BOOK OF ABSTRACTS

1. SESSION DESCRIPTION

ID: B2a

Title of session:

Evaluation, maintenance and promotion of wetland ecosystem functions and services

Hosts:

	Title	Name	Organisation	E-mail
Host:	Prof.	Lijuan Cui	Institute of Wetland Research, Chinese Academy of Forestry	lkyclj@126.com
Host:	Prof. (Associate)	Xu Pan	Institute of Wetland Research, Chinese Academy of Forestry	xu_pan_decom@126.com

Session description:

The symposium takes an interdisciplinary approach to examine critical issues in maintaining and promoting the ecosystem functions and services in wetlands. Wetland ecosystem is one of the three largest ecosystems in the world and it varies in types, characteristics, processes, functions and services. There are many important ecosystem processes and functions, such as primary production, carbon and nutrient cycling, hydrological processes, food webs and etc, but the mechanisms and the potential drivers in wetland ecosystems are still unclear and lack of systematic understanding. Moreover, wetland can provide us various ecosystem services, such as flood control, groundwater replenishment,

shoreline stabilization & storm protection, sediment & nutrient retention and export, water purification, reservoirs of biodiversity, wetland products, culture values, recreation & tourism, climate change mitigation and adaptation. The maintenance and improvement of those services in wetland ecosystems are vital for us, but an efficient technique system is still lacking.

Therefore, we are aiming to discuss the following issues in this symposium: (1) how to accurately and efficiently monitor and evaluate wetland ecosystems including the characteristics, the key processes or functions, and the important ecosystem services of different types of wetland ecosystems; (2) how to reduce the negative impacts of human actives and climate change on the ecosystem functions and services of wetland ecosystems; (3) how to develop new techniques to protect the biodiversity of wetland ecosystems and improve the habitat conditions for wetland organisms, such as plants, soil organism, birds, or other animals; (4) how to maintain and improve the single function or service, and the multi-functionality of wetland ecosystems.

Goals and objectives of the session:

We are interested in all kinds of wetland ecosystems, including rivers, lakes, salt marshes, constructed wetlands and etc. We welcome both fundamental scientists and applied scientists who are working and interested in wetland ecosystems to join us and together contribute to the protection of wetland ecosystems worldwide.

Planned output / Deliverables:

Abstract book

Related to ESP Working Group or National Network:

BWG 2 – Freshwater systems

2. SESSION PROGRAM

Date of session: 12 December 2017
Time of session: 10:30 – 12:30

Timetable speakers

Time	First name	Name	Organization	Title of presentation
10:30	Guofeng	Wu	Shenzhen University, China	Remote sensing of Wetlands
10:45	Vytautas	Narusevicius	Vilnius University, Lithuania	Cultural ESS in wetlands: from national survey to local assessment
11:00	Wilson	Okaka	Kyambogo University, Uganda	Assessing public awareness communication campaigns to maintain and promote wetland ecosystem functions and services in Africa

Time	First name	Name	Organization	Title of presentation
11:15	Hui	Zhu	Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China	Phytoremediation of saline wastewater by constructed wetlands
11:25	Jing	Li	Institute of Wetland Research, Chinese Academy of Forestry, China	Denitrifiers play a key role in the process of nitrogen removal in the constructed wetland
11:35	Xu	Pan	Institute of Wetland Research, Chinese Academy of Forestry, China	Service and disservice of plant litter in constructed wetlands
11:45	Ioanna	Grammatikopoulou	Natural Resources Institute Finland, LUKE	Conservation of mires in Finland. Are citizens' and landowners' perceptions aligned with decision makers' views

Time	First name	Name	Organization	Title of presentation
12:00	Panpan	Xu	Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China	Comparison and assessment of NDVI time series for seasonal wetland classification
12:10	Gang	Liu	Institute of Wetland Research, Chinese Academy of Forestry, China	Meta-barcoding insights into the spatial and temporal dietary patterns of Asian Great Bustard with implications for divergent migratory strategies
12:20	Haifeng	Zheng	Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China	Adapting endangered oriental white storks to climate change in Northeast China

3. ABSTRACTS

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Conservation of mires in Finland. Are citizens' and landowners' perceptions aligned with decision makers' views?

