

PROCEEDINGS OF THE SYMPOSIUM

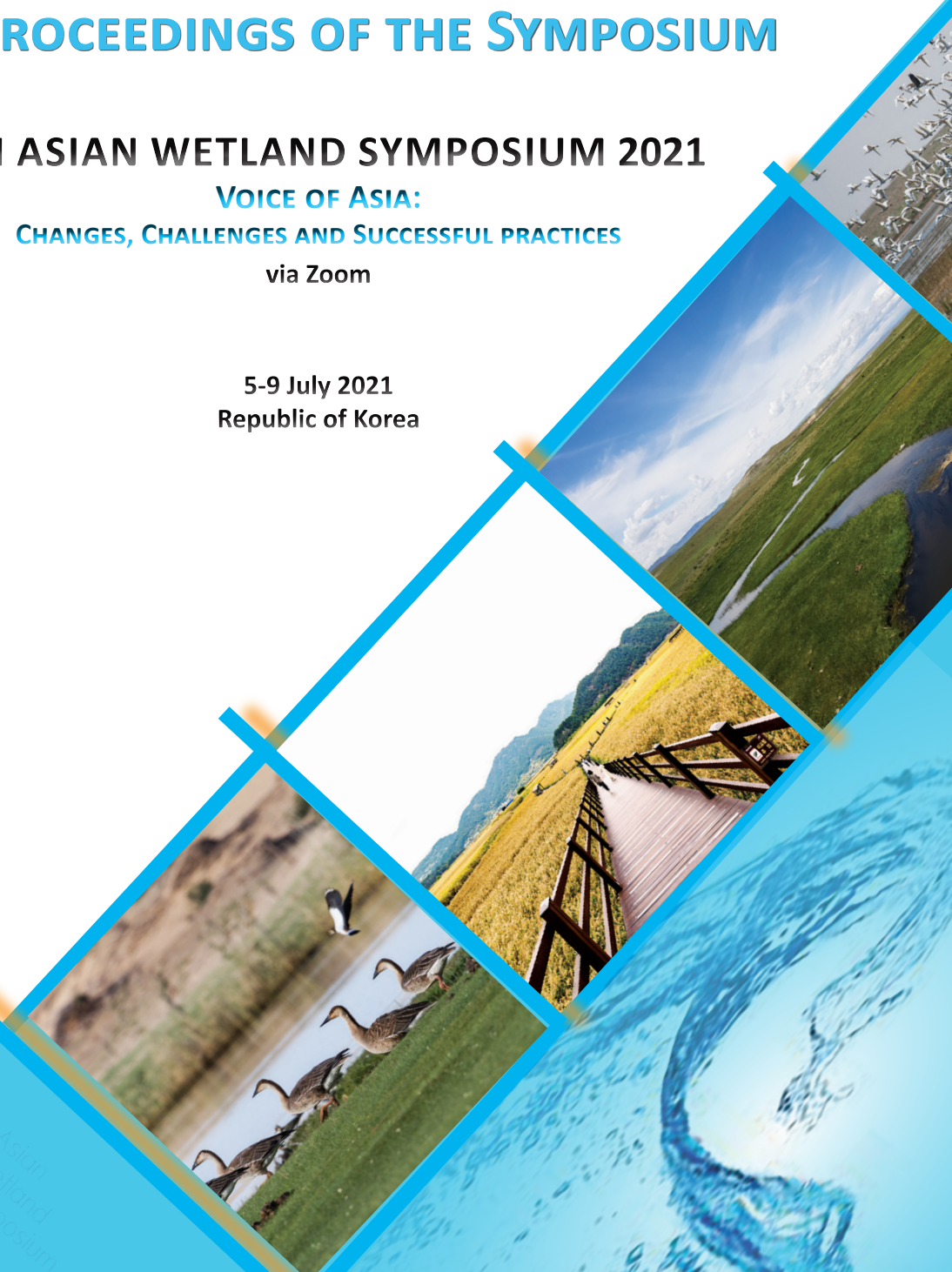
9TH ASIAN WETLAND SYMPOSIUM 2021

VOICE OF ASIA:

CHANGES, CHALLENGES AND SUCCESSFUL PRACTICES

via Zoom

5-9 July 2021
Republic of Korea





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RRC-EA
Ramsar Regional Center East Asia



Wetlands
INTERNATIONAL



9TH ASIAN WETLAND SYMPOSIUM

VOICE OF ASIA: CHANGES, CHALLENGES AND SUCCESSFUL PRACTICES

5-9 July 2021

Organizers:

Ramsar Regional Center-East Asia
Suncheon City Government
Ramsar Center Japan
Wetlands International-Japan
Japan Wetland Society



ASIAN WETLAND SYMPOSIUM 2021

VOICE OF ASIA: CHANGES, CHALLENGES AND SUCCESSFUL PRACTICES

5-9 July 2021

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460 Ocheon-dong, Suncheon City,
Jeollanam-do, Rep. of Korea
Tel: +82-61-746-1160~4

Contents

About the Asian Wetland Symposium5

Program of the Symposium6

Abstracts

Keynote presentations 11

Oral presentations 16

Poster presentations 44



About the Asian Wetland Symposium

The Asian Wetland Symposium (AWS) is a ‘regional forum for all’ that provides opportunities to diverse target groups to share and learn mutual knowledge, wisdom and practical experience on the conservation, wise use and sustainable management of wetlands in Asia. It brings together a wide range of wetland stakeholders such as policymakers, managers, practitioners, donors, promoters, academicians, researchers and students from both the government and non-government sectors.

The last AWS, held in Japan in November 2017, marked the 25th anniversary of the regional forum. It underscores the long history of wetland advocates that openly discuss recent developments on wetland conservation and wise use in Asia. AWS 2017 reviewed the achievements and milestones for the past quarter century and also collectively shared the vision on wetlands in Asia for the next 25 years.

On 5-9 July 2021, the Ramsar Regional Center – East Asia (RRC-EA) supported the AWS tradition by co-organizing the 9th Asian Wetland Symposium (AWS9) with theme “Voice of Asia: Changes, challenges, and successful practices” in collaboration with Ramsar Center Japan, Wetlands International Japan, Japan Wetland Society and other important partners.

AWS9 aimed to promote mainstreaming of wetland conservation and wise use across all sectors of the society as a contribution to the implementation of the Ramsar Strategic Plan 2016-2024 and achievement of the Sustainable Development Goals (SDGs). Specifically, the symposium was able to:

- share skills, traditional knowledge, techniques and methods, good practices and lessons learned from the conservation and wise use of wetlands in Asia;
- compile strategies and approaches for realizing wise use of Ramsar Sites and other wetlands;
- expand networks among Ramsar Site and wetland managers and stakeholders in Asia;
- strengthen international cooperation and partnership on wetland conservation in the region;
- contribute to Ramsar COP14, particularly in support of the implementation of the Ramsar Strategic Plan 2016-2024 and CEPA Programme 2016-2024, by reporting good practices of wise use of wetlands in Asia; and
- enhance involvement of the next generation in conservation and wise use of wetlands.

The symposium focused on the following topics related to continuing and emerging threats and issues, practical approaches, and cooperation and collaboration:

No.	Topic	Description
1.	Impacts of COVID-19 on wetlands	observations, experiences and perspectives of wetland practitioners on the positive and negative effects of the COVID-19 pandemic on wetlands
2.	Nature-based Solutions (NbS) and ecosystem-based approaches to disaster risk reduction (Eco-DRR)	recent developments in NbS and Eco-DRR in Asia
3.	Wetland management, conservation and restoration	good management practices with specific focus on new technologies and techniques in wetland conservation and restoration
4.	Wise use of wetlands	innovative approaches and good practices on the wise use of wetlands including successful ecotourism models
5.	Wetland education, nature and art	wetlands in formal school curriculum and communicating wetlands through art
6.	Urban and rural wetlands	nationally important wetlands in urban and rural environments with potential for Ramsar Site designation
7.	Multi-stakeholder participation and citizen science	diverse groups of wetland stakeholders (local communities, business sector) involved in wetland management including the use of citizen science
8.	Regional policy issues	policy support provided by Ramsar Regional Initiatives to address wetland issues in the region, specifically in transboundary wetlands such as Bay of Bengal, Mekong River and Yellow/West Sea

Program of the Symposium

Oral presentations

Day 1 (5 July 2021)	AWS ZOOM Main Room	AWS ZOOM Room A
16:00-16:20	Opening program Welcome messages Prof. Shimpei Iwasaki President, Ramsar Center Japan Mr. Yoo Beom-Sik Senior Advisor for Asia and Oceania, Ramsar Convention Secretariat Mr. Suh Seung Oh Executive Director, Ramsar Regional Center–East Asia	
16:20-16:45	Keynote presentation Mr. Takuma Satoh AWS Youth Session Youth for wetlands: key messages from the AWS Youth Session	
16:45-17:00	Break Video presentation about Suncheon Bay in Suncheon City, Republic of Korea	
Parallel Sessions	Session 1: Impacts of COVID-19 on wetlands Chair: Dr. Bishnu Bhandari (Nepal Wetlands Society) and Dr. Sanowar Hossain (Bangladesh POUSH)	Session 2: Nature-based Solutions (NbS) and ecosystem-based approaches to disaster risk reduction (Eco-DRR) Chair: Ms. Kathryn Bimson (IUCN Asia Regional Office)
17:00-17:10	Introduction / Chair	Introduction / Chair
17:10-17:30	Ji Yoon Kim Revealing COVID-19 induced changes of visitor pattern in conservation areas using mobile network data	Emiko Nagakura Role and function of wetlands for climate change adaptation and disaster risk reduction in Asia
17:30-17:50	Rajashree Naik Assessment of India's largest inland saline lake integrating GEE platform with public response during the time frame of COVID-19 pandemic	Nyoman Suryadiputra Application of NbS and Eco-DRR in peatland area
17:50-18:10	Sanowar Hossain Impact of COVID 19 pandemic on fish and fishers of Haor Basin in Bangladesh	Shakila Kayum Role of Pandanus Trees as a means of Eco-DRR in Saint Martin's Island, Bangladesh
18:10-18:30	Tapas Ranjan Chakraborty Impact of COVID 19 pandemic on wetland culture of Bangladesh	Wrap-up (10 minutes, 18:10-18:20)
18:30-18:50	Yuki Arai Impacts of the COVID-19 pandemic on small-scale fishing communities of Thailand and Bangladesh -Recommendations for enhancing resilience	
18:50-19:00	Wrap-up	

Day 2 (6 July 2021)	AWS ZOOM Main Room	AWS ZOOM Room A
Parallel Sessions	Session 3-I: Wetland management, conservation and restoration Chair: Mr. Yamme Leung (WWF HongKong)	Session 3-II: Wetland management, conservation and restoration Chair: Dr. Gea-Jae Joo (Pusan National University)
16:00-16:10	Introduction / Chair	Introduction / Chair
16:10-16:30	Aaron Julius Lecciones Creative approaches in ecological waste management in a circular economy model for wetlands conservation	Ajit Pattnaik Can effective communication of scientific evidence to depict the ecosystem services effectively resolve the conflict between the protected area managers and the dependent wetland communities? Nalabana bird sanctuary; Chilika Lake a wetland of international importance, India; a case study.
16:30-16:50	Amy Lecciones Empowering farming communities for managing agricultural wetlands	Laxmi Kant Sharma Advanced geospatial technology pertinence for inland saline wetlandscape: A case study of Asia's largest saline wetland Sambhar lake
16:50-17:10	Induni Liyanage Introducing environmentally sustainable canal bank restoration method to Kotte Canal, Sri Lanka	Maria Retchie Alaba Restoration of Black Noddy <i>Anous minutus worcesteri</i> population in the Tubbataha Reefs Natural Park, Philippines
17:10-17:20	Break	17:10-17:30 Shailendra Kumar Pokharel Biodiversity resources of Dipang Lake of the Lake Cluster of Pokhara Valley (Ramsar Site No. 2257), Nepal Reports two species of Dragonfly New to Nepal
17:20-17:40	Xiaojing Gan First use of Imazapyr herbicide to control invasive <i>Spartina alterniflora</i> in the migratory bird sanctuaries along the Coast of China	Wrap-up (17:30-17:40, 10 minutes)
17:40-18:00	Johnson Chung Fishpond conservation scheme in Mai Po Inner Deep Bay Ramsar Site	
18:00-18:20	Kamal Thapa Governance and management of Jagadishpur Reservoir Ramsar Site, Nepal	
18:20-18:30	Wrap-up	

Day 3 (7 July 2021)	AWS ZOOM Main Room	AWS ZOOM Room A
16:00-16:20	Keynote presentation Mr. Jay Lee Executive Director, National Geographic Society-Asia	
Parallel Sessions	Session 4: Wise use of wetlands Chair: Dr. Sansanee Choowaew (Mahidol University)	Session 5: Wetland education, nature and art Chair: Dr. Gombobaatar Sundev (National University of Mongolia) and Mr. Chris Rostron (Wildfowl & Wetlands Trust)
16:20-16:30	Introduction / Chair	Introduction / Chair
16:30-16:50	James McGill Promotion of wise use of Japanese Ramsar Sites by supporting wildlife tourism People, Wetlands Wildlife (PWW) wildlife tourism promotion project	Kate Gorringer-Smith The wonder of wetlands: using art to engage, educate and inspire
16:50-17:10	Pheak Sok Human use of small wetland natural resources in Kulen Promtep Wildlife Sanctuary, Cambodia	Mariko Abe Visualizing the value of the coastal lives by the treasure hunting events in the east coast of Nago City, Okinawa, Japan
17:10-17:30	Ritesh Kumar Wetlands wise use: reframing for multiple worldviews	Sifan Hu Understanding the integration of the environmental education into school curriculum
17:30-17:50	Shimpei Iwasaki Swimming Crab fishery management through crab bank: lessons learned from Japan and Thailand	Taketo Kitamoto Wetland environmental education program "KOUNOTORI KODOMO Meeting" using an online conference system
17:50-18:00	Wrap-up	Wrap-up

Day 4 (8 July 2021)	AWS ZOOM Main Room	AWS ZOOM Room A
16:00-16:20	Keynote presentation	
	Dr. Chen Kelin Director, International Wetlands & River Beijing Wetlands education for teenagers - China Wetland School Network	
Parallel Sessions	Session 7 Multi-stakeholder participation and citizen science Chair: Mr. Yoshihiro Natori and Ms Emiko Nagakura (Wetlands International – Japan)	Session 8 Regional policy issues Chair: Amb. Amado Tolentino, Jr. (Asia-Pacific Center for Environmental Law)
16:20-16:30	Introduction / Chair	Introduction / Chair
16:30-16:50	Ivy Amor F. Lambio Engaging communities through Wetlands BioBlitz: a citizen-science activity	Ridhi Saluja A Trend Index for Indian wetlands
16:50-17:10	Hideki Sato Report on the urban biodiversity conservation project by the participatory approach of civil society in Khulna city of Bangladesh	Ritesh Kumar Wise use of wetlands in South Asia through regional collaboration
17:10-17:30	Rowena P. Varela Multi-stakeholder participation in managing the Pagatpatan Wetland Learning Center in Butuan City, Philippines	Wrap-up
17:30-17:40	Wrap-up	
17:40-18:00	Closing ceremony	

Day 5 (9 July 2021)	AWS ZOOM Main Room
16:00-17:00	AWS Networking

Poster presentations

Session	Poster presentations
Session 3-I: Wetland management, conservation and restoration	Aaron Julius Lecciones Application of Rapid Assessment of Wetland Ecosystem Services in Las Piñas Parañaque Wetland Park (Philippines) Atsushi Tanabe Selection of estuaries for waterbird habitat conservation through complementarity analysis on class A river in Japan Ayano Yamanaka Biota of the Kuro river retarding basins in the Aso region in Japan
Session 3-II: Wetland management, conservation and restoration	Eiji Sawada How can economics model regional wetland conservation? Systematization and application of regional structure in the economics of migrating species conservation Hye-Ji Oh Creating alternative habitats from a wetland ecosystems perspective: focused on the ecological niche space of endangered frog species Ran-Young Im Seed transport pattern during the typhoon-induced flood in channelized and restored urban streams
Session 4: Wise use of wetlands	Chik Maslinda Omar Assessing local community interaction with wetlands resources and ecosystem services in Setiu Wetlands, Terengganu, Malaysia
Session 7: Multi-stakeholder participation and citizen science	Fumihiro Koyama The launch of on-line information sharing platform about wetlands in Tokyo Bay Jin Tanaka Trends in national and international youth participation discussions on environmental issues Shiina Suzuki Introduction to Japan Wetland Society and some recent activities

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**ABSTRACTS OF
KEYNOTE PRESENTATIONS**

YOUTH FOR WETLANDS: KEY MESSAGES FROM THE AWS YOUTH SESSION

Takuma Satoh

Youth Ramsar Japan

This presentation conveys the results of the AWS Youth Session held on 5 July 2021. The theme of the session is “Youth action for future wetlands based on past and current wetland situation”. The youth can connect generations from the past and the future. Classifying the age groups: adults are referred to the past, the youth for the present, and children for the future. Moving forward with wetland conservation work, it is important to learn from the past, look at the current situation, and apply these learnings and observations in the future.

