

ERWG Letter



Land and Water Management in Europe

EUROPEAN REGIONAL WORKING GROUP (ERWG) OF THE
INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE (ICID)

EDITORIAL

In May 2005, the last ERWG Letter was published focussing on the themes of the 21st European Regional Conference at Frankfurt (Oder), Germany and Ślubice, Poland and dealing with information on the Polish and German vicinity of the Oder, the region of the conference excursions. Since then, another year has passed with many events important to us like the 56th IEC Meeting at Beijing or the 4th World Water Forum in Mexico.

From the later, we took its motto "Local Actions for a Global Challenge" as principle also for our ERWG activities.

It was also one year ago that our esteemed colleague Wolfram Dirksen was among us at Frankfurt and Ślubice for the last time. In his well known active manner, he pushed the finalisation of the book publication elaborated within the Project on Irrigation Management Transfer in European Countries of Transition. At the end of November, we were struck by the sad news on his death. I may say surely in all our names having known him for more than 25 years that Wolfram Dirksen's ambitious principles of fostering international cooperation will guide our future efforts.

Working on efficient irrigation in our countries will become more and more important as the conditions of global change will influence the problem fields of increased water demands versus less water availability. In this context, the utilisation of treated waste water will finally be of concern for the stabilisation of landscape water regime as well as for irrigation purposes, especially in the range of large metropolitan areas. This worldwide visible trend therefore should be incorporated in the work of the ERWG, e. g. by establishing a special new work team.

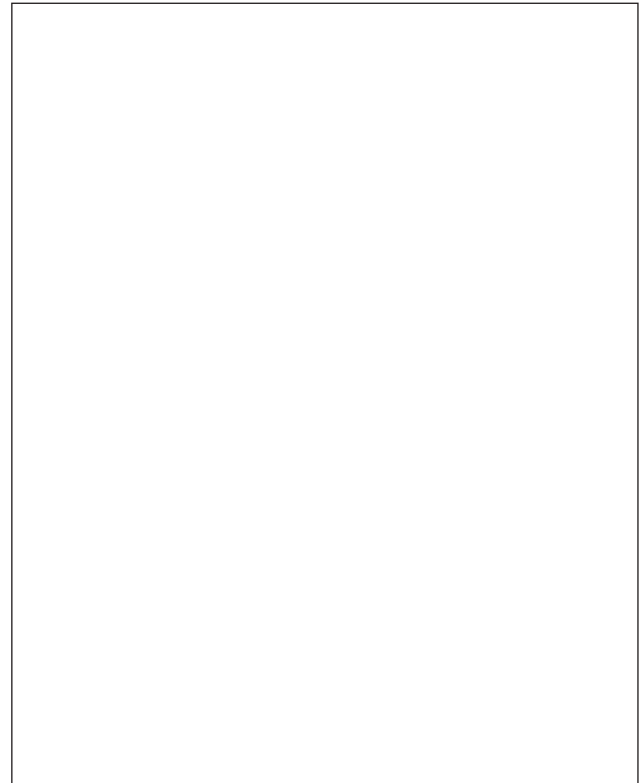
Another subject of future ERWG activities might be the production of crops for bioenergy and biofuels especially regarding the availability of land and irrigation water in competition with food and fodder crops and with regard to environmental goals. An involvement of the ERWG might cover the ICID typical aspects of irrigation and management of land and water resources and would support national and European research and promotion efforts in the sector renewable energies by crop production.

Finally, I want to encourage you to take the chances of strengthening ERWG's relations beyond Europe by today's means of communication like e-networking, e. g. by the FAO / UNESCAP initiative "E-network on strategic planning & management of water resources in Asia and the Pacific" (www.spm-water-ap.net/spm/)

Eiko Lübke

IN MEMORIAM

Wolfram Dirksen 1940 - 2005



Wolfram Dirksen in intensive discussion (51th IEC Meeting, Cape Town, 2000)

Wolfram Dirksen died at 20 November 2005 after a short severe illness in his 66th year. All of us were deeply shocked by the death of our colleague and friend. The many condolences sent to his family and to the ICID German National Committee are testimony of the high esteem Wolfram Dirksen enjoyed in Germany and world wide.

During all his life, he put his entire energy in his commitment to the tasks entrusted to him. Such was the case for his engagement as managing director of the German Association for Water Resources and Land Improvement (Deutscher Verband für Wasserwirtschaft und Kulturbau, DVWK) from 1980 to 2000 as well as especially for

his activities within the ICID. Dr. Dirksen was Secretary of the German National Committee of ICID, he was member of different ICID Working Groups, he was elected ICID Vice President, and it was on his initiative that the European Regional Working Group was founded in 1995. Here, his achievements were exemplary. Still until few weeks before his death he furthered the GTZ project on Irrigation Management Transfer in Countries of Transition which had been initialised by him. Meanwhile, the resulting book with the National Reports on the Irrigation Sector Reform, contributed by ten Central and Eastern European Countries, is published.

Yet another piece of work, which he finished by spring 2005, was of especially great importance to him. Supported by Polish colleagues, the hydro-engineer Dr.-Ing. Wolfram Dirksen, born in 1940 at Danzig/Gdansk, searched for the private and professional roots of his fore-fathers in the polder region of the Lower Vistula.

Back for four generations, his father's ancestors acted as experts and head of dike and polder associations – the "Embankment Commune" and later "Embankment Union" – at the Vistula river. The efforts of the search in his ancestor's history resulted in a comprehensive manuscript on The Embankment Union of the Falkenau Lowland (*Der Deichverband der Falkenauer Niederung*) by Wolfram Dirksen. During our 21st European Regional Conference in 2005 at Frankfurt (Oder) and Słubice, he talked to me about his tour to the Vistula region and gave his manuscript to me. From this manuscript and from another paper jointly published with Waldemar Mioduszeowski we prepared the following article in accordance with Mrs. Ursula Dirksen.

We will honour the memory of Wolfram Dirksen.

Joachim Quast

The Dike Association and Flood Protection of the Falkenauer Niederung / Walichnowska Lowland at Lower Vistula

Based on Wolfram Dirksen's † last paper and a joint publication together with W. Mioduszeowski

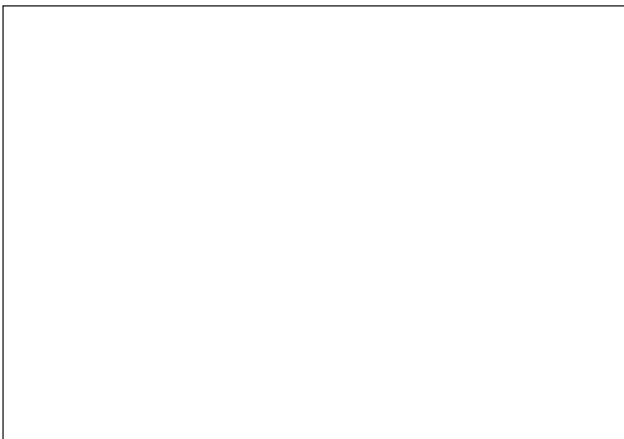
Introduction

Since the dawn of time man settled in river valleys. He built his houses there and farmed on fertile river alluvia. Flooded valleys were, and in many cases still are, treated as the most valuable areas for food production. Civilisation and economic development was often determined by the access to fertile soils and associated with the now considered wasteful exploitation of natural resources in

flooded again and again. In spite of large social and economic losses the valleys were not abandoned, on the contrary, destroyed anti-flood constructions were repeatedly rebuilt. One of such areas "taken back" from the river is Walichnowska Lowland situated in the lower Vistula valley.

The local chronicler (Dirksen, 1899) wrote: „Residents of Walichnowska Lowland acquired their place for living from the Vistula with diligence and stubbornness. Much effort was needed to turn swampy area into fertile fields and economically flourishing villages“.

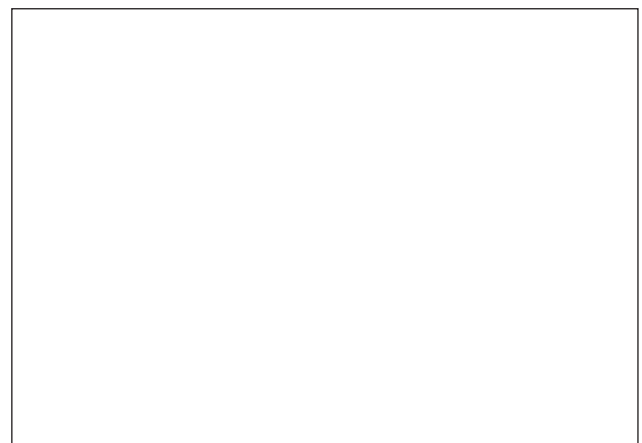
Now we know that river embankments and other measures of flood control brought also many losses in the natural environment. Therefore, a motto "more space for rivers" becomes more and more common. Attempts are undertaken to reconstruct technical systems of flood control to enable flooding the valley areas at least in places where such measures would not cause economic losses. It seems, however, that we also need to do justice to our ancestors who counteracted natural el-



View over Walichnowska Lowland towards Vistula

these valleys. This practically happened all over the world. Valleys of almost all larger European rivers, including the Oder and the Vistula, are more or less utilised for grassland farming and sometimes even as arable lands.

Agricultural utilisation of river valleys and human settlement required protection of these areas from flooding and the excess of water. Hence, actions were undertaken to protect from the destructive element of water. Embankments and draining systems were constructed. These facilities were often destroyed and the valley was



Lowland near Roßgarten / Rozgarty

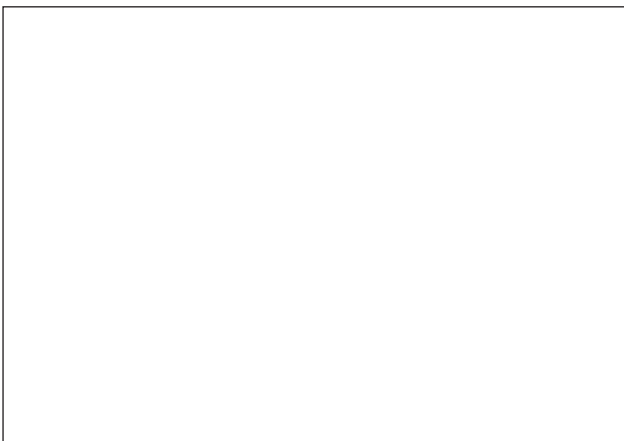
ements and protected their wealth from flooding. The approach of residents of Walichnowska Lowland to the protection of their fields from water element manifested itself in the construction of a monument in 1907 dedicated to Rudolf Dirksen, the embankment starosta (local officer in Old Poland), who devoted most of his life to protecting grounds from flooding. There was an inscription on a bronze plate that said: "To Rudolf Dirksen, the embankment starosta from Małe Walichnowy, 1883–1904, from grateful residents".



