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THE LEAGUE OF RAMSAR WETLAND EDUCATORS

(RAMSAR LEAGUE)

PATHFINDER PROJECT OF

THE CADDO LAKE INSTITUTE

FEBRUARY 1996 STATUS

HUNGARY

Synopsis: Appended documents reflect the status as of February, 1996 of the US and Hungarian participants in the Ramsar League which was organized in Trebon, Czech Republic in July 1995 by Master Wetland Teachers from Caddo Lake Institute and Wetland Managers and Educators from Ramsar sites in Kenya, Ethiopia, Hungary, and Turkey.

CADDO LAKE INSTITUTE'S SUMMARY FOR TECHNICAL PRESENTATION REGARDING:
Community-based Wetland Management, CoP6, Brisbane 23 March 1996
Dwight K. Shelman, Jr. President (rev 3/3/96)

Education is a prerequisite to any meaningful community participation in Ramsar site management. Influential community members who are empowered by knowledge of Wetland functions and values as well as Ramsar principles can influence community decisions That will sustain local Ramsar site functional values over time.

Ramsar principles provide a basis for pursuing wise use at the local level. Success requires a strategic approach but depends upon local NGOs capable of implementing this strategy with locally relevant tactics.

Creation of an adequate local institutional base requires looking beyond governments into local institutional arrangements which can bring together various resources at a marginal cost to implement the strategy. Few models exist to accomplish these local objectives. One, the Caddo Lake Institute, is a local NGO which focuses on the pursuit of Ramsar principles and wise use at the Caddo Lake Ramsar Site in Texas and Louisiana USA. The Institute's Caddo Lake Scholars Program has mobilized a consortium of local educational and agency resources at marginal cost to pursue local community wetland education and useful field research. Other Ramsar commnities may wish to adapt or modify this model to local conditions.

The Institute's programs are designed to maximize the "multiplier effect" of creating teachers trainers, who will train other teachers. Teacher trainers are called MIRWETs (Master International Ramsar Wetland Educator Trainers.) The international theme was reinforced in July 1995, when the Institute's master teachers created a League of Ramsar Educators with colleaglles from Ramsar wetlands in Kenya, Ethiopia, Hungary and Turkey.

At Caddo Lake, the site level project is based upon training exceptional local teachers and studentsts as Wetland Intern Candidates (WICs) . In addition to formal training in wetland ecology, Candidates receive orientation about the role of the Ramsar Convention within larger global sustainabilty strategies such as IUCN's "Caring for the Earth" and Agenda 21. Trained teachers become teaching fellows. They are supported by student Wetland Interns (WINs.) Together they design and Implement wetland curriculum enrichments at campus wetlands at their local schools and colleges, and in local Ramsar wetlands.

These curriculum enrichments include applied wetland science field projects which add to the local community's body of scientific knowledge about the local wetlands, These applied projects include a school-operated wetland monitoring network. ecological assessment and landscape characterization of local public and private wetlands, and maintenance of field data in GIS (Geographic Information Systems) computer mapping databases.

Participants also demonstrate their wetland science skills at community events and through technical management assistance for local, privately-owned wetlands. Planning is underway to extend the Institute's teaching mission by establishing at Caddo Lake the first US regional Ramsar wetland center and the first regional academy of wetland science education. Both are designed to further Ramsar-based science training of Master wetland educators and their wetland communities, locally and internationally.

The League of Ramsar Educators was formed to "twin" the Institute's US educators with wetland educator trainers from Ramsar wetland communities in Kenya, Hungary, Ethiopia and Turkey. As a result, colleagues in those nations have commenced field-training initial groups of local teachers in water quality monitoring as well as the use of Ramsar criteria to describe other local wetlands for possible Ramsar nomination. Outcomes of this effort may include recommendations to the contracting parties to extend official Ramsar Bureau recognition to agreements between local NGO's and private land owners regarding management of privately-owned wetlands under Ramsar priIiciples.

Local pursuit of wise use requires Ramsar communities to work through local instutuions and intcrnational community networks. The Caddo Lake Institute and Ramsar League should be encouraged to continue their initiatives, and to provide criteria and guidance for local action for consideration and adoption by the contracting parties.

TO: Dwight Shellman
FROM: Andrew Bramson
DATE: February 28, 1996
RE: Lake Fertő Report

The following is a report of the water quality monitor day at Lake Fertő conducted on February 21. This report does not contain a copy of the data we collected at that time. Those data were sent last week via e-mail. This memo contains short biographies of the participants, a brief overview of our montior activities, and a one-by-one description of the enclosed slides taken at the lake.

I. Participant Biographies

András Ambrus (Hungarian)--András is a research scientist working for the Hortobagyi National Park and the Hansági National Park. He is currently conducting research on the relationship between dragon-fly habitat selection and water quality. He has been one of the significant players in the partnership between the Caddo Lake Institue and the Hansági National Park. He lives about 20 km from Lake Fertő.

Tibor Csobod (Hungarian)--Tibor is the director for the western agency of the National Children and Youth Foundation. He is responsible for overseeing the development youth programs in the community. The foundation works quite heavily with the local schools, funding student governments, sponsering language and literature competitions, and offering seminars in public health and environmental education.

Csaba Bittman (Hungarian)--Csaba (pronounced Chaba) is a student at Kazinczy Ferenc High School. He enjoys biology and writing poetry. He thinks schools should do be teaching more biology in the field. During the summer, he loves to camp in the hills near his home.

Lőrincz Ferenc (Hungarian)--Ferenc is a student at Kazinczy Ferenc High School. He lives Mosonszentmiklos, a village in the heart of the Sziegetköz wetland. Ferenc enjoys studying English in school and bird watching in his free time.

Kapa Agó (Hungarian)--Agó is also a student at Kazinczy Ferenc High School. She enjoys studying Literature, English, and French, and in her spare times loves to read Hungarian novels. She is interested in a career in Public Health. All three of these students participate in an environmental english class sponsered by Kazinczy Ference High School and the National Children and Youth Foundation.

Andrew Bramson (American)--Andrew is a United States Peace Corps Volunteer serving in Hungary. He works as an environmental educator and advisor for the National Children and Youth Foundation in Gyor. He teaches environmental education in schools and organized environmental clubs and summer camps for Hungarian youth. His foundation has helped to brigde the relationship between the Caddo Lake Institue and the Hansagi National Park.

Kenneth Kato (American)--I.ike Andrew, Ken is also a United Statcs Peace Corps Volunteer serving in Hungary. He works as an environmental programmer for the National Children and Youth Foundation in Debrecen. He is currently working with the Hortobagyi National Park on the Agota Puszta (Agatha Plain) wetlands restoration project. Ken is developing an environmental education summer camp, where youth can come learn about wetlands while helping to dig the water channels needed to re-establish the wetlands.