Acknowledging changes in wetlands through generations is hinged on the 50th anniversary of the Ramsar Convention. In 2021, it will be 50 years since the Ramsar Convention entered into force. The vital role of the youth is recognized in the Saga Statement, which lays down expectations for the “Youth leadership to enable the AWS to continue its vital contribution to effective wetlands management”.

More than 40 youth representatives participated in the session. The session was conducted in two parts. The first part featured eight presentations from five countries (Cambodia, China, Republic of Korea, Philippines and Sri Lanka) anchored on the sub-theme “Sharing past and current wetlands”. Presenters compared the appearance and condition of wetlands 50 years ago with current wetlands. It was observed that there were many changes in wetlands after five decades; in particular, size of a number of wetlands decreased due to development activities and traditional practices of communities have also been affected.

The second part facilitated an open forum for participants and discussed “How to create a connection where passionate youth can share their knowledge and experience”. To provide further guidance for the session, a survey was carried out days before the event. The survey raised a guiding question “What do you think is necessary for the youth to take leadership in wetlands?” and asked to prioritize 12 factors that relate to the guiding question: network, platforms, budget, influence person, passion, knowledge, ideas for activities, support from professionals, business skills, creative skills, experience on wetlands, and companionship. The organizers received 21 responses from six countries of which the top five needs identified are knowledge, influence person, support from professionals, ideas for activities, and passion.

The discussion also allowed participants to express their ideas about “How youth wetland groups can effectively share wetland conservation ideas”. Suggestions include:

- Ramsar for kids, forest school, wetlands school, classroom in a river – Alternative School for Wetlands where they can learn a lot
- field exposure where the youth can have first-hand experience about wetlands to be able to effectively engage more and teach them knowledge on wetlands
- seminar or symposium like AWS is really a helpful and effective platform to share knowledge and experience
- make use of personal hobbies to contribute to environmental conservation activities and to help in raising awareness about wetlands. For example, photography, videography, and biking can be useful in educating other people and to have a first-hand experience on wetlands.
- virtual activities and platforms, such as social media or activity in an online setting
- holding a photo contest using old photographs like this session, many people of all ages can be involved.

In conclusion, the voice of the youth must emphasize that it is important to not only connect to the same generation, but to also to connect the knowledge and experiences of the adult generation to the next generation.

THE NATIONAL GEOGRAPHIC SOCIETY-ASIA

Jay Lee

National Geographic Society-Asia

National Geographic Society - Asia (NGS-Asia) joined the Asian Wetland Symposium held in Japan in 2017. During that time, I had the opportunity to meet and interact with a number of wetland experts, managers and stakeholders that, subsequently, led to organizing capacity building and citizen science events, as well as to engaging explorers. Following this, NGS-Asia intends to continue working with wetland conservation networks of the Ramsar Regional Center – East Asia (RRC-EA), which are in our respective communities across Asia.

Most people are aware that National Geographic is a storytelling media outlet where 750 million people watch National Geographic television channels, 12 million people read the magazines in 45 languages in 171 countries with about 300 million followers or subscribers in social media. The National Geographic Society (NGS) was founded in 1888 in Washington DC, USA as an impact-driven global non-profit organization that engages in grant-making, teaching and empowering people, and sharing the stories for the conservation and protection of the planet. For over 130 years, we have provided 15,255 grants with funding of USD 264 million to recipients across the globe. Grants support research and conservation projects to continue the work of the explorers.

We invest in people, not in systems or organizations, because they play a key role in influencing and making change. We call the grant recipients as explorers who are scientists, educators, conservationists, technologists and storytellers. There are about 5,000 explorers in Asia. Over the past six years, NGS-Asia has increased the number of grants for the region through funding Asian explorers in the field as well as engaging with the community for capacity building, gatherings and meet-ups across Asia.

We recognize diversity, equity and inclusion in our work; thus, we provide support regardless of where the explorers live, their gender or age. By funding such bright minds and the next generation, we identify and elevate such talents who discover and protect the wonders of our world. We pursue a goal, “30 percent of the planet is protected by 2030, in order for the unique planet to sustainably be the engine of our ecosystems”, including oceans, mountains, rainforests and wetlands which are considered as biodiversity hotspots where a diverse number of species and creatures live harmoniously together.

Amidst the global pandemic since early 2020, NGS has immediately created the COVID-19 emergency fund for explorers, educators, and journalists in order to ensure they continue to carry on with their endeavors. As of the second quarter of 2021, we have received over 1,000 applications, of which about 15% are from Asia, and funded nearly 500 projects in the world. Particularly, we invest more in technology to overcome the limitations of the fieldwork hindered by the social distancing and travel restrictions due to the pandemic. Data-driven conservation on mapping out biodiversity, wildlife tracking, carbon and plastic pollution, etc., using the latest high resolution satellite imagery analysis can monitor the changes with great accuracy and visualization so that people in the field can better act for impact. Thus, I strongly recommend the wetland community to invest in technology and data.

Lastly, NGS's new strategic plan for the next five years is called, "National Geographic Next". One of the key messages of NG Next is "Fewer, Bigger, Better" that identifies areas where we can provide support for impact. Along with the strategy for Asia, we just launched the "NGS Jeju Hub" in Jeju Island, South Korea, to prepare post-COVID-19 for upcoming collaboration and convening with programmatic partners in Asia.

WETLANDS EDUCATION FOR TEENAGERS: CHINA WETLAND SCHOOL NETWORK

Chen Kelin

International Wetlands & River Beijing

The work on the wetland school network started years ago with the event “Asian Wetlands Week (AWW)” initiated by Ramsar Center Japan (RCJ). From 2002-2004, AWW was celebrated with the theme “Children and Wetlands” as organized jointly by RCJ, International Wetlands and River Beijing or IWRB (formerly Wetlands International – China), and Wetlands Korea, and supported financially by the Japan Fund for Global Environment (JFGE). During the 3rd AWW held in December 2004 in Dafeng, Jiangsu Province, China, Dafeng No. 4 Middle School was designated as “Wetland Experimental School” by the IWRB- the first Wetland School in China.

From 2005 to 2015, projects were organized by RCJ, Wetlands Korea, IWRB and Wetlands International – Japan supported by the JFGE. During this period, more schools have been designated as Wetland Schools and joined the Wetland School Network. From 2005 to 2007, the “China, Japan, Korea Wetland School Programme” was also implemented. Another project “Wetland School Network Programme Popularized in Asian Countries along the East Asian-Australasian Waterbird Flyway” was implemented in 2008-2010.

Wetland Experimental Schools or Wetland Schools are named during the celebrations of AWW, Wetland School Exchange events and other important events. Some Wetland Experimental Schools or Wetland Schools include:

- Zhalong Middle School, China (2005)
- Lanzhou Shuichayuan Primary School, China (2006)
- Jiangxi Nanchang Normal University Affiliation Primary School, China (2007)
- Zhanjiang No. 1 Middle School, Zhanjiang No. 20 Middle School, Tianjiabing Middle School, Potou No. 1 Middle School, and Jinshawan School in China (2008)
- Wuhan Huazhongli Primary School and Honghu No. 1 Primary School in China (2009)
- Ammartpanichnukul School, Thailand (2009)
- Dafeng Senior Middle School and Dafeng No. 6 Primary School in China (2010)
- Liaoning Panjin Liaohe Oilfield Xinglongtai No. 1 Primary School, China (2011)
- Primary school affiliated to Wuxi Normal University, China (2013)
- Shenzhen Mingde School, China (2014)
- Fujian Quanzhou Huian No. 5 Middle School, China (2015)
- Qingdao Shuyuanlu Primary School, China (2016)
- Anqing Shuangliansi Primary School, Hangzhou Liuxia Primary School, and Wuhan Qingfenlu Primary School in China (2016)
- 7 primary and middle schools from 6 cities or counties in 4 provinces or autonomous regions during the Wetland School Network Exchange Annual Meeting held in Anqing, Anhui, China (2017)
- 18 primary and middle schools from 10 cities or counties in 8 provinces or autonomous regions during the Wetland School Network Exchange Annual Meeting held in Hangzhou, Zhejiang, China (2018)
- 26 primary and middle schools during the Wetland School Network Exchange Annual Meeting held in Haikou, Hainan, China (2019)
- Gansu Zhangye Heihe Wetland National Nature Reserve (2020).

Other related activities were also organized in different venues in China and neighboring

countries in support of the Wetland School Network. These include the establishment of the Wetland School Network Coordination Committee in Dafeng, China in 2010; and the Wetland School Network Exchange events and meetings held in Sandakan, Sabah, Malaysia (2011), Ninxia Wuzhong, China (2012), Shenzhen, Guangdong, China (2014), and Qingdao, Shandong, China (2016). Children read a letter during the opening ceremony of the Asian Wetland Symposium held in Wuxi, China in 2011.

A “Wetland School Ten Years Celebration Event” was held in Wuxi, China in December 2013. In July 2016, the East Asia Youth Meeting for Wetland Conservation was held in Ansan, Republic of Korea. Teachers and students from Wetland Schools attended this event. In August 2020, a Nature Education Tutor Training Course was organized in Zhanjiang, Guangdong, China. More than 60 teachers from Wetland Schools in Zhanjiang participated in the training.

After nearly three years of efforts, “A Guide for Building Wetland Schools” was published in October 2019. This publication covers the Wetland School concept, steps in establishing a Wetland School, teaching methods, curriculum development, education strategy, evaluation, and other relevant topics. The essentials in wetland school naming are as follows:

1. The school must be willing to be active in wetland education activities.
2. A letter of support should be issued by the education authority of the concerned local government.
3. A letter of support should be endorsed by the nature conservation authority such as nature reserve or wetland park.

By the end of June 2021, 106 Wetland Schools have been established, covering 35 cities in 18 provinces. To further strengthen the network, a five-year development strategy for the Wetland School Network is being developed and will be released during its annual meeting to be held in 2021 in Dongying City, Shangdong Province, China. The strategy outlines the direction of wetland schools in eight areas: (1) promoting wetland ecological conservation awareness among teenagers and the general public in China; (2) cultivating their understanding of wetlands; (3) developing their skills to solve wetland problems; (4) establishing the ecological values of wetland conservation; (5) strategic positioning; (6) popularizing wetland knowledge; (7) priority for education resources; and (8) stimulating the interest of students.

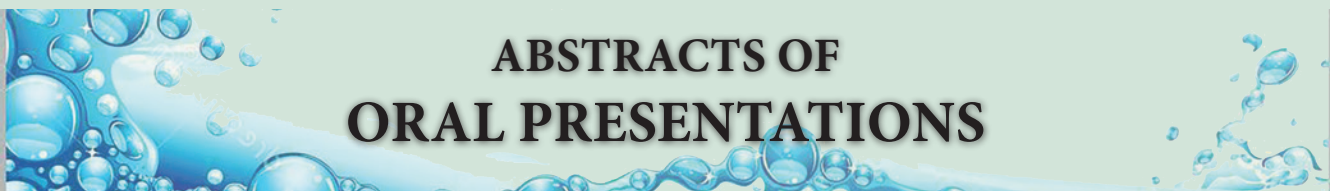
The initial plan is to designate 10 Wetland Schools each year and 50 Wetland Schools in five years from 2021 to 2025. It will be divided into three levels: kindergarten, primary school and middle school. Wetland education will be applied according to the different levels of schools.

In conclusion, a Wetland School does not adopt a one-size-fits-all model nor impose a fixed structure; rather, each Wetland School is encouraged to be dynamic and innovative, and to develop a variety of models according to their unique characteristics.

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ABSTRACTS OF ORAL PRESENTATIONS

REVEALING COVID-19 INDUCED CHANGES OF VISITOR PATTERN IN CONSERVATION AREAS USING MOBILE NETWORK DATA

Ji Yoon Kim^{*,+}, Jun Nishihiro^{**}, Takahiro Kubo^{***}

^{*}Center for Climate Change Adaptation, National Institute for Environmental Studies, Japan • tapegrass.kim@gmail.com

^{**}Center for Climate Change Adaptation, National Institute for Environmental Studies, Japan • nishihiro.jun@nies.go.jp

^{***}School of Anthropology and Conservation, University of Kent, United Kingdom • t.kubo-406@kent.ac.uk

⁺Corresponding author: tapegrass.kim@gmail.com

Prolonged pandemic caused by the global spread of COVID-19 resulted massive economic and health impacts on the broad aspect of our society. Visitation patterns in conservation sites are an essential indicator to plan effective public awareness and participatory management programs. Thus, timely understanding of visitation patterns in changing environments is one of the priority issues to enhance the adaptive capacity of management policies. The rapid development of spatial mobility technology with mobile networks provided a broad insight into human mobility in conservation science. Using mobile network data and attribute information of visitors, we analyzed how visitor patterns in conservation areas were affected during the COVID-19 pandemic. We focused on the visitor characteristics in 98 visitor centers of national parks or Ramsar sites in Japan. The number of monthly unique visitors in each site was aggregated based on their age, gender and travel distance estimated from the user-specified home location. The relative impact of the COVID-19 pandemic on the visitor pattern was estimated by comparing the monthly pattern of visitors in 2019 (pre COVID-19) and 2020 (during COVID-19). Visitor centers were categorized by size of the conservation area and distance from the urban center. Correlative relationship between visit characteristics and attributes of conservation area near visitor centers was also analyzed. The total number of visitors was positively related to the size of the conservation area. And a larger conservation area attracted more people traveling from a remote distance. The relative number of visitors in the conservation area after the COVID pandemic was decreased by $27.7 \pm 3.5\%$ (range: -69.7, 153.8%) compared to the pre-COVID period. Travel distance decreased by $26.0 \pm 2.6\%$ (-79.9, 133.2%). The relative visitor loss tends to increase in places populated with a higher number of visitors in the pre-COVID period. Remote sites showed a higher level of decrease in visitor number and travel distance during the COVID period. Moreover, smaller conservation sites located in the peri-urban range tend to be less impacted by pandemic decrease compared to other sites in different distance ranges. Our findings partly support the idea that the scale diversity of conservation areas along the urban gradient can be an important configuration to maintain aesthetic and recreational services during the prolonged periods under the COVID.