Monument for Rudolf Dirksen (1915)

Management of the Vistula Valley

Walichnowska Lowland is an area located east of Szprudowo, Lignowy Szlacheckie and Wielki and Mały Garc that for ages was flooded and where the Vistula intensively meandered. After every overbank flow the Vistula flooded the valley and left mud which in time formed fertile alluvial soils. There were many islands in the lowland but agricultural utilisation of the area was difficult due to excessive moisture. Unmown grounds became overgrown by dense rushes and willows. Spring and summer floods were a constant threat. Acquisition of these areas for agriculture began at the end of the 13th century when knights of the Teutonic Order decided to settle the Vistula and the Nogat valleys. Settlers from north Germany and Holland came to the Lowland bringing their skills in acquisition and management of flooded areas. Probably parts of the Lowland were equipped with embankments already at the end of the 14th century. First flood embankments were, however, of relatively low height and endurance. Their role was to protect

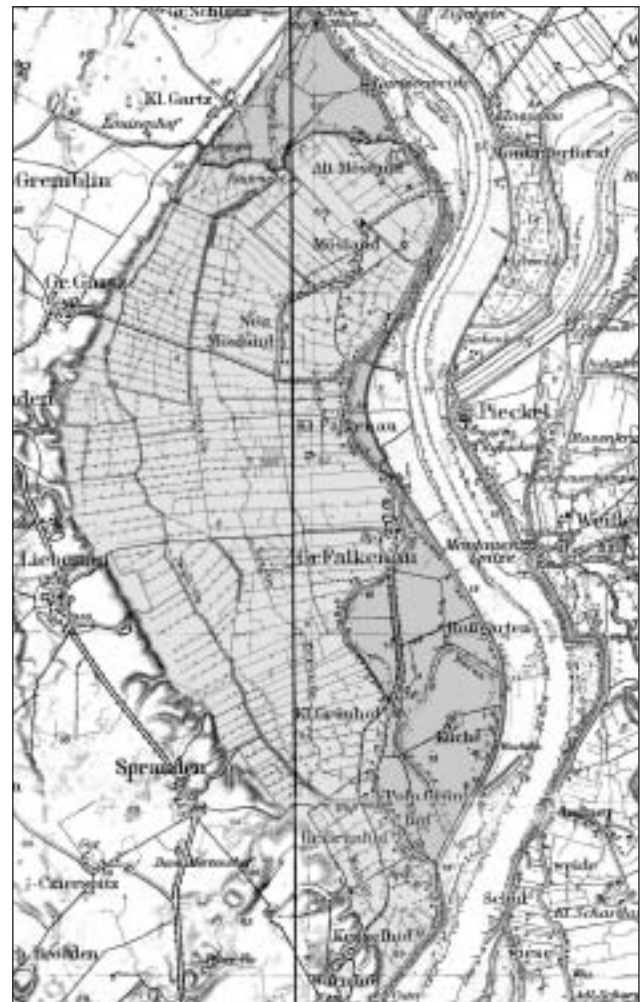


Vistula at Alt Mösländ / Stary Międzyzylęż

croplands from flooding only during summer in the vegetative season. They did not protect from much larger spring floods and from frequent ice jams.

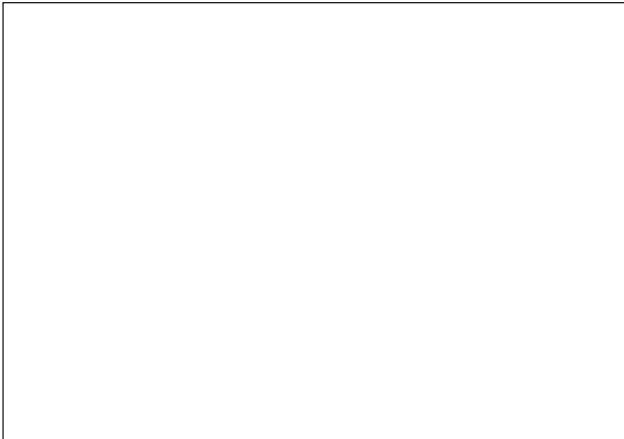
First embankments were not parallel to the main Vistula channel. Smaller areas were protected and separated from the river channel by constructing short dikes perpendicular to the river. Swamp areas and the earlier cut-off old part of Lake Pelplińskie and Lake Lovigius (Lake Pelplińskie Małe) were diked with the so-called end embankment localised south of the Garckie Mountains. Later, the protection encompassed the localities Kuchnia, Rozgarty and Garcka Pastwa (Pasiska). Acquired grounds were primarily used as pastures. Only after decades lasting drainage they became fertile croplands.

Already in the initial stage of settlement it was understood that flood hazard came not only from the Vistula. Waters from an upland that formed western edge of the lowland near villages Szprudowo, Lignowy Szlacheckie, Wielki and Mały Garc could also pose a risk of flooding. Therefore, it was decided to dig out a channel which ought to collect waters flowing from upland and discharge them to Lake Pelplińskie. Right, eastern part of the channel was embanked to protect the Lowland from overbank flows in the channel. After the embankment, the channel was named the Embankment Channel being probably the oldest draining system in the Lowland.



Walichnowska Lowland – water system on a map from second half of the 19th century

To properly manage the area of valuable soils with a thick humus layer covering loamy substratum it was necessary to create a draining system which would involve the whole Lowland since the drainage of rainfall and snow melt waters was indispensable. Another reason for constructing the drainage system was to lower the ground water table. In the middle of the 19th century a dense network of draining ditches was constructed which delivered drained water to three collectors: Graniczny Canal, Średniak Canal and Jeziorniak Canal. The canals discharged water through a sluice and later through a pumping station "Zgoda" to Lake Pelplińskie and further through the sluice "Międzyłęź" in Rybaki and later pumping station "Nadzieja" to the Vistula.



Relocated Vistula dike with lowland (left) and Vistula fore-land (right)

The main anti-flood protective elements were, and still are, flood embankments of a total length now of 17.5 km. In the middle of the 19th century, together with the sluice construction on the Nogat, there was a need to raise the embankments. It was assumed that the embankment's crest should elevate 8.95 m above zero level at the water mark at a crest's width of 4.40 m. Slope of the escarpe was established at 30° from the riverside and 45° from landside. In 1847 a sluice was constructed with 15 m high gate which was closed at high water levels in the Vistula. North from Piekło a channel was built to join the Nogat channel with the Vistula. It could take up to 30% of the Vistula flood water. Closing the Nogat, however, unfavourably affected flood security of Walichnowska Lowland. The amount of water that flew in the left channel increased to 70% i.e. almost twice that from before construction of the sluice on the Nogat. Prussian government intended to reduce flood risk by elevating embankments and deepening the river channel.

Small elevation of embankments soon appeared insufficient. On April 12th 1848 farmers from Walichnowska Lowland paid a high price for that – they lost their crops. Unfavourable effect of the sluice on the Nogat on management on the left Vistula bank became a fact.

Further elevation of embankments started in 1878. Slope of escarps was changed from previous 30° to 36° on the riverside. It was estimated that the crest's width should be 4 m instead of the former 4.40 m. Material obtained in that way allowed for elevating the embankment to final elevation of 10.65 m above zero water mark. At the same time a new embankment was con-

structed between Małe Walichnowy and Nowe Międzyłęże. Old embankment had a weakness – a very sharp arc – so it was replaced by a new one. The works lasted until 1894. Then, the final course of embankments was established parallel to the Vistula main channel that has remained in this shape until now.

In the beginning of the 20th century channel of the Nogat near Piekło was closed because of digging the Vistula cutting. Since March 31st 1895 waters of the Vistula flew directly to the Baltic Sea. Flood risk markedly diminished. Since that time no large flood losses were recorded.

A great problem for the valley residents was to channel the water from draining systems. Construction of a drainage windmill started in 1818 in place of the "Zgoda" sluice. The investment was financed by farmers from Walichnowy, Garc and Janiszewo. Building works pro-



Drainage windmill

longed, documented data on the operation of the windmill are from autumn 1845. The windmill was efficient only at average water tables in Lake Pelplińskie. At higher stages ground around the lake became inundated and the water outflow from the Embankment Channel was hampered resulting consequently in further flooding. Not fully efficient and costly enterprise soon became useless, the windmill eventually burnt down in autumn 1851.

Problems with channelling excess water were solved not until 1889 with the installation of a highly efficient pumping system meaningfully named "Hope". The investment was a milestone in the history of land reclamation in Walichnowska Lowland. For the first time it was possible to control water level in the Lowland regardless of the water table in the Vistula. The system of flood control and draining in the valley formed in the 19th century is, mostly unchanged, the basis for water management until now. Appreciation and importance of the water system that protects area inhabited by thousands people may be evidenced by a map drawn on the wall of a primary school in Małe Walichnowy.

Floods on Walichnowska Lowland

Flood waves entered the Lowland every year, regularly in spring after snow and ice melt and sometimes in summer due to abundant rainfall in the mountains. The list of flood events in valleys of the Vistula and Nogat is probably opened by that from the year 1376.

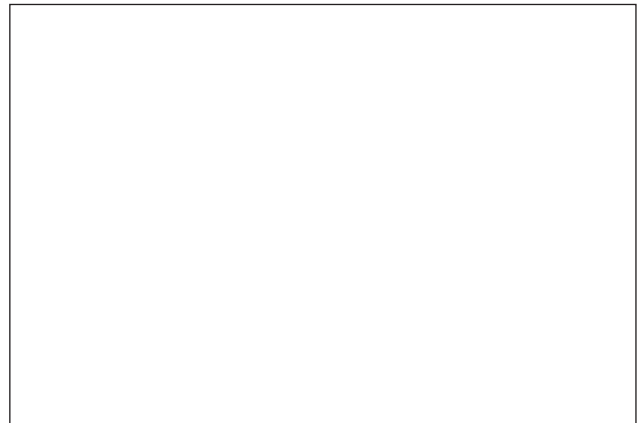
Though little is known of floods in ancient times, we may now find the traces of old disasters in the Lowland. In place of the embankment disruption water washed out several metres deep holes behind the escarp which later became ponds. First such pond is at the border between Małe Walichnowy and Międzyłęź. The second pond of the same origin was formed in 1786 between Polskie and Wielkie Gronowo.

Floods as a consequence of high water stages and breaking the embankments frequently experienced the Lowland. Greatest floods took place in the following years:

- 1804 (spring) embankments broken near Gronowo and Stary Międzyłęź.
- 1813 (August 4th) end embankment broken near Lake Lovigius (Lake Pelplińskie Małe).
- 1816 (March 19th) end embankment broken in 6 places, water brought sand to lower situated areas in Stary Międzyłęź.
- 1829 (April 8th) end embankment broken in 5 places in Stary Międzyłęź.
- 1830 (March 7th) water destroyed a new, weakly compacted embankment at a length of 100 m near the sluice in Rybaki. Newly acquired ground got again under the water. After removing destructions a peaceful period lasted until the catastrophe in 1855.
- 1855 (March 27th). It was one of the most violent floods. Ice services reported on a weak thaw. However, ice cover on the Vistula was strong enough since on the same day four-horse cart carrying tree trunks passed on the ice. In the evening the water started to rise and flew rapidly over the ice cover. At 10 p.m. water flew over the banks, a dark night was filled with tremendous cracks of breaking ice. In the morning March 28th water raising assumed horrible dimensions, during 6 hours the water table raised by 6 m. In Wielkie and Małe Walichnowy the water flew 30 cm over the embankments crest. Two hours later the Lowland resembled the sea.
- 1878 (March 18th). A telegram was received in Walichnowy on an ice jam near Toruń. Farmers heedless of snow and hailstorm hastened to protect the embankments. Guards were set up and material for reinforcement was being carried in horse carts. In the dark night of March 18th, water level raised by 5 m during 8 hours. In the morning it reached 1.50 m beneath the embankment's crest. Fortunately, masses of water and ice were directed to the Nogat by opening the gate of the sluice. Joy did not last long. Violent thaw came on March 26th. Danger came from the upland. Melting snow released huge amounts of water and mud. The Embankment Channel was not able to receive such masses of muddy water. Water destroyed the embankment near channel in many places and flew over lower situated grounds. 2/3 of the Low-land area was inundated. In some places water depth was 2 m. On the road between Wielki Garc and Walichnowy water level was 60 cm.

It was the last flood in the region. The digging of the Vistula cutting improved the discharge of waters to the

Baltic. Moreover, every spring the fleet of icebreakers crushes the ice to prevent from the formation of ice jams. However, the Vistula still poses a flood threat and protective system built in the 19th century must still be kept in operation.