Author(s): Ioanna Grammatikopoulou
Affiliation(s): Natural Resources Institute Finland, LUKE
Other author(s): Primmer E., Pouta E., Artell J., Hjerppe T., Saarikoski H.
Country: Finland
Contact: ioanna.grammatikopoulou@luke.fi

Mires are utilized peat-forming wetland ecosystems of global significance. They provide various ecosystem services (ES) such as biomass, carbon sequestration, flood control, surface water filtration, habitat for numerous species and recreational benefits. There are often tradeoffs between the provisioning services related to the use of mires and regulating and cultural services that are perceived as public goods. Peat extraction and draining

and mechanical soil preparation for agriculture and forestry, result in deterioration of mire habitats, loss of biodiversity, carbon emissions, hydrological imbalance, and deterioration of recreation experiences. The ways in which these uses and impacts are perceived by the general public, the land-owners and by the decision-makers do not necessarily align.

We analyze perceptions about mire ES and conservation in Finland, in a context where the debate of mires is heated. Natural mires and drained peatlands represent over a quarter of Finland's land surface. A majority of these 9 million hectares has been drained for commercial use. In 2012, the Government of Finland adopted a specific strategy on sustainable management of mires and peatlands, which addressed ES explicitly. Following this broad strategy, a Mire Protection Program was drafted but the original ambitious protection goals were narrowed after a decision to base the conservation on the enrollment of private land owners. To promote sustainable use of mires there is a need for collaboration between authorities, citizens, businesses and stakeholders in decision making and for understanding what the views of these different stakeholder groups are and how they align or differ.

Our mixed-method analysis makes use of a national internet based survey of approximately 2000 citizens, including 234 landowners and interviews with ten national level decision-makers representing different uses of peatlands. Our qualitative and quantitative analyses show how ES are recognized by different beneficiaries and stakeholders. The results can be used to support decision-making by identifying the perceptions that have the largest divergence across citizen, landowners and other stakeholder groups and the areas with common ground.

Keywords: peatlands, ecosystem services assessment, conservation policy

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Denitrifiers play a key role in the process of nitrogen removal in the constructed wetland

Author(s): Jing Li

Affiliation(s): Institute of Wetland Research, Chinese Academy of Forestry

Other authors: Zongming Li, Yinru Lei, Manyin Zhang, Wei Li, Xu Pan, Juntao Wang, Lijuan Cui

Country: China

Contact: 15810519839@126.com

Plants are always regarded as the major contributor in the water purification such as the nitrogen removal process, however, more and more research showed that the microorganisms play crucial roles in the nitrogen removal. Here we studied the water properties, the abundance and the composition of denitrifiers in the horizontal subsurface flow (HSSF) constructed wetland from the inlet to the outlet. The results showed that the abundance of denitrifiers especially the nir*S* and nos*Z* gene significantly increased in the outlet of the HSSF. The bacterial

community also remarkably changed from the inlet to the outlet and denitrifiers dominated the bacterial community. We used Picrust to predict the function related to the nitrogen cycling including the Nitrogen Metabolism, Amino Acid Metabolism and Amino Acid related enzyme. The deniterifiers could explained 39.1% of the variation of the Nitrogen Metabolism, 38.87% of the variation of the Amino Acid Metabolism and 25.57% of the variation of the Amino Acid related enzyme. Four genera were further observed to significantly affect the function, which were correlated with the NO_2-N, TOC and ORP of the water. Our results provide solid evidence that denitrifiers mainly contributed to the nitrogen removal process in the constructed wetland.

Keywords: constructed wetlands; denitrifiers; nitrogen removal; abudance; community composition

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Meta-barcoding insights into the spatial and temporal dietary patterns of Asian Great Bustard with implications for divergent migratory strategies

Author(s): Gang Liu

Affiliation(s): Institute of Wetland Research, Chinese Academy of Forestry

Other authors: Minghao Gong, Lijuan Cui, Yu Ning, Huixin Li, Defu Hu, Hengjiu Tian