ASSESSMENT OF INDIA'S LARGEST INLAND SALINE LAKE INTEGRATING GEE PLATFORM WITH PUBLIC RESPONSE DURING THE TIME FRAME OF COVID-19 PANDEMIC

Rajashree Naik^{*}, Laxmi Kant Sharma^{*,+}

^{*}Department of Environmental Science, School of Earth Sciences, Central University of Rajasthan, India

⁺Corresponding author: Laxmikant_evs@curaj.ac.in

Inland saline lakes are unique in nature but highly ignored compared to their freshwater counterparts. These lakes occupy 0.008% of Earth's total water volume which is slightly less than their freshwater counter parts occupying 0.009%. They are also considered as blue lifelines of arid and semi-arid regions. India has world's 10th largest desert holding four major inland saline

lakes out of which Sambhar Salt Lake is the only Ramsar and IBA Site, where the current study is conducted. The prime objective was to compare the status of saline soil and algal community of the lake and check the people's perspective towards the lake. It is India's 7th declared Ramsar Site and an IBA site contributing 9.8% in Indian salt business. However, currently it is undergoing partial desiccation due to illegal salt pan encroachment worth 300 billion dollars. The study is conducted in COVID-19 lockdown time frame of 2019 (pre -COVID lock down), 2020 (COVID lock down) and 2021 (post COVID lock down) using the advanced cloud computational technology Google Earth Engine and a questionnaire using both google form and in person interview. Landsat satellite images were cloud mosaiced, Soil Salinity index and Surface Algal Bloom Index were calculated, and the final generated spatial results were download and map composed in Arc GIS software. The satellite result state that algal value ranges from -0.432 to 0.555 in 2019, 0.136 to 0.696 in 202 and 0.020 to 1.094 in 2021. The values of salinity index state -0.076 to 0.740 in 2019, -0.459 to 0.20 in 2020 and 0.012 to 0.261 in 2021. From interview, total 450 responses were collected. The results stated that 75% population is not working in salt industry and 25% working for salt industry have been experiencing decreasing trend since last 5 years. 58.1% of overall respondents stated the reason to be increasing competition, illegal saltpan encroachment, extensive ground water mining and lack of government help. To find the alternatives, 45.5% chose eco-tourism, 28.3% solar production, 18.2% adventurous activities and 8.1% film shooting. The satellite results clearly state that during lockdown the lake was reviving without any external effort. However, after unlock it again started to degrade showing dubious state of its existence due to construction of different permanent and temporary hydraulic structures. If the current situation of the lake prevails, India will be losing the sources of many chemical and biological resources worth billion dollars. The final part of the paper suggests some restoration strategies, so this lake be restored in the light of UN Decade of Ecosystem Restoration.

IMPACT OF COVID 19 PANDEMIC ON FISH AND FISHERS OF HAOR BASIN IN BANGLADESH

Sanowar Hossain

POUSH, Bangladesh • sanowarpoush@gmail.com

Sixty percent of the area of Bangladesh is wetlands. Around 80% of the people of the county is dependent on natural resources for their life and livelihoods. The first incident of COVID 19 was reported in the February 2021 in the Bangladesh. From March 2020 to March 2021, the country had more than five months of lockdown. The lockdown resulted comparatively undisturbed environment for the environment. The population and diversity of natural flora and fauna have been increased. According to the fishermen of Haor basin the catch number of fish in January 2021 was 1.5 times comparing with winter of last years. Not only the fisheries diversity, at least six species of aquatic weeds were reintroduced in the Medir Haor, located in Brahmanbaria district. The restriction on mobility affected the market system. The poor fishermen suffered. The number of ultra-poor among the fishers increased by nearly the double. Even if the access to wetlands by the poor and marginalized made open they can't survive without external supports and a comprehensive recovery plan. The socio-political state of Hoar basin is yet to pro-poor and natural resource friendly. The power structure in the Haor basin is very elite centric. The current paper aims to analyze the socio- political environment of Haor basin on fish and fisheries resources and its consequences on COVID 19. The study was conducted in the village Bholakut under Nasirnagar sub-district of Brahmanbaria district, sixty fishers were consulted in April and May, 2021.

IMPACT OF COVID 19 PANDEMIC ON WETLAND CULTURE OF BANGLADESH

Tapas Ranjan Chakraborty^{*,*} and Anusree Ghosh^{}**

** Senior Programme Manager, BRAC, Bangladesh • biocontapas@yahoo.com*

*** Research Officer, Science Connect, Bangladesh*

Corresponding author: biocontapas@yahoo.com

The life and livelihood of Bangladesh are mostly dependent on the wetland resources. The lifestyle, norms and social aspects of the people of the country are strongly associated with the wetland ecosystems. There was a lockdown of around five months in the country due to COVID-19 pandemic, there were restriction on social gatherings; many cultural events and rituals remain unpracticed or loosely practiced. Such an interference on rituals and festivals has a significant impact on people's lives. A study was conducted with the communities living in the Haor Basin of Brahmanbaria and Moulavibazar Districts. The Medir Haor, Hakaluki Haor and Hail Haor were studied to know the impact of the pandemic on the culture of the Haor people. The study was conducted remotely using mobile phone specifically audio and video calls, 51 individuals were interviewed in the months of April and May 2021. The new year celebration, which is a major gathering of Haor Basin, was not observed in two consecutive years. It was found that the level of mental shock, because of not celebrating the new year, is gradually lessened which is a serious threat to the protection of local cultural practices. There is a risk of non-practicing the cultural events in the future, if such restrictions of gathering are prolonged. Culture is derivative of ecosystem and also it is a driver of conservation and protection of nature. The paper aims to identify the impact of COVID-19 on wetland culture. To revive the norms and practices, additional support and facilitation are essential from the government and all relevant stakeholders. Wetland networks and activists could have attention for the conservation of cultural norms and practices.

IMPACTS OF THE COVID-19 PANDEMIC ON SMALL-SCALE FISHING COMMUNITIES OF THAILAND AND BANGLADESH - RECOMMENDATIONS FOR ENHANCING RESILIENCE

Yuki Arai^{*,*}, Shimpei Iwasaki^{}, Sanowar Hossain^{***}, Asaduzzaman Miah^{***}, Tapan Ghosal^{***}, Tapas Ranjan^{***}, Maneewan Sanlee^{****}, Misato Uehara^{*}**

** Shinshu University, Japan • yukiarai_alberta@yahoo.co.jp*

***Fukuoka Women's University, Japan • shimpei.iwasaki@gmail.com*

**** Bangladesh POUSH, Bangladesh • sanowarpoush@gmail.com*

***** Save Andaman Network Foundation, Thailand • maneewan19822@gmail.com*

**Corresponding author: yukiarai_alberta@yahoo.co.jp*

It is estimated that 200 million small-scale fishers worldwide rely on fisheries resources for their livelihoods. Economically poor fishers' livelihoods and human well-beings are largely sustained by wetland ecosystems, including mangroves, tidal flats, seagrass beds, and coral reefs. Small-scale fishing communities are considered to be one of the most vulnerable peoples in the world, as they are easily affected by exacerbating environmental impacts such as fisheries resource depletion, biodiversity loss, and global climate change. In addition, they are also said to be vulnerable under economic crisis or global market fluctuations. In 2020, the COVID-19 pandemic caused an unprecedented impact on the global market economy. Although a huge impact can be imposed on the small-scale fishing communities, little has been known until now. In order to understand

the actual situation of the vulnerable fishing communities and to consider how we can help them address the impacts under the pandemic, detailed assessment is necessary. In collaboration with the Save Andaman Network Foundation of Thailand and Bangladesh POUSH, we conducted a questionnaire/interview survey to over 400 coastal fishing community members in the two countries. The objective of the survey was to suggest how to strengthen resilience of small-scale fishing communities under the impacts of the COVID-19 pandemic. In order to achieve this goal, surveys were carried out under the following two study questions: 1) What are the impacts of COVID-19 pandemic on the natural, financial, and social capitals of the small-scale fishing communities? 2) How are the small-scale fishing communities trying to address the impacts caused by the COVID-19 pandemic? Based on the survey results, we have found that the majority of coastal fishers have received negative impacts on their natural, financial and social capitals due to the COVID-19 pandemic. A number of local people who engaged in fisheries suffered from a large decrease of fish catch and income, despite the richness of accessible ecosystem services. Survey findings indicate that most fishers had to reduce their fish catch because of largely decreased market demand caused by the stagnating global market economy. In addition, the survey results revealed that the social relationships within their families and among the community members were significantly weakened compared to the situation before the pandemic, due to fear toward virus infection, decrease of income, unemployment, and governmental regulations. While the majority of the fishers in the target villages seemed to have suffered from negative impacts from the pandemic, some people seemed to be able to address such impacts to a certain extent, by coping with the difficult situation through various strategies (e.g. increase self-consumption of fish to reduce expenditure, produce value-added seafood products and sell online, invest in aquaculture or Betel-leaf businesses, sell fisheries products to local community members and local restaurants instead of international markets, etc.). We will present the major findings from the data analysis regarding the impacts of COVID-19 pandemic on small-scale fishing communities in Thailand and Bangladesh. Our presentation will not only focus on the impacts of the pandemic, but also on how the fishers are trying to address the challenges and adapt to the changes. Recommendations will be made based on the survey findings, to suggest how we can strengthen the resilience of the small-scale fishing communities under the rapidly changing environment and economy. Some of our main recommendations include: 1) further promote conservation and restoration of coastal wetland ecosystems; 2) maintain or support development of localized, community-based economies; 3) provide trainings for diversification of livelihoods and production of value-added products.

ROLE AND FUNCTION OF WETLANDS FOR CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION IN ASIA

Emiko Nagakura^{*,+}, Yoshihiro Natori^{*}, Jun Teramura^{}, Yukihiro Shimatani^{***}**

** Wetlands International Japan, Japan*

*** Daiichi Institute of Technology, Japan*

**** Kyushu University, Japan*

+Corresponding author: emiko_nagakura@wi-japan.org

This study will describe case studies of traditional or local Ecosystem-based approaches to disaster risk reduction (Eco-DRR) related to wetlands in Asia. Eco-DRR is recognized as one of the examples of Nature-based Solutions (NbS) to specific societal challenges. As the number of disasters increases globally and the damage has expanded, Eco-DRR draws attention. Due to the impact of climate change, etc., the number of disasters has increased worldwide. Especially, the Asian region is the most affected area in the world regarding the number of disasters, the number of deaths, and the amount of damage. Under these circumstances, wetlands could be a natural buffer against an increasing number of natural disasters. The case studies are collected using a common format that was developed experimentally in our project funded by Keidanren Nature Conservation Fund. They have been collected from Bangladesh, India, Indonesia, Japan, Philippines and Thailand. One of the objectives of this project is to identify the function of wetlands in regard to Eco-DRR. The other is to contribute to the conservation of wetlands and improvement of disaster prevention capacity of areas. A format developed for the case studies consists of background, system of disaster prevention, gifts from nature, traditional or local knowledge and practices, challenges, lessons learnt, associated ecosystems, disaster, ecosystem services, involvement and collaboration of relevant stakeholders, and funding resource. As for the cases gathered at this point and their related disasters, flooding was the most common. In addition, there seems to be a large amount of damage in coastal areas. Traditional knowledge is utilized, however, local knowledge seems to be more applicable to disaster prevention and mitigation. This project will continue to collect case studies, which will be shared on the website, so that countries in the Asian region can learn and apply these cases, where applicable.

APPLICATION OF NBS AND ECO DRR IN PEATLAND AREA

Nyoman Suryadiputra

Yayasan Lahan Basah, Indonesia • nyoman.suryadiputra@gmail.com

Indonesia's peatlands are one of the largest in the tropics (around 13 - 20 million hectares). The problem faced by Indonesia's peatlands is due to the large network of drainage canals (both in oil palm plantations that are managed by private and community). Apart from oil palm, many peatlands have also been cleared for acacia plantations, as raw material for pulp. For every hectare of peatland cleared for plantations, the length of the canals built is around 120 - 700 meters. These canals have drained the peat water into nearby rivers, causing the peat to become dry, microbiologically oxidized, flammable and releasing large amounts of GHG emissions. If the peatland continues to burn, the material / volume of the peat will be reduced, there will

be subsidence and eventually this area will often be inundated and no longer productive. Since 2019, the Lahan Basah Foundation has been rehabilitating the degraded peatland area with the community in Muara Manompas Village, South Tapanuli, North Sumatra. The NbS approach used in this project aims to integrate peatland rewetting (through the construction of dams using areca stems) combined with jelutong, rattan and sago planting (paludiculture) around and with aquaculture in the blocked canals. All of these activities involved 350 community households of the Muara Manompas Village. The provisional results of this activity are promising from the point of view of rewetting peat, harvested fish (catfish) in floating cages placed in blocked canals and the application of paludiculture in the vicinity. In short, this activity is predicted to be able to rewet the peat and prevent GHG emission due to oxidation and / or burning of the peat.

ROLE OF PANDUNUS TREES AS A MEANS OF ECO-DRR IN SAINT MARTIN'S ISLAND, BANGLADESH AGAINST THE NATURAL DISASTERS

Shakila Kayum^{*,*}, Tomoko Minagawa^{}, Yukihiro Shimatani^{***}**

** Department of Civil and Environmental Engineering, Kumamoto University, Japan*

*** Faculty of Advanced Science and Technology, Kumamoto University, Japan • mina-gawa@kumamoto-u.ac.jp*

**** Kyushu University, Japan • shimatani@civil.kyushu-u.ac.jp*

**Corresponding author: 191d9202@st.kumamoto-u.ac.jp*

The nature-based or eco-friendly solution for some hydro-meteorological hazards along the coastal areas must be implemented to reduce the disaster risks and save resources. Saint Martin's island is the only coral reef island and threatened by several natural disasters. There are a natural Pandanus forest which is also in risk due to increasing population and uncontrolled tourism. There are few researches on the topic in Bangladesh and Asia. However, the studies do not quantify the effects of Eco-DRR elements during the disasters. In this study, attempts have been taken to find out the submerged area during surge and showing the effect of surge in presence of Pandanus.

Objectives

1. Prepare the land use and land cover change detection maps
2. Analyze the flood inundation maps.

High resolution satellite images were classified (combined classification) in ERDAS Imagine Software to prepare LULC maps. Next, the DEM and MSL are overlaid and MSL is considered as 0. Then the DEM is classified two range with the storm surge height. After the classification, the flood inundated areas are identified with the surge height. The land use maps and analysis indicated that the number of Pandanus and coconut trees doubled. The inundation maps reveal that without Pandanus trees, the highest surge height of 5.18 m could submerge 68.77% land of the island. With the Pandanus trees, the flooded area reduced to 26.70%. In this study, the land use changes maps shown a positive result of increasing the Pandanus. Finally, proper awareness and good management is required to preserve the existing Pandanus trees.

CREATIVE APPROACHES IN ECOLOGICAL WASTE MANAGEMENT IN A CIRCULAR ECONOMY MODEL FOR WETLANDS CONSERVATION

Aaron Julius M. Lecciones^{*,*}, Kevin Roy B. Serrona^{}, Ma. Catriona E. Devanadera^{***}, Amy M. Lecciones^{****}, Jeongsoo Yu^{*****}, Jose Carlo H. Quintos^{*****}**

^{}College of Architecture, University of the Philippines, Diliman, Philippines. • amlecciones@up.edu.ph*

*^{**}Prince George's County Government, Department of Environmental, Resource and Recovery Division, Largo, Maryland, USA. • kr.serrona@gmail.com*

*^{***}Department of Community and Environmental Resource Planning, College of Human Ecology, University of the Philippines Los Baños, Philippines. • medvanadera@up.edu.ph*

*^{****}Society for the Conservation of Philippine Wetlands, Inc., Philippines. • amylecciones@wetlands.ph*

*^{*****}Department of International Environmental and Resource Policy, Graduate School of International Cultural Studies, Tohoku University, Japan • jeongsoo.yu.d7@tohoku.ac.jp*

*^{*****}Society for the Conservation of Philippine Wetlands, Inc., Philippines. • carloquintos@wetlands.ph*

^{}Corresponding author: amlecciones@up.edu.ph*

Wetlands play an important role in biodiversity conservation and protection from climate change events. However, they are also faced with serious environmental issues arising from incessant human activities such as industrial and agricultural development, tourism and settlements. As a result, these bodies of water have become dumping ground of waste which has affected aquatic life and habitat. Marine litter is now one of the largest contributors to the decline of the quality of water bodies and the demise of biological diversity. Changing this pattern requires a menu of interventions consisting of policy, behavioral change, hard infrastructure and sustained education. This entails a shift in thinking from linear to circular economy where 4Rs (refuse, reduction, reuse and recycle) principles are adopted. At the government level, policies geared toward eliminating single-use plastic from the waste stream and incentives for environmentally-friendly materials need to be crafted. At the community-level, innovative and game-changing education campaigns make a difference in transforming behavior and attitudes. Likewise, engineering interventions need to be put in place that use indigenous and appropriate materials and built from local knowledge and practices. This paper presents an intervention framework to reverse wetland degradation emanating from indiscriminate and improper waste disposal from industrial, agricultural and settlement activities. A literature review was conducted of the landscape and regulatory framework for wetland management and waste pollution characterization in wetlands and behavioral and development patterns were assessed against ecological waste management interventions vis-à-vis wetland conservation and the circular economy. Two case studies, the Sachet Recovery Project and the Active and Clean Bountiful Rivers program are presented in the analysis. Multisectoral collaboration, harmonizing planning documents, mainstreaming wetland conservation approaches into the circular economy, and strengthening the grassroots involvement in ecological solid waste management in a circular economic model approach will ensure the conservation and sustainable use of wetlands.