II. Summary of our Monitoring Day--February 21, 1996 Fertorakos, Hungary

We patiently waited for Wednesday hoping it would stop snowing and the weather would finally clear up. It did. On February 21, Andras Ambras, a research scientist at the Hortobagyi National Park and the Hansagi National Park, took a group of Hungarians and Americans to Fertorakos, located in Northwestern Hungary, to do water quality testing on Lake Ferto. This brackish, shallow lake located in both Austria and Hungary has a long recorded history dating as far as 1074. Many of the surrounding wetlands are designated as significant natural areas and are strictly designated at protectcd arcas. The most noticabie features of the lake are tire reed beds that reside on the nearby bank. Reeds, located in non-protected areas of the lake, are harvested and used as roofs for Hungarian buildings. This day's monitoring was the first in whatwill be a monthly series of water quality monitoring programs between the Caddo Lake Institue, the Hansagi National Park, and the National Children and Youth Foundation.

We made our observations in the western reed beds. This arca is home to most of the monitor facilities on the Hungarian side of the lake. We arrvied around mid-afternoon and immediately set up our weather station. The temperature and gusting wind limited our ability to work outside, thus we did trrost of our testing indoors. With the weather station we were ab1e to measure wind speed, wind direction, air temperature, barometric pressure, and humidity. The digital monitor attached to the weather station made data collection easy.

We also conducted a series of chemical water quaility, These tests were lead by Andras and Andrew who then instructed the students on how to use the equipment. Each student did there own sample for each chemical test. The language barrier between the Americans and Hungarians was nearly not existent, thanks in part to both groups being able to speak the others language. We tested

for dissolved oxygcn, chloride, nitritc, nitrite, pH, and watcr hardncss. Our results showed an unusually low level of dissolved oxygen which we attributed to the prcsent condition of the lake, which was completely iced over and covered with snow. The western reeds tend to slow low lcvels of nitrogen and of phosphorus and our results correlated with those trends. Due to the ice and snow, we were not able to conduct biological tests on the water, but I am confident that those tests will come in he early Spring.

We finished up in the late afternoon, and packed up our gear amidst a gorgeous sunset. We bought some food and ate dinner during the one hour train trip back to city. We t.alked about our results, the abiotic factors that influenced them, and the possibilty for more in-depth testing come spring tine. Needless to say, the afternoon was a success.

III. Overview of the slides

1, This is a slide of our sample site, Lake Ferto. This lake is located in Northwestern Hungary at the Austrian and Hungarian border. It is quite famous for its reed beds.

2. Here are Ferenc md Csaba, as we arrive at our sampling station. The weather is cold and wind is strong.

3.Fcrenc immediately scans the area for any signs of wildlife. He spots 2 egret nesting in the reed beds.

4. We arrive at our sampling station and set up our equiprncnt. The bearded man in the forefront is Andras Arnbrus, a research scientist at the Hansagi National Park and Hortobagyi National Park, he led our group in conducting the samples.

5. This is a slide of our equipment. We did a series of water chemistry tests. We tested for dissolved oxvgen chloride, nitrite, nitrate, pH, and water hardness.

6. Luckily, Ferenc volunteers to set up our weather station, while we are ready to collect our data.

7. The weather station is hard at work, while we stay inside to record the data. We measure wind speed, wind direction, barometric pressure, humidity, and air temperature.

8. Three Hungarians, András on the left and Csaba and Ferenc on the right as we try to interpret the testing equipment instructions into Hungarian. We succeeded with few problems.

9. The studcnts had never does field testing before so I instructed them on how to do a dissolved oxygen sample. Each student performed their own trial.

IO. Here is a slide of me adding the necessary concentrations of iodine and manganese for the dissolved oxygen trial. The students arc looking on.

11. Finally, the titration. The final step in our experiment. Now the students are ready to begin their trials.

12. Here we have Ago on the left and Csaba on the right collecting a fresh water sample.

13. Csaba is shaking his sample flask while Ago is patiently looking on.

14. Ferenc is the next student to conduct a trial. Unfortunately, the space heater you see on the table did not work.

15. Ferene continues his sample while Andrew instructs Ago on how to use the pH paper.

16. Ago comparing the color of her pH strip with the designated concentration colors.

17. Ago records her data along with the rest of our results.

18. Andras on the1eft and Andrew on the right prepare a water sample to test the level of chloride in the water.

19. We sit down and talk about our results and the possible ramifications they might have on the reeds and the species that live in the lake.

20. This is a group photo. The man on the left is Tibor Csobod (Chobod), who is the director for the National Children and Youth Foundation in Győr.

2 1. We talk about how much we cnjoycd ourselves and when should p1an the sampling event as we eat dinner on the train back to Gyor.

22. This is the castle hill on Gyor. In the forefront of the photo is the Raba River which meets up with the Moson-Danube River about 200 mctcrs downstream. The white building in the Bishop's Castle.

