary.

Lately it has been in the news because of the high water levels and flooding in different villages. Another important issue has been the water quality problems due to a cyanide spill in the river.
(Go to news)

We visited the river in the locality of Szolnok and took the ferry to the other side.

The ferry is attached to a guide cable along the river and it is positioned at an angle to the current; the component of the force parallel to the cable pushes the ferry from one bank of the river to the other; the component of the force in the direction of the flow is in balance with the tension of the cable.

May, 23

Ópusztaszer

In our way to Budapest we visited the Ópusztaszer National Memorial Park

Garden with Ancient Ruins

The Millennial Memorial

Fisherman's Hut

One of the main attractions in the park is "The Feszty Panorama".

This painting depicts the historical legend about how the Hungarian tribes arriving from the east entered the Carpathian Basin.

The painting is 15 m high and 120 m long. The diameter of the circle it creates is 38 m.

(photo by Domotor Mihaly)

Chief Árpád and his chieftains

The wife of the chief and her escort

May, 23

Departure to Budapest

International Perspectives in Water Resources Planning in Eastern Europe

HUNGARY

May, 23

Budapest

City tour

Budapest is a marvelous city, full of history and art, where it is possible to appreciate construction dating from 1100 to the present. The group had few hours to walk in the city, specially in the "Buda Hills" area. Here we present some of our views of Budapest; more complete information about history, museums and activities in the city can be found at this Budapest's web site.

Coat of arms of Hungary

The Danube River flowing through Budapest and the Parliament.

Chain bridge.

The Women of Eger, by Bertalan Székely (1935-1910), at the Museum of Fine Arts

Mathias Church

Heroes' Square

Dinner at Göd

We spent the night at Göd, in one of the field measurement houses of the Budapest University of Technology and Economics.

We enjoyed a traditional Hungarian dish: gulyás

May, 24

Göd

Visit Bank-filtered well on the Danube

We crossed the Danube and went to one of the islands where there are different wells for Budapest's water supply.

This well has a structure similar to an "octopus". There is a central pipe going downwards, and various pervious branches distributed radially around the central pipe that are used to collect the water at different depths.

Visit Visegrád fort

Visegrád is a small village between Szentendre and Esztergom. It is famous for its medieval castle standing on the hill overlooking the Danube.

The Danube river at Visegrad

May, 24

Sarród

Visit Lake Neusiedl

The Fertő-Hanság National Park is situated on the western edge of the Hungarian lowland area at the border with Austria. It is part of a cross-border "International Park Neusiedlersee-Seewinkel" on the Austrian side and "Fertő-Hanság National Park" on the Hungarian side.

The area is characterized by the Lake Neusiedl (Lake Fertő in Hungarian) and around it a number of smaller shallow lakes and ponds. Many plants and animal species from the East have their westernmost presence here.

Our guide, Attila, explained to us about the reeds formation, as well as the flora and fauna in the National Park.

The water depth in the lake is usually smaller than 150 cm. The shallower water zones are covered with reeds.

Gage to measure wind speed and direction.

Since the water depth distribution varies, the action of wind causes transport and redistribution of sediments, also affecting the evolution of the reed cover.

Visit to Fertőrákos quarry

After the trip in the lake we visited the quarry at the Fertőrákos village.

This quarry is known for its geological, palaeontological and cultural historical values. It was worked from the Roman age up to 1948.

During the Second World War it was used by the Germans for storage. Nowadays, it is used for concerts and other musical programs.

May, 25

Gyor

Visit Dunakiliti dam

At Dunakiliti dam we were received by Emil Janók, who explained to us the technical aspects of operating the dams in this region of the Danube River.

The region is composed of several branches of the Danube river, some of which are active during the whole year. Others are old channels that are filled only during flood events. The whole system creates a wetland area rich in flora and fauna that can be considered as a "pseudo Delta" of the Danube.

Training works for navigation in the main channel of the Danube and the upsilting of the various dams in the catchment have caused the "sinking" of the river bottom. As a consequence, the secondary branches and wetlands started to be drained, endangering the wildlife, agricultural production and water supply in some areas. The process was aggravated by the construction and operation of a diversion system for hydropower generation in Slovakia.

As a solution to this problem a series of small dams were built in the Danube river to create a backwater effect and push the

water back into the secondary channels. Then a system of dams and gates was located in some of the secondary branches to control the water depths and the water flow through the wetland.

Dam on the main channel of the Danube River

The various gates in the dam are operated to maintain the required water level upstream.

Trip through wetland protected areas

Secondary channel

Dam for water depth control in the wetland

Fish passage structure

Wetland landscape

"Ship passage" through the dam

Exceedence weir for high flows.

Interview with local newspaper

The group was interviewed by a regional daily paper called Kisalföld. The interview was published on May 29th, 2001. Click here to read the original paper in Hungarian. We present below the translation to English:

AMERICAN STUDENTS IN SZIGETKÖZ

In the organization of the University of Iowa, students representing three universities of the American continent came recently to Szigetköz. The students visited our country on their three-week Central European trip with the objective of enlarging their knowledge of environmental engineering.

The Szigetköz tour was prepared by the staff of North-Transdanubian Water Authority, who showed with pride the internationally renowned water supply system to the future professionals.

As the responsible for the group's Hungarian program, Dr. János Józsa, associate professor at the Budapest University of Technology and Economics (BUTE) said, the students are investigating our water and environmental management practices and compare them to those in the United States. The students came to Eastern European countries for the first time, they were investigating the Danube River Valley starting from the delta.