Nogat barrier with sluice

Organisation of the flood control

Document dated June 24th 1590 prescribed a privilege called the Embankment Act to Walichnowska Lowland. Polish king Sigismundus Vasa the III confirmed the Embankment Act of Walichnowska Lowland on January 8th 1591. A hundred years later in June 1693 king Jan Sobieski the III gave the act a rank of statutory law.

Residents of the valley constituted an embankment commune and were obliged to take care of embankments and draining ditches. It was the so-called „common burden”. The highest authority and control institution was the meeting of representatives of associated localities to which every village delegated two persons. Flood control was directed by a six person Collegium of Embankment Jurors headed by the Embankment Starosta. The collegium realised common activities and reported to assembly of representatives. Szprudowo, Lignowy Szlacheckie, Rudno and Garc were represented in the Collegium by one juror each. Walichnowy had two representatives. When Międzyłęź (Stary, Nowy and the so-called Vorwerk Międzyłęź) and Gronowo (Wielkie, Małe and Polskie) acceded the commune on December 3rd 1768 the Collegium was enlarged to 8 jurors.

Particular localities assembled in the Embankment Commune were obliged to pay taxes related to “possession”. It was the so-called embankment burden. It practically meant that every landowner had to pay. Tax payers had a right to appeal when did not agree with the charge but it was only rarely that landowners succeeded in convincing the Collegium to their arguments.

Parishes whose grounds were situated in the Lowland claimed to be freed from taxes though the rural privilege of May 17th 1645 clearly indicated their duties pertaining to the embankment burden.

Jurors and the embankment starosta were free from taxes; it was remuneration for their efforts. Later, instead of being freed from paying taxes they obtained small salary – a kind of daily allowances. Their function was considered an honour and distinction.

Embankment commune controlled also the so-called „duties in nature” paid by landowners. The statute estimated in details what kind of works should be done in

channels, ditches and embankments. It also listed particularly how much earth should be delivered to repair embankments, how much osier to produce fascine and how much timber to construct and maintain the sluices. The collegium of embankment jurors was in charge of all these works and the whole commune was controlled by the state embankment inspector during every-year supervisions.

By constituting the embankment commune, whose will was written in the statute, our ancestors 400 years ago created a democratic order to serve their development and wealth. The embankment statute is an evidence of autonomous will and responsibility. Unchanged through 240 years it was accepted by 10 generations.

In the year 1830 Prussian government decided to get more influence on the embankment commune. It was considered a restriction on local authority. Government decisions resulted in the enlargement of the collegium of jurors by persons representing the government. Term of office was established at 6 years. Moreover, the Lowland was divided into two districts. Upper district involved Kotło, Wielkie Gronowo, Małe Gronowo, Polskie Gronowo, Szprudowo, Lignowy Szlacheckie, Wielkie Walichnowy, Rozgarty and Kuchnia. Lower district consisted of Małe Walichnowy, Stary Międzyłęź, Nowy Międzyłęź, Międzyłęź Vorwerk, Wielki and Mały Garc, Janiszewo, Wielka Słońca and Garcka Pastwa. A new post was established for embankment guard who operated the sluice and lived in a tied accommodation.

In 1854, the year of catastrophic disaster, the Embankment Union of Walichnowska Lowland was established. Initiation of the union was preceded by numerous consultations led by government representative an assessor Schliep. The union was given a statute that listed both rights and duties of members and elected bodies of the union. The statute was based on Prussian law "Act regarding causeway matters" of January 28th 1848 and on supplementary decree of November 14th 1853.

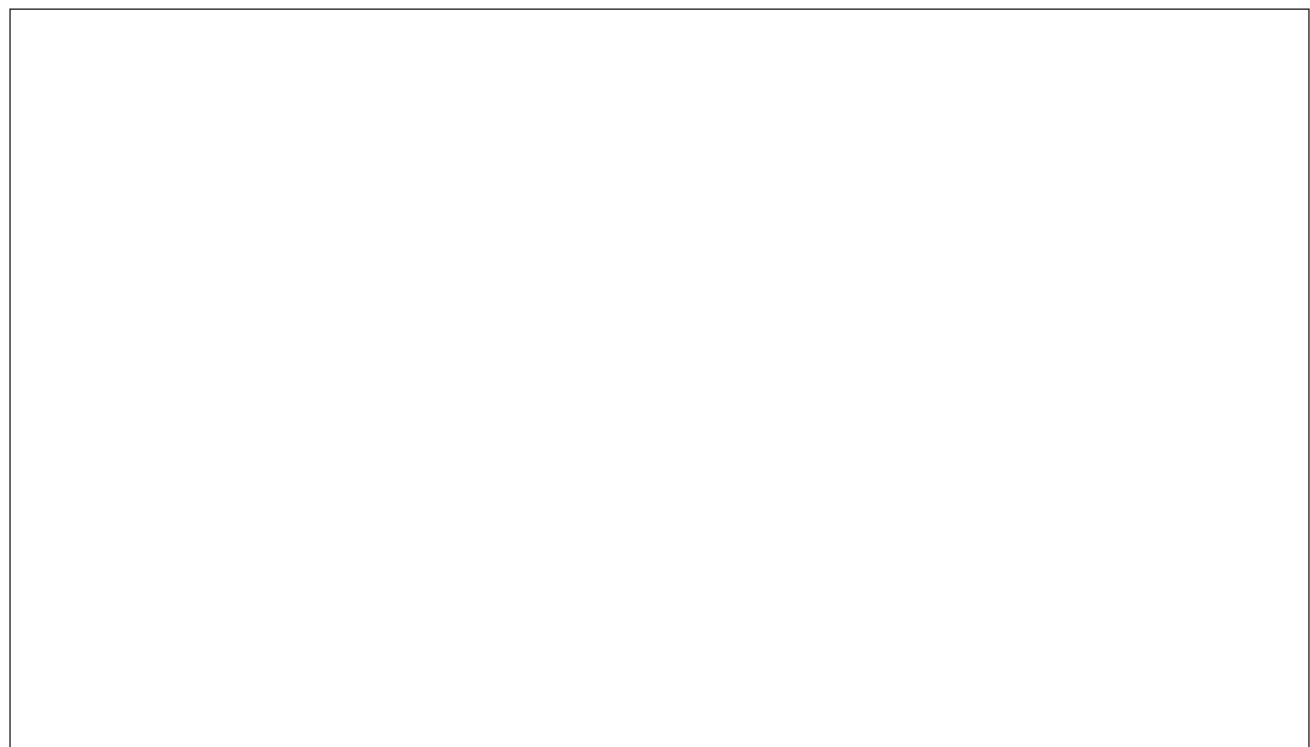
According to new regulations, members of the union were all landowners and also parishes, schools and other institutions having grounds. That was an important difference since members of the former community were communes. Union members elected representatives who, together with the embankment starosta, their chairman, and embankment inspector formed the so-called embankment office. It was the "union's parliament". Every year it decided the range of undertaken works, for example on restoration of embankments, channels and ditches, on repairs of sluices and pumps and on financial sources for these works.

The embankment office had also to control the union's board. The latter being an executive body consisted of the embankment starosta, his deputy and two embankment jurors. The embankment starosta had broad competences. He was the main representative of the union and was obliged to manage current works. He was also a head of technical personnel and administration. His deputy and embankment jurors supported him in his duties. Additional officer was the embankment inspector who was responsible for technical supervision and had also competence for financial matters.

Prussian government confirmed the statute of the Embankment Union of Walichnowska Lowland on August 4th 1854. That way Walichnowska Lowland was the first region in Western Prussia having its embankment union.

W. Dirksen (2005): Der Deichverband der Falkenauer Niederung. Manuscript (in German) for an article in the Polish periodical „Informator Pelpliński”

W. Dirksen and W. Mioduszewski (2005): Flood protection of the Walichnowska Lowland. In J. Water Land Dev. No. 9, 2005: 73–83



Walichnowska Lowland with its embankments and drainage system – a detailed sketch on the local school building

PROJECTS

Drainage of agricultural lands in the context of cultural landscape

Dr. Zbyněk Kulhavý, Eng. PhD. was born in 1960. He graduated from the Czech Technical University in Prague, Faculty of Civil Engineering (Eng./MSc. in 1985) and received his PhD. in 1996 (Water management of agricultural catchments). Since 1989 he is a Head of the Pardubice Research Station of the Research Institute for Soil and Water Conservation in Prague. His professional interests comprise water management, soil water optimisation, land drainage and hydrology of small agricultural catchments. Since 2002 he is a Treasurer of the Czech Committee of ICID.

Dr. František Doležal, Eng., PhD. was born in 1944. He graduated from the Czech Technical University, Faculty of Civil Engineering (Eng./MSc. in 1967) and received his PhD. in 1972 (Flow of water in swelling soils). Between 1968–1982 and then again since 2001 he has been working as a scientist in the Research Institute for Soil and Water Conservation in Prague. His main professional interest lies in soil physics, irrigation, drainage and hydrology of agricultural catchments. In 1996–1999 he was a secretary of the Czech Committee of ICID.

Dr. Mojmír Soukup, Eng., PhD. was born in 1946. He graduated from the Czech University of Agriculture in Prague (Eng./MSc. in 1975) and received his PhD. in 1990 (Runoff regulation and retardation). Since 1991 he is a Head of the Department of Soil Water Regime in the Research Institute for Soil and Water Conservation in Prague. His main professional interest lies in soil water regulation via controlled drainage systems and in agricultural water management. In 1999–2002 he was a secretary of the Czech Committee of ICID.

The Research Institute for Soil and Water Conservation in Prague, the Czech Academy of Agricultural Sciences – Water Management Section, and the Czech Committee of ICID organised a workshop on „Drainage of agricultural lands in the context of cultural landscape“ which took place on 3 November 2005 in Prague.

The purpose of the meeting was to develop working contacts among land drainage specialists and to initiate discussion about the future of drainage systems. The incentive was provided by the notoriously neglected state of the existing drainage systems and the long-lasting lack of proper care of them.

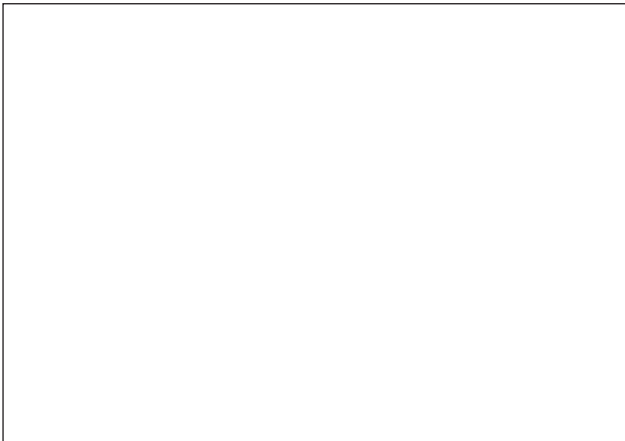
Forty nine invited specialists took part in the workshop. The main themes discussed were:

- Functioning of drainage systems, their “usefulness” or “harmfulness”
- Legal and proprietary aspects of drained lands
- Maintenance of structures and facilities, documentation of their actual state

- Exploitation of drained lands and land use changes
- Lifetime of drainage systems, their modernisation and adaptation to new conditions
- Comparison with the situation abroad
- Policies, prospects and programmes

The workshop proceedings, comprising contributions of participants and records of discussion, are currently being edited and will be published soon (in Czech). Some details (mostly in Czech) are also available on the web (<http://www.hydrmeliorace.cz/Drenaz>). The following text summarises main conclusions and recommendations.