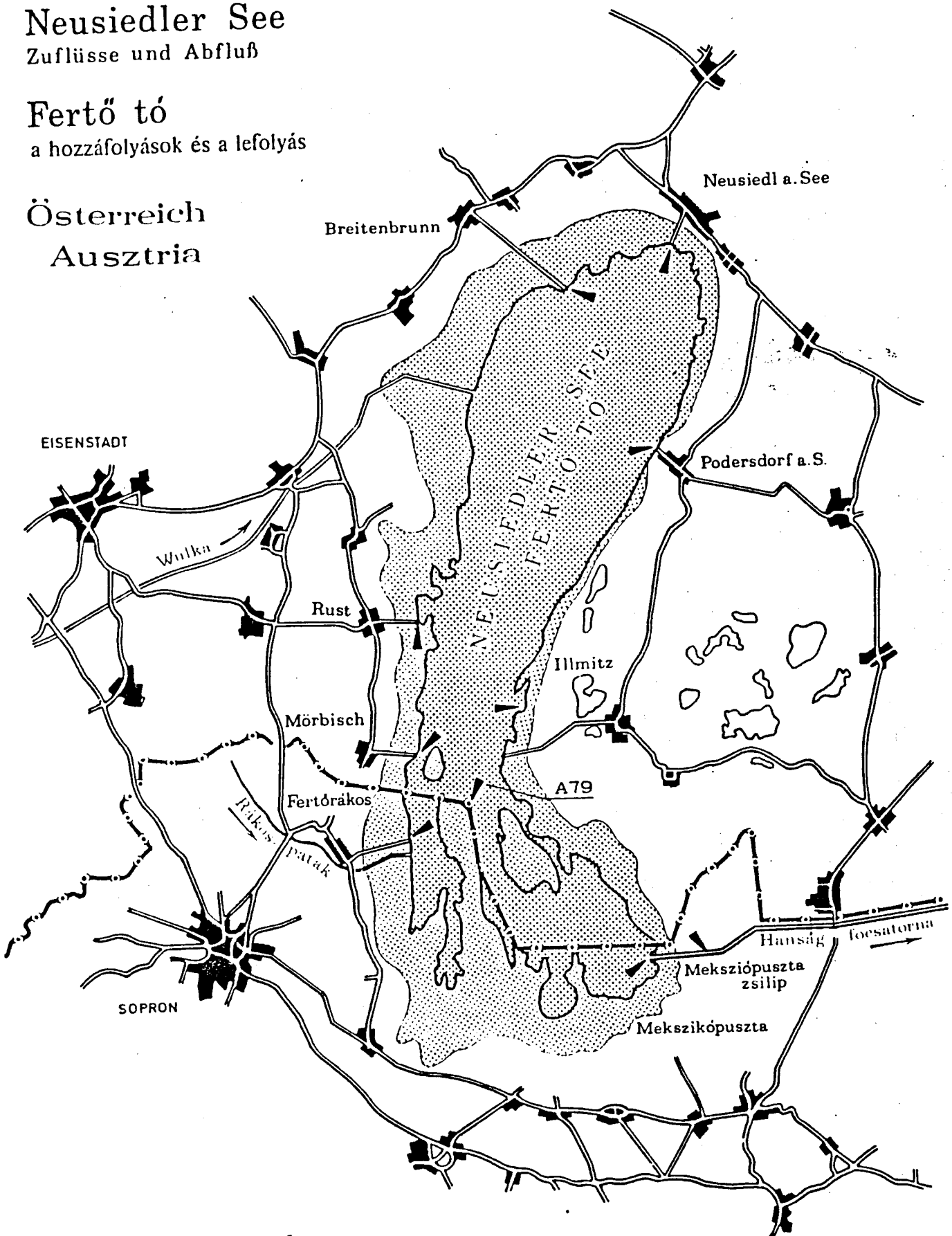
Historical indications of lake-levels

H	1074	Many Bisscnians are drowned during their Gght against King Solomon from Hungary
D ?	1096	Gottfried Bouillon crosses Neusiedlersee during the first crusade
H ?	1230	5 villages are flooded by the lake
H	1270	In an attack against King Stefan from Hungary Premysl Ottokar from Bohemia looses about 350 soldiers when breaking through the ice of the lake
L ?	1320	“Fluvius Fertow”; interpreted by historians as small trench. It could, however, also be understood as high water-level which caused the lake flowing eastward
H ?	1410	Floods. Foundation of the village Apetlon
H	1517	Lake corresponds its present size
H	1554	
L	1568	Due to one of the first major impacts by man: Diversion of one of the lake’s affluents (Rabnitz)
H	1677	
L	1728-1736	
D	1740	Almost dry
H	1768	
H	1786	lake area more than 500 km^2
H	1801	
D	1811	almost dry
H	1838-1854	
L	1862	maximum depth 60-80 cm
D	1865-1871	longest period of desiccation known since 1074
H	1871-1876	fast increasing lake-level
H	1878	maximum depth 2 - 3 m
H	1884	Lake corresponds its present size
L	1891/92	Lake frozen solid; catastrophic fish - kill
L	1901	Again fish - kill
L	912/13	Once again fish - kill
L	1924	Lake area 200km^2
L	1929	Coldest winter during the 20th century; catastrophic fish - kill
L	1930	Highest salinity (16%0) ever observed (measured)
H	1965	Agreement on the regulation of the lake level

H = high level
L = low level
D = dry or almost dry

Neusiedler See
Zuflüsse und Abfluß

Fertő tó
a hozzáfolyások és a lefolyás



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DATA TO THE WATER QUALITY OF THE RAKOS BROOK

ABRAHAM MARGIT and Mlklos PANNDNHALM1

North-Transdanubian District Water Authority Gyor, Hungary

The water quality investigation of the lake Ferto has a long background, but the regular monitoring survey on the Hungarian part of the lake have been In the 60-s begin. Investigating the water quality both, the Hungarian and Austrian researche workers, and last, but not at least the experts of the Austro-Hungarian Water Council had established that the phosphorus discharge of the lake was in the 70-s slowly increased.The potential brutto phosphorus discharge from the catchment area has been estimated about 250 t/y. which after biological treatment and phosphorus removal can be reduce to 120 t/y. This value involves the 90 t/y diffuse phosphorus discharges as well. The brutto phosphorus discharge of the Hungarian sewage treatmentworks(STW) was estimated by the Austrian researchers for 14 t/Y.

On the Hungarian part of the catchtnent area can be find two sewage treatment plants, one on the Kakos Brook drainage area, the STW of Sopronkohida. the second on the Balf sub-catchment area, treating the sewage waters of the medicinal bath.From both STWs the water is provided to the lake, after full biological treatment in case of Sopronkohida through the Rakos Brook. The Balf STW discharge is very small and it is not worth to deal with.

Morphology

On the Hungarian part of the Ferto lake catchment area the only one standing surface water runing to the lake is the Rakos Brook. The catchment area in West and North is bordered by Rust Hills, in South by the Hills round Sopron and East by the lake itself.

The catchment area is 11 km long in North-South and 5 km wide in East-West. The total surface is 50.9 km?, from which 9,l km^2 (17%) belong Austria. The Rakos Brook is about 10 km long. The average annually rainfall is 700 -750 mm and 40 % falls in the winter period. The average annually air temperature is about 10' C. The catchment area land use has an agricultural character, 48 % plough land, 38 % forest, 10 % vineyard and the rest are reeds and grounds.

On the area are two villages -Sopronkohida and Fertorakos -two farms and the Tomalom recreation area. The population is about 3.000.

Hydrological characteristics

The R&Los Brook flow is measured in Fertorakos gauging station. On the basis of 10 years records the characteristical flows are:

- lowest flow 10 - 15 l/set,
- long term average 60 l/set,

Flood waters in mouth stretch:

- 1 % highwater 28 m^3/sec,
- 10 % highwater 16 m^3/sec.

The Rakos Brook has one tributary, the Tomalom Brook, which water is totaly stored in reservoirs. The water volume of the Rakos Brook flowing into the lake in summer time is near to the lowest flow, because below the gauging statjon the water is used for irrigation as well. In 1978 the channel-like direct inflow of the Brook was stoped and the Brook joints the lake through 1,5 km wide reed belt.

Water supply and sewage treatment

The water supply of the two villages is secured by the Sopron Water Plants. Because of the lack of chanalization the water supply is based on public wells.

Fertorakos has no sewerage network, the sewage waters are treated in individual clarifiers and soakink pits. The Tack of sewerage network is the limiting factor of the potable water distribution system.

Sopronhohida and Tomalon recreation area are partly chanalized and the sewage water after biological treatment conducts to Rakos Brook. The loading of the STW is gradually increased and recently reached the 1.000 m3/d level. Ihe STW structure:

- pumping station.
- screen,
- distribution well,
- 2 combined basin (aeration and final clarifiers),
- chlorination basin,
- sluge tank.

The biological treated sewage water joins to the recipient at 5+600 river km stretch.