The coordinator and professional leader of the study trip was Witek Krajewski, professor at the University of Iowa. We learned from him that the students had previously similar excursions in Asia, and after this one the destination will be South America and Turkey. The group is pleased with the reception, organization and the sights offered.

Emile Hall spoke in the name of the group when she said: they feel fortunate that they could participate at this trip. They were curious about our country, about the effect of the last ten years' political and economic changes on the environment protection and related disciplines. Róka Palösty, the local guide of the Americans, studying atBUTE, thinks that a positive picture of the country was shown. The guests were eager to learn and spent their days in Hungary rich in programs.

Kisalföld, 2001.05.29. kedd

Translation by Tamas Kramer

Lunch at Gyor

We finalized our trip through Hungary with a traditional lunch at Gyor. We thanked our hosts and guides János Józsa, Róka Palösty and Gábor Keve for their valuable work and pleasant company.

Köszönüm, Magyarország!

(Thank you Hungary!)

Departure to Poland

International Perspectives in Water Resources Planning in Eastern Europe

POLAND

(Hammond Atlas of the World)

There are two main rivers in Poland: the Odra (or Oder) and the Vistula. The two are of enormous importance for navigation purposes, water supply, hydropower generation, etc... Some important issues related to the use of this water are the flood hazard and the water quality in the rivers due to industry and agriculture.

The group visited the Odra River at Wraclow in the southwest part of the country. Then, the high lands of the Vistula Catchment at Krakow. Finally, Warsaw and the Vistula river at Wloclawek.

May 2001

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27	28	29	30	31		

In this page we will cover only issues related to our technical visits and cultural experiences, but this is a country rich in history, culture and art. There are several sites on Internet where more information about Poland can be found. One of these sites is: http://www.slider.com/Regional/Europe/Poland.htm

International Perspectives in Water Resources Planning in Eastern Europe

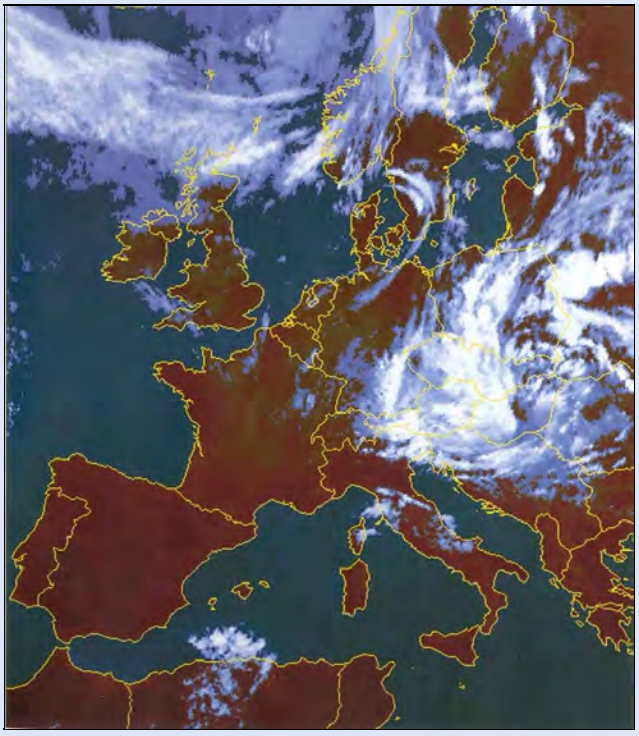
POLAND

May, 26

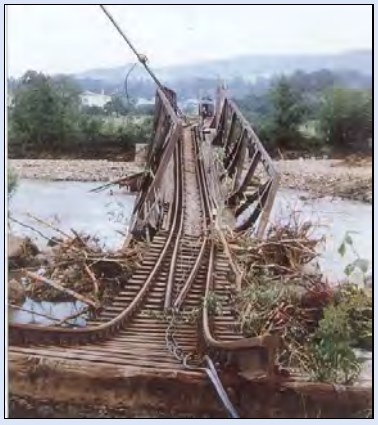
Flood mitigation in Wroclaw

Wroclaw

Our contact in Wroclaw was Agnieszka Kolanek, Ph.D. candidate in Engineering from Wroclaw University of Technology. She talked to us about flood problems in Wroclaw, specially about the damage caused by the flooding in July 1997.



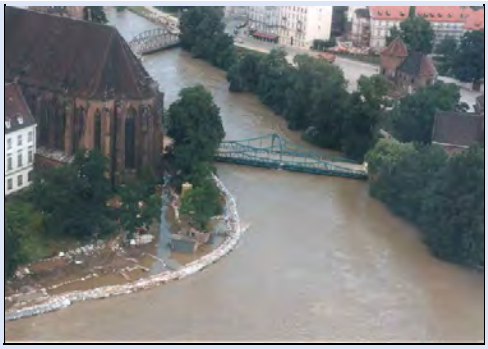
The event of July 1997, is the biggest flood that has been recorded in Poland. What caused the flood was the combination of two important factors: intensive and long-lasting rainfall in southern Poland during raised water stages, and stationary low pressures over Central Europe.



Extreme rainfalls in the upper Vistula River basin amounted over 120 mm locally. In the Oder River basin, the highest levels occurred in the basins of the Bystrzyca, Kaczawa, Bober and Kwisa rivers, and they ranged from 150 mm to as high as 300 mm.

The total losses in the Oder River basin amounted to PLZ 5788 million, and in the Vistula basin PLZ 2085 million. (as of June 2001, 1 USD = 3.99 PLZ).