The purpose of draining agricultural lands was and remains to be to create optimum conditions for growing particular agricultural crops. In Czechia, the lands are almost exclusively drained by underground (tile) drains, the outflow of which is collected by open canals, underground large-diameter collectors, small streams, gullies and other recipients. Even today, the existing drainage systems help Czech farmers to increase their competitiveness. In the past, up to 1960's, it was mainly the soils in the sugar-beet growing regions that used to be drained. The design of drainage was adjusted to the needs of growing sugar beet and other field crops. It was only in 1970's that large and hydraulically complicated drainage systems started to be built, especially in mountainous and foothill regions where the causes of waterlogging were complex. The resulting drainage systems were expensive and their function was uncertain. The land ownership restitution of 1990's, based mainly on the Land Act no. 229/1991 of the Collection of Laws, did not re-establish the pattern of land tenancy of the beginning of 1950's, as originally expected. While the ownership of the land is now almost as fragmented as it was by the beginning of 1950's, the actual fields are still large. They are usually composed of several parcels belonging to different owners. The boundaries between these parcels are visible in the maps but not in reality. The ownership of underground drainage structures and facilities was assigned, with few exceptions, to the owners of the land parcels in which the structures and facilities found themselves. However, the lands were usually handed over to their proprietors without any identification of the existing underground drainage structures. Some landowners do not even know that they are also owners of parts of drainage systems. The majority of landowners do not use their lands and rent them out. They are not worried about the dubious investment that somebody else made in the past in order to make their land more productive. Nevertheless, the investment was made and the value of the land should reflect it. Moreover, each drainage system is a hydraulically connected unit and must be maintained and rehabilitated as a whole. It is useless to take care of only a part of it under a single owner's parcel. The decline of acreage of agricultural lands in Czechia still goes on (on average, about 2000 hectares per year). Unfortunately, the exemption of few land parcels from agricultural land use (e.g., for housing or transport structures) may impair the performance of drainage systems on large areas of adjacent lands. While the so-called main drainage facilities (canals etc.) and small surface streams are now relatively well maintained (since 2005, the maintenance is carried out by the Agricultural Water Management Authority –

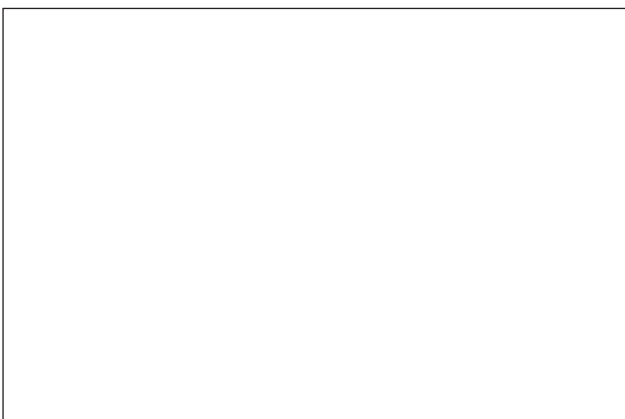


Water emerging from a broken tile drain and flowing down the field – a spring view (photo P. Pražák)

AWMA), virtually nobody takes care of the so-called detailed drainage facilities (tile drainage networks, maintenance manholes etc.).

The future of land drainage depends on the prospects of Czech agriculture, especially in the context of European Union. The extent of the future need for drainage will depend on the pattern of the crops grown and their soil moisture requirements, as well as on the requirements of the market with respect to the yields and quality of production. In the global market context, one cannot expect that agriculture would be able to adhere to a long-term steady strategy of either expansion or, contrariwise, of decline, even though today's trend points towards the decline and the farmers are rather expected to take care of the landscape instead of producing food or other raw materials. In the future, these trends may easily reverse, and agriculture should be prepared to face such changes. At present, of course, the reliable drainage of agricultural lands is not a priority. The acreage of sugar beet drops and the other crops (such as oilseed rape), frequently grown on sugar-beet lands, are not so sensitive to moisture excess. Large areas of arable lands in the mountains have been turned into grasslands. In the foothill and highland regions, the sites where the existing drainage does not function properly are set aside or, too, exploited as grasslands.

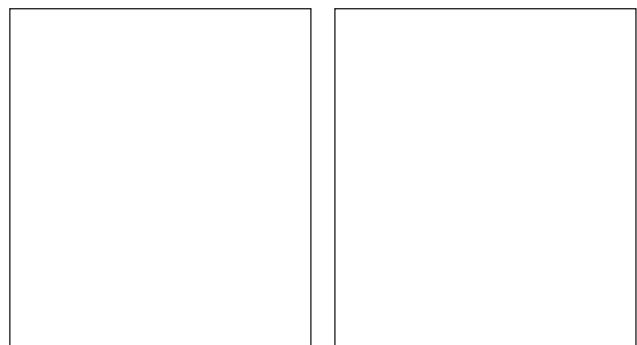
Hence, the problems of land drainage cannot be approached in a simple, universally valid way. Local condi-



A narrow alluvial valley in the highland: groundwater from up-slope areas seeps out and makes the terrain boggy, even though the whole area is tile-drained (photo F. Doležal)

tions must be taken into account. The National Strategic Plan of Rural Development (2007–2013) provides a framework within which a programme of water management-related land improvement measures is being prepared. It will encourage investments into building and rehabilitation of both main and detailed drainage facilities. We recommended to focus this support on the maintenance and rehabilitation of those drainage system that match the purpose they were built for. Their state (functionality) should be monitored systematically. On the other hand, some drainage systems are located at places where they do more harm than use.

The restoration (revitalisation) of the agricultural landscape, of which land drainage systems are inherent components, is a long-distance race. Its concepts will certainly undergo further development. Nature protection specialists put the accent on the restoration of small water courses and canals. They see the problems of underground (tile) drains as unimportant and regard the spontaneous destruction of underground drains (due to breakdown of tiles, siltation and root ingrowth) as a sufficient solution for most cases. This approach is, however, one-sided. It neither provides appropriate water quality protection nor



A subsurface large-diameter drain collector destroyed by soil erosion (left) and silted outlet of a medium-diameter drain collector (right, photos M. Soukup)

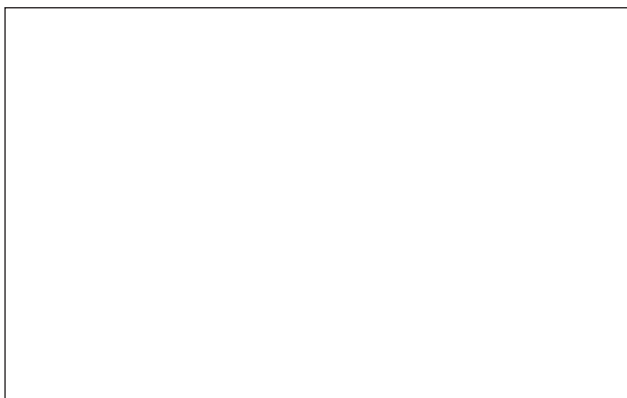
makes the agriculture on the remaining ploughed land competitive. The future of land drainage is therefore associated with the revitalisation of whole catchments. Drainage is a sort of taking care of the landscape. The absence of maintenance of drainage systems does not necessarily mean a gradual return to the genuine natural state but can result in devastation of further lands. The latter prognosis is particularly pertinent to the complex drainage systems in mountainous and foothill regions.

It is recommended that the forthcoming amendment of the Building Act be used to strengthen the care of the landscape on a regional scale and to designate qualified institutions or persons that would be responsible for this care. An important role is to be played by advisors and extension workers, including those who provide advice to applicants for grants. The officers of AWMA, who are well acquainted with water structures and facilities in the field, are predestined to play this role.

The designers of new drainage structures are recommended to prefer, whenever local conditions allow it, sparse networks of sporadic drains, placed only where groundwater seeps out, to systematic networks of drains covering the whole area. The same rule should be applied, as far as possible, to the rehabilitation of existing drainage systems. A suggestion is made that the acreage

of lands on which rehabilitation, restoration or enhancement of existing drainage systems is to be carried out, being economically or otherwise well substantiated, are compensated for by purposeful waterlogging of an equivalent acreage of lands on which the existing drainage is superfluous and unused. In particular, the drainage systems in alluvial planes of narrow valleys of small streams are candidates for inactivation, depending, of course, on the judgement of competent water management and landscape ecology authorities. The rehabilitated outlets of subsurface drains should be placed, if possible, at the outer boundaries of the narrow alluvial planes, while the alluvial planes themselves should be allowed to temporarily waterlog or even inundate, due to drainage and stream water. On the other hand, it is a completely unacceptable practice to use land drainage systems as waste water recipients.

Certain functions within the system of the care of land drainage systems should be temporarily fulfilled by the state, until an intimate liaison between the man (landowner or land user) on the one hand and the land and its use (including its drainage) on the other hand is re-established and a sort of associations of owners of water structures are re-built and start to operate satisfactorily. The existing legislation declares the right of an owner to know the conditions in which his/her property finds itself. It is therefore suitable that the existing central register of drainage systems be preserved and continuously updated,



A vertical soil profile revealing existence of two tile drainage systems on the same field: the older (deeper) system is silted, while the younger (upper) system is active (photo Z. Kulhavý)

because it is the best instrument to ensure the enjoyment of this right. One must bear in mind that a drainage system is usually located on grounds of several different owners and, moreover, several drainage systems of different age often exist on the same place and are vertically or horizontally interconnected. When the landowner endows the land user (tenant) with the right of husbandry, the latter is regarded as having the same relationship with the land drainage system as the original landowner. The existing legislation, namely the Public Notice no. 225/2001 of the Collection of Laws, obliges landowners to take care of the land drainage structures on their lands, but in practice this rule is not observed. It is recommended that the maintenance, repairs and rehabilitations of the existing drainage systems are required from the land users, rather than from land owners. One way how to enforce the observance of the Public Notice no. 225/2001 would be to make it a condition for obtaining subsidies. The situation is

analogous, to some extent, to the enforcement of EU Nitrates Directive, where also the subsidies are granted under the condition that specific measures are taken.

It is recommended to support the monitoring of drainage water quality on the national scale. Even though the drainage water quality depends on the use and management of drained lands and on the pattern of humus mineralisation, drainage water will always pose a risk of pollution to small water courses and reservoirs. In the sense of the Act on Waters no. 254/2001 of the Collection of Laws, § 108, part 2, the measurement of drainage water quality falls within the competence of both the Ministry of Environment and the Ministry of Agriculture.

Bearing in mind that the impact of water management schemes and land consolidation projects, including land drainage systems, is substantial, it is recommended to strengthen the position of AWMA in water right related proceedings, because it is a accredited administrator of the information system on structures for water management-related land improvement and, as such, has at its disposal the data on the extent of drained lands. This recommendation also pertains, among other issues, to the proposals for land afforestation. It should be stressed that the land drainage systems are waterworks in the sense of the Act on Waters or the Building Act. The relevant stipulations of the building and water legislation should therefore be observed if any change, destruction etc. of the land drainage systems is to be effected. The state should, in this context, secure compliance of the intended actions with the public interest.

It is recommended to provide AWMA with appropriate means for it to be able to manage the maintenance of drainage structures and facilities located on agricultural lands (and/or affecting agricultural lands), to keep records on their functionality and inactivations made and to plan their rehabilitation. It is planned that the register of structures for water management-related land improvement will be made public in 2006 within the framework of the Public Administration Information System on Water. This register was built according to the Public Notice no. 391/2005 of the Collection of Laws. It contains, however, only basic demarcation lines of the areas occupied by drainage systems, derived from the maps 1:10 000 or 1:5 000. More detailed information on individual drainage systems, not yet updated and mostly not digitized, is stored in the archives of AWMA, while the other copies of the same documents, originally stored by agricultural enterprises, are now mostly lost. The documentation of newly built structures is archived in a decentralised way by individual water right authorities. It is recommended that the documents relating to the design and building of land drainage structures are registered in a unified way on the national level, which of course must be supported by appropriate legislation and financing. It is also recommended to support any trends towards the formation of associations of owners of drained lands (similar to the former water cooperatives) and to entrust AWMA with the coordination of this process.

