



ENVIRO NITRA2017

international conference

22ND INTERNATIONAL SCIENTIFIC CONFERENCE

4TH – 6TH OCTOBER 2017

SUMMARY OF ABSTRACTS

ONLINE

**Slovak University of Agriculture in Nitra
2018**

SLOVAK UNIVERSITY OF AGRICULTURE IN NITRA
Horticulture and Landscape Engineering Faculty
Department of Landscape Planning and Land Consolidation
Department of Water Resources and Environmental Engineering

UNIVERSITY OF AGRICULTURE IN KRAKOW
Faculty of Environmental Engineering and Land Surveying



ENVIRO
NITRA2017
international conference

22nd International Scientific Conference

4th – 6th October 2017

Mountain hotel AKADEMIK – Račkova dolina

Summary of scientific abstracts
from the international scientific conference ENVIRO NITRA 2017,
held under the auspices of the dean of Horticulture and Landscape Engineering Faculty,
Slovak University of Agriculture in Nitra

doc. Ing. Klaudia Halászová, PhD.

and

dean Faculty of Environmental Engineering and Land Surveying,
University of Agriculture in Krakow

prof. Krzysztof Gawroński, PhD, DSc.

ISBN 978-80-552-1799-4

2018

Under the auspices of:

doc. Ing. Klaudia HALÁSZOVÁ, PhD. – dean of the Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra

prof. Krzysztof GAWROŃSKI, PhD, DSc. – dean of the Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow

Organizer:

Department of Landscape Planning and Land Consolidation
Horticulture and Landscape Engineering Faculty
Slovak University of Agriculture in Nitra
Hospodárska 7
949 76 Nitra
Slovakia
phone: +421-37-641 5214
fax: +421-37-641 5211
e-mail: kkpapu@uniag.sk

Department of Water Resources and Environmental Engineering
Horticulture and Landscape Engineering Faculty
Slovak University of Agriculture in Nitra
Hospodárska 7
949 76 Nitra
Slovakia
phone: +421-37-641 5234
fax: +421-37-641 5210
e-mail: kki@uniag.sk

Organizers:

SLOVAK UNIVERSITY OF AGRICULTURE IN NITRA
Horticulture and Landscape Engineering Faculty
Department of Landscape Planning and Land Consolidation
Department of Water Resources and Environmental Engineering

UNIVERSITY OF AGRICULTURE IN KRAKOW
Faculty of Environmental Engineering and Land Surveying

Committee on Agenda and Procedure:

Ing. Martin PIKALÍK, PhD. – Slovak University of Agriculture in Nitra
Ing. Ľubomír KONC, PhD. – Slovak University of Agriculture in Nitra
Ing. Petra ČERNÁ – Slovak University of Agriculture in Nitra

Members:

doc. Ing. Peter HALAJ, CSc. – Slovak University of Agriculture in Nitra
doc. Ing. Dušan IGAZ, PhD. – Slovak University of Agriculture in Nitra
doc. Ing. Lucia TÁTOŠOVÁ, PhD. – Slovak University of Agriculture in Nitra

Conference goal:

22nd edition of the International scientific conference ENVIRO NITRA 2017 set its goal to apprise the participants and scientists and professionals of the achievements of involved institutions in following fields:

- landscape water resources management,
- landscape design and preservation,
- climate changes,
- waste management,
- land consolidation,
- geospatial information – application in landscaping.

Editors:

doc. Ing. Klaudia HALÁSZOVÁ, PhD. – doc. Ing. Lucia TÁTOŠOVÁ, PhD. – Ing. Petra ČERNÁ – Ing. Martin PIKALÍK, PhD. – Ing. Ľubomír KONC, PhD.

Reviewers / lecturers:

doc. Ing. Viliam BÁREK, PhD.

doc. Ing. Peter HALAJ, CSc.

doc. Ing. Ľuboš JURÍK, PhD.

prof. Ing. Anna STREĎANSKÁ, PhD.

prof. Ing. Jozef STREĎANSKÝ, DrSc.

doc. Ing. Lucia TÁTOŠOVÁ, PhD.

Approved by the rector of the Slovak University of Agriculture on February 13, 2018 as a collection of scientific works – online.

It did not translate into language.

Publisher: © SUA in Nitra, 2018

ISBN 978-80-552-1799-4

CONFERENCE PROGRAM

4. 10.– 6. 10. 2017

Račkova dolina – Mountain hotel Akademik

4. 10. 2017(Wednesday)

12:30 departure by bus from Nitra – Hospodárska 7, Nitra

up to 15:30 arrival and accommodation of conference participants

15:30 – 17:00 registration of participants

17:00 dinner

18:00 Poster presentation:

- Zajac, E., Skowera, B.: *Microclimate of the natural and post-harvested areas of the raised bog*
- Skowera, B., Węgrzyn, A., Wojkowski, J., Ziernicka-Wojtaszek, A.: *Precipitation deficiencies and excesses during the growing season of sugar beet in the Lublin voivodeship area (1971-2015)*
- Policht-Latawiec, A., Zarnowiec, W.: *The effect of agricultural activity on of water quality in the Jasienianka flysch stream*
- Zarnowiec, W., Policht-Latawiec, A.: *Hydrochemical conditions of water management in the Rawa stream*
- Tátošová, L., Húška, D., Tárníková, M., Novotná, B. : *Zhodnotenie územia Žirany, Jelenec a Koliňany družicovými a leteckými snímkami z hľadiska historického, súčasnej krajinej štruktúry, hydrologických pomerov v krajine a vegetačného indexu NDVI*
- Kruk, E., Ryczek, M.: *Comparison of pedotransfer functions for determination of saturated hydraulic conductivity*
- Ryczek, M., Kruk, E.: *Changes of soil moisture, temperature and salinity on eroded loess slope*
- Baran, P., Cholewa M., Kamińska K., Dragan J.: *Changing the compression strength of weak soil in the light of use selected stabilizing composites*
- Kamińska, K., Cholewa, M., Baran, P., Hołody, D.: *An influence of cement additive on compression strength of silt*
- Novotná, B., Tátošová, L., Bárek, V., Halaj, P.: *Modelovanie povrchového odtoku v povodí rieky Žitava*
- Cholewa, M., Kutia, T., Kamińska, K., Baran, P.: *Changes of temperature inside the ground embankment model*
- Báreková, A.: *Assessment of the impact of different payment systems on municipal waste management effectiveness*

5. 10. 2017(Thursday)

8:30 **breakfast**

9:15 – 10:00 **registration of participants**

10:00 **conference opening – doc.Ing. Dušan Igaz, PhD.**

10:15 – 12:45 **Section I. - papers presentation:**

Section head I.: doc. Ing. Lucia Tátošová, PhD.

- Macura, V., Majorošová, M., Vaseková, B., Škrinár, A.: *Designing the water accumulation in curved paths*
- Grzywna, A., Sender, J., Brnowicka-Mielniczuk, U.: *Analysis of the ecological status of surface waters in the region of the Lublin conurbation*
- Kišš, V., Bárek, V.: *Vodný stres a jeho vplyv na dendrologické zmeny rastlín*
- Majorošová, M., Vaseková, B.: *Eradication of Fallopija japonica in the riverbank vegetation*

11:30 – 11:45 **coffee break**

- Antal, J.: *Návrh klasifikácie a kvantifikácie jednotlivých foriem vodnej erózie*
- Sender, J., Grzywna, A.: *Role of artificial phytolittoral in the phosphorous load reduction in storage reservoirs*
- Šinkovičová, M., Igaz, D.: *Analýza distribúcie zrnitostných frakcií pôd pomocou laserovej difraktometrie: porovnanie výsledkov s pipetovacou metódou*
- Kanownik, W., Policht-Latawiec, A., Zarnowiec, W.: *Long-term trends in the value of physico-chemical indicators in the water of the Wisłok River*

13:00 – 14:00 **lunch**

14:15 – 16:30 **Section II. – papers presentation**

Section head II.: doc. Ing. Dušan Igaz, PhD.

- Horák, J., Kondrlová, E., Igaz, D.: *Vplyv biouhľia v kombinácii s rôznymi dávkami N-hnojív na emisie N₂O, vybrané vlastnosti pôdy a úrody jačmeňa jarného v podmienkach poľného experimentu*
- Masłowska, W., Liberacki, D.: *Analysis of selected varieties of American Blueberry crop in different meteorological conditions of the western part of Poland*
- Stachura, T., Bialek, J.: *Assessment of the potential of using solar energy using GIS for a village in southern Poland*
- Papierowska, E., Sikorska, D., Szatyłowicz, J., Sikorski, P., Suprun, K., Hopkins, R. J.: *Wettability of wetland plants*

15:30 – 15:45 coffee break

- Tárník, A., Igaz, D., Borza, T.: *Trend of soil moisture at the beginning of year 2017 at locality Malanta*
- Krackowska, K., Oliskiewicz-Krzywicka, A., Stachowski, P., Liberacki, D., Masłowska, W.: *Inventory of water facilities on the basis of selected geodetic and cartographic materials*
- Jurík, Ľ., Sedmáková, M., Kopčová, Ľ., Rehák, Š., Gacko, I.: *The water erosion and sediments in small water reservoirs in selected catchments*
- Mosiej, J., Suchecka, T.: *Reclamation of degraded rivers by wastewater discharged from large agglomerations - Ner river case study*
- Jeznach, J.: *Some problems of land reclamation in Poland in climate change condition*

18:30 social evening

6. 10. 2017 (Friday)

8:00 breakfast

9:00 – 12:00 team-building (possibilities of cooperation oriented on the research and science in international context)

12:00 lunch

13:00 departure to Nitra

CONTENT OF ABSTRACTS

Zajac, E., Skowera, B.	13
Microclimate of the natural and post-harvested areas of the raised bog	
Skowera, B., Węgrzyn, A., Wojkowski, J., Ziernicka-Wojtaszek, A.	14
Precipitation deficiencies and excesses during the growing season of sugar beet in the Lublin voivodeship area (1971-2015)	
Policht-Latawiec, A., Zarnowiec, W.	16
The effect of agricultural activity on of water quality in the Jasienianka flysch stream	
Zarnowiec, W., Policht-Latawiec, A.	17
Hydrochemical conditions of water management in the Rawa stream	
Tátošová, L., Húska, D., Tárníková, M., Novotná, B.	18
Zhodnotenie územia Žirany, Jelenec a Kolíňany družicovými a leteckými snímkami z hľadiska historického, súčasnej krajinnej štruktúry, hydrologických pomerov v krajine a vegetačného indexu NDVI	
Kruk, E., Ryczek, M.	20
Comparison of pedotransfer functions for determination of saturated hydraulic conductivity	
Ryczek, M., Kruk, E.	21
Changes of soil moisture, temperature and salinity on eroded loess slope	
Baran, P., Cholewa M., Kamińska K., Dragan J.	22
Changing the compression strength of weak soil in the light of use selected stabilizing composites	
Kamińska, K., Cholewa, M., Baran, P., Hołody, D.	23
An influence of cement additive on compression strength of silt	
Novotná, B., Tátošová, L., Bárek, V., Halaj, P.	24
Modelovanie povrchového odtoku v povodí rieky Žitava	
Cholewa, M., Kutia, T., Kamińska, K., Baran, P.	25
Changes of temperature inside the ground embankment model	
Báreková, A.	26
Assessment of the impact of different payment systems on municipal waste management effectiveness	
Macura, V., Majorošová, M., Vaseková, B., Škrinár, A.	27
Designing the water accumulation in curved paths	