In Wroclaw the flood damage was enormous:


(Photos by Zdrojewski, 1997)

Visit Odra River flood protection works

The visit was directed by Stefan Bartosiewicz, Deputy Director of the Regional Authority for Water Management.

Due to the extensive damage caused by the flood of 1997, the protection system in Poland was revised and projects to improve the actual system were started under the "National Program of Reconstruction and Modernization".

A $200 million loan agreement was signed with the World Bank to give financial support to the program of flood protection. The program has three components (Zielinski, 1997 Institute of Meteorology and Water Management):

1. Repair of Municipal and Rural Infrastructure
2. Flood Management and Hazard reduction
3. Project administration and Assistance.

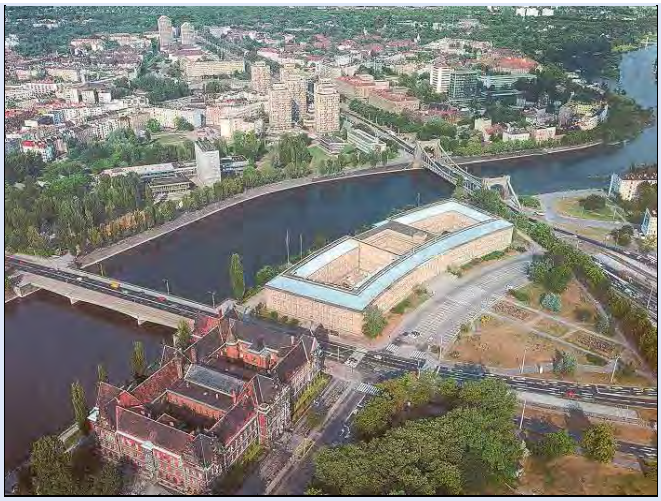
The second component is subdivided in four parts:

- Basin flood management planning
- Hydrological and meteorological monitoring, forecasting and protection system and warning
- Flood protection infrastructure
- Flood risk mitigation and response

Trip along the Odra River

Odra river is an important waterway in central Europe. It is near to 855 kilometers long and drains approximately 119,000 km^2.

The group enjoyed a trip along the Odra River in the boat of Mr. Bartosiewicz.



Odra River in its way through Wroclaw

Training works for navigation: spur dikes in Odra River

"The Oder, also called Odra, rises in the Sudeten Mountains of the Czech Republic. It then flows northward across western Poland where it is joined by the Nysa (Neisse) River. The joined rivers form most of the boundary between Poland and Germany. The Oder empties into the Baltic Sea by way of the Szczecin (Stettin) Lagoon. Oceangoing vessels use the Polish port of Szczecin south of the lagoon. Other major cities on the Oder include Frankfurt in Germany, the Polish cities of Wroclaw and Opole, and Ostrava in the Czech Republic."

City tour

Wroclaw is one of Poland's oldest cities and the capital of the Lower Silesian region. It is called the city of the hundred bridges and the hundred churches; indeed there are 112 bridges in the city.

City Hall

St. John the Baptist's Cathedral

Walking through the city

"Wroclaw was established in the 10th century at the intersection of the trade routes between the Baltic Sea and the Roman Empire, and between the Black Sea and Western Europe. However, archaeological findings show evidence of a settlement several

thousand years ago during the Stone Age.

Main Square

Throughout the rule of many dynasties, the Bohemians (14th century), the inhabitants of Wroclaw, which was known as Breslau before becoming part of Poland once again after World War II, have maintained their Polish language and culture. Succeeding regimes left the architecture of their predecessors, giving Wroclaw a fascinating blend of Gothic, Renaissance, Baroque and Classic".

University of Wraclow

May, 27

Departure to Krakow

International Perspectives in Water Resources Planning in Eastern Europe

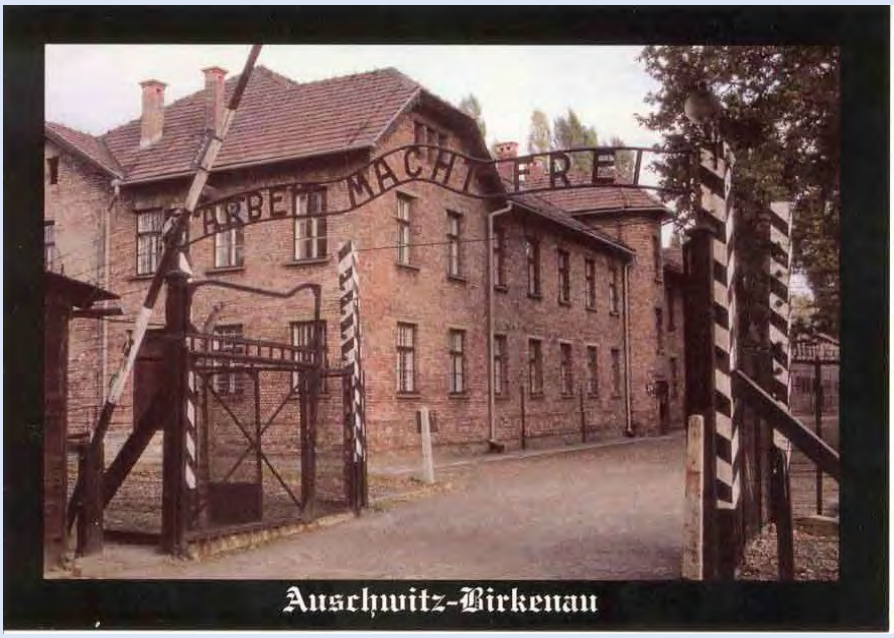
POLAND

May, 27

Departure from Wroclaw

Visit Auschwitz

The group made a short stop in Auschwitz to pay respect to those who perished in the former concentration camp.