Country: China

Contact: liugang9988@126.com

Food resources are often not sufficient to satisfy the nutritional and energetic requirements during winter conditions at northern latitudes. Diet analysis is a prerequisite to fully understanding the feeding ecology of a species and ultimately the nature of trophic interactions, which helps facilitate species conservation and management. Previous dietary studies of Asian Great Bustard (Otis tarda dybowskii) relied only on behavioral

observations, resulting in superficial knowledge of diet limited to broad taxonomic categories. Here, we applied the high-throughput sequencing (HTS) approach to quantify diets of resident and migratory Asian Great Bustard diet in three wintering sites during early winter and late winter. We detected 57 unique plant taxa in the bustard diet, with 15 species being identified from a local plant database we generated. Both agricultural and natural foods were detected, supporting relatively broad dietary niche. Spatial-temporal dietary changes were discovered, revealing an interactive effect of wintering site and wintering time on diets of Asian Great bustards. For the non-migratory population we detected a significantly more diverse array of plant species in the diet, and showed that most individuals in the population were consuming this variety (opposed to one or two individuals). Comparing dietary variation between resident and migratory populations suggests habitat and food availability appears to be involved in the recent transition to partial migration in this species. This work also informs the conservation of this threatened species by establishing a linking between food and a key life history strategy that will be informative for management.

Keywords: Great Bustard, molecular diet analysis, spatial-temporal changes, partial migration, wintering food

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Cultural ESS in wetlands: from national survey to local assessment

Author(s): Vytautas Narusevicius
Affiliation(s): Vilnius University
Country: Lithuania
Contact: narusevicius.vytautas@gmail.com

During a preliminary assessment of ecosystem services (ES) of the third largest bog in Lithuania, the ES selected as priorities to study included the following cultural services (CES)– potential for recreation; nature tourism; leisure/recreational fishing and hunting; and science and education. The priorities also included the provisioning ES, commonly supplemented, again, by CES.

The project area is relatively small, and surveying only its limited resident population will not provide a full and balanced picture of the area's ES. It was therefore decided to use social survey data also from the area from which the majority of visitors would come.

The results showed that recreational fishing is very important for almost 20% of respondents, hiking for up to 25%, visiting protected areas is preferred interacting with nature for 37%, nature photography for more than 40%, and eco-tourism and wildlife watching are preferred for 48% of inhabitants.

The importance of infrastructure to enjoy nature visits was indicated by majority of respondents. Short visits to natural areas appeared to be the most frequent type of visits, accounting on average for 64 days per person per year. Picking mushrooms, berries and medicinal plants appeared to be regular activity for considerable part of the adult population. Wetlands were pointed out by community also as the important ecosystem for the nature watching/ educational ES to look for.

The data received reflects hidden high potential for use of CES in the selected wetland, and it presuppose increase in sustainable use of these services in the future, if effective infrastructure and publicity measures will be implemented. Preliminary calculations of the potential annual economic value of ES were also performed.

Keywords: wetland ecosystem services, cultural ecosystem services, social survey

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Assessing public awareness communication campaigns to maintain and promote wetland ecosystem functions and services in Africa

Author(s): Wilson Okaka, Leticia Komba

Affiliation(s): Kyambogo University

Other author(s): Leticia Komba, Joseph Rwothumio, Joyce Ayikoru4, Philip Owino

Country: Uganda

Contact: nupap2000@yahoo.com

A well planned strategic public awareness communication campaigns play a critical role as a catalyst to maintain and promote public understanding of wetland ecosystem functions, values, benefits, policies, laws, dynamics, as well as issues, among other vital services in Uganda. The major objectives are to: evaluate the ecological functions and services of wetlands to Uganda; review the different categories of wetlands and their socio-ecological services to households or families, local communities, institutions,

and the country, and examine the national public awareness strategies for wetlands policy in Uganda. This review was informed by policy analysis national policies in Uganda backed the findings of relevant research findings, news bulletins, as well as policy reviews. At least 15 percent of the country is covered by almost all kinds of wetland ecosystems, such as dams, rivers, lakes, marshes, constructed or semi-natural wetlands, and ponds. Wetlands provide several socio-cultural, economic, ecological or environmental services and functions in Uganda; but they face a variety of degradation threats. Most wetlands have been degraded and some have already disappeared. All categories of human activities or actors have contributed to the wanton destructions of national laws, regulations, policies, and the constitution. There is a need for all the wetland ecosystems stakeholders to act in concert so as to urgently slow down, stop, reverse, and restore fully, the natural functions, values, and services of all types of wetlands by prudent conservation practices or wise use in Uganda – Africa.