Grzywna, A., Sender, J., Brnowicka-Mielniczuk, U.	28
Analysis of the ecological status of surface waters in the region of the Lublin conurbation	
Kišš, V., Bárek, V.	29
Vodný stres a jeho vplyv na dendrologické zmeny rastlín	
Majorošová, M., Vaseková, B.	31
Eradication of <i>Fallopia japonica</i> in the riverbank vegetation	
Antal, J.	32
Návrh klasifikácie a kvantifikácie jednotlivých foriem vodnej erózie	
Sender, J., Grzywna, A.	34
Role of artificial phytolittoral in the phosphorous load reduction in storage reservoirs	
Šinkovičová, M., Igaz, D.	36
Analýza distribúcie zrnitostných frakcií pôd pomocou laserovej difraktometrie: porovnanie výsledkov s pipetovacou metódou	
Kanownik, W., Policht-Latawiec, A., Zarnowiec, W.	38
Long-term trends in the value of physico-chemical indicators in the water of the Wisłok River	
Horák, J., Kondrlová, E., Igaz, D.	39
Vplyv biouhlia v kombinácii s rôznymi dávkami N-hnojív na emisie N_2O , vybrané vlastnosti pôdy a úrody jačmeňa jarného v podmienkach poľného experimentu	
Maslowska, W., Liberacki, D.	40
Analysis of selected varieties of American Blueberry crop in different meteorological conditions of the western part of Poland	
Stachura, T., Bialek, J.	41
Assessment of the potential of using solar energy using GIS for a village in southern Poland	
Papierowska, E., Sikorska, D., Szatyłowicz, J., Sikorski, P., Suprun, K., Hopkins, R. J.	42
Wettability of wetland plants	
Tárnik, A., Igaz, D., Borza, T.	43
Trend of soil moisture at the beginning of year 2017 at locality Malanta	
Kraczkowska, K., Oliskiewicz-Krzywicka, A., Stachowski, P., Liberacki, D., Maslowska, W.	44
Inventory of water facilities on the basis of selected geodetic and cartographic materials	
Jurík, Ľ., Sedmáková, M., Kopčová, Ľ., Rehák, Š., Gacko, I.	45
The water erosion and sediments in small water reservoirs in selected catchments	

Mosiej, J., Suchecka, T.	46
Reclamation of degraded rivers by wastewater discharged from large agglomerations - Ner river case study	
Jeznach, J.	48
Some problems of land reclamation in Poland in climate change condition	

MICROCLIMATE OF THE NATURAL AND POST-HARVESTED AREAS OF THE RAISED BOG

¹Ewelina ZAJĄC, ²Barbara SKOWERA

¹*Department of Land Reclamation and Environmental Development, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND*

²*Department of Ecology, Climatology and Air Protection, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND*

The goal of this paper was to evaluate the difference of microclimatic conditions between the dome and post-harvested area on a raised bog in the Orawsko-Nowotarska Basin, Poland. The evaluation was performed on the basis of continuous measurement of air temperature and humidity on the bog dome and on post-harvested peat fields overgrown with different vegetation.

Measurements were conducted during growing season in the years 2016-2017, specifically between May and August. Three measurement sites were equipped with miniature air temperature and humidity recorders (Hobo company), which were mounted in the anti-radiation shields 0,5 m above ground. The results were then referenced to the measurements at a height of 2 m from the base meteorological station located about 300 m from the bog. To determine the effect of different vegetation on microclimatic conditions the recorders were placed in three different sites: I – bog dome with characteristic raised bog vegetation, mainly *Sphagnum* cover, II – post-harvested peat field covered with cotton-grass (*Eriophorum vaginatum*) and ericaceous shrubs, mainly heather (*Calluna vulgaris*) and *Vaccinium* spp., III – post-harvested peat field with woodland composed of pine (*Pinus sylvestris*) and birch (*Betula pendula*) with ericaceous shrubs.

On the basis of measurement series with radiation type weather (sunny and windless) the basic microclimatic indicators were calculated i. e. maximum, minimum, mean diurnal temperature, diurnal temperature amplitude and maximum, minimum mean absolute humidity.

The results showed that the highest mean diurnal temperature were on the bog dome (site I), but also the highest diurnal temperature amplitudes was noted there. The lowest maximum and mean diurnal temperature, as well as the lowest diurnal temperature amplitudes were noted on post-harvested field with woody vegetation (site III). Similarly, the absolute humidity measurements developed. The highest differentiation was characteristic to site I, while the lowest to site III.

Key words: Orawsko-Nowotarska Basin, air temperature and humidity, vegetation

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: ewelina.zajac@urk.edu.pl

PRECIPITATION DEFICIENCIES AND EXCESSES DURING THE GROWING SEASON OF SUGAR BEET IN THE LUBLIN VOIVODESHIP AREA (1971–2015)

¹Barbara SKOWERA, ²Alicja WĘGRZYN, ¹Jakub WOJKOWSKI, ¹Agnieszka ZIERNICKA-WOJTASZEK

¹*Department of Ecology, Climatology and Air Protection, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND*

²*Department of Plant Production Technology and Commodities Science Sub-department of Agrometeorology, Faculty of Agrobioengineering, University of Life Science, Lublin, POLAND*

The aim of the investigation was to evaluate the size and the frequency of precipitation deficits and surpluses during the growing season of sugar beet in the Lublin voivodeship in 1971–2015. The voivodeship is situated in central-eastern Poland. In the XX century the farming of sugar beet constituted a significant share of the total country production of the plant due to favorable soil and climate conditions in the region. However, because of the ongoing climate change that brings about more extreme weather conditions, the farming of the sugar beet is exposed to significant deficits and surpluses of precipitation. The water requirements of sugar beet are highest in the critical period of July and August (Dzieżyc et al. 1987). This study determined that in the years 1971–2015 the average amount of precipitation during the growing period of the plant was lower than its water requirements.

The water requirement satisfaction of sugar beet over the months of the growing season (May to September) was assessed using differences between monthly precipitation sums and water requirements of the plant adjusted for the growth of temperature (Skowera et al. 2016).

Classification of deficits and surpluses of precipitation for Lublin voivodeship of (Skowera et al. 2016) was used. The classification distinguishes five class intervals which correspond to the following conditions: dry, moderately dry, optimal, moderately wet and wet. It was established that during the growing season the optimal conditions were the most frequent. In July, the frequency of optimal conditions varied from 18% to 47% of all cases. In August, the dry and moderately dry conditions were prevalent: dry conditions constituted in between 22% and 56% of all cases.

Medians of the precipitation deficits varied between 19 to 55 mm over the months of the growing season of the sugar beet. The highest values were reached in August and July: in these months the median varied between 25 and 55 mm. The medians of the surpluses of precipitation varied between 10–22 mm in May up to 16–56 mm in August.

Key words: deficit and surpluses of precipitation, frequency, sugar beet, Lublin



ENVIRO
NITRA2017
international conference

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: rmskower@cyf-kr.edu.pl

THE EFFECT OF AGRICULTURAL ACTIVITY ON OF WATER QUALITY IN THE JASINIANKA FLYSCH STREAM

¹Agnieszka POLICHT-LATAWIEC, ¹Wioletta ŻARNOWIEC

¹*Katedra Melioracji i Kształtowania Środowiska, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND*

The paper presents the results of hydrochemical research conducted on the Jasienianka flysch stream, a left bank tributary to the Biała Tarnowska river. The submontane catchment of the stream, with area of 94.40 m² is situated in the Malopolska province. The stream catchment area is covered mainly by agricultural lands (68.3%) and to a lesser degree by forests (25.5%), built-up and urbanized areas (6.25) located along the banks of the Jasienianka and its tributaries. The investigations were conducted in 2014. 21 selected physicochemical indices were determined in the stream water at five control-measurement points situated along the 13 km long stream reach. Along the analyzed stream section, only the water temperature, dissolved oxygen, BOD₅ and N-NH₄⁺ allowed to classify the waters to quality class I (maximum potential), whereas ChZT-Mn, EC, SO₄²⁻, Cl⁻, Ca²⁺, Mg²⁺, water pH and P-PO₄³⁻ did not fulfill the requirements for class II. The other indices, in compliance with the Minister of Environment regulation of 2016, classified water to quality class II. Statistical analysis conducted using Kruskal-Wallis test revealed statistically significant differences in the indices values between the investigated measurement-control points for SO₄²⁻, Mg²⁺, K⁺, N-NO₃⁻ and PO₄³⁻. The assessment of water usable values revealed that it may be used for supply of water intended for human consumption only in the upper and middle reach. The Jasienianka did not meet the requirements for a natural habitat for cyprinid and salmonid fish along its whole length because of high NO₂⁻ concentrations.

Key words: agricultural lands, flysch stream, agricultural area pollution

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: a.policht@ur.krakow.pl

THE EFFECT OF AGRICULTURAL ACTIVITY ON OF WATER QUALITY IN THE JASIENIANKA FLYSCH STREAM

¹Wioletta ŻARNOWIEC, ¹Agnieszka POLICHT-LATAWIEC

¹*Katedra Melioracji i Kształtowania Środowiska, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND*

The paper presents the results of hydrochemical analyses of the Rawa stream – a right bank tributary to the Brynica river. The stream catchment, with area of 90km², is covered mainly by built up and urbanized areas (76%) and to a lesser degree by forest and green areas. There are seven steel works operating in the Rawa catchment area, two mechanical-biological treatment plants and two hard coal mines. The data base used in the paper consisted of the results obtained from the Voivodship Environmental Protection Inspectorate and monthly analyses of water samples collected from the stream in the years 2006-2010, at the control-measurement point located by the stream outlet into the Brynica river. Basing on the current regulations of the Minister of Environment, the analysis of the stream water quality was presented and its potential applications for drinking water supply to people were pointed out. Moreover, it was tested whether the water parameters met the requirements for the cyprinid and salmonid fish habitats. 17 physicochemical indices were analyzed in the paper. It was found that the Rawa stream waters did not meet the requirements for class II, their potential was below good due to high concentrations of total suspended solids, Kjeldahl nitrogen, SO₄, Cl, N-NO₄ and P. Moreover, because of too high concentrations of total suspended solids, Kjeldahl nitrogen, SO₄ and Cl, but also BOD₅, TOC and EC the stream waters cannot be used for drinking water supply to people. The Rawa did not meet the requirements for natural habitat for either cyprinids or salmonids because of high concentrations of total suspended solids, dissolved oxygen, BOD₅ and P. Exceeded limit values may evidence constant pollutant inflow into the stream aquatic environment from municipal and industrial sewage.