"Auschwitz was regarded as the most effective concentration camp established by the Nazi regime in pursuit of the "Final Solution." Unknown numbers of people of various nationalities perished in the camp. Even today the name holds a cold and somber connotation". Click here for more information.

In one of the walls of the torture rooms it is written: "Those who forget history are condemned to live it again".

May, 28

Krakow

Visit Krakow University of Technology

Our visit in Krakow was directed by the Institute of Water Engineering and Water Management of Krakow University of Technology.

An introduction to the University history and current areas of action was given by the director, Prof. Elzbieta Nachlik.

Staff members presented the general aspects of water resources management in Poland and other related projects.

Our guides in this city were dr. Adam Laptas, dr. Barbara Kopczynska-Bozek and dr. Andrzej Potocki. They led technical fieldtrips to different reservoirs and also showed us the rich nature and cultural beauty of Krakow.

Visit to Czrosztyn-Niedzica reservoir

The dam of the reservoir is located below the Niedzica castle in a narrowing of the Dunajec valley. The Dunajec is the main tributary of the upper Vistula river.

The power station is equipped with reversible (pumping) units and it is used for water power production during the peak demand hours of the day.

River flow downstream of the reservoir is controlled by a compensation reservoir below the main reservoir that enables a constant outflow to Pieninski Gorge independently of the operation of the power plant.

Characteristics of the system:

- Catchment area: 1147 km^2
- Average flow rate: 23.8 m^3/s
- Installed capacity of pumped storage power plant: 92 MW

- Aggregate average yearly outflow: 750 mln m^3
- Total capacity of reservoir: 234.5 mln m^3

The project construction was approved after several years of discussions. The reservoir construction was opposed by environmentalist that were concerned about the water quality, flora and fauna in the region and by people concerned with the historical value of the areas to be flooded and the landscape modification caused by a huge engineering structure next to a castle. Nevertheless, the requirements of energy production and flood protection in the region pushed the project ahead, even tough a lot of changes were made to the original proposal.

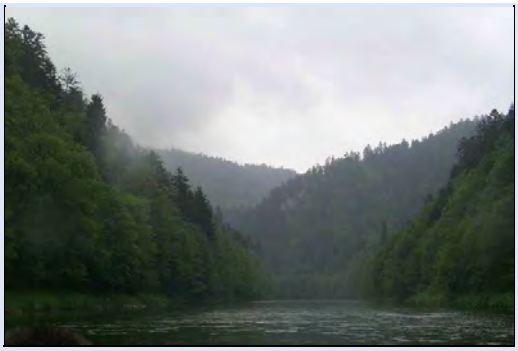
The project was completed and started operation in 1997; shortly afterwards, the structure was proved to be of invaluable importance for flood protection in the upper Vistula catchment.

The reservoir was used to store part of the flood produced by the event of 1997. As a result, the flood wave was delayed and the peak reduced protecting the populations downstream the dam.

Given the magnitude of the event in 1997, even though part of the flood was kept in the reservoir, the spillways were used and significant flow of 550 m^3/s passed through the dam.

White water rafting

One of the benefits of the Czrosztyn-Niedzica reservoir operation is that the flow downstream of the dam is controlled; in this way there is a dependable minimum flow that is provided continuously. The rafting activity is positively affected since it is possible to have rafting during the whole year. And even when weather conditions are not optimal, it is possible to have an enjoyable experience!!!


May, 29

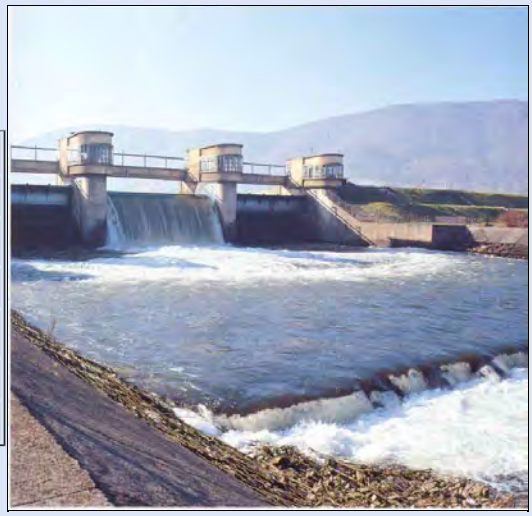
Krakow

Visit cascade system of reservoirs on the Sola River

The Sola River is a tributary of the Upper Vistula River. The cascade system was built for different purposes: water supply to the Silesian-Cracovian Industrial Region; flood control; low flows augmentation through the Vistula River; and energy production.