Keywords: Africa, wetland, conservation, services, policy

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Service and disservice of plant litter in constructed wetlands

Author(s): Xu Pan, Lijuan Cui, Johannes H.C. Cornelissen
Affiliation(s): Institute of Wetland Research, Chinese Academy of Forestry
Country: China and Netherlands
Contact: xu_pan_decom@126.com

Plant litter is an indispensable component of constructed wetlands (CWs), but the ecosystem services and disservices of plant litter are still unclear in CWs. It has been shown that plant litter submergence might either positively and negatively affect the water quality of constructed wetlands. Here we will summarize the services and disservices of plant litter in constructed wetlands based on one or several case studies conducted in Beijing Hanshiqiao ecological station. Our results showed that litter submergence affected water quality positively via decreasing the concentration of nitrate nitrogen and negatively via

increasing the concentrations of total nitrogen, ammonium nitrogen and total phosphorus. The effects of litter submergence depended on the duration of litter submergence, the water source, the litter species identity, and the plant life form. Different plant species had different effects on the water nutrient concentrations during litter submergence, and the effects of floating plants might be more negative than that of emergent plants. These results are novel evidence of how the submergence of different plant (life form) litter may affect the purification function of constructed wetlands. For water at low eutrophication levels, submerging a relative small amount of plant litter might improve water quality, via benefiting the denitrification process in water. These findings emphasized the management of floating plant litter (a potential removal) during the maintenance of human-controlled wetland ecosystems, and helped us to make the most use of the ecosystem services and to avoid potential disservices of plant litter in constructed wetlands.

Keywords: litter decomposition, wetland plants, constructed wetlands, water quality

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Remote Sensing of Wetlands

Author(s): Guofeng Wu

Affiliation(s): Key Laboratory for Geo-Environmental Monitoring of Coastal Zone (GEMCO) of the National Administration of Surveying, Mapping and GeoInformation, Shenzhen University

Country: China

Contact: guofeng.wu@szu.edu.cn

Human demands on wetlands for agriculture, aquaculture and development are accelerating especially in developing countries. Climate change impacts will further exacerbate wetland alteration and loss. Given the environmental and ecological services that natural wetlands provide, it is necessary to manage sustainably wetlands at regional and global scales. In order to effectively manage wetlands, their distribution, area, quality, diversity and dynamics must be known.

Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to on-site observation. During the several decades, remote sensing techniques have been used in many wetland research fields, such as: wetland distribution, wetland type classification, wetland vegetation distribution, biophysical parameters and their dynamics, water quality and invasive wetland plants.

This presentation will give some general introduction and applications of remote sensing techniques on wetlands, including: (1) platforms and sensors, (2) highlights of important applications, and (3) future developments and challenges.

Keywords: vegetation classification, bio-chemical parameters, water quality inversion，topography under water

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Comparison and assessment of NDVI time series for seasonal wetland classification

Author(s): Panpan Xu, Zhenguo Niu
Affiliation(s): Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences
Country: China
Contact: radi_panxu@163.com

Satellite-based wetland mapping faces challenges due to the high spatial heterogeneity and dynamic characteristics of seasonal wetlands. Although normalized difference vegetation index (NDVI) time series (NTS) shows great potential in land cover mapping and crop classification, the effectiveness of various NTS with different spatial and temporal resolution has not been evaluated for seasonal wetland classification. To address this issue, we conducted comparisons of those NTS, including the moderate-resolution imaging spectroradiometer (MODIS) NTS with 500 m resolution, NTS fused with MODIS and Landsat data

(MOD_LC8-NTS), and HJ-1 NDVI compositions (HJ-1-NTS) with finer resolution, for wetland classification of Poyang Lake. Results showed the following: (1) the NTS with finer resolution was more effective in the classification of seasonal wetlands than that of the MODIS NTS with 500 m resolution; and (2) generally, the HJ-1-NTS performed better than that of the fused NTS, with an overall accuracy of 88.12% for HJ-1-NTS and 83.09% for the MOD_LC8-NTS. Future work should focus on the construction of satellite image time series oriented to highly dynamic characteristics of seasonal wetland. This study will provide useful guidance for seasonal wetland classification, and benefit the improvements of spatiotemporal fusion models.