Key words: agricultural lands, anthropogenic pollution, water quality

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: w.zarnowiec@ur.krakow.pl

ZHODNOTENIE ÚZEMIA ŽIRANY, JELENEC A KOLÍŇANY DRUŽICOVÝMI A LETECKÝMI SNÍMKAMI Z HĽADISKA HISTORICKÉHO, SÚČASNEJ KRAJINNEJ ŠTRUKTÚRY, HYDROLOGICKÝCH POMEROV V KRAJINE A VEGETAČNÉHO INDEXU NDVI

¹Lucia TÁTOŠOVÁ, ³Dušan HÚSKA, ¹Mária TÁRNÍKOVÁ, ²Beáta NOVOTNÁ

¹*Katedra krajinného plánovania a pozemkových úprav, Fakulta záhradníctva a krajinného inžinierstva, Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

²*Katedra krajinného inžinierstva, Fakulta záhradníctva a krajinného inžinierstva, Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

³*Katedra regionálnej bioenergetiky, Fakulta európskych štúdií a regionálneho rozvoja, Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

Historické mapy predstavujú cenný dokument, na ktorom je zobrazená krajina spôsobom zodpovedajúcim danej dobe. Mapy sú tak svedectvom rôzneho spôsobu zobrazenia zemského povrchu, rozšírenia miest a osád, polí a lesov, vetvenia vodných tokov, kľukatenia ciest.

Súčasná krajinná štruktúra odráža aktuálny stav využívania Zeme. Je výsledkom vplyvu prírodných, socioekonomických, kultúrno-spoločenských a politických faktorov na pôvodnú krajinu.

Riešené územie príspevku, územie katastrov obcí Žirany, Jelenec a Kolíňany, má výhodnú socioekonomickú polohu. Obce ležia v tesnej blízkosti krajského mesta Nitra. Západným okrajom územia tečie rieka Nitra, ktorá priberá z tohto územia iba menšie autochtónne toky. Ostatné toky v riešenom území sú tzv. drobné vodné toky, ktoré väčšinou odvodňujú, resp. vyúsťujú na poľnohospodárske pozemky. Malé vodné nádrže a rybníky sú významným hydroekologickým faktorom širšieho územia. Menšie vodné nádrže slúžia hlavne poľnohospodárstvu ako zavlažovacie, rybochovné.

Praktickým riešením v krajine pomocou diaľkového prieskumu Zeme, môže byť využitie vegetačného indexu NDVI, ktorý vyjadruje množstvo a vitalitu vegetácie na zemskom povrchu. Časť slnečného žiarenia dopadajúceho na objekt sa odrazí a iná časť je zase objektom absorbovaná. Chlorofyl obsiahnutý v listoch rastlín silno absorbuje viditeľnú časť slnečného žiarenia, t.j. aj červené žiarenie, ktoré sa využíva pri fotosyntéze. Naproti tomu bunková štruktúra listov silno odráža blízke infračervené žiarenie. Čím viac listov teda plodina má, tým viac viditeľného žiarenia je absorbovaného a blízkeho infračerveného odrazeného. Výsledkom výpočtu NDVI indexu je hodnota od -1 do +1. Index NDVI sa pri suchozemskej vegetácii zvyšuje v závislosti od hustoty vegetácie, od hodnoty +0,15 (holá pôda) až po +1 (veľmi hustá vegetácia). Na druhej strane, vodné plochy majú negatívne hodnoty indexu NDVI a oblaky majú hodnoty indexu NDVI okolo 0. NDVI je teda funkciou spektrálnej odrazivosti v červenom (RED) a infračervenom kanáli (IRED) (Šinka a kol., 2013).

Porovnaním leteckej snímky, sledovaného územia, môžeme vidieť vývoj krajiny za 58 rokov. Za tú dobu prešiel zmenou štruktúry krajiny a to rozrastaním intravilánu, budovaním nových ciest, diaľnic. Počas týchto rokov sa menilo rozloženie a hospodárske využitie pôdy,

nastalo sceľovanie pozemkov. Riešené územie Jelenec, Kolíňany, Žirany spadá do CHKO Ponitrie, preto vegetácia za celý ten čas zostala nezmenená, čiže nenastal žiadny výrub. Na leteckých snímkach môžeme vidieť rozdiel za daný čas v sceľovaní pozemkov, budovaním nových ciest a celkovou zmenou štruktúry krajiny. Na modrom, zelenom a červenom pásme môžeme vidieť vegetáciu v nižších hodnotách, pretože odrazí menej žiarenia a viac pohltí, tým sa prejavuje v tmavších farbách. Na satelitných snímkach môžeme sledovať rozdiel vodných plôch vo vegetačnom a mimo vegetačného obdobia. Mimo vegetačného obdobia spektrálna odrazivosť vody je v nižších hodnotách, pretože vtedy je voda čistá a viac žiarenia pohltí a menej odrazí. Spektrálna odrazivosť vody vo vegetačnom období závisí od druhu a intenzity znečistenia vodných plôch. Čím je voda znečistenejšia, tým viac žiarenia pohlcuje a menej odráža. Na snímkach vidieť rozdiel medzi pôdou a vegetáciou mimo vegetačného a vo vegetačnom období.

Ak porovnáваме výsledky vegetačných indexov tak vidíme, že sa menia len vzhľadom k tomu, že každé snímky použité na vegetačný index sú nasnímané v inom období. Na satelitnej snímke vidíme, že je po zbere úrody, pretože hodnoty vegetačného indexu sú mínusové a to znázorňuje pôdu.

Analýzy snímok sme získali v programe IDRISI z hľadiska súčasnej krajinnej štruktúry, vegetačného indexu NDVI, hydrologických pomerov v krajine vo vegetačnom a mimo vegetačného obdobia. Porovnávali sme historické letecké snímky z roku 1949 so súčasnými leteckými snímkami z roku 2007 pre riešené územie katastrov obcí Jelenec, Kolíňany, Žirany. Porovnávaním sme mohli vidieť rozrastanie intravilánu, sceľovanie pozemkov, zmeny štruktúry krajiny.

Kľúčové slová: diaľkový prieskum Zeme, družicové snímky, spektrálne pásma, reflexia

Kontaktná adresa: Hospodárska 7, 949 76 Nitra, Slovenská republika
e-mail: lucia.tatosova@uniag.sk

COMPARISON OF PEDOTRANSFER FUNCTIONS FOR DETERMINATION OF SATURATED HYDRAULIC CONDUCTIVITY

¹Edyta KRUK, ¹Marek RYCZEK

¹Department of Land Reclamation and Environmental Development, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND

Direct laboratory and field methods of measurement of saturated hydraulic conductivity coefficient are time or cost-consuming. At present the popularity of indirect empirical methods has increased. Their main advantages are speed of calculations and low costs. Comparison of various empirical methods (pedotransfer functions) for saturated hydraulic conductivity coefficient determination was the purpose of this work. The used methods were: Campbell's and Shiozawa's, Krüger's, Saxton's, Dane's and Packett's, Packett's, Cosby's, Jabro's, Brakensiek's, Amer's and Awad's as well as Slichter's. The methods are based on: texture, bulk density and total porosity. Calculations were carried out for the soil samples of differential texture. The obtained results shows the methods used for permeability coefficient determination differ considerably. Mean values obtained by analyzed methods fluctuated between $2 \cdot 10^{-4}$ and $12,1 \text{ m} \cdot \text{d}^{-1}$. The results of calculations by the chosen methods were compared with the results of the laboratory methods. The best compatibility with laboratory method was obtained by use of the Campbell's and Shiozawa's method.

Key words: saturated hydraulic conductivity, pedotransfer functions

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: e.kruk@ur.krakow.pl

CHANGES OF SOIL MOISTURE, TEMPERATURE AND SALINITY ON ERODED LOESS SLOPE

¹Marek RYCZEK, ¹Edyta KRUK

¹Department of Land Reclamation and Environmental Development, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND

Investigations of horizontal and vertical changes of soil moisture, temperature and salinity on eroded loess slope, were the aim of the work. The investigation site of 29.46 ha is located near Racibórz, southern Poland, on the area of land holding. Measurements were carried out using device of the TDR type. Investigation points were located along the slope. Vertical changes were determined based on measurements in depths: 0-5, 5-10, 10-15, 15-20, 20-30, 30-40, 40-50 and 50-60 cm. Soil moisture was shaped between 0.4 and 39.3 %. Soil temperature fluctuated between 17.7 and 38.0 °C. Salinity attained values between 10 and 1350 dS·m⁻¹. There were high differences between values of examined parameters both horizontally and vertically in relation to location on the slope. Horizontal and vertical distributions of investigated parameters were elaborated using the kriging method and 3D maps were carried out. The influence of the point location on the slope on values of parameters were determined using variance analysis.

Key words: soil moisture, soil temperature, soil salinity, spatial distribution

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: rmryczek@cyf-kr.edu.pl

CHANGING THE COMPRESSION STRENGTH OF WEAK SOIL IN THE LIGHT OF USE SELECTED STABILIZING COMPOSITES

¹Przemysław BARAN, ¹Mariusz CHOLEWA, ¹Katarzyna KAMIŃSKA, ²Jarosław DRAGAN

¹*Department of Hydraulic Engineering and Geotechnics. University of Agriculture in Krakow, POLAND*

²*Alumnus of Faculty of Environmental Engineering. University of Agriculture in Kraków, POLAND*

The aim of the research is to investigate the influence of selected stabilizers on the strength and density parameters of natural weak soil. Transport infrastructure facilities and buildings are often located in areas with insufficient load capacity. These are areas where weak organic and fine grained soils are present. When choosing the right method of substratum improving, the results of the on-site research are essential. The research should include: determining the thickness of the layers to be improved, the heterogeneity of the substratum (occurrence of interactions or lenses of weak soil), determination of the type of soil and its parameters. Diagnosis of the substratum should be comprehensive and give a scope of the ground conditions.