The construction work of the STW was completed in two stages, according to the demands of the 50-s and 70-s. and this effect can be seen on the Rakos Brook water quality too.

The water quality of the Rakos Brook

The water quality control and the biological survey of the Rakes Brook started 15 years ago by the North-Transdanubian D.W.A. with mountly system at Fertorakos in the 2t900 river km. stretch in the frame of our harmonizing monitoring network. We control regulary the STW of Sipronkohida, the effluent and the STW efficiency as well. For a successful water quality protection of the Rakes Brook and Fertbrakos Bay. we have been carring out many times long- and cross profile surveys on the lake and the Brook. Since 1981 near our harmonizing monitoring sampling point have been carried out the Austro-Hungarian consnon investigations too.

Hydrochemical investigations

The investigations involve the determination of the main components of salt-household, and nutrients and such as special components as oil residues, phenols, detergents.

Analysing 11 years Tong water quality data, since 1970 till 1980 we have divided this period into two, because the improvement of the STW of Sopronkbhida had been completed in 1976. These two periods are 1970 - 1976 and 1977 - 1980.

Salt-housenold (1. figure)

The salt concentration of the Rakos Brook water in term of conductivity during this 11 years shows a small increase which can be in connection with the slowly increase of the discharges of the STW. The total salt concentration since 1976 show stagnation. The standard deviations in both cases are rather small, 10-15 expressed in % The sodium-ion concentration in the past 11 years did not show any important changes and the average concentration is lo times less comparing to the Ferto lake.

Oxygen-household (Z. figure)

From the oxygen-household we analyse here the dlchromat and permanganat COD. Generally can be established. that after completing the STW. the COD of the water did not increase and in case of permanganat COD the Rakos Brook showed some slight improvement. The load of the Rakos Brook has been equalized what shows the standard deviation of the permanganat COD, which decreased of l/3. The average COD values show in the last 3 years a decreasing tendency.

Nutrients (3. und 4. figure)

Among plant nutrients have been done regulary the amnoniun, nitrit. nitrat and phosphat-Ion analysis. The distribution of amnonlum and nitrat- ion follow the improvement of the STU. In the 1970-1976 period the ammonium-ion concentration had a significant increase and after completting the STW in 1976 showed a decreasing tendency. According to this, but In opposite direction changed the nitrat-ion concentration.

After a quiete fast increase of the orthophosphat-ion during the 1970-1976 period, later on the increase was slower. On the STW is no phosphorus removal, so the increase of the phosphorus concentration can be connected with the increase of loading. Figure 4 shows the average distribution of anion active detergents. The figure shows, that after completing the STW Improvement. In Spite of increasing loads, the values are decreasing, and looking the standard deviation rates, the discharge of the recipient has been equalized.

Concerning total phosphorus loading of the Brook we carried out long-profile surveys as well and could established, that the total phosphorus concentration of the Brook changed between 0.25 - 1,22 mg/l P. The discharge was 0,036 g P/set on the survey day, that means a 3.1 kg/d phosphorus load in mouth stretch. This value agree well with, the measured 5 kg/d phosphorus load in STW effluent.

Saproblological surveys

To qualify rivers biological quality we used the saprobiological index lined out by Kolkwitz-Marson-Liebman. At our sampling point, a slowly decreasing tendency of the water quality till 1975, from alfa-mezosaprob to alfa-polimezosaprob and in some cases even polisaprob could be seen.

Since 1975 the quality improved and by now it has an alfa-mezosaprob character. in Spring and Summer periods by diatoms domination even analfa-beta-mezosaprob character.

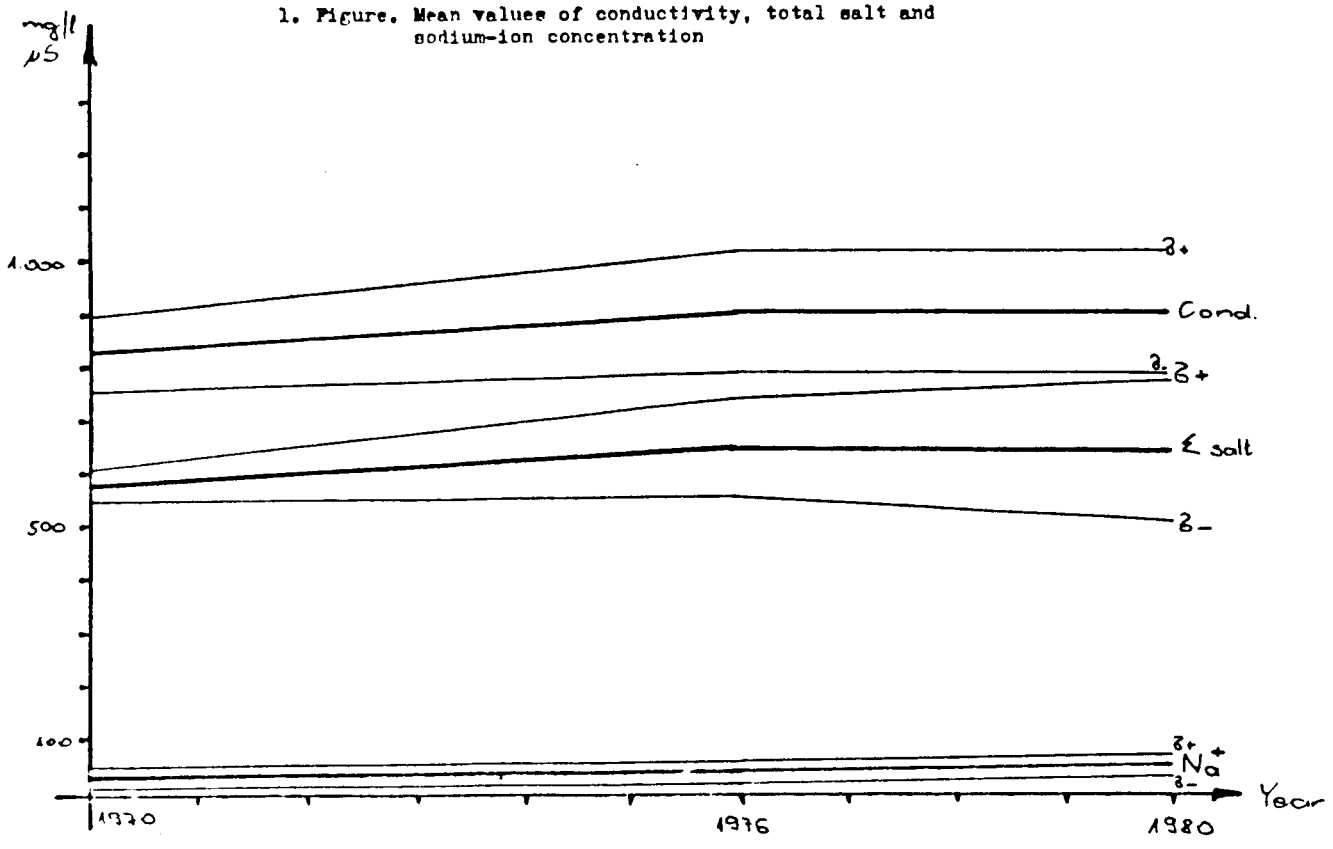
On the basis of our long-profile surveys it can be established that the water quality over the STW was in the II-III class and below the STW changed to III-IV Class.