EMPOWERING FARMING COMMUNITIES FOR MANAGING AGRICULTURAL WETLANDS

Amy M. Lecciones^{*,+}, Simplicia A. Pasicolan^{}, Ma. Catriona Devanadera^{***}, Ivy M. Lambio^{****}, Aaron Julius M. Lecciones^{*****}, Jamella M. de Castro^{6*}, Jose Carlo H. Quintos^{7*}, Darryshel M. Estorba^{8*}, Cristian C. Lucañas^{9*}**

^{*}*Society for the Conservation of Philippine Wetlands, Inc., Philippines. • amylecciones@wetlands.ph*

^{**}*Department of Environment and Natural Resources – Ecosystem Research Development Bureau, Philippines. • simpasic456@yahoo.com*

^{***}*Institute of Biological Sciences, University of the Philippines Los Baños, Philippines. • iflambio@up.edu.ph*

^{****}*Department of Community and Environmental Resource Planning, College of Human Ecology, University of the Philippines Los Baños, Philippines. • medvanadera@up.edu.ph*

^{*****}*College of Architecture, University of the Philippines, Diliman, Philippines. • amlecciones@up.edu.ph*

^{6*}*Department of Environment and Natural Resources – Ecosystem Research Development Bureau, Philippines. • jmdc0920@gmail.com*

^{7*}*Society for the Conservation of Philippine Wetlands, Inc., Philippines. • carloquintos@wetlands.ph*

^{8*}*Society for the Conservation of Philippine Wetlands, Inc., Philippines. • darryestorba@wetlands.ph*

^{9*}*Museum of Natural History, University of the Philippines Los Baños, Philippines. • cclucanias@up.edu.ph*

⁺*Corresponding author: amylecciones@wetlands.ph*

Candaba Wetlands is a 30,000 ha floodplain straddling three provinces that has been cultivated mostly as rice paddies. The area has been experiencing both natural and anthropogenic threats which have resulted to the decreasing productivity and income of farmers that derive livelihood from this vast farmland, compelling them to sell the land to commercial developers. The Society for the Conservation of Philippine Wetlands, Inc. (SCPW) partnered with a group of farmers, the Macagatal Irrigators Association (MIA), to conserve a 135 ha rice land while generating additional income for the community. It is also an attempt to conserve a portion of the Candaba Wetlands that hopefully would lead to sound policies and initiatives on larger scale. The site is a significant area for agricultural and fisheries production, water for irrigation, natural retention, and an extremely important staging and wintering area for migratory birds, being part of the East Asian-Australasian Flyway. The farmers and SCPW characterized the area, including survey of flora, entomofauna, macrofauna, avifauna and fishery, carried out water quality measurements and Rapid Assessment of Wetland Ecosystem Services (RAWES), to provide science-based information for the formulation of a management plan for the project site. A management plan was developed employing participatory methods and focusing on increasing the capacity of farmers to manage their farm resources. In partnership with various stakeholders, bird watching guide and rice production trainings were conducted. The trained guides are now organized into a registered association. The community is currently designing an equitable benefit-sharing scheme from the revenues generated by this activity. To date, SCPW and the community are making further efforts to solicit support for establishing a wetland center in the area to boost farm tourism, showcase traditional farming practices, and to offer sanctuary for birds as a strategy for its conservation.

INTRODUCING ENVIRONMENTALLY SUSTAINABLE CANAL BANK RESTORATION METHOD TO KOTTE CANAL, SRI LANKA

Liyanage H. I. D. *, Dharmasoma U. Y. I. L. **, Wijayarathna N. S. *, Thalgaswatte O. *, Ziyaroon I. L. *, Kalahe K. P. H. S. *, Bandara K. G. A. S. *

* Sri Lanka Land Development Corporation, No. 03, Sri Jayewardenepura Mawatha, Welikada, Rajagiriya, Sri Lanka

**Corresponding author: isuriedharmasoma1@gmail.com

Colombo, Sri Lanka was designated as a Wetland City of the Ramsar Convention in 2018 recognizing the significance of 19km² of urban wetlands within the city (15% of the land area of Colombo City). These wetlands include marshes, paddy fields, and connected by an extensive canal network. Some of these canals are being used for water-based transportation and recreation. Kotte Canal, having a 2.91 km length (both left bank and right bank) and flowing through Kotte Marsh, is one such major canal within Colombo City. Erosion of canal banks in Kotte Canal has become noticeable in the recent past. It has accelerated due to the instability of the soil and the wave load caused by the boats. Only 2.09 km length (both left bank and right bank) of the canal bank had been protected earlier either by gabion or wet masonry walls. These methods are costly and cause negative impacts to the wetland environment. An environmentally sustainable soft banking system was proposed to restore these eroded canal banks in Kotte Canal. The objectives of this project were to (i) stabilize canal banks with an ecologically safe and cost effective, sustainable alternative and (ii) enhance aesthetics and ecosystem services provided by Kotte Canal. Soft banking system contains coir geotextile, coir logs and specific cover crop. For the restoration of canal bank, *Vetiveria zizanoids* (Vetiver grass) was selected due to its intensive root network. Canal banks were improved to its original form by earth filling. Coir logs were installed to the toe of the canal bank to act as a primary barrier for the boat induced wave load. Coir geotextile was laid through the slope to control the soil erosion until *Vetiveria zizanoids* get stabilized. These coir products will persist for 3 to 5 years while *Vetiveria zizanoids* establish themselves and eventually roots in to the bank. When these products biodegrade, the plants and roots will remain to stabilize the bank with an intensive native root structure substrate. Soft banking system in Kotte Canal will restore the natural vegetation of canal banks, thereby creating a favorable habitat for fauna, and allowing reptiles, amphibians and birds in marshy areas to enter the waterways easily. This system will improve water quality in urban areas by trapping solid particles and absorbing heavy metals in urban runoff before entering the waterways.

FIRST USE OF IMAZAPYR HERBICIDE TO CONTROL INVASIVE *Spartina alterniflora* IN THE MIGRATORY BIRD SANCTUARIES ALONG THE COAST OF CHINA

Jianbin SHI^{*,*}, Xiaojing GAN^{*}, Chao MA^{**}, Hebo PENG^{***}, Weipan LEI^{****}

^{*}The Paulson Institute (U.S.) Beijing Representative Office, China • jshi@paulsoninstitute.org

^{**}College of Biological Sciences and Biotechnology, Beijing Forestry University, Beijing, China • machao@bjfu.edu.cn

^{***}Conservation Ecology Group, Groningen Institute for Evolutionary Life Sciences, University of Groningen, the Netherlands • hebo.peng@nioz.nl

^{****}College of Life Sciences, Beijing Normal University, China • leiweipan@163.com

^{*}Corresponding author: jshi@paulsoninstitute.org

Coastal wetlands in China are critical habitats that sustain irreplaceable biodiversity, including millions of migratory birds, along with many unique species of plants and other animals. However, the biological viability of this coastal wetland ecosystem has been seriously threatened due to the invasion of *Spartina alterniflora*. *S. alterniflora* was first introduced into China in 1979 and spread rapidly throughout the coast of China with adverse effects on the habitats for migratory birds. Numerous and varying methods have been tested for eradicating *S. alterniflora*, and in this study we used imazapyr (as aquatic formulation Polaris® by Nufarm) – an herbicide with very low toxicity to humans and other animals that has been used successfully in Washington and California for large-scale control of invasive *Spartina* for more than a decade – in combatting the spread of *S. alterniflora* in two of the most important migratory bird sanctuaries along the coast of China. Since 2018, pilot experiments were performed under tidal marsh conditions in Luannan, Hebei (handheld sprayer) and Yancheng, Jiangsu (unmanned aerial vehicle) respectively to determine imazapyr's efficiency in eradicating *S. alterniflora*, persistence in sediment and bioaccumulation in macrobenthos, and impact on the macrobenthic community. Our preliminary results indicate that 1) Imazapyr herbicide was effective in eliminating *S. alterniflora* with 95% being removed after two sprayings; 2) the application of Imazapyr can significantly inhibit the growth of *S. alterniflora* and stop it from producing flower head and root sprout; 3) there were no significant differences in the community structure of macrobenthos among the imazapyr treatment and the control areas; 4) Persistence of imazapyr in sediment samples approached the zero asymptote at 30 days and 14 days respectively in Luannan and Yancheng; 5) No Imazapyr residue was detected in the macrobenthos samples in Yancheng where the application spray volume was ultra-low. This study demonstrates that imazapyr is a cost-effective mean for eradicating *S. alterniflora* on large scale and restoring tidal flat habitats for migratory birds while having an insignificant risk to the tidal benthic community.

FISHPOND CONSERVATION SCHEME IN MAI PO INNER DEEP BAY RAMSAR SITE

Johnson Chung

Mai Po Inner Deep Bay Ramsar Site is one of the most important wetlands in the East Asia – Australasian Flyway as more than 40,000 waterbirds utilize the area all year round. Apart from the mudflat and gei wai, fishponds also provide feeding and loafing grounds for a wide range of bird species on a seasonal pattern and form a particularly important habitat for herons/egrets/spoonbills. Since 2012, The Hong Kong Bird Watching Society (HKBWS) has been implementing the Hong Kong Fishpond Conservation Scheme. It aims to provide a feeding ground for migratory waterbirds and other avifauna relying on these commercial fishponds. The fishpond culture industry flourished in the 1980s. There were more than 1,000 ha of fishponds in the Deep Bay area in Hong Kong. However, income from fish farming dropped gradually due to competition with imported fishes. More fishponds were inactively managed or abandoned in the past twenty years. According to our investigation, the average age of fishpond operators is 66 years old in 2020. Many of their descendants have left the industry. These abandoned fishponds may dry out and/or occupied by invasive plants. It is predicted that more and more fishponds will be abandoned in the coming decade. Gradual wetland habitat loss will result in significant threat to ecological conservation in the Ramsar Site. In collaboration with more than 130 local fishpond operators and a local fishery organization -The Hong Kong New Territories Fish Culture Association (HKNTFCA), we have organized the conservation scheme in the last 10 years. With funding supported by the HKSAR Government, fishpond habitat management was implemented in more than 600 ha of fishponds in order to enhance the ecological value of the fishponds and maintain their attractiveness to wildlife, in particular waterbirds, by providing a feeding ground and roosting site. In the past, fishpond operators used to drain down and dredge the fishpond regularly to harvest fish and disinfected the pond by sunlight. The drained fishponds with low water level serve as supplementary feeding habitats especially for waders, and fish and invertebrates left in the pond becomes a food source for waterbirds in particular egrets, herons and the globally endangered Black-faced Spoonbill. However, due to the increase in operation cost in the past two decades, the traditional drain-down practice has become less frequent and less sustainable. We provide financial incentives to fishpond operators and successfully encourage them to conduct half drain-down and full drain-down. On the other hand, because of raising cost in pond profiling, fishpond operators have reduced the frequency of fishpond drying and profiling in recent years. The sloped edge of fishpond bund serves as roosting and feeding space for waterbirds such as egrets and herons. However, the lack of pond bund maintenance results to vertical edges which reduces the space. To cope with this situation, we encourage fishpond operators to conduct fishpond profiling by providing subsidy once every two years. All in all, Hong Kong Fishpond Conservation Scheme reduced the wetland habitat loss and enhance the ecological value of fishponds in Mai Po Inner Deep Bay Ramsar Site. It is a successful case showing harmonious cooperation among green group, local fishery community and government to conserve the valuable wetland.

GOVERNANCE AND MANAGEMENT OF JAGADISHPUR RESERVOIR RAMSAR SITE, NEPAL

Kamal Thapa

James Cook University, Australia / Water Users Association, (Taulihawa) Kapilvastu, Nepal • thekamal@gmail.com

Governance and management of protected areas, including Ramsar Sites, is important for successful conservation outcome. Therefore, the future of protected areas lies in the governance structure and management effectiveness of the site. This study documents the governance regime and assess management effectiveness of Jagadishpur Reservoir Ramsar Site (JRRS) in Nepal. JRRS is the only human made wetland listed as Ramsar Site in Nepal. Similarly, jurisdiction of the site overlaps between two government entities; one focusing on irrigation system and the other focusing on forest. Governance and participatory management was assessed through the online survey aided by author's own experience from the site and key information obtained from local stakeholders. Management effectiveness evaluation was carried out using Ramsar - Management Effectiveness Tracking Tool (R-METT) in a workshop setting. Overall management effectiveness of the site is found to be 30.63%, which is much lower than other legally established protected areas in Nepal whereas governance status score is more than 50% which is on par with other protected areas in the Eastern Himalayas.

CAN EFFECTIVE COMMUNICATION OF SCIENTIFIC EVIDENCE TO DEPICT THE ECOSYSTEM SERVICES EFFECTIVELY RESOLVE THE CONFLICT BETWEEN THE PROTECTED AREA MANAGERS AND THE DEPENDENT WETLAND COMMUNITIES? NALABANA BIRD SANCTUARY; CHILIKA LAKE A WETLAND OF INTERNATIONAL IMPORTANCE, INDIA; A CASE STUDY.

A.K. Pattnaik^{*,*} and S.K.Mohanty^{}**

**Wetlands International South Asia, India • ajitpattnaik13@gmail.com*

***Wetland Research & Training Center, Chilika Development Authority, India*

**Corresponding author: ajitpattnaik13@gmail.com*

Chilika Lake is the most significant coastal wetland along the east coast of India and a Ramsar Site. The highly productive lake eco-system with its rich fishery resources sustains the livelihood of more than 0.2 million fishers. Chilika is a vital wintering ground for the migratory bird of Asiatic subcontinent. Nalabana Island within the lake, spread over 15.53 sq. km, designated as a bird sanctuary in 1973. Nalabana was known for highly productive capture fishing ground till 1973. The ban on fishing clamped after notification led to conflict between the local fishers and the protected area managers. Interestingly, after the designation of protected area the fishers have been getting a good harvest from the trap they lay outside the sanctuary boundary. However, the ecosystem services, contributed by the sanctuary quietly has been gone unnoticed by the local fishers. For the ecosystem service paradigm to be relevant to resource dependent communities, it is essential to generate awareness and enhance their perception about it. The study carried out during July 2011 to June 2017, by the authors, attempted to establish through scientific evidence, the ecosystem services flowing from the sanctuary in the form of potential nursery and spawning ground for fish. The outcome of the study conclusively demonstrated to the fisherman of the lake that sanctuary is serving as feeding and nursery for 45 spawning of 11 resident species, contributing significantly to the lake fishery. In the process the local fishers are immensely benefitted. The outcome of the study changed the perception of local fishers about the sanctuary and ecosystem services it provides, also in resolving longstanding conflict.

ADVANCED GEOSPATIAL TECHNOLOGY PERTINENCE FOR INLAND SALINE WETLANDSCAPE: A CASE STUDY OF ASIA'S LARGEST SALINE WETLAND SAMBHAR LAKE

Laxmi Kant Sharma^{*,*} and Rajashree Naik^{*}

**Department of Environmental Science, School of Earth Sciences, Central University of Rajasthan, India • laxmikant_evs@curaj.ac.in*

**Corresponding author: laxmikant_evs@curaj.ac.in*

Wetlands are complex natural ecosystems. These provide valuable resources and services benefiting man and nature. So far, there have been a lot of publications on remote sensing for wetlands. However, there are no recent review articles for the study of inland saline wetlands, integrated with advanced geospatial technology. This article aims to provide a comprehensive overview of characteristics, importance, and challenges of saline wetland studies with remote sensing and advanced geospatial technology. Research papers were collected using online

database only from Google Scholar, Web of Science, Science Direct and some journals. Total 720 papers were collected on saline lakes out of which 300 were for inland saline lakes and among these only 150 papers had remote sensing application for these lakes. Among these only optical datasets were widely used. Only a few papers had use of Microwave, LiDAR, and Hyperspectral remote sensing. Prospects of these advanced technology has been analysed in detail for Asia's largest inland saline wetland, Sambhar lake. It is the 7th declared Ramsar Site of India undergoing partial desiccation due to illegal encroachment bearing the loss of about 300-billion-dollar salt in global market. High resolution optical data will enable to classify, time-series spatio-temporal dynamic and future prediction for efficient monitoring and management while microwave will provide bathymetry information, detection of halophytes and halophiles, biomass estimation and edaphic characteristics. The hyperspectral remote sensing will offer spectral information on its biotic components. LiDAR will provide dynamics of Aravali hills surrounding Sambhar in 3 sides within its 3 km buffer zone. This study will help the scientific communities, wetlanders and academicians for the use of advanced geospatial technology for management and conservation of inland saline lakes.