CZANIEC

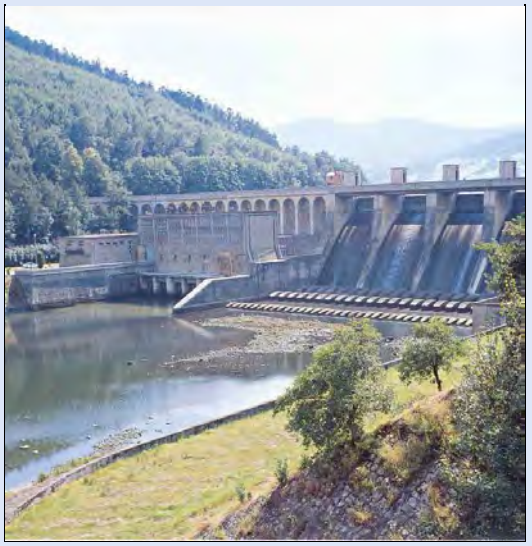
Year of construction	1967
Reservoir area (ha)	45
Reservoir capacity (mill m^3)	1.3
Installed capacity (MW)	Compensation
Dependable flow (m^3/s)	--
Nominal head (m)	--
Energy production (mill-kWh)	--



PORABKA

Year of construction	1953
Reservoir area (ha)	367
Reservoir capacity (mill m^3)	28.4

Installed capacity (MW)	12.6
Dependable flow (m^3/s)	64.6
Nominal head (m)	21
Energy production (mill kWh)	25



TRESNA

Year of construction	1967
Reservoir area (ha)	1000
Reservoir capacity (mill m^3)	100
Installed capacity (MW)	21.0
Dependable flow (m^3/s)	122.0
Nominal head (m)	20.4
Energy production (mill kWh)	28.0

As a result of the cascade operation, the following benefits were achieved: increased minimum river discharge from 1.5 m^3/s to 9.1m^3/s; production of 53 millns KWh of the peak load electric energy (power installed 33.6 MW); decreased maximum flood discharges recorded in Sola River from 1400 m^3/s to 650 m^3/s**.**

Visit to hydroelectric power plant Porabka-Zar

Porabka-Zar is a pumping storage power plant located in the right bank of the Sola River.

The water is taken from the Sola river at the Porabka reservoir and pumped 440 m to the top of a hill during hours of low energy consumption and cheap energy price. Then, during peak demand hours, the water is sent back to the river and energy is generated in the process.

Plant characteristics:

Year of construction	1979
Generation capacity (MW)	500
Pumping requirement (MW)	540
Nominal Head (m)	432.0
Energy production (mill.kWh)	640.0

Landscape view from Porabka-Zar reservoir:

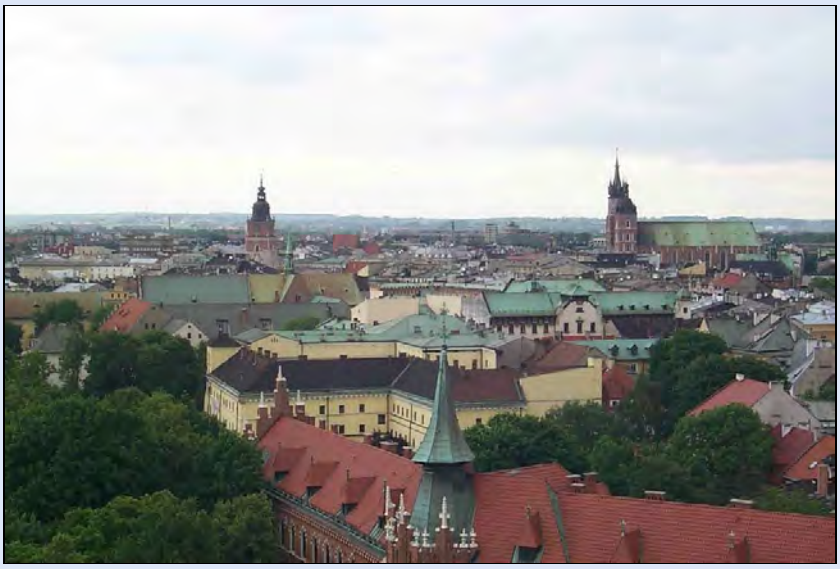
Tresna reservoir and Sola river.

Porabka reservoir

May, 30

Krakow

City tour in Krakow



" Kraków is one of the most beautiful, and magic cities in Europe. Settled since the Stone Age, established as a city in XIII century, is a woderful example of medieval and renaissance architecture and art. Thousands of historic buildings, monuments, ecclesiastical edifices, defensive and fortification constructions, palaces and residences, Poland's larges collection of work of art estimated at over 2 million items in museums, churches, monasteries and private collections - all of it made that the UNESCO World Heritage Committee placed the architectural and historic complex of Kraków, together with the nearby salt mine of Wieliczka, on the list of the first twelve major historic sites in the world."