Conclusion

According to our surveys it can be established, that the Rakos Brook does not have any effect on the lake water quality. On the catchment of the Hungarian territory the STW-phosphorus load does not exceed the 2 t/y value. In spite of this, to improve the water quality of the Kakos Brook it seems to be necessary to introduce the chemical phosphorus removal, which gave exellent results in case of the Austrian STW-s.

RÁKOS BROOK

1. Figure. Mean values of conductivity, total salt and sodium-ion concentration



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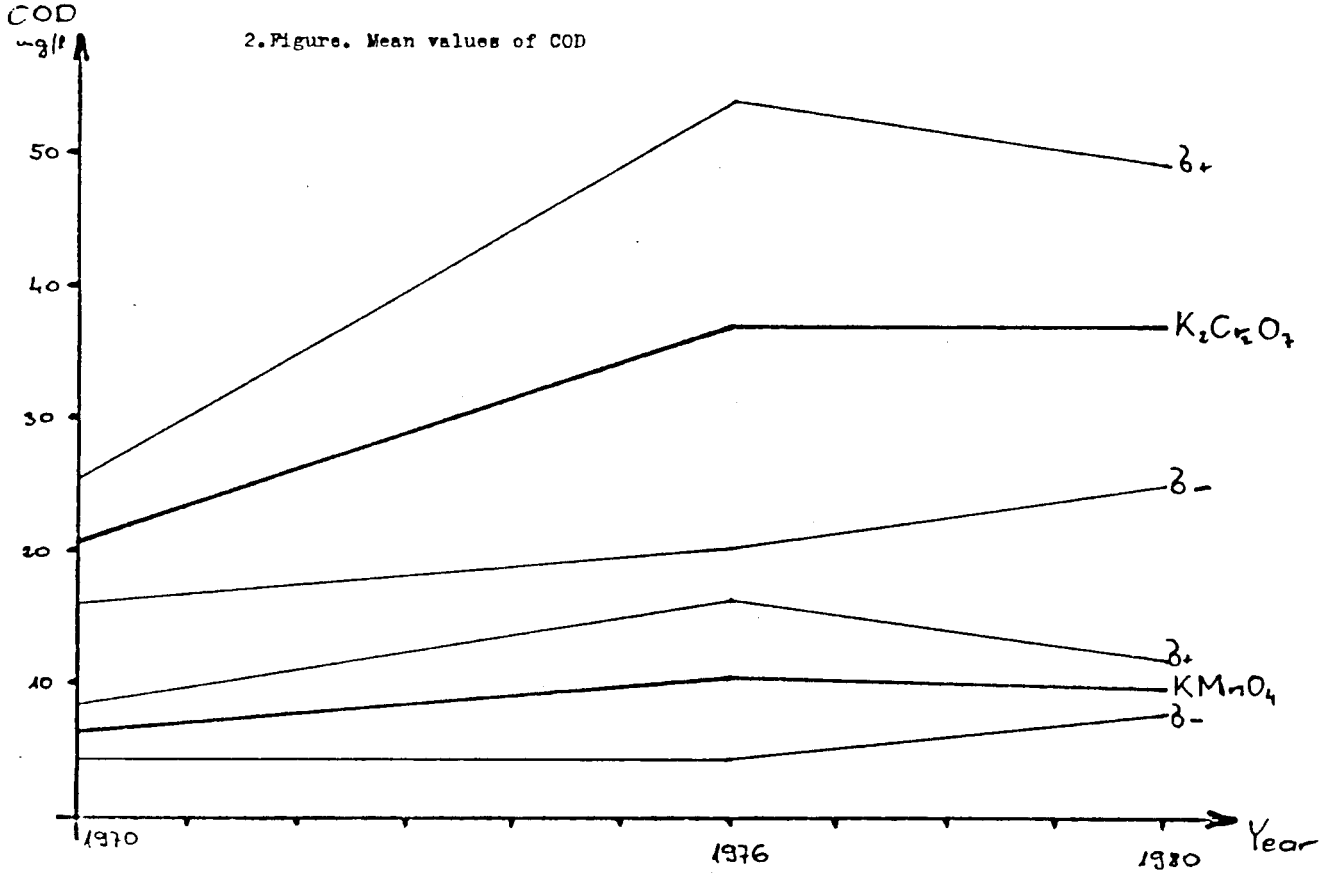
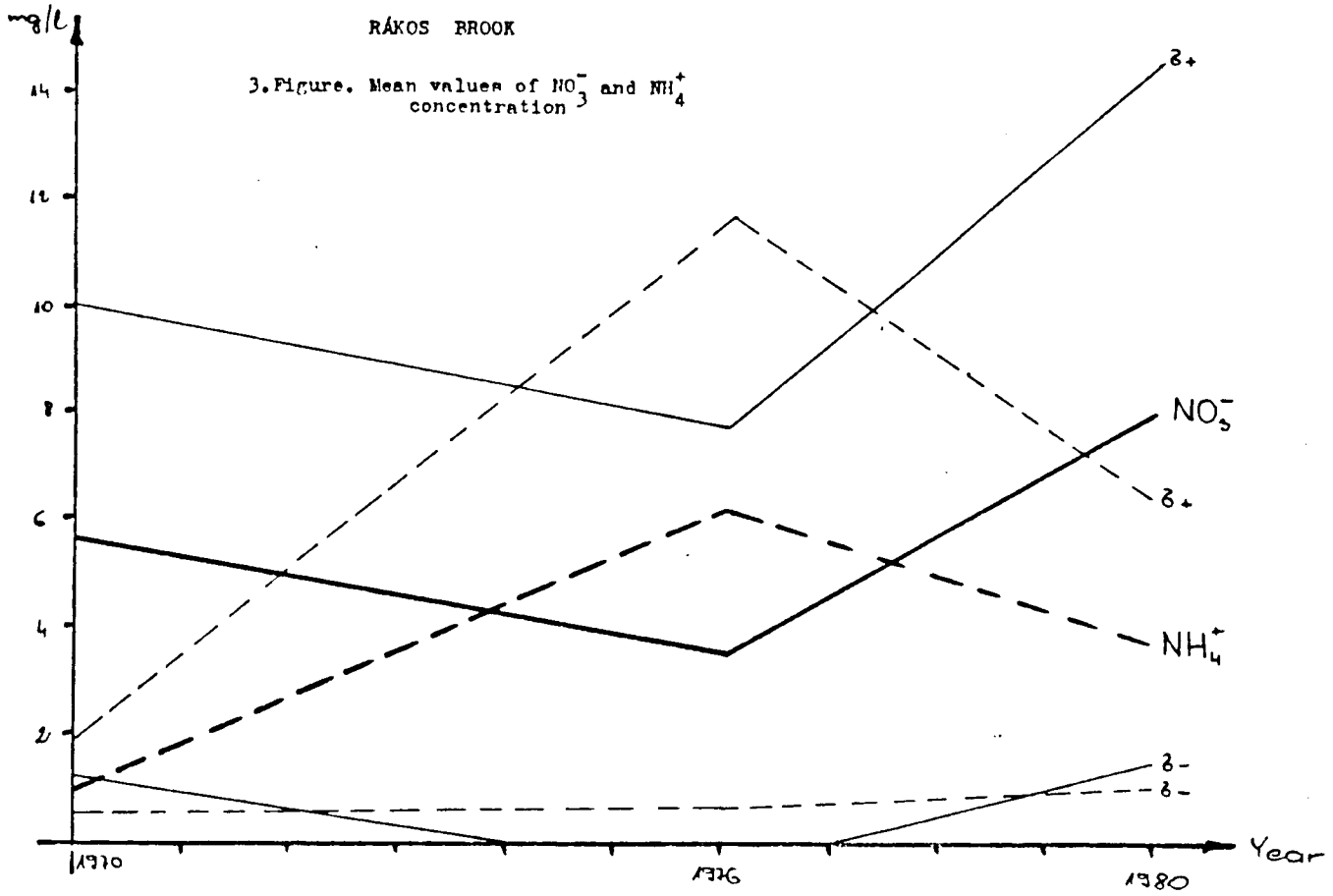
2. Figure. Mean values of COD