RESTORATION OF BLACK NODDY *Anous minutus worcesteri* POPULATION IN THE TUBBATAHA REEFS NATURAL PARK, PHILIPPINES

Maria Retchie Alaba^{*,*}, Angelique Songco^{*}, Segundo Conales, Jr. ^{*}, Noel Bundal^{*}, Jeffrey David^{*}, Crisencio Caranay^{*}, Rowell Alarcon^{*}, Gerlie Gedoria^{*}

^{*}Tubbataha Management Office, Philippines

^{*}Corresponding author: retchpagliawan@gmail.com

The subspecies of Black Noddy *Anous minutus worcesteri* is endemic to the Philippines and is known to breed only in the Sulu Sea. Tubbataha Reefs Natural Park (TRNP) is the last known intact breeding ground for this species. This study looked into the population development of *A. minutus worcesteri* in the two islets in TRNP (Bird and South Islets) from 2004 to 2020, the threats they face and the management interventions applied to conserve the species. In 2014, the natural vegetation in the islets began to deteriorate due to over fertilization of the trees with bird droppings and years of inadequate rainfall. *A. minutus worcesteri* nests on trees, thus, the deterioration of vegetation, coupled with habitat competition with the Red-footed Booby *Sula sula*, resulted to a 72% decline in the adult population from 2013 to 2020. Other threats to the population include marine debris and erosion of the islets. Early 2017, temporary nesting structures made of bamboo sticks and poles were built. These structures deteriorated after two years. In September 2020, structures made of PVC and steel pipes were fabricated and placed on the islets. The long-term goal is to provide habitat and restore the 2013 population of 10,000 adults. Native trees are planted to restore the habitat. Nesting materials, like grasses, seagrasses and leaves, are also brought from the mainland. This year, decoys will be used to attract birds to the new structures.

BIODIVERSITY RESOURCES OF DIPANG LAKE OF THE LAKE CLUSTER OF POKHARA VALLEY (RAMSAR SITE NO. 2257), NEPAL REPORTS TWO SPECIES OF DRAGONFLY NEW TO NEPAL

Shailendra Kumar Pokharel^{*,*}, Juddha Bahadur Gurung^{*,*}, Aashis Tiwan^{*}

^{*}Conservation Development Foundation, Nepal • shailedrapokharel@gmail.com

^{**}Conservation Development Foundation, and National Natural Resources Fiscal Commission, Government of Nepal, Nepal
• juddhagurung@hotmail.com

⁺Corresponding author: shailedrapokharel@gmail.com

This paper is based on outcomes under the support of Hariyo Ban Program/WWF/USAID and Keidanren Nature Conservation Fund/Japan in 2018, and explores biodiversity resources of Dipang Lake, a freshwater sub-surface drainage basin and shallow lake at the cross-road of Chitwan-Annapurna Landscape Complex in Pokhara, Nepal at an altitude of 687-1269 m asl. It is the 4th biggest lake among nine lakes of Lake Cluster of Pokhara Valley (LCPV), Ramsar Site (Core Area: 0.15 km², Basin Area: 2.4 km²). The project initiative focused on building capacity of communities and local government entities to comprehend about the importance of the Ramsar Site and consolidate their actions so that conservation of the Ramsar Site provides long term sustainable benefits to the communities in LCPV, particularly in Dipang Lake. In this regard, one of the objectives was the participatory documentation of biodiversity resources of Dipang Lake. Conservation Development Fund (CODEFUND) worked with communities in building technical capacity of both the government personnel and communities for climate resilience at the local level, wetlands governance, promotion of green benefits from tourism and green enterprises, and conservation of wetlands biodiversity. Many training events were conducted; plans for tourism and green enterprises developed; a local mechanism for the control of financial mechanism including benefit sharing discussed, agreed and implemented; and biodiversity and socio-economic profiles of Dipang Lake prepared. In all processes, local NGO Dipang, Dipang Lake Infrastructure Development and Conservation Committee, and a financing institution Dipang Lake Agriculture Production & Fishery Cooperative (DLFAPC) were key grassroot partners. Integrated Lake Basin Management (ILBM) approach developed by the International Lake Environment Committee Foundation/Japan with a modification in the Nepalese case were applied in overall implementation of the project, including biodiversity assessment. This abstract does not reflect the outcome of the entire project, but reveals the biodiversity of Dipang Lake, Pokhara. ILBM blended with participatory assessment of biodiversity revealed that Dipang constitutes its 44.7 percent of land use under three kinds of composite forests with the canopy of 60 percent, a good indicator of forest health which supports 254 species of plants (trees: 57; shrubs: 25; herbs/grasses: 62; climbers: 17; cultivated: 32; aquatic: 34; invasive: 18). It also harbors 415 species of fauna (mammals: 16; birds: 152; reptiles: 19; amphibians: 5; pisces: 5). Interestingly, Dipang is examined to represent 88.5% of vertebrates of the entire LCPV including Vulnerable and CITES I species *Panthera pardus* and *Lutra lutra*, Critically Endangered *Emberiza aureola*, *Sarcogyps calvus*, *Gyps bengalensis* and *Gyps tenuirostris*, and CITIES II herpetofauna *Hoplobatrachus tigerinus*, *Naja kaouthia* and *Ophiophagus hannah*. Further, the lake is home to more than 156 species of insects including the charismatic species of butterflies like *Polyura athmas*, *Elymnias malelas*, *Pieris brassicae nepalensis*, and *Helophorus epicles*; and 29 species of dragon fly with two species reported new to Nepal, the Indian Violet Dartlet *Aciastrion approximans* (Selys, 1876) and Orange-tailed Marsh Dart *Ceriagrion cerinorubellum* (Brauer, 1865). Very interestingly, sustainability of this biodiversity wealth seems challenging because the study also explored LVI-IPCC value of Dipang which is 0.22, making a decision that Dipang is highly vulnerable, which may be due to high exposure (0.389) and sensitivity (0.358) but lower adaptive capacity (0.328). This finding will significantly update the biodiversity of LCPV, and value adds on globally well-known tourism destination, Pokhara Valley while addressing the issues of climate vulnerability of Dipang and other lakes of LCPV at the same time.

PROMOTION OF WISE USE OF JAPANESE RAMSAR SITES BY SUPPORTING WILDLIFE TOURISM PEOPLE, WETLANDS WILDLIFE (PWW) WILDLIFE TOURISM PROMOTION PROJECT

James McGill*, Yuki Ozaki*, Reiko Nakamura**

**INTEM Consulting Inc., Frontier Business Section – james@intemjapan.co.jp/ozaki@intemjapan.co.jp*

***Ramsar Center Japan - reiko.nakamura@nifty.com*

Looking past the global COVID-19 pandemic, increasing the numbers of inbound tourists to Japan remains a major long-term strategy of the Japanese government. After a comprehensive review, the government identified the natural environment of Japan as an underutilized tourism resource. In particular, ecotourism highlighting Japan's rich biodiversity was identified as untapped opportunity. Accordingly, the Japanese Ministry of the Environment developed the Wildlife Tourism Promotion Project subsidy scheme that requires equal funding from project partners. To participate in this project, INTEM Consulting, Inc., a Tokyo-based development consulting firm, created People, Wetlands Wildlife (PWW) in collaboration with NGOs Ramsar Center Japan and Wetlands International Japan. Focusing on Ramsar Sites, PWW introduces Japan's natural environment, wildlife and culture in order to promote the concept of 'wise use' and contribute to the economic development of local regions through supporting increased inbound tourism. PWW introduces Ramsar Sites with high ecotourism potential by offering content that has a unique point of view and is designed to be attractive to inbound tourists. A review of existing introductions of Japanese Ramsar Sites revealed that they had a strong academic orientation and were primarily descriptions of the sites from a neutral viewpoint. We hypothesized that introductions with an 'attitude' that were written from a subjective perspective would be more effective in attracting the attention of potential inbound tourists. To emphasize the importance of wise use, we highlighted the connections between the Ramsar Sites and the residents of their surrounding communities. PWW was written in English to appeal to a wide, global audience. The PWW website was successfully launched in 2020 (<https://pwwj.org>), and a total of 13 Ramsar Sites in Japan was introduced by the end of March 2021. The website has the following characteristics.

1. Each Ramsar Site is introduced under its own original theme.
2. The editing, design, and video production are professional grade.
3. Unlike other websites introducing Ramsar Sites, wetlands are viewed from the eyes of an inbound tourist.

The Ramsar sites introduced are as follows:

1. Kushiro-shitsugen (Hokkaido)
2. Kabukuri-numa and surrounding rice paddies (Miyagi Prefecture)
3. Shizugawa-wan (Miyagi Prefecture)
4. Lower Maruyama River and surrounding rice paddies (Toyooka City) (Hyogo Prefecture)
5. Higashiyoka-higata (Kyushu)
6. Hizen Kashima-higata (Kyushu)
7. Arao-higata (Kyushu)
8. Tofutsu-ko (Hokkaido)
9. Notsuke-hanto and Notsuke-wan (Hokkaido)
10. Furen-ko and Shunkuni-tai (Hokkaido)
11. Kiritappu-shitsugen (Hokkaido)
12. Akkeshi-ko and Bekambeushi-shitsugen (Hokkaido)
13. Oze (Gunma Prefecture)

PWW obtained the full cooperation of the related local city governments, environmental organizations, NPOs and environmentally-conscious local residents. PWW also received a high evaluation from the Ministry of the Environment. PWW has over 20,000 page views to date and has been accessed from 42 countries.

HUMAN USE OF SMALL WETLAND NATURAL RESOURCES IN KULEN PROMTEP WILDLIFE SANCTUARY, CAMBODIA

Pheak Sok*⁺ and Soben Kim**

*Center for Agricultural and Environmental Studies, Royal University of Agriculture, Cambodia •
sopheakstar14@gmail.com

**Faculty of Forestry Science, Royal University of Agriculture, Cambodia • kimsoben@gmail.com

⁺Corresponding author: sopheakstar14@gmail.com

Kulen Promtep Wildlife Sanctuary, which is located in northern part of Cambodia, is the largest protected area, and covering 4,099 km² within the three provinces: Oddar Meanchey, Preah Vihear, and Siem Reap. The sanctuary was originally designed to protect the Kouprey Bos sauveli, currently listed by the IUCN Red list of Threatened species as Critically Endangered. Small and scattered wetlands played essential roles in environmental functions and other biodiversity conservation. However, they were in the situation of destroying from the anthropogenic activities, including farming, hunting, fuel wood harvesting, deforestation, and new settlement. The specific objectives are to (i) show impacts of human uses on small wetlands in the wildlife sanctuary; to (ii) find out importance of wetland values supporting local livelihoods; and (iii) to understand wetland management among stakeholders and local authorities. A study focused on the small wetland natural resources and people, threat to wetland, and wetland function and its value in the dry open forest. The study based on the presurvey preliminary in October 2014 and field work in June 2015. A simple random sample was used to select the target population; two villages were selected sample randomly, namely: Rum Chek (30) and Tmartboey (50). The total 84 respondents were selected by using the formula Yamane (1967). Field observation was also used to collect the data. The focus group discussion, 10 (5 males and 5 females) farmers per village were collected. The study was conducted from 20 to 26 March 2016. As results, about 94.5% of the households conducted farming as primary source of income generation, while secondary source is only 64% in both villages. Sixteen fish species were harvested due to small-scale fishing ground. By the observation, small-sale fishing has been regarded as the subsistence activity for rural livelihood, particularly in the upland area where having a small-scale fishing ground nearby village. A number of fish catch in the area, including Striped snakehead is 1.07 kg per time (26.18%). However, the Asian redbtail catfish *Hemibagrus* sp. is 3.50 kg, compared to *Glossogobius koragenis* is only 0.30 kg per time. Approximately 95% of the local people harvested the fish for household consumption, only the climbing perch is sold (1.25 USD/kg/time). Timber is forest product that collected from nearby wetlands, surrounding tree of the natural pond. Most of local people depended on the natural resource and forestry, while a small of amount relied on the small-holder business, such as selling, motor driver, and labor. The people used natural resource, such as collecting tree resin, fish harvesting, crab, eel, water lily, shrimp, frog, snail, bamboo shoot, plants and edible plants. For wetland management, they established as eco-tourism area and community forestry to protect from other illegal activities. Tmartboey village was already registered as eco-tourism community, while Rum Chek was processing legal documents. However, the management is not performed well due to the lack of support from the wildlife sanctuary, financial support, and technical assistance. Small wetlands play important roles in improving local livelihood through extracting natural resources for human consumption.

WETLANDS WISE USE: REFRAMING FOR MULTIPLE WORLDVIEWS

Ritesh Kumar

Wetlands International South Asia, India • Ritesh.kumar@wi-sa.org

In 2021, the Ramsar Convention will be marking 50th year of one of the oldest multilateral environmental agreements on a single ecosystem, the wetlands. At the heart of Convention is the wise use philosophy, which, at the time of adoption of the Convention text in 1971, marked a novel framing of human-nature interdependency as the basis of delivering conservation as well as sustainable development outcomes. Wise use of wetlands is defined in the text of Ramsar Convention as ‘maintenance of ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development’. While wise use has broader connotation, ecological character has been defined in a narrow sense, mostly aligning with stationarity, and relegating humans as external agents behind adverse changes in ecosystem. Managing wetlands in this era of rapid human-mediated transformation requires analytical approaches which consider integrated systems of human and nature as a unit of analysis, overcoming the human-nature dualism which has underpinned conservation approaches thus far. There is emerging scholarship which encourages a coupled view of ecological and social systems, as an alternate to framing of nature as setting context for human interactions, or human enterprise as an external disturbance acting upon ecosystems. In this talk, an alternate framing of wetland wise use and wetlands character is discussed, proposing replacement of wetland ecological character by an inclusive term ‘wetland character’ as a manifestation of a plurality of values and multiple worldviews. Wise use consequently becomes the maintenance of wetland character.

SWIMMING CRAB FISHERY MANAGEMENT THROUGH CRAB BANK: LESSONS LEARNED FROM JAPAN AND THAILAND

Shimpei Iwasaki*⁺ and Thamrat Phutthai**

**Department of Environmental Science, Fukuoka Women's University, Fukuoka, Japan • iwasaki@fwu.ac.jp*

***Faculty of Environment and Resource Studies, Mahidol University, Thailand • thamrat.phu@mahidol.edu*

⁺Corresponding author: iwasaki@fwu.ac.jp

The fish sector is a source of income and livelihood for millions of people around the world. Significant proportion of fishing population comprises “Small-scale fishers”. It is estimated that there are 51 million fishers in the world of whom 50 million (around 98 per cent) are small-scale, subsistence, or artisanal fishers. Existing fisheries management poses challenges for ensuring wise use of fishery resources, which include climate change, population growth, technological development, market fluctuations, institutional changes, etc. Revenue-oriented thoughts are a good example that often induces dominant persons/ groups such as government officials and capitalists to apply for destructive fishing methods or gear practices, accounting for numerous losses of fisheries resources. Such practices destroy fish ecology and then undermine people’s capacity to adapt to fishing activities especially for small-scale fishers. It has been reported that swimming crab (SC) catches have declined during the past several decades in many countries including Asian region. SC is one of important commercial species so that SC fishery has high-valued sources of coastal household income. Due to higher market demand and use of highly effective fishing gears, however, the crab fishery has caused to overfishing, resulting in decreased amount of the total

catch and smaller size of the crab catch. Taking into the above account, sustainable use of SC is needed, not only for maintaining the ecological balance and coastal resource abundance, but also for securing food security and sustaining fishery and its associated income opportunities in coastal areas. To ensure sustainable use of SC resources, a new system called crab bank has been developed in Asia. It is a community-based fishery management system which allows eggs-bearing mother crabs to spawn before or instead of being sold. The origin of the crab bank goes back to a model which has been developed by a fishers-initiated group in Hyogo Prefecture, Japan, since 1986. Since then, the crab bank has been adopted and practiced by coastal fishing communities in many countries of Asia. In particular, crab banks have been actively established in Japan and Thailand, but little has been known with regard to the SC fishery management system using crab bank. This study aims to highlight the institutional mechanism of crab bank in Japan and Thailand, and impacts of the fishery resource management on the socio-ecological system of coastal areas. The research used interview methods in Japan and Thailand while conducting a questionnaire survey to 20 crab bank organizations in Thailand. Findings revealed that the fishers believed that crab banks are effective to enhance not only crab stocks, but also other fishery species supported by the food chain via increased SC larvae. There are good cases that establishment of crab bank has affected other SC resource management rules including release of crab juveniles and temporal banning of crab fishery while providing income opportunities to engage in crab processing at the community level. Mobilizing various stakeholders poses important challenges for promoting crab bank initiatives, in terms of fund raising and cooperation of crab catch. The lessons learned from case studies in both Japan and Thailand will provide insights on factors contributing to long-enduring SC fishery management.