Both the theoretical background of the art of drainage and the technology of draining must be adjusted to the new context, which is the landscape management in a general sense. The land consolidation projects are important tools of landscape restoration (revitalisation) and of the rehabilitation of drainage systems. Un-

fortunately, many complex problems associated with the drainage systems are tackled ad hoc, without a support of (frequently missing) systematically generalised research results. The relevant research institutions are encouraged to pay more attention to these problems.

Different views of various professional groups and lobbies and the broad public on the functions and the future of land drainage systems are generated, beside the understandable variety of particular interests, also by the lack of communication and informedness. It is recommended that the professional discussion, which started at this workshop, goes on and, in parallel, the essential questions associated with the land drainage systems are made public in media. This means, in particular, to enhance the awareness, among landowners, of the existence, functions and available documentation of drainage systems on their lands, and to disseminate the data on the impact of land drainage on water quality.

Zbyněk Kulhavý, František Doležal, Mojmír Soukup

Delineation of irrigation management zones using sensor-based soil electrical conductivity measurements

Aboutaleb Hezarjaribi was born in 1973 in Iran. He worked as a lecturer at the faculty of agriculture at the Iranian Gorgan University of Agricultural Sciences and Natural Resources from 1999 to 2003.

Presently, he is enrolled at Giessen University for his Ph.D. in cooperation with the Institute of Production Engineering and Building Research of the Federal Agricultural Research Centre (FAL) at Braunschweig, Germany

He had his former professional education at two universities in Iran. There, he attended the Tehran University from 1992 to 1996 to gain a B.Sc. Degree in "Irrigation Engineering".

From 1996 to 1999, he continued his studies at the Tarbiyat Modarres University from which he holds an M.Sc. Degree in "Irrigation and Drainage Engineering".

Dr. Heinz Sourell (1949) is senior researcher in charge of research projects on irrigation techniques and irrigation management.

He has worked from 1977 until now at the Federal Agricultural Research Centre (FAL), Institute of Production Engineering and Building Research, Braunschweig, in different kinds of projects:

- Possibilities of Precision Irrigation
- Development and Evaluation of Mobile Drip Irrigation
- Sprinkler Irrigation Machines
- Irrigation Management

- Low Pressure Irrigation
- Standardization and Statement

In 1977 he graduated in Agricultural Engineering (Dipl. Ing. agr.) at the University of Hannover, Germany. He gained his PhD (Dr. rer.hort.) on "Water- and Energy Saving Irrigation Systems" in 1991 at University of Hannover, Germany.

He is member of the ICID WG - On farm irrigation systems

Introduction

Water needs vary spatially in fields because of spatial soil variability (texture, topography, water holding capacity and infiltration and drainage rate). Therefore, the need for irrigation may differ between different zones of a particular field and "Precision Irrigation" (PI) can apply

water supplying the right tools at the right time in the right place with the right amount. One of important resources that affect on in-field variation of irrigation requirement is in-field variation of the Total Available Water Capacity (TAWC) that represents the differences between amount of water at field capacity and at wilting point as affect on irrigation frequency and depth. In non-saline soils and when the field is at field capacity, TAWC will be a dominant factor that affect on the soil electrical conductivity and within-field variation of TAWC can be delineated by fast and non-destructive measuring apparent soil electrical conductivity (ECa). The objective of our study were to compare the ability of two fast, non-destructive and sensor-based ECa measurement methods: a). A contact and electrode-based sensor and b). A non-contact, electromagnetic induction-based sensor to monitor the in-field variation of the TAWC and delineate irrigation management zones (IMZ) that is needed to create an irrigation application map (IAM).

Methods and materials

The two of ECa sensors used in this study were VERIS 3100 sensor (both shallow and deep readings) and EM38 (both horizontal and vertical orientations). They were equipped with Differential Global Position System (DGPS). ECa measurements were collected on a 8,2 ha field and standardized to 25°C (EC25) because of different soil temperature during ECa measurements. Based on ECa spatial variability pattern and to cover the range of ECa values present, 29 calibration points were located using DGPS to develop field-specific relationships between ECa data and TAWC. At each sampling point, an auger boring was used to take soil samples to 60 cm depth. The water content at F.C. and P.W.P were measured in three replications using gravimetric method and pressure plate method, respectively ($b=1,42 \text{ gr/cm}^3$). A fuzzy k-means unsupervised classification scheme was performed using the FuzME program to identify optimum number of IMZ. A ArcView (ESRI) software program was used to

- create the ECa and TAWC maps after the ECa readings were logged to a data logger and
- interpolated using a spherical kriging model.

Results

ECa measurements using VERIS 3100 at field capacity and in non-saline soil of our field could provide important information on in-field variation of the TAWC in upper shallow soil profile. We think the selection of an ECa sensing system to delineate TAWC should be based on its nominal depth of investigation. In our field the need for irrigation was differ between different IMZ because of spatial variation of TAWC. Differences between ECa measurements were attributed to differences between the depth-weighted response functions for the four data types, the differences in sensing depth between the different sensors and data collection modes (deep vs. shallow or vertical vs. horizontal, respectively). This study showed that, while qualitatively similar, ECa data obtained with different sensors were quantitatively different. In field with high variation of which soil properties affect ECa like our field (because of high CV) and specially when this properties are heavily weighted in the upper layers, there is a big difference between EM38 and VERIS 3100 readings and VERIS 3100 readings can reflect

Actions to Mitigate Impacts of Climate Change on Rural Environment – A joint ICID-EurAgEng regional and world wide cooperation

Prof. Dr. Daniele De Wrachien is Full Professor of Irrigation and Drainage and Director of the Department of Agricultural Hydraulics at the State University of Milan, Italy. At the same University, he graduated in Geology in 1964, and obtained Ph.D. Degree in Advanced Engineering Geology in 1966 there as well.

As Executive Officer of well-established regional and world-wide scientific and professional Associations (ICID, CIGR, EurAg-Eng,) Daniele De Wrachien has been actively involved in the organization of more than forty International Events (Conferences, Congresses, Seminars, Symposia, and Workshops), performing the roles of Convenor and invited keynote Speaker, held in about fifteen countries of Europe, Africa, Asia and America.

In his capacity as the President of EurAgEng he established links of close cooperation between the European Society of Agricultural Engineers and eleven like-minded international Organisations, among which it is worth mentioning ICID.

Daniele De Wrachien is the author of more than hundred and twenty publications in all areas of soil and water phenomena, as irrigation, drainage, flow and transport processes, crop water requirements, water resources use and management, soil erosion and conservation, using both advanced laboratory and field observation techniques and mathematical and stochastic simulation models. Since research has been focused, mainly, on complex spatial patterns of the environment, much attention has been given to the spatial variability of hydrological characteristics and the upscaling of knowledge from point to field scale, and from field to regional scale.

Prof. Dr. Costantino Fasso, Vice President Hon. ICID, is Professor emeritus of fluid mechanics. Born in 1920, he graduated in Hydraulic Engineering from the Politecnico di Milano, Italy in 1944. He was a Professor at the Agricultural School, Catholic University in Piacenza and at the Universities of Cagliari and Mogadiscio, Somalia. He was Professor of Fluid Mechanics and Director of Department of Hydraulic, Environmental and Surveying Engineering in the Politecnico di Milano. He is a consulting engineer in the field of water resources, urban and industrial water supply and drainage, design and construction of dams, and irrigation systems.

Costantino Fasso was President of the Committee for Engineering and Architecture of the National Research Council of Italy (1971–1980). He was Vice Chairman of Committee on Practices and Member of the Working Group on Construction, Rehabilitation and Modernization of Irrigation Projects. From 1993–1996, he was Vice President of ICID.

Fig. 1: Interpolated TAWC and EC25 TAWC map obtained with VERIS 3100-sh. Within each classification interval, an equal number of readings is represented.

Fig. 2: Calibration and relative Changes of TAWC, F.C. and P.W.P from EC25 VERIS 3100_sh to organize management zones and create an AIM

the spatial variability better than EM38. Because VERIS 3100 is heavily weighted in the upper layers compared with EM38. Calibration equation to estimate TAWC from shallow mode of VERIS 3100 data exhibited a good fit to the data and had highest correlation ($R^2 = 0.77$), whereas calibrations to EM38 data (both vertical and horizontal orientation) were low and apparently could not adequately reflect the spatial variability of the TAWC due to the more influence of the EM38 on deeper layers that were more uniform. We identified 6 IMZ using FuzME program to make IAM as shown in figure 1 and 2.

Aboutaleb Hezarjaribi, Heinz Sourell

Agriculture is a human activity that is intimately associated with climate. It is well known that the broad patterns of agricultural growth over long time scales can be explained by a combination of climatic, ecological and economic factors. Modern agriculture has progressed by weakening the downside risk of these factors through irrigation, the use of pesticides and fertilizers, the substitution of human labour with energy intensive devices, and the manipulation of genetic resources.

A major concern in the understanding of the impact of climate change is the extent to which world agriculture will be affected. Thus, in the long term, climate change is an additional problem that agriculture has to face in meeting global and national food requirements. Uncertainties as how the climate will change and how agriculture will have to adapt to these change are issues

that engineers, planners and managers are compelled to address. These uncertainties call for continued attention and suitable actions on many fronts, if productivity and flexibility in agricultural systems are to be enhanced. In this context the effects of climate change will undoubtedly play an important role.

Availability of reliable hydro-climatic data is an essential prerequisite for the rational planning, design and management of water resources. Irrigation and drainage systems were designed for a long life, on the assumption that climatic conditions would not change in the future. This will not be so in the years to come due to global warming and the greenhouse effect. Therefore, water systems designers need to systematically re-examine engineering design criteria, operating rules, contingency plans and water allocation policies. All the above factors and constraints compel decision makers to review the strengths and weaknesses of current trends in irrigation and drainage and rethink technology, institutional and financial patterns, research thrust and manpower policy so that service levels and system efficiency can be improved in a sustainable manner.

With regard to the environment, the risk of land degradation and desertification is already felt under the present climatic regime and human activities in most arid and semiarid regions of the world, and the above-outlined changing climate patterns are expected to lead to environmental conditions even more conducive to land degradation and desertification over these regions. The most significant aspect of desertification is the decline of soil fertility and soil structure and the consequent reduction of the land's carrying capacity for plants, animals and human beings. This leads to widespread poverty, overexploitation and, ultimately, destruction and abandonment of land. In combating desertification priority should be given to preventive measures in drought-prone areas, whose implementation requires participation of civil society, from local communities to governments along with international Organisations.

To cope with these challenges, ICID, in 1990, made an urgent appeal to well-established international Organisations, such as the World Bank, to respond to the need for promoting research in the environmental impacts of climate change on irrigation and drainage development. Since then many research programmes have been launched by different scientific, financial and professional institutions. In September 1995, during the Meeting of the SIG on Soil and Water held in Rome within the 46th ICID International Executive Council, ICID and EurAgEng have committed themselves to working together in an endeavour to select priority issues that tackle the root causes of the major problems encountered in the broad subject areas concerning the impact of climate change on:

- Water resources availability, planning and management
- Crop water requirements
- Irrigation and drainage development
- Soil erosion and land desertification.

The mission was to enhance the standards of research at both the European and world-wide levels, to examine the most updated documents available, to organise international scientific Events and to draw up conclusions and recommendations. The importance and role of research thrust, technology transfer, institutional strength-

ening, effective partnership between governmental and non-governmental Organisations and sound financial frameworks have been investigated. Finally, the challenges and benchmarks for future actions which the scientific community and planners have to face and deal with have been also analysed.