Keywords: NDVI time series, seasonal wetland, Poyang Lake, satellite image time series

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Phytoremediation of saline wastewater by constructed wetlands

Author(s): Hui Zhu

Affiliation(s): Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences

Country: China

Contact: zhuhui@iga.ac.cn

The objectives of this study were to 1) evaluate the potential use of constructed wetlands (CWs) for removing nitrogen, phosphorous, heavy metals (Cu, Zn, Cd, Cr, and Pb) and sulfamethoxazole from wastewater with different salinity levels; 2) clarify the impacts of different factors on the performance of CWs; and 3) optimize the operation parameters for obtaining an intensified performance of CWs. A series of CWs mesocosms differing in specific designs were set up to test synthetic wastewaters. The results were

as follows: 1) CWs planted with Canna (Canna indica L.) outperformed the CWs planted with other tested plant species in the removal of nitrogen and sulfamethoxazole. There were no significant differences among plant species in the removal of phosphorous and heavy metals. 2) The removal of nitrogen and sulfamethoxazole was significantly ($P < 0.05$) inhibited when the EC value in the wastewater was increased to 30 mS/cm. The change of salinity levels didn't show significant influence on both the removal of phosphorous or most of the heavy metals, except for Cd. 3) The removal efficiencies of CWs to some of the target contaminants were decreased when multiple contaminants co-existed, compared to an individual contaminant. 4) The different structures of CWs lead to different removal efficiencies of each respective contaminant. In conclusion, CWs showed very promising removal efficiencies of nutrient, heavy metals and sulfamethoxazole from the saline wastewater, especially when the EC value of the wastewater was below 15 mS/cm. CWs were demonstrated to be a good alternative strategy for treating saline wastewater containing high levels of these contaminants.

Keywords: constructed wetlands, nutrients, heavy metals, antibiotics, salinity

ESP 9
WORLD CONFERENCE
Shenzhen, China 11-15 Dec 2017
Ecosystem Services for Eco-civilization
Restoring connections between people & landscapes through nature-based solutions

Type of submission: *Abstract*

B. Biome Working Group sessions: B2a Evaluation, maintenance and promotion of wetland ecosystem functions and services

Adapting endangered oriental white storks to climate change in Northeast China

Author(s): Haifeng Zheng

Affiliation(s): Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences

Country: China

Contact: zhenghaifeng@iga.ac.cn

Climate change can lead to habitat loss and degradation, and consequently endangers species in a specific region. Besides addressing the priority areas of species distribution, an urgent consideration is to identify suitable conservation options and map areas according to their effectiveness when planning to conserve a rare species under climate change. Here, we conducted a study to develop potential conservation strategies and assess their effectiveness under different climate scenarios in Sanjiang ("Three rivers" in English) Plain (Amur, Ussuri and the

Songhua Rivers) of Northeast China. We used the species distribution software MaxEnt to model current and future habitat distributions of endangered oriental white storks (Ciconia boyciana). Based on field surveys, experts' knowledge and literature findings, we developed the methods to identify conservation strategies. By including additional species presence sites derived from conservation strategies (a presumption of the further analyses) into MaxEnt, we predicted the future habitat distribution under the implementation of different conservation strategies. To estimate the effect of conservation strategies, we compared the differences in the extent of suitable habitat with and without conservation strategies under two different predicted climate change scenarios. The results showed that the suitable habitat of the oriental white stork in the study region dramatically declined by over 80% in the absence of conservation strategies under both scenarios. Predicted suitable habitats with conservation strategies had broader distribution ranges than those without. The strategy of reclaiming cropland back to wetland offers the most impressive effectiveness with a tenfold increase in suitable habitat, followed by the strategy of establishment of

nature reserves with six fold and the strategy of artificial bird nest with two fold increase. Our approaches emphasize the effect of integration of knowledge of experts in conjunction with MaxEnt when mapping and assessing the effect of the conservation strategies.

Keywords: Endangered species, Artificial bird nest, Habitat distribution, Establishment of nature reserve, Maximum entropy (MaxEnt), Reclaiming cropland back to wetland