THE WONDER OF WETLANDS: USING ART TO ENGAGE, EDUCATE AND INSPIRE

Kate Gorringer-Smith

Co-ordinator of the Overwintering Project: Mapping Sanctuary, Australia • kategorringesmith@gmail.com

Over the past decade I have initiated three major art projects to engage artists and audiences with migratory shorebirds and their wetland habitat throughout the East Asian-Australasian Flyway, and I have found art to be an effective and lasting way to engage communities with migratory shorebirds and their habitat. My current project, the Overwintering Project: Mapping Sanctuary, seeks to engage artists with their local migratory shorebird habitat. Like the birds themselves, the wetland habitat of shorebirds is often overlooked and undervalued. Wetlands are often seen as an empty wasteland, waiting for development or conversely a desirable site awaiting exploitation. Through the focus of migratory birds and their links to wetland habitat, the Overwintering Project has been engaging artists and communities with this habitat to help them see it in a new light and understand that wetlands have great global significance. In my presentation I will discuss the challenge of engagement faced by those involved in wetland conservation, how art can help address these challenges and whether behavioural change from involvement in shorebird-related art projects can be measured.

VISUALIZING THE VALUE OF THE COASTAL LIVES BY THE TREASURE HUNTING EVENTS IN THE EAST COAST OF NAGO CITY, OKINAWA, JAPAN

Mariko Abe

Conservation Division, The Nature Conservation Society of Japan, Japan • abe@nacsj.or.jp

The east coast of Nago City is known to be a biodiversity rich coastal area, having rich coral reef ecosystems. Mangrove forests, coral reefs, sea grass beds, sandy areas, muddy areas are expanding and Oura River and Teima River convey the nutrition of Yanbaru forests. There are many endangered and important species. We have done the treasure hunting events to visualize the values of nature and culture of the area. There are 13 districts in Nago City. In several districts, we have conducted treasure hunting events. We, together with local people, explored the area and visited the symbols of the districts, important places which local people have been protected and proud of, must see sights, and nature which have unique characteristics. This led local people to recognize the value of the local area again, to be proud of their own places, and started finding meaning to introduce their valuable things to tourists and the people outside of the districts. We have done the treasure hunting event twice in Sedake, through an indoor session and by field work. The local people of Sedake found that there are lots of hedges for preventing wild boar damage in the mountain. They must have settled a long time ago. Surprisingly, they are made of corals (*Acropora* sp.). This stimulated local people's imagination on how people deliver live corals from ocean to the mountain, and this describes how life in the coastal areas is like. By conducting the treasure hunting and mapping, we have succeeded in visualizing the values of nature and culture of the area. People in Sedake started to do their own initiative. In the end of February 2021, they put a display in front of the community center, the center of the district. The display is

a map of the district which shows the location and explanation of their treasures, including the hedges. Since then, many local people, tourists, and people who live outside the district come and see the display. They plan to use the experience into contours in the future. Due to the COVID-19 pandemic, we had to stop this project temporarily. We would like to introduce the first step of our challenge.

UNDERSTANDING THE INTEGRATION OF THE ENVIRONMENTAL EDUCATION INTO SCHOOL CURRICULUM

Huizhe Hu^{*,+}, Sifan Hu^{*,}, Yang Chen^{*}, Shaofen Cai^{*}, Qie Zhong^{***}, Zhuo Zeng^{*}**

**Mangrove Foundation, Shenzhen, Republic of China*

***School of Life Sciences, Sun Yat-sen University, Guangzhou, Republic of China*

****Shenzhen Middle School, Shenzhen, Republic of China*

+Corresponding author: husf@mail2.sysu.edu.cn

Environmental Education (EE) is regarded as one of the main approaches in promoting teenagers' perceptions and engagement in environmental issues. While, how EE could be better integrated into the school curriculum is still the focus both in practice and research fields. Despite having many related studies and attempts, the localization and adaptability of EE would affect the way of curriculum integration and its outcomes. Considering the regional and cultural context, we firstly localized a popular EE program about water resources, "Project Wet (PW)" from North America, into Shenzhen, a coastal city of China. We further integrated the goals of EE into the school curriculum. Based on such localization and integrations, we launched a one-semester course in Shenzhen Middle School. To better understand the outcomes, qualitative research was conducted to evaluate the effectiveness of this program, including concept maps, drawings and semi-structured interviews. The results showed that the program could help students successfully establish systematic knowledge on water resources. Indeed, it could increase students' understanding and concerns about the local water resources, also the connection between individuals and the local water environment. The program also promoted a positive attitude towards water resources protection and the critical thinking about sustainable use among students. Besides, the localization of PW (e.g., the local water topics and issues) and the teaching methods (outdoor-learning and experimental learning) were the key components in achieving the integrated goals of this program. Our attempt in Shenzhen could provide comprehensive thinking for better applications in the future on the localization of EE and its integration into school curriculum.

WETLAND ENVIRONMENTAL EDUCATION PROGRAM "KOUNOTORI KODOMO MEETING" USING AN ONLINE CONFERENCE SYSTEM (TOYOOKA CITY, JAPAN)

Taketo Kitamoto*, Miki Hyodo, Daisuke Nakamura***,†**

**Secretary General, Ramsar Center Japan • ramsarcj.nakamura@nifty.com*

***Division for coexistence with the Oriental White Stork, Toyooka City Hyogo Prefecture*

****School Teacher of Shiga Prefecture*

†Corresponding author: ramsarcj.nakamura@nifty.com

The global expansion of COVID-19 has had a significant impact on society. And the loss of a few out-of-school environmental education opportunities for children is a great loss for CEPA activities in wetlands. Under these circumstances, Toyooka City in Hyogo Prefecture has planned the "KOUNOTORI KODOMO meeting" (KOUNOTORI means the Oriental White Stork in Japanese), to connect the children from all over Japan where Oriental White Stork's habitat is located by using Zoom, and asked Ramsar Center Japan, which has a wealth of experience in wetland education for children, to help in the event. Although this was the first time the method of online remote exchange was tried, 45 children from five regions participated, and we were able to provide learning opportunities for the children. At the same time, we saw the limitations and improvements of online remote exchange, as well as new possibilities beyond "Real exchange". We will share our experiences. The Oriental White Stork, once extinct in Japan, was successfully returned to the wild by Toyooka City in 2005. Currently, the number of storks has increased to about 200 birds in various parts of western Japan. However, the number of areas where they have succeeded in breeding is still limited. Therefore, to encourage children in the areas where the Oriental White Stork inhabits and to think about what is important for storks to breed and increase safely, the "KOUNOTORI KODOMO Meeting" was planned. By sharing Toyooka City's successful achievement of the Oriental White Stork's conservation through the KODOMO Meeting, we aimed to inspire children to work for stork conservation in their own communities. The "KOUNOTORI KODOMO meeting" was held on March 28, 2021. Toyooka City invited other Japanese municipalities where storks live to participate in the meeting, and 45 children from five regions including Toyooka City participated. Using Zoom, we broadcasted from various locations in Toyooka City, interviewing people involved in conservation and introducing places and facilities involved in conservation in real time. After watching the live broadcast, six themes were presented to the children, and each participant thought about which items were important, ranked them, and presented them to each other using Zoom. Facilitators (elementary school teachers, etc.) and technical assistants were assigned to support each region. In Toyooka City, a comprehensive facilitator, who monitors the progress of the meeting, was arranged. Six themes, such as the history of stork conservation, people involved in conservation, and large rivers flowing through the city, were introduced to children as "Important things to live with storks". The results of the ranking differed from each region to region, showing the diversity of the results. It was a great pleasure for the participants to be able to interact and meet with children from different regions using Zoom, as the opportunity for environmental education had been lost due to COVID-19. We found that the use of a web conferencing system can provide certain effective learning opportunities locally, beyond the various constraints of time, distance, and cost, in addition to going to the site. On the other hand, experiences using the five senses, such as touch, taste, feel, and smell, cannot be obtained without going there. It will be necessary to bridge the gap between local and online events by providing content and materials that complement these experiences.

ENGAGING COMMUNITIES THROUGH WETLANDS BIOBLITZ: A CITIZEN-SCIENCE ACTIVITY

Amy M. Lecciones^{*,+}, Simplicia A. Pasicolan^{}, Ivy Amor F. Lambio^{***}, Ma. Catriona E. Devanadera^{****}, Aaron Julius M. Lecciones^{*****}, Darry Shel M. Estorba^{6*}, Jose Carlo H. Quintos^{7*}, Christian C. Lucañas^{8*}, Jamella M. de Castro^{9*}, Jonathan U. Nicolas^{10*}**

^{*}*Society for the Conservation of Philippine Wetlands, Inc., Philippines. • amylecciones@wetlands.ph*

^{**}*Department of Environment and Natural Resources – Ecosystem Research Development Bureau, Philippines. • simpasic456@yahoo.com*

^{***}*Institute of Biological Sciences, University of the Philippines Los Baños, Philippines. • iflambio@up.edu.ph*

^{****}*Department of Community and Environmental Resource Planning, College of Human Ecology, University of the Philippines Los Baños, Philippines. • medevanadera@up.edu.ph*

^{*****}*College of Architecture, University of the Philippines, Diliman, Philippines. • amlecciones@up.edu.ph*

^{6*}*Society for the Conservation of Philippine Wetlands, Inc., Philippines. • darryestorba@wetlands.ph*

^{7*}*Society for the Conservation of Philippine Wetlands, Inc., Philippines. • carloquintos@wetlands.ph*

^{8*}*Museum of Natural History, University of the Philippines Los Baños, Philippines. • cclucanas@up.edu.ph*

^{9*}*Department of Environment and Natural Resources – Ecosystem Research Development Bureau, Philippines. • jmdc0920@gmail.com*

^{10*}*Laguna Lake Development Authority. • junicolas110@yahoo.com*

⁺*Corresponding author: amylecciones@wetlands.ph*

The Society for the Conservation of Philippine Wetlands, Inc (SCPW) adopted the BioBlitz concept for wetlands and added other parameters such as water quality, climate-related and other information indicated in the Ramsar Information Sheet and called it the “Wetlands BioBlitz”. It also included the Rapid Assessment of Wetland Ecosystem Services (RAWES). The Wetlands BioBlitz is a 3-day citizen-science-based activity spearheaded by the Youth participants, teachers, and other local stakeholders with guidance of scientists and other experts. It was implemented in pilot rivers namely Pangil, Pagsanjan-Lumban, and Mabitac in Laguna de Bay, the largest inland wetland in the country. The activities include Learning Session about wetlands, its importance, and the current efforts to conserve them; an orientation seminar on the methods to be used in the field activity; and actual field work. Data gathered were processed and used for preparing or updating the profiles of pilot rivers, which were also the basis for the Action Plans prepared by the students for the rehabilitation of these wetlands. The Action Plans were presented to the Local Government to solicit their support and are currently being implemented by seven High Schools. Further, a website has been created for uploading the data gathered during and even after the activity. Students and other stakeholders were trained on how to use the website for uploading of data. A writeshop was also conducted to develop a “Guide to Implementing a Wetlands BioBlitz Activity”. This guide that was tested and produced has been presented to wetland managers as possible methodology for rapid characterization of wetlands. As an approach, it was observed that Wetlands BioBlitz increased awareness of local communities on the importance of wetlands, increased the capacity of local communities to embark on wetland conservation activities, and operationalized an easy and cost-effective method for characterizing wetlands using citizen-science.

REPORT ON THE URBAN BIODIVERSITY CONSERVATION PROJECT BY THE PARTICIPATORY APPROACH OF CIVIL SOCIETY IN KHULNA CITY OF BANGLADESH

Hideki SATO^{*,+}, Md. Maksudur Rahman ^{}, Saumitro Chakrabarti ^{***}, Md. Nurul Amin^{****}**

**Department of Sociology, Edogawa University, Japan• hi-sato@edogawa-u.ac.jp*

***Bangladesh Environment and Development Society (BEDS), People's Republic of Bangladesh• chief@bedsbd.org*

****BEDS, People's Republic of Bangladesh• saumitrobedsbd@gmail.com*

*****BEDS, People's Republic of Bangladesh• opubeds@gmail.com*

**Corresponding author: hi-sato@edogawa-u.ac.jp*

Khulna is the third largest city of Bangladesh and it is located in south-western part of the country. In the last thirty years, biodiversity of Khulna has been decreased due to cutting the tree, hunting the bird and animal, illegal grabbing, filling and polluting the wetland, etc. for industrialization and urbanization. Moreover, city people and policy makers' lack of consideration and sympathy to urban biodiversity accelerated its destruction. Still some wetland, tree, forest, bird, animal and fish are available in the city, but those are not properly managed and maintained. Unfortunately, city people are not always aware of conserving the existing urban biodiversity. Neither the government nor any organization or company has taken any initiative to conserve the urban biodiversity so far in Bangladesh. There is no clear policy, guideline and educational materials on urban biodiversity conservation in Khulna city. As a result, children, students, city people and policy makers don't get any appropriate knowledge and capacity on the urban biodiversity conservation. The project objective is to raise the urban biodiversity issues and to bring the behavioral change of the city people in Khulna city through conserving biodiversity with the engagement of civil society, government, companies and students for making a bridge between city people and urban biodiversity. The activity outline is as follows; (1) Target area: Khulna City Corporation area of Bangladesh; (2) Target people: 51,000 people of the Khulna City; (3) Direct Beneficiaries: Approx. 15,000 students and teachers from 50 schools and colleges, and 36,000 general people of the city, 620 Urban Biodiversity Conservation Youth Club (UBCYC) members; (4) Indirect beneficiaries: 1.5 million people of Khulna City; (5) Project duration: April 2018 to March 2021(for three years). During the three year's project, we have created a common platform for urban biodiversity conservation by involving multi stakeholders. The urban biodiversity conservation education program using the developed education materials (posters, board game and comic book) was being conducted in the selected schools and colleges. Also, 31 Urban Biodiversity Conservation Action Plan have been developed. The UBCYC members have been conducting wetland, bird, animal conservation activities through public campaign and education program, etc. The leadership capacity of the youth club members has been improved. 25,000 trees have been planted at public places to make a biotope. In addition, we held the forum for considering the fundraising activities from CSR contribution as well as biodiversity observation study tours by UBCYC members. Finally, we suggested the policy makers to take further initiative on urban biodiversity conservation through the developed urban biodiversity corridor map and guideline, etc.