The research material was a silty sand from trenches under the shopping mall “Galeria Bronowice” in Krakow. The stabilizers used in the research was Lipidur DF and Terramix F 22,5. The investigations are conducted in the Laboratory of Hydraulic Engineering and Geotechnics Department. Lipidur DF is a complex mineral hydraulic binder with dehumidifying properties, designed for stabilization, sealing and soil improvement for the construction, repair and upgrading of roads in the in-situ mix method. Lipidur binder exhibits intermediate features between lime and cement, which combine the beneficial properties of both binders. It has typical dehumidifying properties of lime and bonding properties of cement. Terramix F 22,5 consists of portland cement clinker, W or V pozzolanic additives, lime and minor components and time bonding regulators.

From a practical point of view, the compressive strength and the frost resistance index are more advantageous for the use of Lipidur DF than Terramix 22,5 in sandy-silts soils. Significant increases of compression strength are achieved using selected stabilizing additives, while the impact on the compaction parameters is insignificant. It is recommended that the selected stabilizers should be applied to other fine-grained soils in order to confirm this dependence.

Key words: soil stabilization, weak soil, compaction, compression strength, frost resistance

AN INFLUENCE OF CEMENT ADDITIVE ON COMPRESSION STRENGTH OF SILT

¹Katarzyna KAMIŃSKA, ¹Mariusz CHOLEWA, ¹Przemysław BARAN, ²Dawid HOŁODY

¹*Department of Hydraulic Engineering and Geotechnics, University of Agriculture in Kraków.
POLAND*

²*Alumnus of Faculty of Environmental Engineering. University of Agriculture in Kraków, POLAND*

The purpose of the research was to determine the compressive strength and the frost resistance factor of a silt clay sand stabilized with cement II/B-S 32,5 R. These parameters were necessary to evaluate usability of this soil in stabilization and road engineering. The tested soil was the coarse silt from Krakow in Małopolska Province. The tests included determination of the compressive strength and the frost resistance factor of the soil without any additive and with different additions of the cement II/B-S 32,5 R. The addition of the binder in relation to the dry mass was 3%, 5% and 8%. A Tritsch 50 compression apparatus was used to determine the compressive strength. A frost chamber was used in the frost resistance tests. The samples, 8 cm in diameter and 8 cm high, were formed in a Proctor's apparatus at the compaction index $I_s = 1.0$ and optimal moisture content. The tests were carried out on the following samples: a) the coarse silt without any addition of the binder b) soil with the binder directly after formation c) soil with the binder after 7 and 28 days of curing in water d) soil with the binder after 7 and 28 days of curing (the samples were protected from drying) e) soil with the binder after 7 and 28 days of freeze and thaw cycles. Based on the carried out tests it was stated that improvement of the compressive strength is influenced by the method of curing. Whereas the samples showed low resistance to water – the compressive strength under wet conditions increased very little in relation to the addition of the binder as well as time of curing.

Key words: soil stabilization, compression strength, frost resistance

MODELOVANIE POVRCHOVÉHO ODTOKU V POVODÍ RIEKY ŽITAVA

¹Beáta Novotná, ²Lucia TÁTOŠOVÁ, ¹Viliam BÁREK, ¹Peter HALAJ

¹*Katedra krajinného inžinierstva, Fakulta záhradníctva a krajinného inžinierstva, Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

²*Katedra krajinného plánovania a pozemkových úprav, Fakulta záhradníctva a krajinného inžinierstva, Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

Modelovanie povrchového je jednou z dôležitých súčastí pre stanovenie oblastí ohrozených povodňami, vodnou eróziou a následným úbytkom organickej hmoty i živín. Poľnohospodársky využívané povodie Žitavy (903 km²) patrí k oblastiam, v ktorých sa v rokoch 2009 a 2010 vyskytli zvýšené vodné stavy ako aj povodne. Hydrologické modely patria k dôležitým nástrojom na predpovedanie a chovanie odtokového procesu a pre výpočet reakcie povodia na jednotlivé zrážkové udalosti. Ako účinný model na tento účel bol použitý model WaSiM-ETH, ktorý efektívne modeluje jednotlivé zložky, podieľajúce sa na tvorbe odtoku. Použitím Green-Ampt metódy určuje priamy odtok a stanovuje dynamiku pôdnej vody aplikáciou Richardsovej rovnice. Celkové ročné sumy hodnôt povrchového odtoku boli prepočítané pre celú plochu povodia, vzťahnutú k profilu Vlka (793,51 km²), čo predstavovalo 81,78 m³.s⁻¹ v roku 2009 a 12,38 m³.s⁻¹ v roku 2010. Pomocou modelových výpočtov boli vytipované obdobia jednotlivých kritických období, na základe ktorých je možné v menšom časovom kroku podrobnejšie analyzovať pravdepodobné príčiny vzniku povrchového odtoku a následne aj povodní. Článok je zameraný na vznik a genézu priameho odtoku a na faktory, ktoré ovplyvňujú celkový odtok z povodia, či už klimatické, pôdne alebo antropogénne. Popis príčin vzniku minulých povodní môže slúžiť ako podklad pre návrh adaptačných opatrení na zníženie vzniku povodňového rizika v súvislosti s globálnou zmenou.

Kľúčové slová: hydrologická bilancia povodia, hydrologický model, retencia vody v krajine, povrchový odtok

Kontaktná adresa: Hospodárska 7, 949 76 Nitra, Slovenská republika
e-mail: beata.novotna@uniag.sk

CHANGES OF TEMPERATURE INSIDE THE GROUND EMBANKMENT MODEL

¹Mariusz CHOLEWA, ²Tetiana KUTIA, ¹Katarzyna KAMIŃSKA, ¹Przemysław BARAN

¹*Department of Hydraulic Engineering and Geotechnics, Faculty of Environmental Engineering and Lands Surveying, University of Agriculture in Krakow, POLAND*

²*Institute of Automation Cybernetics and Computer Engineering, National University of Water and Environmental Engineering in Rivne, UKRAINE*

Construction of soil embankments and earth dams needs a huge experience and great responsibility. Instability and deformations of such soil objects can cause not only the destruction of the whole construction but also can be a danger to a humans' lives. That's why it is so important at the stage of the designing and planning to take into account all possible factors that can influence on the building (construction) state. Among such factors are groundwater table, filtration, strength parameters of soil, pore water pressure, seepage through the slope, influence of atmosphere and others.

There always was a persistent interest to the coupled processes of heat and moisture transfer in the porous medium as these factors have a great influence on the passing of physical processes in soils and its parameters. Nowadays the more attention should be paid to this problem due to the climate change (greenhouse effect), growth of anthropogenic and economic activity.

Beginning from the 1950s a lot of scientists were interested in the investigations of coupled processes of heat and moisture transfer. Philip and De Vries laid the theory of these processes in a porous medium in 1957 considering both vapor diffusion and capillary migration. The aim of this article was to investigate in the laboratory conditions how the water level and the change of temperature from one side of the embankment would influence on the processes of heat and moisture transfer in the soil body and groundwater table level. And of course to show the dependence of change of safety factor from above named factors.

The paper presents to investigate in the laboratory conditions how the water level and the change of temperature from one side of the embankment would influence on the processes of heat and moisture transfer in the soil body and groundwater table level. The change of temperature was significant. On the top of water 11 - 12 °C, top of the embankment and downstream slope 16,5 - 18,9 °C, drainage 19,9 °C. Measurements of the air temperature were also performed. the soil well separated the temperature in different parts of the model.

Key words: temperature, ground, embankment model, filtration

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland

ASSESSMENT OF THE IMPACT OF DIFFERENT PAYMENT SYSTEMS ON MUNICIPAL WASTE MANAGEMENT EFFECTIVENESS

¹Anna BÁREKOVÁ

¹Department of Landscape Planning and Land Consolidation, Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra, SLOVAKIA

The most pervasive monetary motivation in a municipal waste management is a direct fee based on waste volumes, that is, a PAYT or unit-based pricing scheme, which forces households to carry the full social costs of their disposal decision, what induces more efficient choices. Volume-based schemes usually require households to purchase waste bags or stickers (tags) that they can attach to their waste containers. The aim of our research was assessment of the waste management system in the municipality of Dolný Ohaj, where different payment systems for municipal solid waste charges were introduced during the monitored period. A flat fee was introduced in the municipality by the end of 2014. From the beginning of 2015 the municipality decided to introduce a volume-based scheme in a form of the tag system. Main focus was to analyse the waste management of the municipality in the monitored years 2012-2016 with emphasis on municipal solid waste fees, generation of municipal solid waste and rest fraction, municipal waste management revenues and expenditures, evaluation of economic results. The production of municipal solid waste in kilograms per person had decreasing tendency in the monitored period. The highest production was in 2012 (262.68 kg per capita per year) and the lowest in 2016 (175.85 kg per capita per year). In the monitored period also the amount of landfilled residual waste had been decreasing. The lowest quantity of landfilled municipal waste was in 2016 (237.15 tonnes). The municipality was reaching noticeably better economic results of waste management in the period of the volume-based scheme.

Key words: municipal solid waste, waste management, municipal solid waste charges, municipality Dolný Ohaj

Correspondence address: Hospodárska 7, 979 76 Nitra, Slovakia
e-mail: anna.barekova@uniag.sk

DESIGNING THE WATER ACCUMULATION IN CURVED PATHS

¹Viliam MACURA, ¹Martina MAJOROŠOVÁ, ¹Barbora VASEKOVÁ, ¹Andrej ŠKRINÁR

¹*Faculty of Civil Engineering, Slovak University of Technology in Bratislava, SLOVAKIA*

The paper presents the method of determining the shape of the riverbed in curves of the watercourse, which is based on the method of Ikeda (1975) developed for a slightly curved path in sandy riverbed. Regulated rivers have essentially slightly and smoothly curved paths; therefore this methodology provides the appropriate basis for river restoration. Based on the research in the experimental reach of the Holeška Brook and several alluvial mountain streams the methodology was adjusted. The method also takes into account other important characteristics of bottom material - the shape and orientation of the particles, settling velocity and drag coefficients. Thus, the method is mainly meant for the natural sand-gravel material, which is heterogeneous and the particle shape of the bottom material is very different from spherical. The calculation of the river channel in the curved path provides the basis for the design of optimal habitat, but also for the design of foundations of armouring of the bankside of the channel. The input data is adapted to the conditions of design practice.

