Reports by chairpersons of the sessions and final summary

10th International Drainage Workshop of ICID
Helsinki Finland - Tallinn Estonia
6.-11. July 2008

ICID•CIID

Session 1a Agricultural drainage and environment in different farming policies
Willem Vlotman, Toomas Tamm

- EU directives described and history of drainage given
- Nitrate and Phosphorous losses studies show interesting results; other management practices are important too, perhaps more than drainage design details
- Zero tillage versus conventional tillage; more discharge from zero tillage
- Incomplete water balances: where does the water go?
- Trace metals vary along stream length, function of oxidation processes, management of water levels in stream is important

Observation:

- Context of work was missing; how to classify the observed contaminant levels with respect to appropriate guidelines (EPA in USA and EU WFD and others in Europe)

Session 1b: Agricultural drainage and environment in different farming policies

Laura Alakukku

Drainage should be developed as a part of field cultivation system

- Both in large and small scale agriculture
- Reduction of environmental loading from arable fields is one part of the drainage and water management system work

In arid and semiarid regions controlled subsurface drainage system is a cost efficient system

- To prevent water logging and to control soil salinity
- Drain depths can be reduced in salinity control of irrigated lands

Session 2a:
Technical Solutions to prevent leaching from agricultural drainage systems
Seppo Rekolainen

Key Findings

- drainage can be a pressure for water quality or control measure for water pollution
- sub irrigation seems to reduce N losses but might increase P losses
- drainage installation depth is important in controlling N losses
- water table management practices are economically and environmentally feasible also in less developed countries

Session 2a:
Technical Solutions to prevent leaching from agricultural drainage systems
Seppo Rekolainen

Recommendation

- integrate agricultural and environmental objectives
- increase extension services to take also environmental issues into account
- pay more attention in water management in developing countries

Session 2b:
Technical Solutions to prevent leaching from agricultural drainage systems
Kerstin Berlund

In order to control nutrient losses from agricultural lands you have to control the water flows

- It is very important to analyse all components of the water balance

Project studying mitigation of nutrient losses should include analyses of the fate of both N and P

- Make sure that a mitigating measure to reduce one problem does not create another problem

Session 2c Technical Solutions to prevent leaching from agricultural drainage systems

Pol Hakstege

Environmental evaluation of subsurface drainage system in a coastal region of Iran

- Traditional drainage from agriculture has environmental impacts on Miankale bay wildlife area. Several mitigation measures are proposed, but further environmental evaluation is needed.

Session 2c Technical Solutions to prevent leaching from agricultural drainage systems

Pol Hakstege

Hydrological and environmental impacts of peatland drainage: alternative methods for sustainable management

- Drainage of peatland leads to loss of unique hydrological and ecological functions and causes negative environmental effects such as nutrient leaching and transport of suspended solids and organic matter. Various cost-effective measures for stream restoration and water quality control are presented to reduce impacts of peatland drainage.

Session 2c Technical Solutions to prevent leaching from agricultural drainage systems

Pol Hakstege

Effect of wastewater irrigation and drainage on soil properties of sewage fields of Gdansk (Poland)

- Terrestrial ecosystems and plants on sandy dunes were used for waste water treatment for 110 years with an efficiency of about 80% until the system collapsed due to an overload of wastewater.
- Irrigation by large volumes of waste water led to the creation of wetlands.

Session 2c: Technical Solutions to prevent leaching from agricultural drainage systems

Pol Hakstege

Mitigation of pressures on water bodies by nutrient retention from agricultural drainage effluents using purification ponds

- Purification ponds, with natural vegetation, between the drainage system and the downstream water reduce nutrient fluxes considerably. There is a seasonal variation, but N is retained at a higher degree than P.
- The efficiency of purification ponds is expected to improve by the removal of biomass dying in autumn.

Session 3: Agricultural water management, decision support methods and technology
Tuomo Karvonen

The very important issues

- where does water go and where does N go were discussed

Some new aspects for deep seepage that can cause water losses were introduced

- evapotranspiration can be increased
- lateral seepage may influence
- deep seepage can cause water losses

very important issue related to scale effect in field experiment was raised by Keynote speaker

- the influence of controlled drainage on water losses is scale dependent especially concerning lateral seepage

Models can be useful in explaining results of field experiments and in finding answers where does water and N go

Session 3 Agricultural water management, decision support methods and technology
Tuomo Karvonen

Moreover, the need of new measurement campaigns and model solutions are needed in up scaling the results of field scale experiments to catchment scale

We should be sure that positive influence of water management actions measured at field scale is not local but it can be extended to larger scale

- Perhaps integration of models & measurements at different scale

Session 4: Drainage in the context of environmental river engineering. Johannes Deelstra