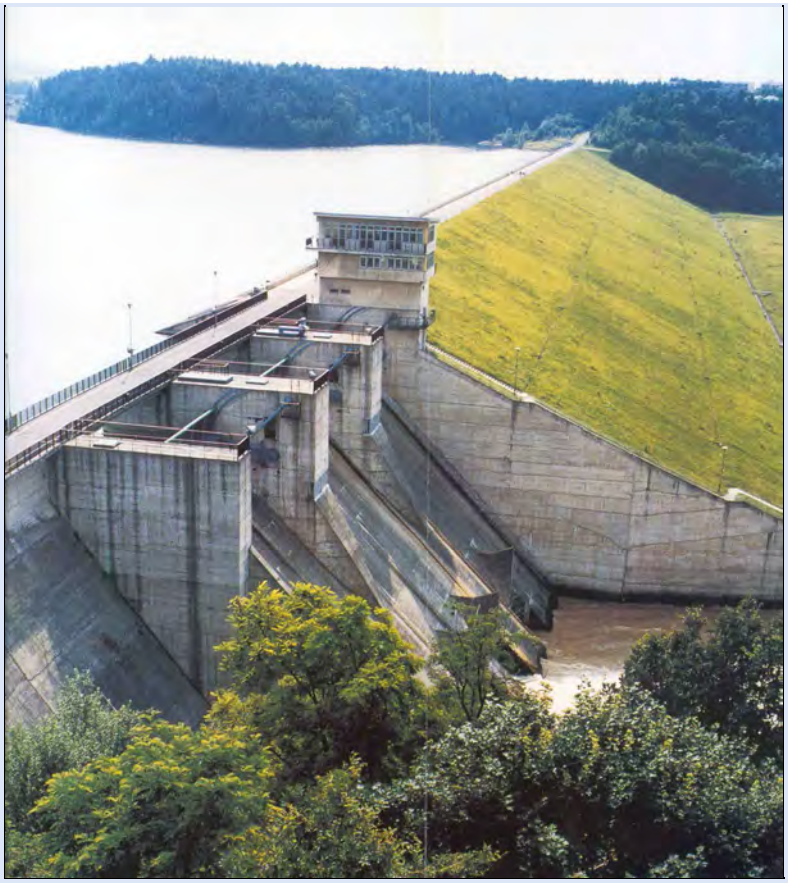
Visit to Dobczyce reservoir

The Dobczyce reservoir is used for water supply of Krakow, flood control and hydropower generation. It is located in the Raba river in the Vistula River catchment.

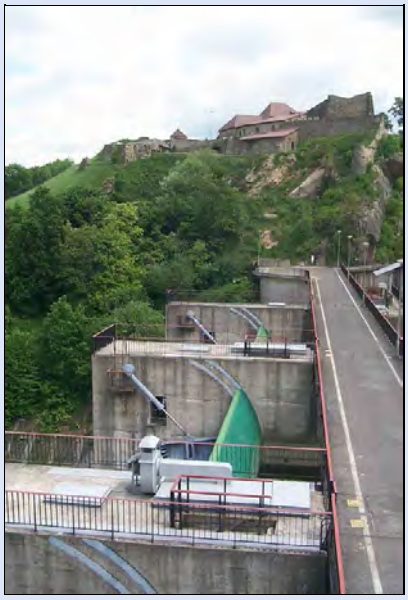
Barbara Kopcynska-Bozek, Witold Krajewski and our guide at the dam talk about the reservoir construction and operation criteria.

The installed capacity is 2.5 MW. The flow in the river varies from 1.25 m^3/s to 12.6 m^3/s. The annual energy production is 9.6 GWh.

The reservoir is used for drinking water, therefore recreation is not allowed. The extensive use of fertilizers in the catchment area has an important effect on the water quality, since a lot of nutrients are transported to the river during rainfall. Some punctual sources of pollution are related to the spill of non-

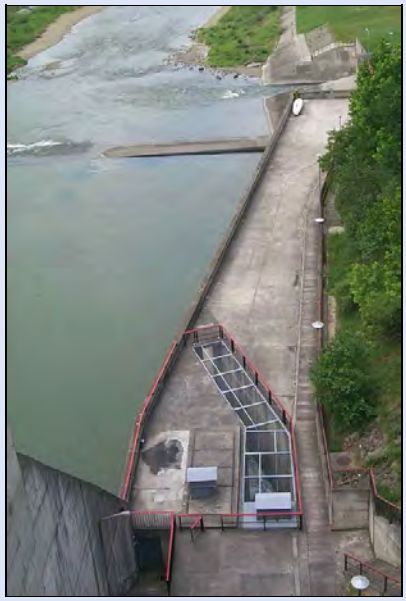


treated waters from industry and agriculture directly in the river. For these reasons the water quality of the reservoirs ranges from class 2 to class 3 (class 1 being the optimal), and the limiting factor is most of the times the phosphorus and nitrogen concentration.



Dam and gates for spillways

Stilling basin and river downstream the dam



Fish passage structure

The reservoir is used also for flood control; information related to rainfall and water levels in the upper catchment is sent to the authorities in a continuous basis and this data is used to plan the operation criteria of the reservoir.

International Perspectives in Water Resources Planning in Eastern Europe

POLAND

May, 31

Warsaw

Visit to Warsaw University of Technology

Warsaw University of Technology

The group was welcomed to Warsaw by Prof. Janusz Kindler, the dean of the Faculty of Water Resources and Environmental Systems.

Dr.Kindler talked about Warsaw University of Technology's work in the field of water resources management and the changes in the system during the last decade. He also gave a general introduction to the Wloclawek dam problem, as a preparation to our fieldtrip in the afternoon.

Visit to Vistula River dam Wloclawek

Wloclawek dam is located on the Vistula River. It was designed to be part of a cascade system, nevertheless, the other dams of the cascade were never built. As a result, there is continuous and severe erosion of the river bed below the dam and the structural stability of the dam is endangered.

Works to protect river bed at the edge of the stilling basin

The small islands have been created with the material that is eroded from the river bed.

If the dam fails, the flood potential is enormous and important historical villages could be destroyed (Copernicus' home town for example). The construction of a second dam of the cascade system, downstream from Wloclawek, is being discussed at the Polish Congress. The second dam would be used to compensate the flow below Wloclawek dam and reduce the erosion.