Correspondence address: Radlinského 11, 810 05 Bratislava, Slovakia
e-mail: viliam.macura@stuba.sk

ANALYSIS OF THE ECOLOGICAL STATUS OF SURFACE WATERS IN THE REGION OF THE LUBLIN CONURBATION

¹Antoni GRZYWNA, ¹Joanna SENDER, ¹Urszula BRONOWICKA-MIELNICZUK

¹*University of Life Sciences in Lublin, POLAND*

The paper presents the results of surveys into the ecological status of rivers in the region of Lublin. Biological and chemical elements were analysed between 2012-2014. The following chemical and biological indices were determined in water samples (8 following checkpoints). The results obtained were processed by statistical methods including the determination of the differentiation of water quality ratios as regards the measuring site and the year of measurement.

The analysed river waters were characterised by very low content of ammonia nitrogen below $0.4 \text{ mgN-NH}_4/\text{l}$, total nitrogen below $5 \text{ mgN}\cdot\text{dm}^{-3}$ and conductivity below $600 \text{ }\mu\text{S}/\text{cm}$. These values are characteristic of class I of water purity. The content of Kjeldahl nitrogen within the range of $1\text{-}2 \text{ mgN}\cdot\text{dm}^{-3}$, phosphates within the range $0.2\text{-}0.4 \text{ mgPO}_4\cdot\text{dm}^{-3}$, nitrate nitrogen $2\text{-}5 \text{ mgN-NO}_3\cdot\text{dm}^{-3}$ and phosphorus $0.2\text{-}0.4 \text{ mgP}\cdot\text{dm}^{-3}$ makes the analysed waters eligible for purity class II. In the region of Lublin sometimes the content of phosphates exceeds the limit value for class II – $0.4 \text{ mg PO}_4\cdot\text{dm}^{-3}$. For MIR the index was 37 – 41, which made the waters eligible for purity class II. At some sites within the limits of Lublin city the value of the index lower than 37 made the water eligible for purity class III. For IO the index most often ranged from 0.3 to 0.4, which corresponds to class III of water purity. A decrease in the index below 0.3 made the water eligible for purity class IV.

The main reason for the poor ecological status of water was a high content of phosphates and a low diatom index. The largest variability in the value of the index was characteristic of the analysed watercourses for nitrate nitrogen and ammonia nitrogen and oxygen level. The watercourses are not very wide and not very deep, they have a low flow and their beds are modified. Watercourses located outside the city are characterised by quality class III, whereas watercourses in Lublin are characterised by quality class IV.

Key words: region of Lublin, water, ecological status, quality indicators

Correspondence address:
e-mail: antoni.grzywna@up.lublin.pl

WATER STRESS AND ITS INFLUENCE ON DENDROLOGIC CHANGES PROCESSES IN PLANTS

¹Vladimír KIŠŠ, ¹Viliam BÁREK

¹*Katedra krajinného inžinierstva, Fakulta záhradníctva a krajinného inžinierstva, Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

Sucho je forma prírodnej katastrofy, ktorá sa prejavuje nedostatkom zrážkovej a podzemnej vody, v dôsledku čoho dochádza k hynutiu rastlín. Z pohľadu prognózovaných stupňujúcich sa ekologických zmien je v poslednom období štúdium stresov, adaptácií a funkčných porúch biologických systémov v podmienkach extrémnych faktorov veľmi aktuálne. Z dôvodu predpokladu opakovania suchých vegetačných období s trvalým charakterom sa pestovanie hlavných plodín v nížinných oblastiach nezaobíde bez závlah, ktoré spolu s inými agrotechnickými opatreniami zaručia optimálny produkčný efekt.

Cieľom práce bolo analyzovať vzťah medzi dendrologickými zmenami rastlín a vlhkosťou pôdy ako merateľné príčiny a dôsledky vodného stresu. Na výskum sa použila kukurica siata - jednoročná rastlina, ktorá dorastá do výšky 1 až 3 metrov. Má plné steblo, vyrastajú z neho dlhé listy striedavo, v dvoch zvislých radoch. Skoré odrody majú na hlavnom steblo 8 – 12 listov, neskoré 24 a viac. Čepeľ listu má výrazné stredné rebro, je podlhovasto kopijovitá. Rastliny sa vypestovali v miestnosti s umelým LED osvetlením MARS HYDRO, emitujúcim červené a modré spektrum, nastaveným na 12 hodín svietenia. Teplota sa pohybovala v rozmedzí 25 – 30 °C a vlhkosť 60 – 65 %. Na stonkách rastlín boli pripevnené senzory na monitorovanie radiálnych zmien - diameter dendrometer type DD-S. Namerané dáta sa ukladali v 15-minútových intervaloch do Dendrometer Data Logger DL 18. Zber dát prebiehal nepretržite od 03.05.2017 do 06.06.2017. Dáta boli vyhodnocované v programe HOBOWare a následne spracované v Excel-i. Kukurica bola rozdelená do 4 skupín, pričom každá bola zavlažovaná rôznou dávkou vody v dvojdňových intervaloch a hodnoty boli merané senzormi na meranie pôdnej vlhkosti HS-10. Prvá skupina bola zavlažovaná dávkou 11,9 mm, druhá 7,3 mm, tretia 2,4 mm posledná nebola zavlažovaná vôbec. V polovici experimentu boli tieto dávky znížené o polovicu. Od 01.06. nebola zavlažovaná ani jedna nádoba, čím boli všetky vystavené stresovým podmienkam. Najväčší nárast priemeru bol pri kukurici zavlažovanej dávkou 11,9 mm (nárast o 0,43 mm), čo bolo očakávané. Vlhkosť pôdy sa pohybovala v rozpätí 48 – 52 % obj. Po znížení dávok vody o polovicu, začali priemery stoniek postupne klesať z 0,6 mm na 0,5 mm pri tejto skupine (vlhkosť klesla o 22 % obj.) a aj skupine zavlažovanej dávkou 7,3 mm (priemery klesli o 0,1 mm a vlhkosť o 20 % obj.). Pri tretej skupine s 2,4 mm dávkou vlhkosť pôdy narástla o 5 % obj., ale po znížení dávky sa dokázala v pôde lepšie udržať, kým závlaha nebola zastavená. Takisto zmena priemeru stonky bola druhá najvyššia (o 0,41 mm) a pokles bol v mikrometroch.

Z výsledkov vyplýva, že kukurica zavlažovaná dávkou 2,4 mm dokázala aj pri nižších dávkach v porovnaní s prvou skupinou (závl. dávka 11,9 mm) dosahovať porovnateľné priemery stoniek a vlhkosť pôdy v rozpätí 25 – 35 % obj., kým u ostatných vzoriek pôdna vlhkosť aj priemery stoniek začali klesať už pri znížení dávok o polovicu. Sucho je súčasťou poľnohospodárstva a touto prácou sme zistili, že vo fenologickom vývoji rastlín je dôležité

optimalizovať množstvo závlahovej vody na zabezpečenie úrody a zachovanie ekologickej stability.

Kľúčové slová: Dendrometer, pôdna vlhkosť, sucho, kukurica siata

Kontaktná adresa: Hospodárska 7, 979 76 Nitra, Slovakia
e-mail: xkissv1@uniag.sk

ERADICATION OF FALLOPIA JAPONICA IN THE RIVERBANK VEGETATION

¹Martina MAJOROŠOVÁ, ¹Barbora VASEKOVÁ

¹*Faculty of Civil Engineering, Slovak University of Technology in Bratislava, SLOVAKIA*

Fallopia japonica is an extremely aggressive invasive plant that threatens the natural riverbank ecosystems. The biodiversity is rapidly decreasing and therefore it is very important to decelerate the invasive process. The best solution to the problem of Fallopia japonica invasion is to eradicate the species completely. As Fallopia is very high invasive plant, the eradication is a very complicated and slow process. The presence of a river nearby the Fallopia japonica stands is making the removal process even more complicated. This paper is focused on the different approaches that are appropriate to use for eradication of Fallopia japonica in areas close to the rivers.

Correspondence address: Radlinského 11, 810 05 Bratislava, Slovakia
e-mail: martina.majorosova@stuba.sk

NÁVRH KLASIFIKÁCIE A KVANTIFIKÁCIE JEDNOTLIVÝCH FORIEM VODNEJ ERÓZIE

¹ Jaroslav ANTAL

¹*Katedra biometeorológie a hydrológie, Fakulta záhradníctva a krajinného inžinierstva,
Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

Vodná erózia pôdy je najvýznamnejším procesom fyzikálnej deštrukcie pôdy a tým aj najzávažnejším problémom poľnohospodárskych pôd na území Slovenska.

Hoci vodnou eróziou u nás je postihnutých 100% (!) výmery poľnohospodárskej pôdy, pozornosť protieróznej ochrany treba sústrediť najmä na 65% silne a extrémne ohrozenej pôdy, resp. najmä tej časti ornej pôdy, na ktorej intenzita erózneho odnosu pôdy je väčšia ako 10 t/ha/r.

Rôzne inštitúcie na Slovensku (napr. vedecké, výskumné, akademické, projekčné) venujú značnú pozornosť problematike vodnej erózie. Výsledkom je, okrem významného súboru vedeckých i praktických poznatkov, aj určitá rozkolísanosť používanej terminológie, nehovoriac o tom, že do slovenskej terminológie prenikajú nie vždy odôvodnene aj cudzojazyčné, ale aj významovo nesprávne slovenské termíny, napr. prielohová priekopa (pretože prieloh v slovenčine znamená neobrobenú, nezoranú alebo nevyužitú pôdu), stružka (pretože stružka v slovenčine znamená menšie umelo vytvorené vodné koryto, napr. kanalizačná stružka).

Na základe výsledkov viacročného štúdia domácej a zahraničnej erodologickej literatúry, vrátane 2 slovenských technických noriem z tejto oblasti, a to STN 75 0142 – Vodné hospodárstvo. Protierózna ochrana pôdy. Terminológia a STN 75 4501 Hydromeliorácie. Protierózna ochrana poľnohospodárskej pôdy., sme spracovali nasledovnú klasifikáciu, a kde sa dalo, aj kvantifikáciu jednotlivých foriem vodnej erózie - Tabuľka 1.