Keynote lecture Seppo Rekkolainen

- WFD holistic approach; obtain good water quality by 2015 in EU.
- Water quality status has to be estimated, class boundaries obtained through intercalibration
- Agriculture the main contributor of plant nutrients, many different measures can be applied to reduce this.
- WFD - Programme of measures
- Proper tools needed to design measures;
- To cope with temporal -, structural -, metrical -,translational, implementation, institutional, epistimological uncertainty

Session 4: Drainage in the context of environmental river engineering. Johannes Deelstra

Restoration of contaminated waterways in the Netherlands, by Pol Hakstege

- Sediments; sink for heavy metals
- Source control of contaminant emissions very successful in improving water quality of Dutch waterways
- A new classification, based on site-specific risk assessment, is aimed at more use of dredged material.
- The regulatory framework for sediment remediation will be transferred from soil legislation to water legislation, being in compliance with the WFD.
- Flood management, water/sediment management and nature conservation are being integrated into River Basin Management Plans.

Session 4: Drainage in the context of environmental river engineering. Johannes Deelstra

Environmental friendly drainage practices by Jukka Jormola

- Ecological restoration in agricultural areas showed increasing diversity for fish, the return of the trout!
- Two-stage profiles have many benefits for diversity, water quality and rural landscape.
- Channel bed erosion must be prevented by stone material, weirs and vegetation.
- Sedimentation basins and wetlands needed downstream of dredging works, to stop the movement of solid material.
- The accomplishment of new profiles needs more experience to fit working methods in different soil circumstances and to convince landowners of the benefits.

Session 4: Drainage in the context of environmental river engineering. Johannes Deelstra

Hydraulic considerations in designing environmental preferable channels by Juha Järvelä

- Two aspects investigated : 1) hydraulic characteristics of small natural streams and 2)determination of flow resistance caused by natural vegetation.
- In the case of small channels cross-sectional geometry and flow resistance were weakly interconnected, being significantly influenced by factors such as local roughness elements.
- The special characteristics of small streams should be fully addressed to accomplish a successful hydraulic design.
- The characterisation of vegetation should be based on readily defined, objective and measurable variables.
- Natural woody vegetation was characterised by leaf area index, a species-specific drag coefficient, and a vegetation parameter, which accounts for the effects of plant deformation in a flow.

Session 5: Extreme Weather Conditions, Drainage, Flood Management and Land Use
Osmo Purhonen

Keynote:

- Tremendous challenges facing the flood prone areas in the world
- Climate change is important but other changes, such as population growth, urbanisation and other land use development, increasing standard of living, etc. are actually even more important at least in the short and medium perspective

Session 5: Extreme Weather Conditions, Drainage, Flood Management and Land Use
Osmo Purhonen

Delineation of flood hazards and risk mapping in the Chi river basin, Thailand:

- Combining models SWAT and SOBEK proved to be functional tool to evaluate extent and risks of floods the Chi river basin

Hydrological processes in small agricultural catchments:

Hourly flow values instead of daily flow values should be used for small catchments in assessing the floods and amount of sediment and nutrients

Session 5: Extreme Weather Conditions, Drainage, Flood Management and Land Use

Osmo Purhonen

Flood risk management and land use planning in changing climate conditions:

- In Finland the future flood risk management will be based on flood directive. Flood risk maps will be a key basis for actions. The problem is to get the message through to land use planners

Summary Remarks, Willem Vlotman, 1/2

- Very interesting data at field scale but also some conflicting results: what is good for N reduction is not for P reduction. Rice husk envelope, trace elements, bio diversity in re-shaped drains (=brook, stream, river)
- Water, soil, crop, management, pest control: solving water management problems is but one of the solutions; silver pellets rather than a silver bullet. So do not stop looking for alternative and innovative solutions
- Solution to managing trace elements in water: silver pellets
- Scale effect of field research and the answer to the question where does the water and N, P go?
- Models can help with the analysis, but remember GIGA.
- Context of the work with respect to current guidelines (EPA or the EU WFD); so are the results indicating excellent, good or bad conditions?
- Very happy to see that the extension service in the US is very much alive and kicking: reaching the stakeholders. Also good to become aware of the Agricultural Drainage Management Coalition (ADMC, www.admcoalition.com)….solutions may with other organisations outside the ICID: UN, GWP,….etc.

Summary Remarks, Willem Vlotman, 2/2

- We need to make sure we also reach the designers and planners of drainage systems, get them involved early
- A role for the 9th International Drainage Symposium: translate the field results in design guidelines
- Whole of water balance and whole of catchment approach.
- Can lessons from the Rhine Basin be used for Mississippi Basin, e.g. long-term reductions in N and P in Rhine and hypoxia problem in the Gulf of Mexico.
- EU WFD we need more results to be presented so we can compare with other basins outside the EU
- Triple Bottom Line Reporting possibly a tool to achieve this
- Innovations: flow measurement in pipes, bio filter, flow resistance in natural streams,….
- A different type of innovation: use Katrina experience to emphasize that a billion of investment will safe 100's of billions in damage prevented.

Thank you for coming
and happy travels ….all
the way to IDW2011