MULTI-STAKEHOLDER PARTICIPATION IN MANAGING THE PAGATPATAN WETLAND LEARNING CENTER IN BUTUAN CITY, PHILIPPINES

Rowena P. Varela*⁺ and Romell A. Seronay**

**Office of the Vice President for Research, Innovation and Extension, Caraga State University, Ampayon, Butuan City 8600
Philippines*

***Center for Research in Environmental Management and Eco-governance • romell.seronay@gmail.com*

**Corresponding author: rpwarela@carsu.edu.ph*

The Pagatpatan Wetland Learning Center (PWLC) is a new wetland center intended to educate school children about nature, particularly about the wetland ecosystem. The creation of the PWLC is a joint initiative of the Gawad Kalinga Community Development Foundation, a Philippine poverty alleviation and nation-building movement, Barangay Pagatpatan and the Caraga State University. The Learning Center is viewed to be a component of the Gawad Kalinga's program in nurturing values and dignity among the families in the Gawad Kalinga community. The PLWC is designed as a communal project of the Gawad Kalinga community in Barangay Pagatpatan, where the families can volunteer in helping develop the various structures and tourism attractions. The Caraga State University (CSU), for its part, is responsible in the scientific and technological aspects of the PWLC to make it a place for learning about environment among school children. Because of the university's community engagement program, it works in partnership with the Gawad Kalinga and Barangay Pagatpatan. The CSU team submitted a proposal to the Tourism Infrastructure and Enterprise Zone Authority (TIEZA), a Government Owned and Controlled Corporation (GOCC) attached to the Department of Tourism to access funds for the construction of the infrastructure supporting the PWLC. From there, the partnership eventually expanded which later include the City Government of Butuan, being the local government unit (LGU) where the PWLC is located. Through the involvement of the City Government of Butuan, the City Tourism Office is tasked to officially oversee the PWLC activities. The multi-stakeholder participation is challenging inasmuch as the interests are diverse. Moreover, the involvement of the LGU is also tough due to the changes in priorities every time there is a change in leadership. Nonetheless, the strong commitment of the primary initiators of the project is essential in sustaining the wetland center.

A TREND INDEX FOR INDIAN WETLANDS

Ridhi Saluja*, Harsh Ganapathi*, Ritesh Kumar*

**Wetlands International South Asia, India • ridhi.saluja@wi-sa.org*

In 2016, a global wetland trend index was created as a proof of concept to build a global picture of trends in wetland extent over time and was adopted for use in key environmental assessments such as the Ramsar Conventions Global Wetland Outlook, the UN SDG6 Synthesis Report and the Global and Regional Assessments produced by Intergovernmental Science Policy Platform on Biodiversity and Ecosystem services. The indicator uses a meta-analysis approach similar to Living Planet Index (LPI). In this paper we report the application of Global Wetland Trend Index to Indian wetlands. The index uses data from 240 wetlands from the ten biogeographic zones of India. The index for 1980-2014 indicates an average decline in natural wetlands area by 41% and a near commensurate increase in area under human-made wetlands. Natural inland wetlands were observed to have increased in Trans-Himalayan Zone (by 87%), and declined in all other biogeographic zones (minimum loss of 5% in Desert zone, and maximum loss of 71% in the Gangetic plains). Inland human-made wetlands have increased in all biogeographic zones (minimum in Deccan Peninsula by 3% and maximum in Desert by 257%). Coastal natural wetlands have declined by 51%, an increase in area under mangroves (71%), being offset by a decline in mudflats (73%), lagoons (62%) and beaches (39%). Coastal human-made wetlands have increased by 619%, the maximum increase being in aquaculture ponds (2908%). The assessment also presents insight on direct and indirect drivers of wetlands loss and deterioration. Natural wetlands of seven BGZs were moderately affected by the alterations in water frequency and introduction of nutrients making the most dominant direct drivers of change followed by structural modification. Urbanization, Industry and mining along with infrastructure development and local climate change are key indirect drivers which reinforce alterations in physical regimes of natural wetlands of Deccan peninsula, Semi-arid and Coasts. The replication of Trends Index within other countries of South Asia and Asia can help bring to fore the information on wetlands trend and drivers of degradation at resolution amenable to policy and programming interventions.

REGIONAL COLLABORATION FOR WISE USE OF WETLANDS IN SOUTH ASIA

Ritesh Kumar

Wetlands International – South Asia, India • Ritesh.kumar@wi-sa.org

Development of South Asia is closely linked to the health of the region's wetlands. These ecosystems are cradles of several of region's civilizations and play an important role in ensuring water, food and climate security; supporting livelihoods and cultural identities, and a secure habitat to range of biodiversity. However, complex development dynamics, coupled with limited awareness on the contribution wetlands make to societal well-being, has led to severe pressure on wetlands. Wetlands continue to be degraded and lost due to their conversion for alternate uses, fragmentation of hydrological regimes, pollution, species invasion, unsustainable tourism, overharvesting of resources and regional climate change. South Asia's burgeoning food and water insecurity calls for increased attention to integrated management of wetlands. South Asia is home

to nearly one-fourth of world's population with just 3% of world's land area and 5% of world's renewable freshwater resources. Irrigated agriculture supplies 60-80% of region's staple food and accounts for over 90% of water use. Nearly three fifths of the region's irrigation water is sourced from groundwater tapped from its 25-27 million shallow tube wells. Water, once considered abundant, is becoming increasingly scarce, with rapid declines in per capita availability. Unsustainable extraction of groundwater has led to falling water tables in several regions. With 35% of the world's malnourished population in the region, increasing food and water security is indeed alarming. At the same time, the frequency of natural disasters in South Asia is increasingly showing an upward trend. As per the Global Risk Analysis Report, 49.43% of the total South Asian population are at 'relatively high mortality risk' from natural disasters. A majority of the most devastating water related disasters in the South Asian region have had their genesis in mismanaged wetlands wherein lopsided development has adversely impacted the inherent buffering capacity of these ecosystems. Infrastructure led planning, historically adopted for agriculture development in the region has proven counterproductive for natural ecosystems as wetlands. The Contracting Parties to Ramsar Convention within the region are committed to wise use of wetlands, to be achieved through creation of enabling policy environment, integrated management of Ramsar Sites and other wetlands, CEPA and regional cooperation. A suite of guidance has been adopted by the Contracting Parties to assist in practical implementation of wise use approach. However, continued degradation of wetlands in the region indicates challenges in application of available guidance, as well as the need to tailor implementation approaches considering specific regional contexts, such as structural approach to water management, heavy dependence on groundwater, high population densities and rampant poverty. Regional homogeneities in the wetlands regimes, their influencing drivers and pressures, policy environment, and capacities indicate possibilities of benefitting from regional collaboration and exchange while seeking wetlands wise use outcomes. Restoration initiatives as demonstrated in Chilika (India), Ghodaghodi (Nepal) and TanguarHaor (Bangladesh) embellish the significance of community driven and adaptive management of wetlands, as pathways for realization of wise use principles in South Asia. During the 13th Conference of Parties Meeting of the Ramsar Convention held in October 2018 at Dubai, Wetlands International South Asia organised a side event on promoting wise use of wetlands in South Asia to identify opportunities for regional collaboration and exchange. The panel endorsed the idea of the development of a regional platform for supporting the exchange of knowledge and management practices. During the side event, Wetlands International South Asia and Ramsar Regional Center - East Asia signed a Memorandum of Understanding to promote wise use of wetlands in South Asia through capacity development, and supporting application of recent scientific and technical advancements in the management of wetlands. In September 2019, a follow-up Round table of Ramsar National Focal Points of South Asia region, was organised by Wetlands International South Asia in collaboration with the International Water Management Institute and Department of Wildlife and Conservation, Government of Sri Lanka during September 2-3, 2019 at IWMI Headquarters in Colombo, Sri Lanka. There was an overall agreement towards the establishment of a South Asia Regional Forum for Wetlands under the aegis of Ramsar Convention. The purpose of the regional initiative would be to support the implementation of Ramsar Convention by building capacity, regional exchange, and sharing best practices and lessons learnt. Following from discussions, the paper further outlines the regional platform concept, priority actions and modalities for implementation with a view of getting feedback from wetland practitioners and stakeholders attending the Asian Wetland Symposium.

9TH ASIAN WETLAND SYMPOSIUM

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ABSTRACTS OF POSTER PRESENTATIONS

APPLICATION OF RAPID ASSESSMENT OF WETLAND ECOSYSTEM SERVICES IN LAS PIÑAS PARAÑAQUE WETLAND PARK (PHILIPPINES)

Aaron Julius M. Lecciones^{*,*} and Ma. Catriona E. Devanadera^{*,*}

^{}College of Architecture, University of the Philippines, Diliman, Philippines. • amlecciones@up.edu.ph*

*^{**}Department of Community and Environmental Resource Planning, College of Human Ecology, University of the Philippines Los Baños, Philippines. • medvanadera@up.edu.ph*

^{}Corresponding author: amlecciones@up.edu.ph*

The Las Piñas Parañaque Wetland Park (LPPWP) is an urban wetland on the southern portion of Manila Bay on the brink of being lost to rapid urbanization and development. A Ramsar wetland of international importance, this 181-hectare protected area is a sanctuary for migratory bird species that travel the East-Australasian Flyway and is also the nesting site for several endemic species. The mangrove is an important breeding ground for fish, is home to several different species of trees and other flora, and provides storm surge moderation, among many other ecosystem services to the adjacent six coastal barangays in Las Piñas and Parañaque. This paper discusses how the RAWES approach was used as a tool for wetland ecological characterization and presents the results of using RAWES to characterize the LPPWP. A vast amount of evaluation approaches to characterize wetlands exist. Some of these approaches come with high rates in time, cost, and data, limiting their utility. While the Ramsar Convention provides guidance on the conduct of wetland characterization in line with the treaty's reporting requirement, there is a need for a more qualitative assessment of wetlands that require less resources and that could be used in conjunction with a wider array of assessment tools. The RAWES assessment serves as a practical, rapid, and systemic approach in taking account of interdependent ecosystem services. This methodology adapts the rapid technique of assessing ecosystem services listed in a field assessment sheet and linking them to beneficiaries at different scales. A 200-m transect walk was conducted along the shore facing Manila Bay on both Long and Freedom Island using the RAWES Guide. The results were compared with secondary data gathered from literature. It was found that the LPPWP is a source of ecosystems services for the community but that significant socioeconomic factors hampered its use. The RAWES has potential as a tool to establish baseline conditions describing the ecological character of a wetland for use in resource management and conservation planning.

SELECTION OF ESTUARIES FOR WATERBIRD HABITAT CONSERVATION THROUGH COMPLEMENTARITY ANALYSIS ON CLASS A RIVER IN JAPAN

Atsushi Tanabe^{*,*}, Tomoko Minagawa^{,}, Akihiko Koyama^{***}**

^{}Asia Air Survey Co., Ltd., Japan • atanabennjcagf@gmail.com*

*^{**}Faculty of Advanced Science and Technology, Kumamoto University, Japan • minagawa@kumamoto-u.ac.jp*

*^{***}Fishery Research Laboratory, Kyushu University, Japan • koyamaakihiko15@gmail.com*

^{}Corresponding author: atanabennjcagf@gmail.com*

Approximately 300 species of waterbirds inhabit Asia; among these, approximately 200 species of waterbirds are observed in Japan. Estuaries are the foraging and resting habitats for various species of birds. Protection areas for bird habitats, such as “Ramsar Site” based on the Ramsar Convention, and “Special Protection Areas” based on the Protection and Control of Wild Birds and Mammals and Hunting Management Law in Japan, contribute to bird habitat conservation. However, few estuarine areas protected for waterbird habitat in Japan, and consequently, the ideal conservation areas, have not been identified. Therefore, it is necessary to clarify important estuary areas that should be prioritized for conservation for waterbird habitat in estuaries. The aim of this study is selecting high priority conservation estuaries for waterbird habitat in Japan.

We used biological data from the results of the bird surveys of the National Censuses on River Environments (NCRE) in estuary area on 101 class A river systems throughout Japan that are managed by the Ministry of Land, Infrastructure, Transport, and Tourism. Waterbird population of 69 and 70 species in the summer and winter survey, respectively, that were observed during the 4th NCRE bird survey (2006–2015) were used for analyses. The important estuary for waterbird habitat conservation in each season were selected using the complementarity analysis which was performed by Marxan ver.1.8. Through complementarity analysis, 22 and 19 estuaries nationwide of Japan were selected in the summer and winter, respectively, for the conservation of waterbird habitats. These selected rivers, such as the Yoshino and Midori rivers in summer, and Kiso and Kitakami rivers in winter, support the high species habitat of waterbird. Furthermore, in several selected rivers, such as the Maruyama and Kuma rivers, Oriental Stork (*Ciconia boyciana*) and Great Knot (*Calidris tenuirostris*) were observed, which are Red List species. We propose to protect the selected rivers for waterbird habitat. We clarified the high priority conservation estuaries in 101 class A rivers in Japan based on the waterbird data. The protection of estuaries selected using complementarity analysis in each season will contribute to the effective management of waterbird habitat.

BIOTA OF THE KURO RIVER RETARDING BASINS IN THE ASO REGION IN JAPAN

Ayano Yamanaka^{*,*} and Tomoko Minagawa^{*,*}

^{*}Department of Civil and Environmental Engineering, Kumamoto University, Japan

• 179t4834@st.kumamoto-u.ac.jp

^{**}Faculty of Advanced Science and Technology, Kumamoto University, Japan

• minagawa@kumamoto-u.ac.jp

^{*}Corresponding author: 179t4834@st.kumamoto-u.ac.jp

Flood damage frequently occurs at the Kuro River basin in the Aso region. Thus, some retarding basins were built in the river basin to reduce flood damage. These retarding basins are expected to provide various environmental services. However, demonstrating these environmental services from the perspective of environmental conservation and sustainability of the Kuro River basin community is required. In particular, the natural environment and biota characteristics that are the basis of environmental services of the Kuro River retarding basins are not clear. This study aims to clarify the natural environment and biota characteristics of the Kuro River retarding basins. We conducted an environmental survey (water depths, lentic water areas, spring water discharge, and ground heights) and a biological survey (plants, fishes, aquatic insects, and birds) in the Teno, Okura, Uchinomaki, Ono, and Muta retarding basins. Moreover, we calculated lentic water areas using QGIS with orthophotos created from aerial photographs taken by a drone (Inspire 1 - DJI). We calculated the spring water discharge by measuring the flow drained from the waterway under the drain gate to the Kuro River. In addition, we studied the plants by the line transect method. Simultaneously, we measured ground heights using an RTK-GPS and water depths using a staff. We caught aquatic insects and fishes in the lentic water areas using a scoop net and then identified and recorded them. We studied birds by the fixed-point observation method. The environmental survey results indicated that many lentic water areas are formed due to spring water and not the overflow during floods, except in the Uchinomaki retarding basin. Regarding the biological survey, we found 155 plant species and 9 fish species, in which 6 species lived in flood plain wetlands. Therefore, the Kuro River retarding basins function as habitats of living things that live in the wetlands. The aquatic insect's survey results showed 28 species, while the bird's survey showed 41 species. These results demonstrated that the Kuro River retarding basins function as habitats of many living things in the wetlands. In this study, we clarified the natural environment and biota characteristics of the Kuro River basins. As a result, many lentic water areas are formed by spring water, except Uchinomaki retarding basin, and the function of habitats of living things in the wetlands is high.

HOW CAN ECONOMICS MODEL REGIONAL WETLAND CONSERVATION? SYSTEMATIZATION AND APPLICATION OF REGIONAL STRUCTURE IN THE ECONOMICS OF MIGRATING SPECIES CONSERVATION

Eiji Sawada

Faculty of Economics, Kyushu Sangyo University, Japan • e.sawada@ip.kyusan-u.ac.jp

Wetland pollution is often classified as nonpoint source pollution, and it is known to be extremely difficult to improve water quality. In response to this, the research field of environmental economic theory has contributed to the solution of the problem by proposing various measures to control nonpoint source pollution. However, wetland conservation is a problem that should be considered simultaneously with multiple wetlands connected by various networks representing flyways. While there have been many studies focusing on water quality improvement at a single site, economic studies focusing on wetland conservation over a wide area are still few and insufficient. In this study, we surveyed economic studies on the migratory species conservation and attempted to systematize the modeling of "regional" structure as a step toward extending economic studies on regional wetland conservation. There are very few existing economic studies that focus on the migratory species conservation as well. In addition, most of them focus their analysis only on species that travel between the two sites by simplifying the model. When considering a network structure of three or more sites, the spillover effects of wetland and migratory species conservation changes greatly depending on whether or not there are relay sites. We conclude by summarizing how the main analytical results of previous studies change when considering the relay sites and discuss the remaining issues for further generalization of the regional structure.