Tabuľka 1 Typické(všeobecne známe) formy vodnej erózie

Názov formy vodnej erózie		Hĺbka vytvorených erózných rýh	
v slovenčine	v angličtine		
Ronová erózia Zmyvová erózia	Sheet erosion	< 2 cm	Plošná erózia
Jarčeková erózia	Rill erosion	2 – 10 cm	
Brázdová erózia	Furrow erosion	10 – 30 cm	
Rýhová erózia	Ridge erosion	30 – 100 cm	Líniová erózia
Výmoľová erózia Stržová erózia	Gully erosion	.>100 cm	

Okrem týchto foriem sa v literatúre uvádzajú aj zvláštne (osobitné) formy vodnej erózie, uvedené v Tabuľke 2. Osobitné (zvláštne) boli nazvané preto, že napr. hoci pri nich nedochádza

k odnosu pôdných častíc, predsa svojim vznikom a pôsobením fyzikálne deštruujú zasiahnuté pôdy.

Tabuľka 2 Osobitné (zvláštne) formy vodnej erózie

Názov formy vodnej erózie		Pôsobenie
v slovenčine	v angličtine	
Kvapková erózia	Raindrop erosion Splash erosion	Vyšplachovanie pôdných častíc do výšky a dĺžky
Kalužová erózia	Puddle erosion	Deštrukcia pôdných agregátov

Kontaktná adresa: Hospodárska 7, 979 76 Nitra, Slovenská republika
e-mail: jaroslav.antal@uniag.sk

ROLE OF ARTIFICIAL PHYTOLITTORAL IN THE PHOSPHOROUS LOAD REDUCTION IN STORAGE RESERVOIRS

¹Joanna SENDER, ¹Antoni GRZYWNA

¹*University of Life Sciences in Lublin, POLAND*

Eutrophication of waters is one of the main problems threatening their quality all over the world. The dam reservoirs are particularly vulnerable to this process. The Zemborzycki Reservoir is a mid-size retention and recreation reservoir built on the Bystrzyca River, within the borders of the Lublin city. It was put into use in 1974. There are many factors adversely affect its functioning and increasing its eutrophication. The shores, whose length is 12 km, are concrete or steep, fortified with stones, which prevent the development of rushes. The average depth of reservoir does not exceed 1.5 m. The reservoir is large (surface about 280 ha), the western winds dominant, the lack of well-developed belt of rushes, is strongly exposed to serious wave action. In addition, the reservoir, on a large area, is surrounded by compact buildings and farmlands.

In 2010, the creation of the artificial surfaces on the reservoir area was initiated (called the lagoons). The purpose of their creation was to enrich the biodiversity of the reservoir, as well as reduction of the phosphorus supply through the plant barrier.

The purpose of the study was to determine the role of artificially created of phytolittoral in phosphorus reduction. The phosphorus load from the surface sources, river water and external sources was determined. In addition, its concentration in water of the naturally and artificially vegetated zones of reservoir was defined. In order to determine the role of macrophytes we studied the qualitative and quantitative structure of them in the entire reservoir, as well as in the Bystrzyca river (above and below the reservoir).

Zemborzycki reservoir was affected by water very rich in phosphorus. Up to 4.29 g m⁻² P-PO₄ and 77 g m⁻² TP are charged. In the estuary zone, where the phosphorus load is significantly reduced, the most qualitative and quantitative phytolittoral is formed. In the lagoon area there was also a marked reduction in phosphorus concentration, along with the progressive colonization of plants. In the littoral zone of Zemborzycki reservoir, with a very low plant density, the concentration of phosphorus was much higher than in the lagoon zones. The lowest values were in the water of the Bystrzyca River below the reservoir. This means that a large proportion of phosphorus is deposited in the reservoir, mainly in bottom sediments. The load of phosphorus entering the reservoir largely depends on the land use and was highest in the built up areas.

With limited possibilities of forming a buffer zone, special care should be taken to develop the trapped zone of the tank to create artificial substrates, allowing them to develop in regulated shorelines in order to reduce the phosphorus compounds in the water.



**ENVIRO
NITRA2017**
international conference

Key words: dam reservoir, phosphorous concentration, macrophytes, artificial phytolittoral

Correspondence address:

e-mail: joanna.sender@up.lublin.pl

ANALÝZA DISTRIBÚCIE ZRNITOSTNÝCH FRAKCIÍ PÔD POMOCOU LASEROVEJ DIFRAKTOMETRIE: POROVNANIE VÝSLEDKOV S PIPETOVACOU METÓDOU

¹ Miroslava ŠINKOVIČOVÁ, ¹ Dušan IGAZ

¹ *Katedra biometeorológie a hydrológie, Fakulta záhradníctva a krajinného inžinierstva,
Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

Distribúcia rozmerov pôdných častíc (resp. zastúpenie častíc určitej veľkosti vzhľadom k všetkým časticiam nachádzajúcim sa v celku) je jednou z najdôležitejších pôdných vlastností (Ryzak, Bieganski, 2011). Na meranie rozmerov častíc sa v súčasnosti používa niekoľko desiatok metód založených na rôznych fyzikálnych princípoch. Zvolená metóda musí umožniť a čo najobjektívnejšie odmerať distribúciu rozmerov častíc, z čoho vyplýva, že musí byť zvolená taká metóda a prístroj, ktorý má vhodný merací rozsah rozmerov častíc, zodpovedajúci rozmerom častíc v meranej vzorke (Čerňanský, 2004). Najčastejšie sú používané sedimentačné (pipetovacia, hustomerná), mechanické (sitová analýza) a optické metódy (laserová difrakčná metóda, röntgenová). Laserová difrakčná metóda je využívaná na meranie distribúcie rozmerov častíc a rozptylu elektromagnetického vlnenia na časticiach. Pre výpočet distribúcie veľkosti častíc sa používajú dve rôzne teórie: Mieho a Fraunhoferova teória. Fraunhoferova teória je vyhovujúca len pre niektoré častice, pretože presne neopisuje rozptyl svetla. Veľmi málo častíc má diskovitý tvar, väčšina ich je transparentných a preto prijateľnejšia teória, ktorá presne predpovedá správanie rozptylu svetla zo všetkých materiálov za všetkých podmienok, je Mieho teória (Malvern Instruments Ltd, 2007).

V súčasnosti sa mnohí autori (Wang, W., 2013; Polakowski, C., 2014; Jena, R., 2013; Kun, Á. 2013; Ryzak, M. 2011; Barasa, E. 2014 a iní) zaoberajú laserovou difrakčnou analýzou, dosiahnuté výsledky porovnávajú so štandardou pipetovacou metódou pričom pracujú s rozdielnym typom prístroja, ako aj s inou metodikou prípravy pôdnej vzorky. Rozdielny fyzikálny princíp, na ktorom je laserová difrakcia založená spôsobuje situáciu, že výsledky zrnitostnej analýzy pre pôdnu vzorku nie sú totožné so sedimentačnými metódami, avšak distribúcia zrnitostných frakcií určená laserom nie je porovnateľná s konvenčnou metódou (pipetovacia, hustomerná a pod.) v pomere 1:1. Preto táto skutočnosť často odrádza odborníkov prijať laserovú difrakciu ako metódu stanovenia pôdnej textúry. Aj keď vznikajú viaceré regresné modely, ktoré umožňujú prepočet výsledkov laserovej difrakcie na hodnoty porovnateľné so sedimentačnými metódami, ich výsledky nie sú použiteľné pre podmienky Slovenska kvôli rozdielom v metodickom postupe prípravy vzorky, v použitom meracom zariadení s rôznymi nastaveniami, ako aj v použitých zrnitostných klasifikáciách, ktoré nie sú u nás štandardné. Hlavným cieľom práce bola analýza 132 vzoriek stredne ťažkých pôd, odobratých z povodia rieky Nitra, z hĺbky 15-20 cm a 40-45 cm, pomocou laserového analyzátora ANALYSETTE 22 MicroTec plus od spoločnosti FRITSCH a MASTERSIZER 2000 od spoločnosti Malvern Instruments Ltd. Výsledky distribúcie zrnitostných frakcií, dosiahnuté laserovou difrakciou boli porovnávané so štandardnou pipetovacou metódou a boli odvodené ich regresné závislosti s lineárnym, exponenciálnym, mocninovým a polynomickým trendom. Z uvedených vzťahov boli vybrané 3 s najvyššími hodnotami spoľahlivosti R^2 . Významným

výsledkom bola tesnosť odvodených vzťahov pre 2. frakciu ($< 0,01$ mm) podľa metodiky komplexného prieskumu pôd (KPP), pretože podľa ich percentuálneho zastúpenia v pôde sa stanovuje na Slovensku pôdny druh. S ohľadom na získané analýzy odporúčame používať na odhad zastúpenia frakcie ílovitých častíc ($< 0,01$ mm) polynomicú regresiu, kedy bol priemerný rozdiel medzi vypočítanou a nameranou hodnotou 8% pre Analysette 22 MicroTec plus a 22% pre Mastersizer 2000 (pre vzorky z hĺbky 15-20 cm), respektíve 7% pre Analysette 22 MicroTec plus a 14% pre Mastersizer 2000 (pre vzorky z hĺbky 40-45 cm). Laserová difrakčná metóda je výhodná z hľadiska krátkeho času analýzy, použitia malého množstva vzorky, využitia výsledkov pre účely rôznych národných klasifikačných systémov, širokého rozsahu a triedenia frakcií. Na základe uvedeného je naďalej nevyhnutné pre potreby hydropedologického výskumu, zaoberať sa touto problematikou a pokúsiť sa v budúcnosti nahradiť štandardnú pipetovaciu metódu inou, napríklad laserovou difrakčnou metódou.

Kontaktná adresa: Hospodárska 7, 949 76 Nitra, Slovenská republika
e-mail: xsinkovicvm@is.uniag.sk
dusan.igaz@uniag.sk

LONG-TERM TRENDS IN THE VALUE OF PHYSICO-CHEMICAL INDICATORS IN THE WATER OF THE WISŁOK RIVER

¹Włodzimierz KANOWNIK, ¹Agnieszka POLICHT-LATAWIEC, ¹Wioletta ŻARNOWIEC

¹*Katedra Melioracji i Kształtowania Środowiska, Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow, POLAND*

The paper presents changes in concentrations of ammonium, Kjeldahl, nitrite, nitrate and total nitrogen, phosphates and total phosphorus concentrations in the Wisłok River water occurs in Poland. The investigations were conducted in 2004–2013, water samples were collected at a measurement point at 67.9 kilometer of the river at the intake of surface water intended for collective water supply to the inhabitants of Rzeszów city and adjoining districts. Among seven investigated nutrient indicators, only mean concentrations of total Kjeldahl nitrogen exceeded the value ($1 \text{ mg} \cdot \text{dm}^{-3}$) acceptable for class 1, which allowed to qualify the Wisłok River water to class 2, with good potential. The other analyzed substances ranged within class 1. Kjeldahl nitrogen also determined the water quality category, its concentration exceeded the value ($2 \text{ mg} \cdot \text{dm}^{-3}$) permissible for A2 category in 8.3% of 120 samples. For this reason the Wisłok River water taken for collective drinking water supply must be subjected to a high performance physical and chemical treatment, appropriate for A3 category, particularly to oxidation, coagulation, flocculation, decantation, filtration, adsorption on active carbon and disinfection (ozonation and final chlorination). On the basis of Kendall-Mann test, statistically significant declining trends of concentrations were observed for four parameters: ammonium, Kjeldahl nitrogen, total nitrogen and phosphates. A decrease in nutrient concentrations in the Wisłok River water over a decade is a measurable effect of implementing the San basin water management plan, mainly ordering water and sewage system management and modernization of sewage treatment plants in the catchment area. Diminishing the volume of untreated sewage discharged into the waters or to the soil and increasing the number of sewage treatment plants with enhanced nutrient removal was of key importance for the improvement of surface water condition and achieving a good potential of the Wisłok River water.