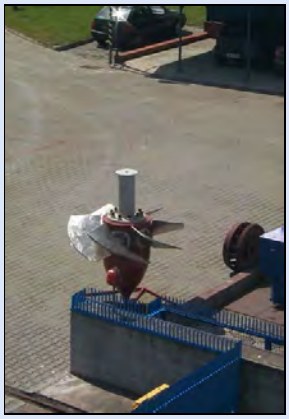
There are different interests involved in this problem and the decision is not an easy one. There are those whose main interest is to keep the energy generation at Wloclawek; there are those who are worried about the flood damage downstream of the dam; there are environmental groups concerned about the flora and fauna disruption due to the construction of a second dam; etc...

There is another important issue of Wloclawek dam operation. The Vistula River is heavily polluted and a lot of people in Poland fear that the sediment load that is being deposited in the reservoir is toxic and a dam failure could cause an ecological disaster. What can be done in this case? There doesn't seem to be a clear answer.

Our guides

Generator room

Measuring structural stability of the dam



The spillways section and a model of the turbines used for power generation.

There is a fish passage ladder in the dam, nevertheless, the water quality in the river is so poor that it is rare to see fish in this section.

City tour in Warsaw

The group had some time to walk in the Old Town in Warsaw.

Zygmunt's Column was erected here in 1644, it serves to commemorate King Zygmunt who moved the capital from Krakow to Warsaw in 1596.

Mermaid in the Main Square of the Old Town

We had dinner at one of the restaurants in the Main Square.

We thanked and said good bye to our dear hosts in Warsaw: Dr. Kindler, Agnieszka and Michael.

In this way we finished our trip through Eastern Europe with our hearts filled with joy for the beautiful and memorable experience we had.

We were thankful for the opportunity we had to observe the socioeconomic evolution, technical development, history and culture of this region, all of which determine the water resources planning and the perspectives in future development of these countries.

June,1

Warsaw

Return to the United States of America

Contacts list:

PARTICIPANTS

Michaela Bell **University of Iowa, USA** **Urban & Regional Planning** **E-Mail:** *michaela-bell@uiowa.edu*	**Jeff Gotts** **RR3, Canada** **E-Mail:** *jefferygotts@hotmail.com*	**Emile Hall** **Colorado State University, USA** **E-Mail:** *emile@lamar.colostate.edu*
Martin Matsen **University of Iowa, USA** **Urban & Regional Planning** **E-Mail:** *mmatsen@pineside.com*	**Yenory Morales** **University of Iowa, USA** **IIHR** **E-Mail:** *yenory-moraleschaves@uiowa.edu*	**Shira Perlis** **Rowan University, USA** **E-Mail:** *perl9242@rowan.edu*
Catherine Shrier **Colorado State University, USA** **E-Mail:** *cshrier@lamar.colostate.edu*	**Lichun Zhang** **University of Iowa, USA IIHR** **E-Mail:** *lichun-zhang@uiowa.edu*	
Coordinators:		
Pedro Alvarez **Associate Research Engineer** **IIHR** **E-Mail:** *pedro-alvarez@uiowa.edu*	**Witold F. Krajewski** **Research Engineer** **IIHR** **E-Mail:** *witold-krajewski@uiowa.edu*	**Marian V.I. Muste** **Assistant Research Engineer** **IIHR** **E-Mail:** *marian-muste@uiowa.edu*

ROMANIA

DESIGN INSTITUTE FOR ROAD, WATER AND AIR TRANSPORTS

Prof. Ph. D. Romeo Ciortan
MANAGER OF HYDROTEHNICAL AND PORT WORKS DIVISION

Address:
38, Dinicu Golescu Blvd.
Sector 1, Bucharest
ROMANIA

Phone: 40-1-223.12.06
Fax: 40-1-312.14.16
Mobil: 094.300.053
E-mail: iptana@mynet.ro

The „Politehnica" University of
Timişoara – Romania
Faculty of Hydrotechnical Engineering

Prof. univ. dr. eng. Michael ION
Dean

Office:
1900 TIMIŞOARA
Str. George Enescu 1/A
Tel. Fax: 0040(0)56193872

Home:
1900 TIMIŞOARA
Str. Take Ionescu 11/13, Sc. A, ap. 19
Tel.: 0040(0)56130453
E-mail: michael@mail.dnttm.ro

Marius Ceausescu

Technical University of Civil Engineering Burcharest

CDMARIUS@hidro.utcb.ro

HUNGARY

MŰEGYETEM 1782

Dr. János Józsa
associate professor

Budapest University of Technology and Economics
Faculty of Civil Engineering
Department of Hydraulic and Water
Resources Engineering
H-1111 Budapest, Műegyetem rkp. 3. bldg. K. 8.
www.vit.bme.hu
e-mail: jozsa@vit.bme.hu

Tel.: (36-1) 463-2362
(36-1) 463-1164
Fax: (36-1) 463-1879
Mobil: (36) 30-964-6181

MŰEGYETEM 1782

Prof. István Ijjas
Head of Department

Budapest University of Technology and Economics
Faculty of Civil Engineering
Department of Hydraulic and Water
Resources Engineering
H-1111 Budapest, Műegyetem rkp. 3. Kmf. 8.
e-mail: ijjas@vit.bme.hu
http://www.vit.bme.hu

Phone: (36-1) 463-1894
(36-1) 463-1164
Fax: (36-1) 463-1879
Mobile: (36-30) 991-1940

MŰEGYETEM 1782

Dr. Molnár György
tudományos főmunkatárs

Budapesti Műszaki és Gazdaságtudományi Egyetem
Építőmérnöki Kar
Vízépítési és Vízgazdálkodási Tanszék
1111 Budapest, Műegyetem rkp. 3. K ép. alagsor 5.
www.vit.bme.hu
e-mail: molnarg@vit.bme.hu

Tel.: 463-1683
463-1164
Fax: 463-1879

Körös Valley District Water Authority

KÖVIZIG GYULA

ZOLTÁN GALBÁTS
C.E., technical deputy manager

Gyula, Városház u. 26.
Hungary
Post Address:
H-5701 Gyula, Pf.: 19.