To meet the above-mentioned challenges, the two Organisations, besides their national Committees, did create and improve a multilevel networking system with links and feedbacks among the different levels, able to collect, control, store and disseminate information concerning this field of knowledge. The aim was to come up with an updated inventory of the key-issues dealing with the impacts of climate change on the rural environment, which are investigated at both the European and world-wide levels, along with the financial and human resources involved, to the end of optimising the whole process and obtaining a better synergistic coordination of all the activities related to the subject. All this did require an interdisciplinary, multi-sectorial approach, using system engineering methodology to recognize the necessary interrelationships.

The network at European level, known as European Water Network, is nowadays managed by the European Regional Working Group (ERWG) of ICID, while, at world-wide level, the facility constitutes an integral part of the CIGR-FAO Global Network on Agricultural Engineering sponsored by EurAgEng.

This enterprise was formally recognised by a Memorandum of Understanding signed by the Presidents of the two Organisations, Prof. Bart Schultz on behalf of ICID and Prof. Daniele De Wrachien on behalf of EurAgEng, on 27 July 2002, during the 53rd IEC meeting and 18th ICID Congress, in Montreal Canada.

Important milestones of this cooperation are represented by five regional and world-wide investigations and by the proceedings of fourteen international Conferences and Workshops.

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- De Wrachien D., Feddes R., Ragab R. and Schultz B.: Agricultural development and food security under climate uncertainty. *New Medit N 3*, 2004, pg 12–19
- Proceedings of joint ICID-EurAgEng Conferences and Workshops
- The full list is available in the Websites of the two Organisations www.icid.org and www.eurageng.net

Daniele De Wrachien, Costantino Fasso

Successful termination of the project "Irrigation Management Transfer in Countries of Transition"

Just recently, the book "Irrigation Sector Reform in Central and Eastern European Countries" was published by Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) in cooperation with ICID. This book, edited by Wolfram Dirksen and Walter Huppert, presents the Country Reports on the reforms in the irrigation sector of ten Central and

Eastern European countries. The country reports are the outcome of the international GTZ/ICID/ERWG project "Irrigation Management Transfer in Countries of Transition", a cooperation of the ICID National Committees and National Editorial Teams of Bulgaria, Czech Republic, Germany, Hungary, Macedonia, Poland, Romania, Slovenia, and Ukraine. The national teams contributed their reports for a comparative assessment of irrigation sector reforms in the concerned countries, which is targeting at the identification of obligatory actions for a successful implementation of transformation policies.

The project had its background in the political changes at the beginning of the 1990 in Central and East European countries which marked the start of transition processes from central planning economies towards market economies. Changes of agrarian structures had severe impacts on irrigated agriculture. The development from centrally towards privately managed agriculture was, among others, accompanied by deterioration of irrigation and drainage infrastructure and by the initiation of different reforms in the management of agriculture and of land and water resources. In Ukraine – one of the countries where new solutions for the adoption of irrigation infrastructure and land ownership were to be found – the National Committee of ICID initiated first steps towards an exchange of experiences among the countries concerned with transformation processes already in 2001.

From this initiation, the project "Irrigation Management Transfer in Countries of Transition" was developed and finally started at the end of 2003, funded by the German GTZ. The project was embedded in the activities of the European Work Team on Sustainable Irrigation Management (EWTSIM) and coordinated by Wolfram Dirksen. Main objectives of the project were

- the elaboration of country reports according to a common report structure,
- the performance of a comparative assessment of irrigation sector reforms
- preparation of recommendations for future development.

After a preceding kick-off meeting at Wageningen in the Netherlands at the end of 2003, the first project phase started in 2004 with the development of the report structure and the identification of data to be collected. The second phase was used for data collection and elaboration of draft reports. During each phase the representatives of the participating national teams met for discussions at two workshops at Kiev, Ukraine and Słubice, Poland.

Volker Ehlert

PAST CONFERENCES

ICID 21st European Regional Conference

The ICID 21st European Regional Conference was held from 15 to 19 May 2005 at Frankfurt (Oder), Germany and Słubice, Poland under the patronage of the Federal Minister of Consumer Protection, Food, and Agriculture of the Federal Republic of Germany and the Brandenburg Minister of Rural Development, Environment, and Consumer Protection. Preparation and organisation were done by the German National Committee in cooperation with the Polish National Committee.

Kleist Forum – the conference venue at Frankfurt

225 experts from 20 European and 8 Non-European countries met at the Kleist Forum at Frankfurt (Oder), with almost one third them belonging to the group of Young Professionals. Their large portion among the participants was one of the conference characteristics which resulted from the special emphasis given to the involvement of Young Professionals right from the beginning of the conference preparation. Thanks to funds by the German Federal Ministry of Education and Research and by the Deutsche Forschungsgemeinschaft, considerable grants for their conference attendance could be offered to 44 Young Professionals from selected East European, Asian, and African countries, of whom 35 could participate in the conference while the rest did not receive visa in time or had to cancel their attendance for other reasons. Further Young Professionals came from Western and Northern European Countries. They had opportunities to exchange their minds, to share their experiences, and to discuss with senior professionals. During a special forum, many of them stated that they were encouraged by the conference to participate in the activities of their ICID National Committees and to represent the Young Professionals concerns at future ICID events. S. Belsare (member of the WG on Young Irrigation Professionals Forum) and others developed various ideas to continue the cooperation among the group of young professionals and to strengthen their share in ICID activities.

Under the conference theme "Integrated Land and Water Management: Towards Sustainable Rural Development", a total of 108 papers and 68 posters were presented during three days of sessions on the topics

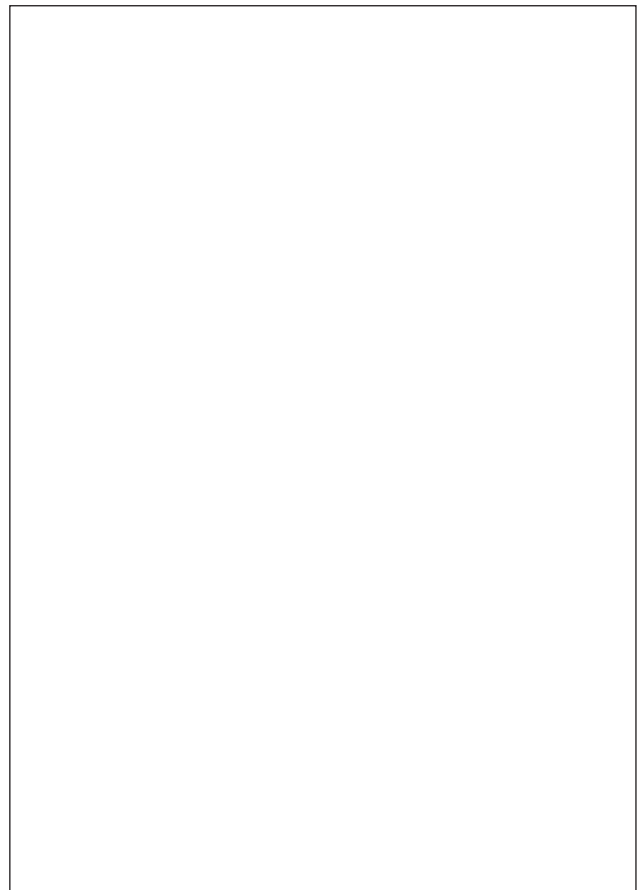
1. Water Resources Protection (chair persons F. Doležal, W. Mioduszewski, W. Werner),
2. Flood Management (E. Lübbe),
3. Irrigation and Drainage (P. Kovalenko, A. Maziliauskas, O. Zhovtonog, G. Guluyk),
4. Drought and Drought Management (L. Vermes, L. Pereira),
5. Integrated Land and Water Management (F. Ligetvari, B. Schultz, D. Zavgorodnyaya), and
6. History of Irrigation, Drainage, and Flood Control (H. Fahlbusch)

These topics dealt with current problems related to integrated management of land and water resources management with a focus on Central and Eastern European countries, but, too, beyond this region. Among others, specific problems of integrated management under conditions of transition economies were presented as well as aspects of multifunctional landscapes and their requirements for harmonised co-action of agricultural land use, integrated river basin management (e. g. according to the EU Water Framework Directive), protection of nature and landscapes, development of tourism and infrastructure, up to a holistic sustainable development of rural areas. Within the broad spectrum of presentations, more emphasis should have been given to the linkage from irrigation, drainage, and flood management towards socio-economy and to socioeconomic impacts on the development of land use and resources management. All presented papers and posters and, additionally, another 19 as paper-only submitted contributions were published on the Conference Proceedings CD which was given to the conference participants and which is also available via the GECID website http://www.zalf.de/icid/ICID_ERC2005/HTML/ERC2005_SciProg.htm.

The presentations were framed by plenary sessions. During the first plenary session, welcome addresses and statements were given by representatives of the German and Polish governments, by the Brandenburg State Minister of Rural Development, Environment, and Consumer Protection, and others. Plenary lectures were held on water budget at landscape scale, on multilateral tasks of the International Odra Commission, regional water management in Poland, and on nutrient loads of the Odra River. The closing plenary session gave room for reviews and closing remarks and ended with an outlook and invitation, given by M. E. Scarascia, to the 22nd European Regional Conference which will be held during September 2007 at Pavia and Rome, Italy.



Study tour participants at renewed Oder dike



Alain Vidal, Vice President ICID during plenary session

Five different full-day excursion tours were offered. Four of which presented examples of integrated resources management, covering aspects of land and water management, harmonisation as well as conflicts of agriculture and nature protection, and finally of conservation of cultural heritage. The fifth tour visited sites related to the history of irrigation, drainage, and flood control. The participants enjoyed the landscape of the Oder region and were especially impressed by sites like the wetlands of the Spreewald region with its network of canals, the large agrarian enterprises which were successfully privatised, or the 1934 built and still operating ship lift near Eberswalde. Some of the sites or institutions being visited during the excursion tours were presented also in the ERWG Letter 15, which was compiled with special regard to the conference and which was included in the conference materials given to the participants.

On the occasion of the conference, a meeting of the European Regional Working Group was held. Among others, the chairman of the European Work Team on Drought, L. Vermes, gave a detailed overlook of the activities of the Work Team within the Drought Mapping Project. Further-on, the Working Group gave its congratulations to its initiator and long-year chairman, W. Dirksen, who celebrated his 65th birthday in February 2005.

The ICID Working Group on Integrated Land and Water Resources Management had an interim meeting in Frankfurt.