Key words: nutrient pollution; surface water; water quality; trend

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: rmkanown@cyf-kr.edu.pl

VPLYV BIOUHLIA V KOMBINÁCIÍ S RÔZNYMI DÁVKAMI N-HNOJÍV NA EMISIE N₂O, VYBRANÉ VLASTNOSTI PÔDY A ÚRODY JAČMEŇA JARNÉHO V PODMIENKACH POĽNÉHO EXPERIMENTU

¹Ján HORÁK, ¹Elena KONDRLOVÁ, ¹Dušan IGAZ

¹*Katedra biometeorológie a hydrológie, Fakulta záhradníctva a krajinného inžinierstva,
Slovenská poľnohospodárska univerzita v Nitre, SLOVENSKÁ REPUBLIKA*

Napriek tomu, že výhody aplikácie biouhlia sú dobre popísané pre tropické pôdy, na popísanie jeho účinkov na poľnohospodárskych pôdach mierneho pásma neexistuje ešte dostatok informácií. V podmienkach intenzívneho poľnohospodárstva sa môže vyskytnúť zaujímavé a málo preskúmané vzájomné spolupôsobenie: prídavok biouhlia môže pozmeniť účinok bežného hnojenia dusíkom. Za účelom výskumu vplyvu aplikácie biouhlia bol vykonaný terénny experiment pri aplikačnej dávke 0, 10 a 20 t ha⁻¹ biouhlia (B0, B10 a B20) v kombinácii s 0, 40 a 80 kg N ha⁻¹ minerálneho dusíkatého hnojiva (N0, N40, N80). Sledovali sme emisie oxidu dusného (N₂O), analyzovali sme skupinu fyzikálno-chemických pôdných vlastností a zisťovali sme úrody jačmeňa jarného na hnedozemi kultizemnej na experimentálnej báze nachádzajúcej sa na pôdach Podunajskej pahorkatiny. Sezónne kumulatívne emisie N₂O z variantov B10N0 a B20N0 sa znížili o 27, resp. 25% v porovnaní s kontrolným variantom B0N0. Kumulatívne emisie N₂O z variantov N40 a N80 v kombinácii s B10 a B20 boli tiež nižšie o 21, 19, 25, respektíve 32% v porovnaní s kontrolnými variantmi B0N40 a B0N80. Aplikácia biouhlia do pôdy mala za následok štatisticky významne zvýšenie pH pôdy. Zvýšené pH pôdy a znížený obsah NO₃⁻, ktorý bol pozorovaný vo variantoch s biouhlím boli identifikované ako dva možné mechanizmy zodpovedné za zníženie emisií N₂O. Taktiež došlo k štatisticky významnému zvýšeniu obsahu vody v pôde pri variante B20N0 v porovnaní s kontrolou B0N0, pravdepodobne v dôsledku väčšieho merného povrchu pôdných častíc a prítomnosti mikropórov, ktoré mali vplyv na zmenu distribúcie veľkosti pórov a vododržnú schopnosť pôdy. Aplikácia biouhlia pri aplikačnej dávke 10 t ha⁻¹ mala pozitívny vplyv na úrodu zrna jačmeňa jarného.

Kľúčové slová: biouhlie, hnojenie dusíkom, vlastnosti pôdy, emisie N₂O, úrody

Kontaktná adresa: Hospodárska 7, 979 76 Nitra, Slovenská republika
e-mail: jan.horak@uniag.sk

ANALYSIS OF SELECTED VARIETIES OF AMERICAN BLUEBERRY CROP IN DIFFERENT METEOROLOGICAL CONDITIONS OF THE WESTERN PART OF POLAND

¹Weronika MASŁOWSKA, ¹Daniel LIBERACKI

¹Institute of Land Improvement, Environmental Development and Geodesy, Faculty of Environmental Engineering and Spatial Management, Poznań University of Life Sciences, POLAND

Poland for many years has been recognised as a leading European and World producer of blueberries. With the correct conditions for growth, plants can fruit for 40 years and even longer (Kaiser i in. 2014). This paper presents the influence of meteorological conditions prevailing in the western part of Poland on the yield of selected blueberry varieties. The research was conducted on a small plantation located in the Przyczyna Górna village, in the Wschów district of the Lubuskie province. There are 77 shrubs of five varieties of blueberry: Patriot, Duke, Chandler, Elliott and Bluecrop. The study was conducted over the period of 2006-2016, with particular focus on the years 2014, 2015 and 2016, as the first crop yields were recorded during this period. 2014 was the warmest year during this period with an annual average air temperature of 10.3 °C, whilst the lowest temperature of 7.6 °C was recorded in 2010. The highest annual precipitation was in 2016, with a precipitation level of 760 mm. However, the year with the lowest total rainfall of 418 mm turned out to be 2011. The goal of the study in 2014-2016 was to evaluate the respective yields of five varieties of blueberry on a small plantation, taking into account various meteorological conditions.

Keywords: blueberry, precipitation, temperature, crop

Correspondence address: ul. Piątkowska 94, 60-649 Poznań, Poland

ASSESSMENT OF THE POTENTIAL OF USING SOLAR ENERGY USING GIS FOR A VILLAGE IN SOUTHERN POLAND

¹Tomasz STACHURA, ¹Joanna BIAŁEK

¹*Wydział Inżynierii Środowiska i Geodezji Uniwersytetu Rolniczego w Krakowie, POLAND*

The aim of this study was the selection of optimal location for solar investments in.

To achieve this goal made modeling of the total solar radiation in the ArcGIS 10.3.1. For this purpose, used a digital terrain model (DTM) with a resolution of 30 m/pixel. The result of the analysis were the maps of solar radiation for each month of the year.

Based on the author's method of valuation of land in terms of solar energy reaching the areas, indicated in 4 different classes of solar radiation.

It was found that more than half of the area of the village Lewniowa has a good and a very good class of the potential solar, where the annual amount of solar energy is more than 960 kWh·m⁻². In these areas, designated places for investment in photovoltaics (PV).

Key words: solar energy, GIS, photovoltaic

Correspondence address: al. Mickiewicza 24/28, 30-059 Krakow, Poland
e-mail: tomasz.stachura@urk.edu.pl

WETTABILITY OF WETLAND PLANTS

¹Ewa PAPIEROWSKA, ¹Daria SIKORSKA, ¹Jan SZATYŁOWICZ, ²Piotr SIKORSKI, ¹Katarzyna SUPRUN,
³Richard J. HOPKINS

¹*Faculty of Civil and Environmental Engineering, Warsaw University of Life Sciences - SGGW,
POLAND*

²*Faculty of Horticulture, Biotechnology and Landscape Architecture, Warsaw University of Life
Sciences - SGGW, Warsaw, POLAND*

³*Natural Resources Institute, University of Greenwich, Central Avenue, Chatham Maritime, Kent
ME4 4TB, UK*

Leaf wettability is understood as plants' ability to retain water on their surface. This is a very important feature, especially in sensitive environments susceptible to drought such as wetlands.

The aim of this study was to determine leaves wettability based on contact angle measurements. Measurements were conducted in the laboratory at 20°C with the sessile drop method. In this method, a drop of distilled water is placed on the leaf surface and the angle formed between the tangent to the liquid surface and the leaf surface at the interface between solid and liquid phases is determined. For measurements, a CAM 100 goniometer (KSV Instruments, Finland) was used.

Leaf material was collected from a degraded peat-bog located in Central Poland (near Warsaw). We measured the contact angle of the adaxial and abaxial surfaces of 10 wetland plant species.

Despite a similar living environment, we found the plants to vary greatly in terms of leaf surface wettability with contact angles ranging from 81 to 138° for the adaxial surface of the leaf and from 94° to 160° for the abaxial surface. Most species revealed higher hydrophobicity on the abaxial surface of the leaf with the exception of *Phragmites australis*, which presented a significantly higher hydrophobicity on the adaxial surface.

We conclude that wettability has the potential to be used as a bioindicator for investigating wetland habitat degradation and require further investigation.

Correspondence address: ul. Nowoursynowska 159, 02-776 Warsaw, Poland
e-mail: ewa_papierowska@sggw.pl

TREND OF SOIL MOISTURE AT THE BEGINNING OF YEAR 2017 AT LOCALITY MALANTA

¹Andrej TÁRNÍK, ¹Dušan IGAZ, ¹Tomáš BORZA

¹*Department of Biometeorology and Hydrology, Horticulture and Landscape Engineering
Faculty, Slovak University of Agriculture in Nitra, SLOVAKIA*

Soil moisture and soil water storage is crucial factor for agricultural production. Volume of water in soil is changing due to climate changes. It is necessary to give attention to this process. This paper is focused on trends in soil moisture changes in the first seven months of the year 2017 in the Poddunajská lowland (locality of Malanta). Balanced run or slightly decreasing of soil moisture can be observed from February to May. Significant decrease started in May. This is caused by long term precipitation deficit. The deficit of soil water content compared to the point of decreased availability was calculated. Shortage of the volume of soil water was in June and July in depth till to 150 cm. Lack of soil moisture was from 4 to 11 % vol. Overall deficit of rainfall was 92,6 mm compared to long term climate normal 1961-1990.