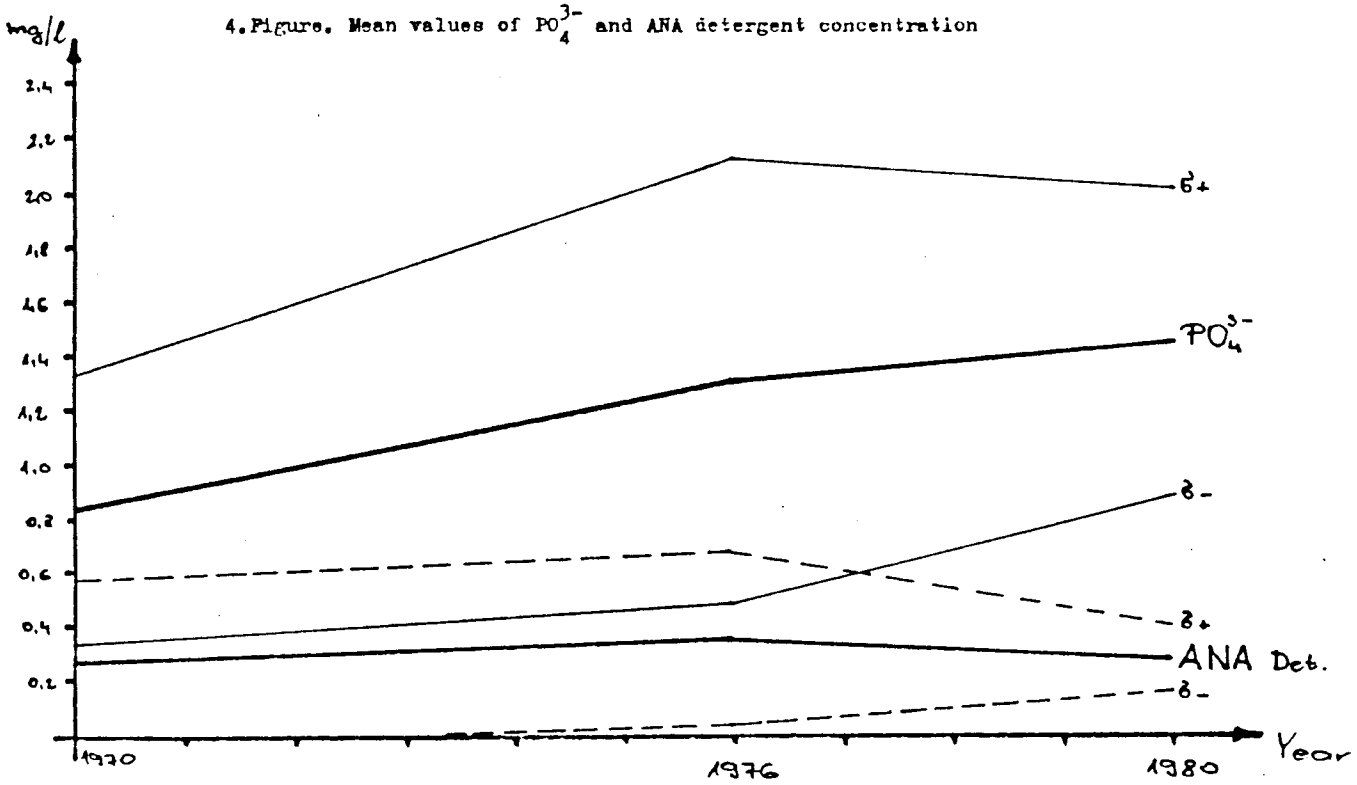
RÁKOS BROOK

3.Figure. Mean values of NO_3^- and NH_4^+ concentration



RÁKOS BROOK

4.Figure. Mean values of PO_4^{3-} and ANA detergent concentration



DATA TO THE NUTRIENT BALANCE OF FERTOLAKE

PANNONHALMI Miklos
North-Iransdanubian District Uater Authority Gyor, Hungary

The way and distribution of pollutants loading our water resources can be classified intO two main groups:

- the point-like pollution, and
- the non-point like pollution

The point-like pollution sources load the recipient in a concentrated form through one or a few effluents, in spite of the non-point like pollutions, which have a regional character, expressing the impact of the whole catchment area on the recipient, including wet and dry depositions as well.

The regional pollution is determined by natural factors and human activities on the catchment area, but both factors have an interaction too. We have to note, that beside thehunan activities the determining factors are the natural affects, because these transmit and transport the pollutants to the recipients.

The main forms of non-points like pollutants are:

- wet and dry deposition, namely precipitation and dust,
- pollutants transported by runoff
- pollutions transported by ground water

For quantitative analysis of the above mentioned loads two genera1 methods can be applied:

- in case of a small catchnent area the indication of pilot project area and monitoring as much as possible of water quality parameters
- in case of a larger area by means of material-balance as i.e. calculations.

Both of these methods involve a lot of suppositions and estimations. In our present approach the combination of the two methods was used.

1. The positive side of the nutrient balance

In 1981 the point-like pollution sources of the Hungarian catchment area respectively the data of water quality of the Rakos Brook have been reviewed on the basis of the North-Transdanubian DWA. Horeon. 1982 - 1983 non point like pollution sources of Lake Ferto were investigated in order to obtain newer information/data on its nutrient balance. The results and their validity are for the Hungarian part of the lake only.