The European Regional Conference was preceded by the second workshop of the project on Irrigation Management Transfer in European Countries of Transition

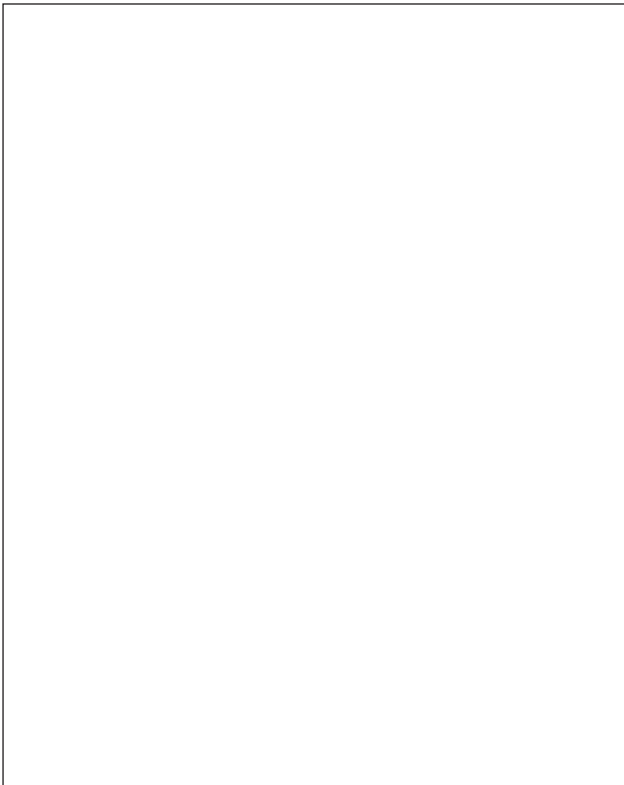
Frankfurt (Oder) – Słubice Declaration on Integrated Land and Water Resources Management

- 1 The ICID 21st European Regional Conference 2005 from 15 to 19 May 2005 at Frankfurt (Oder) and the preceding Workshop of the ERWG Work Team on Sustainable Irrigation Management from 13 to 15 May 2005 at Słubice gave the occasion to more than 300 experts, among them more than 60 Young Professionals, to meet in the neighbouring border cities at the German and Polish banks of the Oder River for interdisciplinary discussions on Integrated Land and Water Resources Management. Representing a broad spectrum of professional disciplines, all of them are joined by their equally directed view towards the common target of preservation and sustainable development of rural areas as sites of living and economy at the conditions of global change within the 21st century.
- 2 To reach these targets it is of decisive importance to harmonise land use and water regime at landscape scale.
- 3 On the one hand, the availability of water and the fertility of soils determine the potential biodiversity, the biomass and crop production of landscapes while, on the other hand, land use has a strong impact on the quality of waters.
- 4 In this context, for the participants of the conference it is definitely clear that managing water for sustainable agriculture means both: Managing water for food and managing water for rural development. Therefore, it is necessary to coordinate all activities concerning agricultural land use and nature protection with water management practices at regional scale respectively catchment scale. This coordinated action is what the participants consider as Integrated Land and Water Resources Management.
- 5 Activities of the recent years, more and more, were focused on aspects of quality of water and of waters. Without any doubt, mitigation of water pollution from agricultural non-point sources has to be one of the central targets of our work. Regulations like the Water Framework Directive of the EU give an orientation to reach this target.
- 6 Water protection issues are of high relevance for all countries. Nevertheless, the participants are convinced that the significance of flood protection, irrigation, drainage, and drought – the traditional issues of ICID – will not decrease, but that these issues will become more and more important, even in Central Europe, due to climate and economic changes.
- 7 The extreme flood events which many river basins experienced within the last decades (e. g. Oder, Tisza, Elbe, Danube) have shown that more than in previous times technical flood protection measures are to be combined with land use changes which result in effective water retention and water discharge retardation. Such solutions are to be verified for their efficiency with respect to catchment areas as well as to floodplains. For the future development of sustainable polder landscapes, existing conceptions have to be evaluated for their monetary and non-monetary impacts and on their functionalities. Thus, the conference participants propose case studies on modular concepts for sustainable polder development strategies and their stepwise realization.
- 8 The situation of the irrigation sector in Central and Eastern Europe is characterised by the needs of complete reorganization due to the transition to market economy. Irrigation of crops has to follow economic rules including operation and maintenance costs. The irrigation systems are to be modernized under water and energy saving aspects. For the operation of such irrigation systems suitable user associations should be established.
Due to the climate change, the irrigation sector has to cope with higher water requirements and better water use efficiencies, and with the needs for more advanced water saving technologies. The users' willingness to pay depends strongly on the quality of the services provided.
- 9 Also in future, drainage will play an important role to allow agricultural production on sites affected by water logging and, under conditions of arid climate, to mitigate irrigation caused salinization of soils. Drainage technologies have reached a high level today. Future requirements will concentrate on the purification of drain water from nutrients and pollutants as well as on the sustainable integration of drainage systems into the landscape scale. This will even allow for revitalised wetlands in the vicinity of drained areas.
- 10 Dryness and drought increased severely, especially in South and South-eastern Europe, but also in other regions and resulted in crop yield losses and restrictions in agricultural production.
Due to reduced water availability, economically based decisions have to be taken whether to cultivate crops or crop varieties of higher dryness resistance, to extend irrigation if water is available, or to move to other sites suitable for agricultural production.
- 11 Integrated Land and Water Resources Management includes the improvement of ecological situations, especially wetland conservation, reconstruction and landscape aesthetics.
- 12 To fulfil the implementations of required measures, to reach the midterm targets towards sustainable development, and to carry on today's visions, it takes the involvement of the scientists and practitioners who are at the beginning of their professional career, who are Ph.D. candidates or still students. Emphasis should be given to the strengthening of this group and their envisaged activities e. g. establishment of a network among the Young Professionals or establishing an e-mail conference. Such strengthening requires the support by further conferences and workshops.
- 13 To understand today's situation and to plan for future needs, knowledge and analysis of the historic development of land and water management is prerequisite.
- 14 The ICID 21st European Regional Conference gave important impulses to all the items mentioned above.

Local Actions for a Global Challenge

from 13 to 15 May 2005 at Slubice. This project was an activity of the ERWG Work Team on Sustainable Irrigation Management.

As an outcome of the European Regional Conference, the Final Note on the Frankfurt (Oder) – Slubice Conference was elaborated as a draft and discussed during the closing plenary session. Among others, the participants pointed out the interaction of water availability and land use and the impact of land use on water quality. Integrated land and water resources management has to co-ordinate all activities concerning agricultural land use and nature protection with water management practices at regional scale respectively catchment scale. Future tasks within the drainage sector will arise from the necessity to mitigate negative impacts on the environment. The draft is launched to the Internet (www.erc2005.org) for a continued discussion among the conference participants so that the final version will be presented at the forthcoming ICID Conference at Beijing in September.



Exhibition area at the conference venue

Numerous private companies, associations and ministries took partnership in the conference and thus contributed to the good performance. Thirteen of the partners participated in the exhibition which was arranged at the conference venue and gave opportunities for additional interesting information to the conference participants.

The conference website www.erc2005.org will be maintained to provide the Conference Proceedings and the Draft Version of the Final Note as mentioned above. Additionally, the website will also be the place to present photos of the event and information for a phase of follow-up activities.

Volker Ehlert, Ralf Dannowski, Joachim Quast

ANNOUNCEMENTS

Sustainable Irrigation 2006

1st International Conference on Sustainable Irrigation Management, Technologies and Policies, 5–7 September 2006, Bologna, Italy

This Conference, organised by the Wessex Institute of Technology (WIT) and co-sponsored by CIGR, ICID, WWC and EurAgEng, will be held from 5 to 7 September 2006 in Bologna, Italy.

The scientific programme of Sustainable Irrigation 2006 will include an opening session, parallel oral sessions and poster sessions on the following topics and subtopics:

Irrigation Controls:

- Irrigation control systems
- Automation solutions
- Data acquisition systems
- Real time information

Irrigation Modelling

- Irrigation canal modelling
- Modelling water availability for irrigation
- Irrigation demand modelling
- Regression methods to determine main variables
- Global modelling of water availability
- Quantitative and qualitative water management modelling
- Dynamic simulation
- Statistical methods and time series
- Experimental irrigation

Irrigation Systems and Planning

- Soil-water-atmosphere-plant systems
- Water policy strategies and irrigation seminars
- Optimal resource allocation
- Wastewater treatment for irrigation
- Landscape and agricultural irrigation
- Drainage and soil conservation
- Water and soil pollution control
- Contamination indicators in irrigation water
- Legislative contamination indicators
- Reclamation and modernisation of irrigation systems
- History and heritage (learning from the past)

Irrigation Management

- Development and implementation of management programmes
- Irrigation infrastructure
- Design and management of irrigation systems
- Operation and maintenance of irrigation systems
- Laws and legislation regarding water usage
- Water resource demand and supply
- Decision support systems in irrigation
- Social benefits and costs
- Government and users participation
- Environmental impact assessment of management strategies
- Policies, techniques and strategies for managing sustainable irrigation
- Effect of irrigation on yield and quality of crops

- Water use efficiency
- Irrigation water quality
- Strategic planning
- Information planning and management
- Simulation and organisational models
- Water and irrigation economics.

The language of the conference will be English. The Proceedings will be published by WIT Press as a Volume of WIT Transactions on Ecology and Environment (ISSN 1743-3541).

For further information please look up
www.wessex.ac.uk/conferences/2006/irrigation06/

ICID 57th International Executive Council Meeting

57th IEC Meeting in conjunction with 3rd Asian Regional Conference and 7th International Micro Irrigation Congress: 10–16 September 2006; Kuala Lumpur, Malaysia

From 10 – 17 September 2006, the ICID family will come together in Kuala Lumpur for its 57th International Executive Council Meeting, 3rd Asian Regional Conference and 7th International Micro Irrigation Congress. It is a time to get together, to share views and experiences, to push at the frontiers of knowledge – on irrigation, drainage and flood control.

Together with these mentioned events, several important workshops, especially related to Climate Change, Tidal Areas, Capacity Building, Water Saving Practices in Rice Paddy Cultivation, Drainage, Water Quality, Modernization of Improved Service Delivery, etc. will be organized by the ICID Workbodies. Thus, there will be an enriching professional experience for all the delegates coming to Kuala Lumpur for these events. Finally, a number of study tours is offered to visit the following sites:

- Malaysian Agricultural Research and Development Institute (MARDI)
- Jelebu Dam is an infrastructural element of Commercial Research Program for Fruits under the Malaysian Agriculture Research and Development Institute (MARDI).
- Integrated Agricultural Development Project, North-west Selangor (Sept. 17, 2006), The project covers a gross area of about 19,857 ha, of which about 18,980 ha is net cultivated paddy land.
- Sungai Besar Farmers' Association manages a 35000-ha agricultural area which include padi, coconut, cocoa and oil palm plantations.
- Aeroponic vegetables (Sept. 17, 2006)
- Sime Aerogreen Technology Sdn. Bhd. cultivates vegetables in a soilless method with their roots suspended in the air.

More information is available at
<http://www.icid2006.org/>

acqua alta 2006

3rd International Trade Fair and Congress for Flood Prevention; 13–15 September 2006; CCH – Congress Center Hamburg, Hamburg, Germany

The 3rd International Trade Fair and Congress for Flood Prevention, Consequences of Climate Change and Disaster Management, acqua alta, is to be held at the CCH Congress Center Hamburg for the first time in 2006. The decision in favour of Hamburg was made because

this maritime city gives ideal conditions for a convention on these subjects – the two previous acqua alta events were held in Munich.

New Challenges – New Topics

No other environmental theme during the last years has attracted such a great deal of attention as the changes in the climate. Without a doubt: the climate is changing dramatically. The annual average value of measured temperatures is clearly rising worldwide, as well as the annual counts of floodings and the population affected by the floods. The frequency of floods, especially flash floods, will further rise as a result of the changes in the climate. Moreover, geogenic happenings such as earthquakes and tsunamis require a new international disaster management.

We need solutions for collaborative action – world-wide.

The Free and Hanseatic City of Hamburg, due to its position near the coast and on the river Elbe, offers the best conditions as an international congress location for the themes of „acqua alta 06“. Hamburg combines coastal and inland waters, both of which represent a similar risk for flooding. The Free and Hanseatic City of Hamburg, the German Federal Ministry of Transport, Building Industry and Housing, the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety as well as representatives of regional authorities, the German Conference of Cities, industrial unions from building, engineering and organisations for disaster prevention and emergency aid support the concern of acqua alta, which is the permanent examination of the entire problem encompassing topics such as consequences of climate change, flood prevention, natural disaster and disaster management

Central themes:

- development of early-warning systems
- climatic consequences
- coastal protection
- long-term flood precaution
- medical emergency precaution and epidemics
- mobile flood prevention
- risk and disaster management
- data entry and forecasting

Further details at <http://www.acqua-alta.de/>

ICID 22nd European Regional Conference

Water Resources Management and Irrigation and Drainage Systems Development in the European Environment; September 2–6, 2007; Pavia – Italy

The Conference will provide delegates with the opportunity to share experiences in managing irrigation and drainage from an integrated basin management perspective at both National and Regional levels.