Telefon: 36 (66) 463-314
36 (30) 9432-619
Telefax: 36 (66) 463-128
E-mail: titkarsag@kovizig.hu

Körös Valley District Water Authority
Department of Utilities

KÖVIZIG GYULA

LÁSZLÓ RÉTI
MSc, Civil and Process Engineer
Expert of Water and Wastewater-treatment
Head of Department

H-5700 Gyula, Városház u. 26.
HUNGARY
E-mail: lreti@yahoo.com

Tel.: +36 (66) 463-563
Fax: +36 (66) 463-128
Mobile Phone: +36 (30) 931-9952

KÖVIZIG GYULA

Körös vidéki Vízügyi Igazgatóság
Árvízvédelmi és Folyószabályozási Osztály

Nagy Sándor
okl. építőmérnök, műszaki ügyintéző

Gyula, Városház u.26.
Levélcím:
5701 Gyula, Pf.: 19.

Telefon: (66)-463-563*
(66)-463-041
Tel./Fax: (66)-463-428
Fax: (66)-463-128
Telex: (83)-342

Gábor KEVE
civil engineer
Head of Informatic Department

VÍZÜGY LOWER DANUBE VALLEY WATER AUTHORITY

Address:H-6500 Baja, Széchenyi u. 2/c
Phone:##-36 79/525-156
Fax:##-36 79/325-212
Mobile:##-36 30 3495-496
E-mail:keve@aduvizig.hu
Private:H-6500 Baja, Puttonyos u. 18. Phone:##-36 79/422-158

POLAND

REGIONALNY ZARZĄD GOSPODARKI WODNEJ
we Wrocławiu
50-375 WROCŁAW, ul. C.K. Norwida 34

mgr inż. Stefan Bartosiewicz
Z-CA DYREKTORA D/S TECHNICZNYCH I EKSPLOATACJI

tel. +48 71/328 41 38
tel. centrali +48 71/328 25 59
fax +48 71/328 50 48
tel. kom. 0601 055 592

NIP: 898-18-72-062
tel. dom. +48 71/352 42 18
e-mail: sekretariat@odgw. wroc.pl

mgr inż. Agnieszka KOLANEK

POLITECHNIKA WROCŁAWSKA
INSTYTUT INŻYNIERII OCHRONY ŚRODOWISKA

ul. Plac Grunwaldzki 9, 50 – 377 WROCŁAW
fon: (071) 320 – 25 – 98; fax: (071) 328 – 29 – 80
e-mail: akolanek@cybernet.com.pl
akolanek@iios.pwr.wroc.pl

Cracow University of Technology
Institute of Water Engineering and Water Management

Prof. Elżbieta Nachlik
Director

Warszawska 24
PL 31-155 Kraków
phone/fax +48 12 628 20 41

phone 628 28 10
e-mail: enachlik@lajkonik.wis.pk.edu.pl

POLITECHNIKA KRAKOWSKA
im. Tadeusza Kościuszki
Instytut Inżynierii i Gospodarki Wodnej

dr inż. Adam Łaptaś

ul. Warszawska 24
31-155 Kraków

tel. + 48 12 633 03 00 w. 2858
e-mail: alaptas@profek.wis.pk.edu.pl

INSTYTUT INŻYNIERII I GOSPODARKI WODNEJ
POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

dr inż. Barbara Kopczyńska-Bożek

ul. Warszawska 24
31-155 KRAKÓW

tel.(+48 12) 628 28 17
fax (+48 12) 628 20 41
e-mail:bbozek@lajkonik.wis.pk.edu.pl

Cracow University of Technology
Institute of Water Engineering and Water Management

Andrzej Potocki Ph.D.

Warszawska 24
PL 31-155 Kraków

phone +48 12 628 28 43
e-mail: apotocki@lajkonik.wis.pk.edu.pl

WARSAW UNIVERSITY OF TECHNOLOGY
Faculty of Environmental Engineering

Janusz KINDLER, Ph.D, D.Sc.
Professor of Water Resources and Environmental Systems
Faculty Dean

ul. Nowowiejska 20
00-653 Warsaw, Poland
e-mail: jkindler@iis.pw.edu.pl

Phones: (48-22) 621-4560
660-7425
Fax: (48-22) 625-7377

Andrzej K. Kraszewski D.Sc., Ph.D., Eng.
Assistant Professor
+605-296-048
Warsaw University of Technology
Institute of Environmental Engineering Systems

ul. Nowowiejska 20, 00-653 Warszawa

tel.: +48 (22) 825-18-63 fax: +48 (22) 625-43-05
e-mail: akk@is.pw.edu.pl

PRZEDSIĘBIORSTWO BADAWCZO-WDROŻENIOWE
OCHRONY ŚRODOWISKA I INŻYNIERII WODNEJ
„HYDEKO" Sp. z o.o.

dr inż. Tadeusz Adamczyk
Prezes

MICHAEL
ciecin@hotmail.com
topez87@hotmail.com

02-904 Warszawa
ul. Bernardyńska 16/73

tel./fax 840 32 55
841 02 30
tel. kom. 0 602 215 855

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