CREATING ALTERNATIVE HABITATS FROM A WETLAND ECOSYSTEMS PERSPECTIVE: FOCUSED ON THE ECOLOGICAL NICHE SPACE OF ENDANGERED FROG SPECIES

Hye-Ji Oh*, Kwang-Hyeon Chang*, Ju-Duk Yoon**, Kyung-Hoon Shin***, Su-Gon Park****,
Min-Ho Chang*****,+

**Department of Environmental Science and Engineering, Kyung Hee University, Republic of Korea • ohg2090@naver.com*

***Research Center for Endangered Species, National Institute of Ecology, Republic of Korea • grandblue@nie.re.kr*

****Department of Marine Sciences and Convergence Technology, Hanyang University, Republic of Korea • shinkh@hanyang.ac.kr*

*****Invasive Alien Species Research Team, National Institute of Ecology, Republic of Korea • park9663@nie.re.kr*

******Environmental Impact Assessment Team, National Institute of Ecology, Republic of Korea • mhchang@nie.re.kr*

+Corresponding author: mhchang@nie.re.kr

Amphibians are key species related to the conservation and restoration of wetland ecosystems and serve as material and energy circulation between aquatic and terrestrial ecosystems throughout their life history focusing on wetlands. In particular, amphibians are sensitive to environmental changes and are used as bioindicators to evaluate ecosystem health, but at the same time, they are more affected by habitat loss due to their lower mobility and avoidance compared to other species. Recently, researches have been actively conducted to restore habitats and create alternative habitats to minimize biological damage caused by habitat destroying. However, although biological interactions are major factor for stable settlement of organisms in restored or constructed habitats, the quantitative information about ecological niche space, inter-specific competition, etc. are still limited. In this study, we intended to provide quantitative information on biological interactions that can be used fundamentally to restore wetland habitats and establish alternative habitats for endangered frogs (Gold-spotted Pond Frog, *Pelophylax chosonicus*) in South Korea. Based on stable isotope ratios, we estimated the ecological niche space (ENS) of Gold-spotted Pond Frogs in an ecological wetland park and a rice paddy differing in habitat patch connectivity and analyzed the possibility of their ENS overlapping that of competitive and predatory frogs. The

Gold-spotted Pond Frog population exhibited a broader ENS in the ecological wetland park than in the rice paddy. According to the carbon stable isotope ratios, Gold-spotted Pond Frogs mainly fed on insects, regardless of habitat type. However, the results comparing the range of both carbon and nitrogen stable isotopes showed that Gold-spotted Pond Frogs in the rice paddy showed limited feeding behavior, while those in the ecological wetland park fed on various food sources located in more varied trophic positions. Although the ENS of the Gold-spotted Pond Frog was generally less likely to be overlapped by that of other frog species, it was predicted to overlap with a high probability of 87.3% in the ecological wetland park. Nevertheless, since the stable isotope analysis showed that Gold-spotted Pond Frogs fed on more diverse prey than their competitors, it would remain relatively easy to procure alternative food sources, which are less affected by the competition in an environment with abundant food. Since these results show that a habitats' food diversity has an effect on securing the ENS of Gold-spotted Pond Frogs and prey competition, we recommend that the establishment of a food environment that considers the feeding behavior of gold-spotted pond frogs is important for the sustainable preservation of Gold-spotted Pond Frogs and their settlement in alternative habitats.

SEED TRANSPORT PATTERN DURING THE TYPHOON-INDUCED FLOOD IN CHANNELIZED AND RESTORED URBAN STREAMS

Ran-Young Im^{*,†}, Ji Yoon Kim^{**}, Gea-Jae Joo^{***}, Jun Nishihiro^{****}

^{*} Department of Integrated Biological Sciences, Pusan National University, Republic of Korea • chloi1108@gmail.com

^{**} Center for Climate Change Adaptation, National Institute for Environmental Studies, Japan • tapegrass.kim@gmail.com

^{***} Department of Biological Sciences, Pusan National University, Republic of Korea • gjjoo@pusan.ac.kr

^{****} Center for Climate Change Adaptation, National Institute for Environmental Studies • nishihiro.jun@nies.go.jp

[†]Corresponding author: chloi1108@gmail.com

Flood is one of the important mechanisms for seed transport and secondary seed dispersal of riverine plants. Seed dispersal of riparian plants is adopted to the seasonal timing, frequency and magnitude of flooding. In this respect, altered hydrological characteristics after physical modification of stream channel can affect the dispersal capacity of riverine plants in urban streams. In this study, we compared the seed transport by the typhoon-induced floods in channelized (Komagome River) and restored urban streams (Kido River) in Chiba prefecture, Japan. We surveyed 1) the diversity and abundance of transported seeds during the flooding, and 2) the relative proportion of secondary dispersal was estimated based on the species pools in standing vegetations. Three seed traps were set up in each stream in September 2018. Seed samples were collected every six hours for four days during the typhoon passing. Collected seed samples were moved to the laboratory and sieved into different size classes. Seeds were visually sorted and identified with a 10x microscope. We identified 4,824 seeds of 114 species (i.e., 84 species in the channelized stream and 88 species in the restored stream). Only half of the species (49.6%) were cooccurred in the two sites. The similarity between transported seeds and the stand vegetation was slightly higher in the restored stream (overlap 8.7%) than channelized stream (6.1%). The lower similarity in channelized stream partly indicates a higher inflow of seeds from out of the channel. In addition, the relative abundance of alien species was higher in the channelized streams (30% in channelized stream, 25% in restored stream). We found the rate of seed transports was peaked at the high flood in both sites. Response of seed dispersal rate against flood level explained the various transport patterns related to the seed morphology. For example, seed dispersal abundance of light-weighted seeds (e.g., *Oenothera* spp.) increased during the lower water level (i.e., 20 cm). During the high-flood level (i.e., 90cm), the relative abundance of heavier seeds with larger volume mostly adapted to wetland environments (e.g., *Persicaria lapathifolia*) was increased than that of lower flow period. By understanding the relationship between flood and seed transport in urban streams, our results will provide essential information to suggest practical guidelines for riparian management.

ASSESSING LOCAL COMMUNITY INTERACTION WITH WETLANDS RESOURCES AND ECOSYSTEM SERVICES IN SETIU WETLANDS, TERENGGANU, MALAYSIA

Chik Maslinda Omar*, Nur Syahirah Wahab*, Hazman Samsudin, Siti Nor Adawiyah Azzahra Kamaruddin**, Daria Mathew Abdullah*⁺**

* Freshwater Conservation, Peninsular Malaysia Terrestrial Conservation Programme, WWF-Malaysia • comar@wwf.org.my

** Faculty of Business, Economics and Social Development, Universiti Malaysia Terengganu (UMT) • hazman.s@umt.edu.my

⁺Corresponding author: dmathew@wwf.org.my

The Setiu Wetlands, located in the state of Terengganu in east coast of Peninsular Malaysia comprise a diverse array of inter-connected freshwater, brackish and coastal ecosystems. The 23,000 ha wetlands provide a wide range of ecosystem services including flood control, erosion mitigation, nursery ground for juvenile marine fishes and supply of natural resources for the local population's traditional livelihood. The wetlands also have great potential as an ecotourism destination that can generate economic returns to the local communities and to the State. However, continuous observation revealed that there is a lack of understanding on the natural resources and ecosystem services provided by the wetlands and its utilization among the local community. Furthermore, limited integration of vital local knowledge and information related to communities' dependency and wetland resources utilization, if not properly governed may affect the management of and conservation effort undertaken in the Setiu Wetlands State Park and other High Conservation Value areas in Setiu district. The accurate perception of ecological and social benefits of wetland ecosystems among the decision makers thus important to underline the potential of wetlands resources in sustaining the livelihood and well-being of communities. In order to establish and disseminate credible information to guide the wise use of natural resources for sustainable management of the Setiu Wetlands, a survey was undertaken to gauge local communities' perception, reliance and use of natural resources and ecosystem services. The survey was carried out to 200 respondents from 22 villages in Setiu. The large number of respondents selected from these villages was intended to represent more diverse background whereby the natural resources scopes including mangrove, Melaleuca, and forest, as well as land use activities for oil palm and aquaculture are happening and accessible for the community to harvest and utilize. Findings from this survey revealed that majority of the respondents understand the services provided by the ecosystem in their area. Communities are found to be depending more on mangroves, and oil palm and aquaculture activities, compared to the communities of Melaleuca and forest. Although they are depending on these ecosystems, the respondents are at the same time willing to play their roles in conservation and support the sustainable management efforts in these ecosystems. The community also recognizes the wetland ecosystems play an important role in providing services such as carbon storage, habitat for flora and fauna, recreation, beaches, food sources, timber and construction, ecological balance systems and economic resources as well as water catchment areas. They also realized that unsustainable utilization of resources and management of these ecosystems might be threatening the functions and services provided by the ecosystems. Various education and awareness programs pertaining to conservation and management could be introduced to these communities to empower their knowledge and understanding of the ecosystem importance in their area. Findings from this study provide a vital information to garner support for sustainable management of Setiu Wetlands among the local communities and other relevant stakeholders. Apart from that, ideas for potential nature-based bankable solution that may provide economic returns to the state, improve communities' livelihood and support sustainable management of the Setiu Wetlands could be identified and promoted to the State Government.

THE LAUNCH OF ON-LINE INFORMATION SHARING PLATFORM ABOUT WETLANDS IN TOKYO BAY

Tatsuya Shibahara* and Fumihiro Koyama,***

**Center for Ecological Education, Japan • shibahara@eco-plan.jp*

*** Omori Nori Museum, RCJ, Japan • norimuseum@nifty.com*

**Corresponding author: norimuseum@nifty.com*

The size of Tokyo Bay is about 1,500 km² and surrounded by three prefectures. Catchment area population of Tokyo Bay is about 30 million people. After the 1960s, wetlands in Tokyo Bay have been reclaimed on a large scale. Now, more than 90% of the bay coast is artificial. There are two Ramsar Sites, Yatsu-higata and Kasai Marine Park. Other than these, there are small but many other types of wetlands, for example, estuary, tidal flat, shallow sea, canal, artificial beach, etc. Along the Tokyo Bay coast, there are many kinds of learning facilities such as nature observation center, environmental education center, bird park visitor center, injured bird protection center, aquarium, museum, etc. The number of facilities is about more than 20. But, the relationship between them was limited to a part before, because they have their own purpose. The staff of some learning facilities met at the event with a conservation of Tokyo Bay theme in 2015. At that time, we agreed on the importance of partnership between learning facilities for conservation of wetlands of Tokyo Bay and also arousing people's interest in them. And we decided to make a project team and began the information exchange of each other. From then, we were able to establish relationships between learning facilities little by little under the common theme, conservation of wetlands of Tokyo Bay. We carried out facilities stamps collecting event together in 2017, 2018, and 2019. Now, we can say that a network between facilities is made. After the first state of emergency declared in April 2020 in Japan, all of the facilities had to be closed and people were requested to refrain from unnecessary and unurgent going out. We had to stop all kinds of face-to-face educational activities. We worried about decreasing of people's interest on wetlands in Tokyo Bay. As a result of project team discussion, we decided to launch the information sharing platform about wetlands in Tokyo Bay by using Facebook (FB). Easy access is the reason of using FB. After launching, learning facilities were able to send daily information about their own field to people. Everyone who has an FB account can join our group page and post an article about wetlands in Tokyo Bay. Members can also make comments on articles freely. The page address is <https://www.facebook.com/groups/tokyowaninfo>.

TRENDS IN NATIONAL AND INTERNATIONAL YOUTH PARTICIPATION AND DISCUSSIONS ON ENVIRONMENTAL ISSUES

Jin Tanaka* and Seino Satoquo**

**21st Century Program, Kyushu University, Japan • jin.tanaka.660@s.kyushu-u.ac.jp*

***Graduate School of Engineering, Kyushu University, Japan • seino@civil.kyushu-u.ac.jp*

**Corresponding author: jin.tanaka.660@s.kyushu-u.ac.jp*

In recent years, climate change has been rapidly recognized as a problem that causes abnormal weather, natural disasters, and loss of biodiversity. In addition, with the economic development of emerging countries, especially in Asia and Africa, disasters caused by climate change are increasing in a wide range of regions, seriously affecting flora and fauna. In particular, the World Economic Forum has announced that the top five global risks for 2020 will be environmental risks such as "human-induced environmental disasters. On top of that, during the COVID-19 epidemic, international conferences are continuously held regionally and issue by issue with the participation of not only politicians but also investors, young people, and indigenous people. And as for wetlands, they have been severely damaged by drought and floods caused by climate change, which has resulted in the loss of habitat for migratory birds in the Asian region. In

response to these developments, not only in the Asia-Pacific region, but all over the world, young people at home and abroad are discussing environmental issues such as wetlands and climate change problems, even though they are affected by the global epidemic of COVID-19, and their behavior is changing dramatically. In this study, this research summarized the current status of the participation and discussion of young people in their twenties on environmental issues in Japan and abroad and analyzed the changes in the international discussion of youth on wetlands and their actual activities by actually participating in international conferences as organizers, observers, and representatives of the declarations, reports, and discussions presented. The following is a summary of the results. Focusing on international conferences and international campaigns targeting the Asian region, I will show that environmental conservation in the region, especially climate change issues, has been characterized by on-the-ground activities such as mangrove forest planting and cleanup activities, which were reported in the Asia Pacific Forum for Sustainable Development Goal. However, after the global popularity of COVID-19, there is an increasing tendency to set up activity policies, present opinions to the current decision-making generation, and make recommendations to national policies. On top of that, at international conferences such as the ECOSOC Youth Forum and the High Level Political Forum, which also cover the Asian region, there is a tendency to focus more on building international cooperation than on actual conservation activities. On the other hand, at the Asia Pacific People's Forum for Sustainable Development, where civil society groups in their 30s and above took the lead in introducing case studies, there were many examples of activities such as wetland conservation, tree planting, and negotiations with corporations. It is possible that the COVID-19 epidemic has physically alienated youth from the wetlands themselves. At the same time, it can be said that COVID-19 has shifted the discussion of wetland and river conservation by youth to more international and abstract policy making. While such a change in trend can be expected to encourage youth to take on the role of international communication on wetland conservation, there is a concern that there will be a shortage of successors to conserve wetlands and the region itself.

INTRODUCTION TO JAPAN WETLAND SOCIETY AND SOME RECENT ACTIVITIES

Shiina Suzuki^{*,*}, Yoshihiro Natori^{}, Satoshi Kobayashi^{***}**

**Seigakuin University, Japan • shi_suzuki@seigakuin-univ.ac.jp*

***Wetlands International Japan, Japan • natori@wi-japan.org*

****Kushiro Public University of Economics, Japan • satoshi@kushiro-pu.ac.jp*

**Corresponding author: shi_suzuki@seigakuin-univ.ac.jp*

Japan Wetland Society (hereinafter, JAWS) is an academic association aiming at promoting comprehensive and interdisciplinary research on wetlands, and supporting practitioners to implement conservation and wise use of wetlands in the real world. Our activities can be divided into three main categories. First, Annual Academic Conference (once a year, with field trips to wetlands including Ramsar Sites); second, publication of academic journal “Wetland Research” (once a year); third, publication of wetland related books and educational materials etc. Members include academic researchers from a wide variety of fields including ecology, biology, engineering, limnology, geology, sociology, law, public administration, education, cultural studies, etc. Furthermore, members are not restricted to researchers or students, but include practitioners from governmental organizations, NGOs/NPOs, and private companies. We organize interdisciplinary, multi-sectoral working groups to produce practical outcomes including the publication of “A Guide to the Wetlands of Japan” etc. In recent years, JAWS has organized three subcommittees (such as Pond; Hokkaido Wetland Consortium; Wetland Culture, Community, Local Government Development, CEPA and Education) and has been active in cross-disciplinary research and survey-related activities. We also focusing on international activities, and we were fortunate to be part of the organizers of Asian Wetland Symposium in 2017 and 2020. As for the journal, we accept submissions to the journal in English, and hope to disseminate wetland research in Japan to the world.



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Ramsar Regional Center-East Asia

1st floor, Suncheon Bay Institute of Natural Ecology,
460 Ocheon-dong, Suncheon City,
Jeollanam-do, Republic of Korea
Tel: +82-61-746-1160~4



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