Key words: vlhkosť pôdy, klimatické zmeny, Malanta

Correspondence address: Hospodárska 7, 949 76 Nitra, Slovakia
e-mail: andrej.tarnik@uniag.sk

INVENTORY OF WATER FACILITIES ON THE BASIS OF SELECTED GEODETIC AND CARTOGRAPHIC MATERIALS

¹Karolina Krackowska, ¹Anna Oliskiewicz- Krzywicka, ¹Piotr Stachowski, ¹Daniel Liberacki,
¹Weronika Masłowska

*¹Institute of Land Improvement, Environmental Development and Geodesy, Faculty of
Environmental Engineering and Spatial Management, Poznań University of Life Sciences,
POLAND*

We can do correct define quantitative status of water facilities, by field inventory or by analysis of cartographic materials. The purpose of elaboration was analysis: which of selected cartographic materials are the most useful to detailed inventory of melioration devices. By using modern methods, for example photogrammetric techniques, we can obtain information from places with difficult, in conventional way, access. In the elaboration was made analysis: which of selected cartographic materials are up to date and which are enable, in the optimal way, to the most accurate and the most according to actual state, reading of the quantitative status of melioration devices, located in the field. Photogrammetric large-format photographs, showing the melioration devices, show them in the most objective and accurate way. They could be the underlay material for the inventory of melioration devices in the future.

Key words: inventory, melioration devices, geodetic and cartographic materials, photogrammetry

Correspondence address: ul. Piątkowska 94, 60-649 Poznań, Poland

THE WATER EROSION AND SEDIMENTS IN SMALL WATER RESERVOIRS IN SELECTED CATCHMENTS

¹Ľuboš JURÍK, ¹Miroslava SEDMÁKOVÁ, ²Ľubica KOPČOVÁ, ²Štefan REHÁK, ²Igor GACKO

¹*Department of Water Resources and Environmental Engineering, Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra, SLOVAKIA*

²*Water research institute Bratislava, SLOVAKIA*

Fyzikálne, biologické a chemické vplyvy sú príčinou orografických zmien na povrchu Zeme. Popri prírodných účinkov uvedených faktorov mimoriadne významnú úlohu v tomto procese má práve človek. Využívanie krajiny v prospech človeka, najvýraznejšie mení vzhľad ako aj kvalitu krajiny. Prírodná krajina má schopnosť najlepšie odolávať všetkým vonkajším vplyvom, pričom najstabilnejšie sú nedotknuté lesné porasty. Na druhej strane, využívanie prírodných zdrojov pre zabezpečenie potravín pre ľudstvo, si vyžaduje zvyšovanie produkcie potravín. Rast populácie sveta prebieha exponenciálne, pokiaľ produkcia potravín má zatiaľ ešte lineárny rast. Problém je, že súčasne dochádza k rozsiahlemu znižovaniu potenciálnej produkčnej schopnosti poľnohospodársky využívaných pôd v dôsledkoch dezertifikácie, a degradácie pôd, znižovaním organickej hmoty v pôdach a následnou petrifikáciou pôd. (Bedrna Jenčo 2016). Popri tvorbe novej pôdy, účinky vylúhovania, zvetrávania, pseudooglejenia, ilimerizácie, petrifikácie, mineralizácie humusu a pod. vedú k značnému znižovaniu rozlohy poľnohospodárskych pôd, čo zvyšovanie intenzity produkcie nemôže zabezpečiť sústavný nárast populácie Zeme. Erózne procesy popri pozitívnych vplyvoch, spôsobujú však najväčší pokles rozsahu úrodných pôd odnosom najúrodnejšej vrstvy pôdneho profilu na poľnohospodárskych pôdach. Splaveniny a plaveniny transportované vodou predstavujú problém nielen vo forme zanášania korýt tokov a znižovania akumulačného objemu vodných nádrží, ale je to aj problém zaradenia týchto sedimentov do ďalšieho využitia. Je to aj problém chemizmu vodných nádrží, do ktorých sa popri splaveninách dostáva aj veľké množstvo chemických látok, či už zo samotnej pôdy, alebo použitých hnojív, herbicídov a pesticídov a dôsledkom ich prítomnosti vo vodných telesách. Príspevok sa venuje tomuto komplexu problémov na príklade vybraných malých vodných nádrží na Slovensku a ich opatreniam v ich dielčich povodiach.

Key words: water erosion, small water reservoir, sediments, phosphorus, eutrophication

Correspondence address: Hospodárska 7, 949 76 Nitra, Slovakia
e-mail: lubos.jurik@uniag.sk

RECLAMATION OF DEGRADED RIVERS BY WASTEWATER DISCHARGED FROM LARGE AGGLOMERATIONS – NER RIVER CASE STUDY

¹Józef MOSIEJ, ¹Teresa SUCHECKA

¹*Division of Ecological Engineering and Restoration of Environment, Faculty of Civil and Environmental Engineering, Warsaw University of Life Sciences-SGGW, POLAND*

The aim of the presentation is analysis of water quality changes in degraded waste water receivers based on selected parameters in the Ner river in period 2004- 2011. The Ner river belongs to the most degraded river ecosystems. Ner is the right tributary of the Warta River. In the upper course, the Ner and tributaries were subjected to many years of degradation by the discharge of both municipal and industrial sewage from the Łódź Urban Agglomeration. Between 1995 and 2003 sewage from the agglomerations started to be cleaned in the Group's Sewage Treatment Plant, which was fully expanded and modernized only between 2004 and 2009. These two investigated periods, before and after modernization, were analyzed for quality improvement water in the river. The results of the measurements were taken by the Voivodship Inspectorates for Environmental Protection and the data of the Institute of Meteorology and Water Management in Poznań. The values of selected parameters (BOD₅, total nitrogen, nitrate nitrogen, total phosphorus, phosphates, suspended solids) in river water for different sections of the river Ner were compared. The input loads of pollutions were calculated on the basis of their concentration values and water flow volumes in selected cross sections.

In the section of Chełmno (lower course, 5 km before the Warta outlet), the average concentration for N_{tot} was 9.3 mg dm⁻³ in the years 1995-2003. In the second period of 2004-2011, this mean decreased to 6.44 mg dm⁻³. Taking into account average flows in these years, the load amounted to 3380 Mg/year and 1872 Mg / year, respectively. Mean P_{tot} concentrations were 1.2 mg dm⁻³ for the first period and 0.44 mg dm⁻³ for the second, with a load of 439 and 128 Mg/year, respectively. Mean value of BOD₅ were 18.3 and 4.96 mg dm⁻³, respectively. This gives annual load of 6337 and 1443 Mg/year. Concentrations of the total at 28.4 and 11.25 mg dm⁻³, respectively, give a load of 9908 and 3271 Mg/year, respectively. It follows that the load of pollutants entering the Warta River between 2004 and 2011 decreased by 45% for total nitrogen, total phosphorus by 71%, suspended solids by 67% and BOD₅ by 73% compared to the comparative period.

The quality of water in the Ner River clearly determined the discharge of purified sewage from the treatment plant. Concentration of P_{tot} and N_{tot} indicators for most measurements in section Smulsko (below the outlet from treatment plant) were in II and III cleanliness class. In other measurement points to Dąbie cross section these indexes are mostly below quality class There is a clear improvement in the value of these indicators only from 2008 and this is consistent with the full efficiency of the treatment plant.

In the years 2004-2009, the share of nitrate and phosphate in the total nitrogen and phosphorus increases for the cross sections below the outlet of the treatment plant.

On the one hand, it demonstrates better treatment process of the wastewater plant (biological decomposition) from the other hand also about the Ner river natural self purification process.

Tracking down the BOD₅ values for cross-sections below Lutomiersk between 2004 and 2011, there is a clear downward trend with the river run. This demonstrates the increasing potential of the self-cleaning process in the water ecosystem. The concentration of organic compounds is decreasing but there is still a risk of excessive eutrophication due to the increasing share of biogenic substances.

Improvements in water quality in Ner also indicate that ichthyologists have observed positive changes in fish species abundance and greater diversity of invertebrate fauna since 2005. Regeneration of degraded river ecosystems depends on the improvement of water quality, so the attempt to re-colonize depleted species was undertaken only after 2005 and is subject to continuous evaluation.

Correspondence address: ul.Nowoursynowska 166, 02-787 Warszawa, Poland
e-mail: jozef_mosiej@sggw.pl

SOME PROBLEMS OF LAND RECLAMATION IN POLAND IN CLIMATE CHANGE CONDITIONS

¹Jerzy JEZNACH

¹*Katedra Kształtowania Środowiska, Faculty of Civil and Environmental Engineering, Warsaw
University of Life Sciences-SGGW, POLAND*

Several variants of climate change have been developed in Poland in relation to water conditions. They are currently being verified. Some scenarios work well in practice. Based on them, the following hypothesis can be presented – water will be too much, not enough and a lot of pollution.

We are currently observing an increase in the intensity of precipitation, lengthening their duration (continuous for several days), and increasing their frequency. These precipitation causes several days of flooding mainly in urban and rural areas. After flooding, these areas remain under floods, sometimes for several months. Dewatering equipment must meet these challenges. Extensive work is being done on the development of standards and design principles for the land reclamation system.

On the other hand, in summer periods, long-term droughts often occur, resulting in low of water levels and the problem of energy harvesting, the supply of water to the population, and a significant reduction of yields. In these periods, often due to lack of water sources, it is not possible to irrigate. This forces the development of water retention strategy and its availability. A major problem is increased water pollution both during periods of excess and deficiency.

These problems should be solved in the coming years. Hence new tasks for drainage and irrigation systems.

Correspondence address: ul.Nowoursynowska 166, 02-787 Warszawa, Poland
e-mail: jerzy_jeznach@sggw.pl

Title: **ENVIRO NITRA 2017**

Summary of scientific abstracts from the international scientific conference ENVIRO NITRA 2017, held under the auspices of the dean of Horticulture and Landscape Engineering Faculty, Slovak University of Agriculture in Nitra doc. Ing. Klaudia Halászová, PhD. and dean Faculty of Environmental Engineering and Land Surveying, University of Agriculture in Krakow prof. Krzysztof Gawroński, PhD, DSc.

Editors: doc. Ing. Klaudia Halászová, PhD. – doc. Ing. Lucia Tátošová, PhD. – Ing. Petra ČERNÁ – Ing. Martin PIKALÍK, PhD. – Ing. Ľubomír KONC, PhD.

Reviewers/lecturers: doc. Ing. Viliam BÁREK, PhD.
doc. Ing. Peter HALAJ, CSc.
doc. Ing. Ľuboš JURÍK, PhD.
prof. Ing. Anna STREĎANSKÁ, PhD.
prof. Ing. Jozef STREĎANSKÝ, DrSc.
doc. Ing. Lucia TÁTOŠOVÁ, PhD.

Publisher: SUA in Nitra
Year of publication: 2018
Place of issue: Nitra
Issuance: first
Number of pages: 50

The authors are responsible for the wording and content of the abstracts.

© SUA in Nitra, 2018

ISBN **978-80-552-1799-4**



ISBN 978-80-552-1799-4



9 788055 217994