1.1 Deposition

Since 1964 chemical analysis of rainfall have been carried out. Results were presented by Scientists of the Hungarian Metereological Survey.

1.1.1. Wet deposition

To eliminate errors while using open rain gauges an automatic rain gauge-type was developed and in 1978 installed on shore of LakeFerto at Fertorakos. During dry periods this gauge is closed and thus the impacts of top soil originated dust or other pollution sources are eliminated. Results were discussed and issued by HORVATH(1981 Central Institute for Atmospherics). Comparisons of analytical data from both types of gauges show a 100 % error of the own one against the closed.

1.1.2. Dry deposition

In the case of inorganic nitrogen the dry deposition was estimated of about 482,2 mg/m^2/year, which gives 36,2 t/year of inorganic nitrogen on the Hungarian lake surface. For both areas it says, that 5 t are falling on the open water and about 30 t on the reed belt.

In regard to the income of phosphorus same values were used as for calculation of the wet deposition, namely 0,5 t/year. The total nutrient income of the Hungarian part of the lake being deposition was estimated for 1,0 t P-PO_4 and about 110 t inorganic nitrogen yearly.

The areas utilized for agriculture intensively can be classified as 64 % plough land 12,1 % vineyard, 2 % garden and fruit plantation, while 9,4 % meadows as well as 8,9 % are pasture land.

As a total from the whole catchment area 61 % are utilzed intensively. Both, artificial and natural fertilizers are used. In all farms in which an intensive agriculture takes place 723/t/year nitrogen and 573/t/year phosphorus in form of artificial fertilizers are used, while for the same catchment area on plough-land 17 615 t a year natural organic fertilizer were distributed.

1.2 Pollutions transported by runoff

Generally, nutrients supply of natural waters by means of run off is a central problem of eutrophication processes all over the world. Recently VOLLENWEIDER (1968)summarized present knowledge. According to our experience one of the main effects is the length of the period between the fertilisation and the first rainfall causing a runoff. Moreon, the authors found phosphorus to be mobilized less than nitrogen.

In case of Lake Balaton 0,5 % phosphorus and 4 % nitrogen have been calculated to be originated from artificial fertilizers. Austrian authors estimated 35 - 70 kg/km^2 dissolved phosphorus to be washed out and transported by runoff, while according to Dutch investigations (catchment area 74 % agricultural area, 26 % forest) a loss of 18 kg/km^2/Year nitrogen was assumed to take place by runoff.

On the other hand agronomists think, that the load to recipients transported by runoff and erosion of phosphorus is not more than 1-2 % and 5-10 % nitrogen of the used artificial fertilizers.

According to JOLANKAI, who carried out a special pilot project on a small catchment area of Lake Balaton 5,5 % phosphorus and 6,6 % nitrogen of the utilized fertilizers came to the rediplent.

On our own data it can be shown that phosphorus concentration of runoff waters is near to those of other surface water after sedimentation took place, wheres concentration in nitrogen is far more higher compared to the Rakos Brook or other recipients.

Drainage canal N°	Condct. /uS	K^+ mg/l	Organic NO_3^- mg/l	NO_3^- mg/l	Tot. N mg/l	PO_4^{---} mg/l	Tot. P mg/l
1.	410	47	11,6	52,1	14,3	1,09	0,75
2.	970	27	6,1	28,8	7,7	1,74	0,66
3.	860	78	10,6	47,0	12,8	2,21	0,90
4.	530	54	26,2	116,0	32,3	2,21	0,94
5.	1350	12	20,1	89,2	25,4	0,42	0,66

In regard to the Hungarian Lake catchment area first estimations took a 3 t phosphorus and 30 t nitrogen supply from artficial fertilizers in account.

Investigations on the amounts of runoffs values of 2,5 - 5 t phosphorus and 110 t nitrogen were obtained. While the values for phosphorus are in agreement with the estimates, the amount of nitrogen was 4 times higher using the runoff approach method.

Since 110 t nitrogen would have been 15 % in excess of the total amount used as fertilizers on the whole catchment area, the present authors took into account a 6 % runoff coefficient. In total the load of the lake from fertilizers can be expressed in an amount of 3 t phosphorus and 30 t nitrogen.

1.3. Pollution transported by groundwater

In order to be able to evaluate loads in nutrients as an effluent by groundwater any data were available and it was supposed that in the case of Lake Ferto groundwater dlscharge as a source of an enrichment of nutrients can be neglected.

Non point lfke load on the Hungarian catchment area is about 4/5 t phosphorus and 140 t nitrogen according to our opinion.

2. Ihe negative side of the balance

In the negative scale of a balance drainage and reed management have to be taken in account.

2.1 Drainagr

Within hydrometereological conditions the water balance of the lake is positive and long year average results in a surplus of 48,5 millions m^3 water, which can be drainaged. Calculating with 0.150 g/m^3 phosphorus in average in the lake water the amount of phosphorus which possibly could be removed by drainage is about 7 t a year.

Same considerations in regard to the nitrogen-compounds are ruther difficult. Up to now in our investigations during sommer period is it was impossible to detect nitrat-nitrogen at all or in very small portions only. Therefore on the nitrogen cycle further investigations are required.

2.2. Reed management

On the Hungarian part of the lake reed managemnt takes place in a very intense way. During the last 8 years 2 million sheaves were harvested yearly, i.e. 13 846 t/year, but in 1979 the harvested crop was 2.2. millions sheaves.

3. Conclusion

On the basis of our investigations during 1981 point like phosphorus load of the Hungarian catchment area did not exceed 2 t/ year,whilc the non point like nutrient supply can be estimated for 5 t phosphorus and 140 t nitrogen.

FROM; Roy G. Darville, 102 7,3406
TO: Andrew Bramson/NGYIK, 100333,3452
cc: Dwight Shellman, 72007,165
DATE: 2/22/96 6:06 PM

Re: Follow-up to previous e-mail

Dear Andrew,

I have received an e-mail concerning your monitoring activities. Thanks for the report and good job. I hope that by now that you have received my report. I sent copies to Andras and 'Dwight.

I talked with Dwight late this afternoon and reported on your efforts. He appreciated your iniitial good work and cooperation and effort to make it happen so quickly. Due to the short time frame with him leaving for Australia, he would like for you send be FedEx to him directly to his Aspen office:

1) the slides that you took at the montoring event
2) a short biographical note about each participant -- student, teacher, nationality, grade level, general academic interests, etc.
3) a short narrative describing your monitoring event
4) if possible, we could use an audiotape to provide voice over for the production of a video. You could provide this to us by describing what is happening in each slide. For example, in slide #I, (pause) the group of 9 monitors has arrived at the lake which is in the background. This would not be needed for each slide -- only the best and most significant.