The European Union Countries today are faced with some new and original challenges, including increased competition for scarce water supplies, expanding demand for food, implications of global climate change and energy shortage.

Recognizing these challenges, the Conference will address the theme "Water Resources Management, and Irrigation and Drainage Systems Development in the European Environment" to be articulated along four thematic topics:

Topic 1: Impacts of Extreme Hydrological Events on Irrigation and Drainage Systems

- a) Prognoses of consequences of the climate change;
- b) Evaluation of causes and consequences of floods and droughts;
- c) Statistics of dry periods and floods;
- d) Planning principles and design criteria of irrigation and drainage systems under climate uncertainty;
- e) Role of irrigation and drainage in impacts mitigation of both droughts and floods.

Topic 2: Energy Saving Technology in Advanced Irrigation Systems

- a) Energy consumption indices;
- b) Advanced energy saving technology in irrig. systems;
- c) On-farm and off-farm energy consumption case studies. Prognoses of consequences of the climate change.

Topic 3: Conjunctive Use of Surface and Ground-water

- a) Modelling technology;
- b) Spatial analysis procedures;
- c) Decision support systems;
- d) Case studies.

Topic 4: Participatory Manage and Economic Policies for Irrigation and Drainage Development

- a) Stakeholders involvement;
- b) Legal regulations and organisational frameworks with regard to participatory decision processes;
- c) Trade-off between owners' and users' rights;
- d) Harmonisation of water management and agricultural policies among individual European countries;
- e) International cooperation in building water management information systems.

A one-day technical tour to nearby water facilities will supplement Conference sessions providing the participants with the opportunity to be acquainted with the Italian Natural Resources and also with some historical monumental sites.

Further details on the conference may be taken from <http://www.italicid.org/erc2007/>

NEWS AND NOTES

EU Flood Directive under preparation

EC Press release IP/06/50, 18 January 2006

Commission adopts new directive to fight floods

The European Commission today proposed a directive to help Member States prevent and limit floods, and their damaging effects on human health, the environment, infrastructure and property. Since 1998 floods in Europe have caused some 700 deaths, the displacement of about half a million people and at least E 25 billion in insured economic losses. The new directive will require Member States to carry out preliminary assessments to identify the river basins and associated coastal areas at risk of flooding. Such zones then will be subject to flood risk maps and flood risk management plans. These plans will focus on prevention, protection and preparedness.

Commissioner for the Environment Stavros Dimas said: "Catastrophic floods endanger lives and are likely to cause human tragedy as well as heavy economic losses. This new directive will help Member States choose the right tools with which to reduce the likelihood of floods and limit their impacts. In particular, it aims to ensure that Member States cooperate in shared river basins and coastal areas to improve flood protection all over Europe."

Between 1998 and 2004, Europe suffered over 100 major damaging floods, including the catastrophic floods along the Danube and Elbe rivers in the summer 2002. Severe floods in 2005 further reinforced the need for concerted action.

Floods can also have severe environmental consequences, when, for example, installations holding large quantities of toxic chemicals are affected.

Flood risks and costs likely to increase

The coming decades are likely to see a higher flood risk in Europe and greater economic damage. Firstly, the scale and frequency of floods are likely to increase due to climate change – which will bring higher intensity of rainfall and rising sea levels. In addition, failure to manage river systems properly can be compounded by constructions in flood plains with the result of reducing the areas' capacity to absorb flood waters. Finally, an increasing number of people live in areas at risk of flooding, and the number of business and industry located in flood risk zones continues to grow.

Why a Floods Directive?

In response to the 2002 floods, the Commission adopted a Communication on flood risk management in 2004 to improve protection against flooding, in which the need for Community legislation on flood risk management was identified.

Since most of Europe's river basins are shared by more than one country, concerted action at European level will result in better management of flood risks. A binding legal instrument will ensure flood risks are properly assessed, coordinated protection measures taken and the public properly informed. This basic set of legal obligations will

create a firm basis for cooperation, while the Commission will also continue to work with Member States on a voluntary basis to exchange information and best practice.

What does the directive require?

The proposal creates an EU framework for flood risk management that builds on and is closely coordinated with the 2000 Water Framework Directive,[2] the cornerstone of EU water protection policy.

A three-step process is proposed. First, Member states will undertake a preliminary flood risk assessment of their river basins and associated coastal zones. Where real risks of flood damage exist, member states shall then develop flood risk maps. Finally, flood risk management plans must be drawn up for these zones. The management plans are to include measures to reduce the probability of flooding and its potential consequences. They will address all phases of the flood risk management cycle but focus particularly on prevention (such as preventing damage caused by floods by avoiding construction of houses and industries in present and future flood-prone areas or by adapting future developments to the risk of flooding) protection (by taking measures to reduce the likelihood of floods and/or the impact of floods in a specific location such as restoring flood plains and wetlands) and preparedness (for instance through providing instructions to the public on what to do in the event of flooding)).

In the case of international river basins, these steps must be coordinated between the member states concerned to prevent problems being passed from one area to another. Active participation by all interested parties in the development and updating of the flood risk management plans will have to be ensured and the plans, risk assessments and maps made public.

The proposal (available in 20 EU languages) and accompanying documents, as well as other information on EU water policy, can be found at:

http://europa.eu.int/comm/environment/water/flood_risk/index.htm

http://ec.europa.eu/environment/water/flood_risk/key_docs.htm

Source of press release:

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/50&format=HTML&aged=0&language=EN&guiLanguage=en>

Joint Indo-German Energy Workshop at Bangalore and visit of ICID Central Office

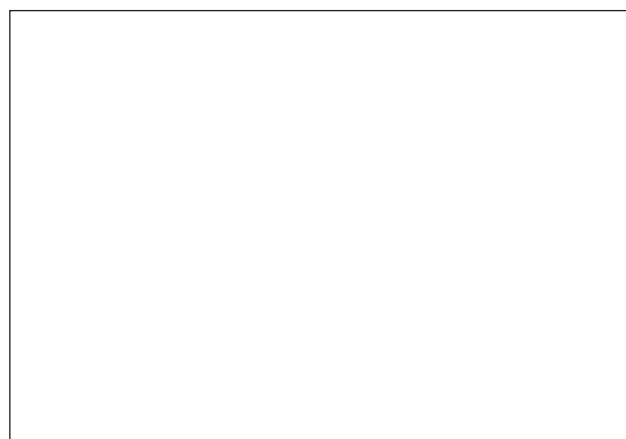
At the beginning of March 2006, the NIAS (National Institute of Advanced Studies, Bangalore, India) and the CESR (Center for Environmental Systems Research, Kassel, Germany) arranged the joint Indo-German Workshop "Will Competition for Land and Water Hinder Energy Development in India?" organised by Prof. Dilip Ahuja (NIAS) and Prof. Joseph Alcamo (CESR). For two days, the invited experts (20 scientists from India and 5 representatives from Germany) discussed relevant problems and research issues which resulted from an envisaged

progressive development of bioenergy sector. The available land and water resources and their future withdrawal for biofuel production at due consideration of water scarcity and water stress were in the focal point of the discussions. The identified research needs serve Indian and German authorities in the preparation of joint research programmes.



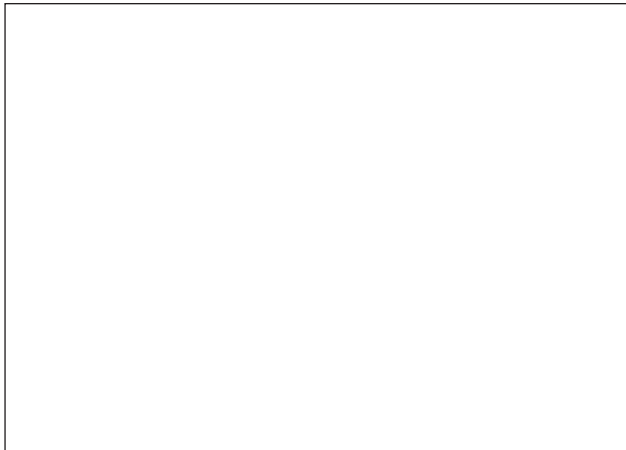
On the occasion of this workshop I took opportunity to visit ICID Central Office at New Dehli where I had intensive talks with the Secretary General, Mr. M. Gopalakrishnan, and the staff members Dr. S. A. Kulkarni, Dr. V. K. Labhsetwar, and Mr. K. N. Sharma. The Secretary General pointed out the active work of the European Regional Working with a special mentioning of the successful 21st European Regional Conference in 2005 at Frankfurt (Oder) and Słubice. SG Gopalakrishnan stressed the importance of furthering works on an increased utilisation of treated waste water for irrigation. There is a high need for actions and ICID has great expectations for the European countries to contribute technical and management innovations to this sector. With reference to the 4th World Water Forum in Mexico and to several other international activities, we agreed with each other that this subject should be considered increasingly within the work of the ERWG. Thus, I want to propose to include this topic in the agenda of the next ERWG meeting and, if possible, to establish a European Work Team on issue. I received the latest ICID publications and enjoyed a sight seeing tour to Dehli under the guidance of Mr. V. Singh of the Central Office giving me an impression of cultural and historical highlights of New Dehli before my return to Germany.

Joachim Quast



PERSONALIA

Eiko Lübbe, Chairman ERWG celebrated his 60th birthday



Dr.-Ing. Eiko Lübbe, Chairman of the European Working Group and Chairman of the German National Committee, turned 60 at 22 June 2006.

His professional education began at the Technical University of Hannover where he graduated in Civil Engineering (Dipl.-Ing.) for Water Management Issues and Coastal Protection. Eiko Lübbe holds a Ph. D. from the University of Bonn, where he postgraduated as Dr.-Ing. in Hydrology at the Department of Agricultural Water Management and Land Improvement. Hereafter he went to the Federal State Government of North Rhine-Westphalia, was postgraduated as Assessor for Civil Service and appointed to the Regional Government of Cologne responsible for regional water resources and waste management issues.

Since 1980 he is working in the Federal Ministry of Food, Agriculture and Consumer Protection, now as Head of Division of Water Management Issues in Rural Areas, Coastal Protection, Transport, Post and Telecommunication. In this position he was and still is chairman or member of a lot of working groups on national and international level mainly dealing with all soil and water problems and coastal zone management such as inland and coastal flood protection, drinking and wastewater management, surface and groundwater quality management and agricultural water management. As expert he worked for the World Bank in Greece as well as in Poland and Russia for the EU.

Within the ICID, Eiko Lübbe's activities and commitment are manifold. In 1995, he became Chairman of the German National Committee of ICID and in 1997, he joined the Working Group on Environmental Impacts of Irrigation, Drainage, and Flood Control Projects. Since 2002, he chairs the European Regional Working Group and is editor of the ERWG Letter. Even before he took over the ERWG chairmanship he strongly supported the working group since its foundation in 1995. As chairman he very successfully serves what he considered his main task, bringing together the western, central and eastern European members of the ICID-family for cooperation and integration in the field of water management issues

in rural areas. Among other activities he was among the initiators and with his special efforts strongly contributed to the efficiency of the Dialogue on Water, Food and Environment in Central and Eastern Europe.

The ERWG members express their congratulation to their Chairman Eiko Lübbe and wish him a fruitful continuation of his professional commitment, joyful days in his private life and a healthy future.

On behalf of the ERWG family, *László Hayde*

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