Any of this material that you send will be used as much as possible in Australia and in the future as we develop our joint monitoring program.

The FedEx address for Dwight's office is
0190 Woods Road
Woody Creek, CO 81656
Tel (970) 9252710

Bill to Caddo Lake Institute, FedEx Account

Thanks again for your help. I look forward to hearing from you.

ROY

FROM: Roy G. Darville, 102 7,3406
TO: Dr. Andras Ambrus, INTERNET:tocs@mobk.zpok.hu
cc: K. Warkentin/A. Bramson, 100333,3452
Dwight Shellman, 72007,165
DATE: 2/22/96 4:34 PM

Re: Results for Joint Monitoring of Ramsar Wetland

Dear Andras and Andrew,

I conducted water monitoring of our Ramsar wetland on Saturday, 17 February 1996 at a location called Collier's Landing on Caddo Lake. This site is located at mid-lake on the south shore. This is private property with the owners giving consent for us to sample off a pier that extends about 20 meters into the lake. Below I am transmitting the results that I obtained during this chemical and biological monitoring effort.

Air temperature 9.5 C
Water temperature 8.5 C
Dissolved oxygen 9.95 mg/l
Conductivity 110 micromhos/cm (or microS)
pH 7
Secchi disk depth 0.47 m
Total depth 1.22 m
Total alkalinity 36 mg/l
Ammonia nitrogen 0 mg/l
Nitrate nitrogen 0 mg/l
Orthophosphate 0 mg/l
Sulfide <0.2 mg/l
Chlorine <0.5 mg/l
Copper 0 mg/l
Zinc 0 mg/l
Carbon dioxide 4 mg/l

General Observations:
Water color -- clear
Water odor -- none
Water surface – ripples
Water level -- low
Wind intensity -- 2
Wind direction -- south
Present weather -- 1
Rainfall accumulation in past 7 days -- none

Birds identified -- belted kingfisher, great egret, cormorant

Benthic macroinvertebrate survey based on the Issac Walton Save Our Stream protocol -- fair

Odonate monitoring (larvae only)
Family Coenagrionidae
Enallagma sp. -- 2

Family Gomphidae
Gomphus sp.--1
Family Corduliidae
Tetragoneuria -- 4
Family Libellulidae
Libellula -- 1

This is a modest beginning, but as time goes along I believe that we will expand the work to include other tests. I hope that you had a successful monitoring event and look forward to receiving your report via e-mail. I will telephone soon to confirm our joint work.

Thanks for your cooperation and dedication to making this a successful effort.

ROY

FROM: K. Warkentin/A. Bra on, 100333,3452
TO: Dwight Shellman, 72007,165
Roy Darville, 102567,3406
DATE: 2/22/96 11:42 AM

Re: Ferto Lake Data Feb. 21,1996

Dear Dwight and Roy,

Here are the data we collected yesterday. The program was very successful. We are currently developing the slides. Unfortunately, that process takes about a week. (I can one guy tell me he could develop them in a month!) The weather was cold but clear and tolerable. The only problem with the afternoon was the video camera. After all our preperations, the battery failed and thus we were not able to take a video. I can assure you that we have enough slides to make up for it. We are presently replacing the battery and the camera should be ready to function next month.

Before our observations, we met with park officials to discuss the different projects they are currently working on. They also presented us with a little history about the lake and past data. I plan to write something up in English and send you a summary of the lake along with recent data. The students had a wonderful afternoon and say they are ready to go back anytime we need them.

I believe that Roy will be in the States until the middle of March. I was hoping to send the slides to him before he leaves for Australia. Normal air-mail takes about 6-10 giving us enough time. I do not think Federal Express will be necessary. Of course, I am assuming that I will get the slides back in a week. I hope this is what you guys were looking for. If not, let me know so we can make the necessary changes. I look forward to hearing from both of you soon.

Sincerely,
andrew

DATA:

Place: Fertorakos, Hungary (the first “0” has a double accent mark)
Date: February 21, 1996
Participants: Andras Ambrus, Andrew Bramson, Tibor Csobod, Kenneth Kato, Bittman Csaba, Lorincz Ferenc, Kapa Ago, Nagy Peter, Kiss Eva.

Weather conditions at 15:45 (3:45 pm)

Wind Direction: East to North-east
Wind Speed: 3.6 m/s with a maximum of 6.7 m/s
Barometric pressure: 995.8 millibars (29.40 inches Hg or 746 mm Hg)
Humidity: 40%
Air Temperature: O*C
Water Temperature: O*C
Sky: Sunny
Lake Condition: Ice and snow covered

Data were collected using the Aquamerck 11107 Sauerstoff-Test

Dissolved Oxygen:

Average Dissolved Oxygen 8.1 mg/l n=2

(This level is considerable lower then what you would expect during the winter months. However, the ice covering and subsequent snow greatly reduced the rate of photosynthesis and thus oxygen production.)

Average Nitrate and Nitrite: 0.1 mg/l n=3

(The lake tends to have very low levels of nitrogen. I will send the 1994 data next week, however, the test strips used for this portion of the data collection are 8 months old and may not be accurate)

pH concentration: 7.7

(The measurement is a little lower than the average at this time of the year)

Chloride Test: 275 mg/L n=2

Water Hardness: over 30*e (Based on the German degree scale)

(The lake water is extrememly hard throughout the year)

Weather conditions at 16:45 pm)

Wind Direction: East to North-east
Wind Speed: 3.6 m/s with a maximum of 6.6 m/s
Barometric pressure: 995.7 millibars (29.40 inches Hg or 746 mm Hg)
Humidity: 44%
Air Temperature: -1 *C
Water Temperature: O*C
Sky: Sunny
Lake Condition: Ice and snow covered

19 February 1996

Dear Dwight,

I talked with Andras today. The joint monitoring activity seems to be going as planned on Wednesday. They will be sampling Lake Ferto on the western side near Fertorakos, specifically at a beach area called Udulotelep (about 25 km the Heron Castle). He said that there is still about 20 cm of ice on the lake but that they will try to get through the ice.

The head of the U.S. Peace Corps in Hungary will meet them at the sampling site and will bring with her some type of water quality kit. Andras was not sure what the kit contained but he said that he would run as many test as possible.

He has our weather station at his house and is currently reading throught the instruction manual. He has found a location for installation of the unit that is secure. It is in some type of field location inside of a small building. My only concern is that it is unheated which could cause some problems with the electronics. I will call Ken to get further advice concerning that issue.

We will exchange data hopefully on Wednesday via e-mail. Andrew and I are connected well, but Andras and I still seem to have some problem with the Green Spider Network. I have water quality and benthic data from sampling last Saturday at the lake. I also have a number of odonates that I will identify by Wednesday.

Andras is very excited about meeting Andrew Bramson. I think it has helped his and gave him someone to relate to. He told me to tell you “thanks” for the video and the letter. He will view the video as soon as he can get access to a VCR.

Talk with you soon.

ROY