The 13th Asia Impact Assessment Conference

21-23 August 2019

Hainan, China

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The 13th Asian Environmental Impact Assessment Conference

August 21-23, 2019, Hilton Hainan, Haikou, China

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Environmental Impact Assessment Review
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Clara U, Hong Kong Institute of Environmental Impact Assessment
Mitsuru Tanaka, Japan Society for Impact Assessment (JSIA)
Lee Sang-Don, Korean Society of Environmental Impact Assessment (KSEIA)

Forum topic

Theme Forum 1:

Theory, Technical Methods and Practical Applications of Strategy/Planning Environmental Assessment

Theme Forum 2:

Theory and Practice of Environmental Assessment in Asia (English)

Special Forum 1:

"Three Lines and One List" System Standardization, Technical Method Case Sharing

Special Forum 2:

Academic Journal Editors Meeting

AIC2019 Conference Schedule

Date		Content		Venue
21st Aug & 22 nd Aug (7:30 – 9:00)		**Registration**		Lobby
22nd Aug		**Guest speech and keynote speech** Host: Prof. Xu He		Lecture hall
	9:00—9:30	Welcome speech Prof. Zhu Tan Prof. Mitsuru Tanaka Prof. Lee Sang-Don		
	9:30—10:10	Mr. Liu Zhiquan	Progress and Prospects of Environmental Impact Assessment in China	
	10:10—10:40	Prof. K.C. Lam	Reshaping Impact Assessment to Respond Human Survival Challenge	
	10:40—11:00	Photo and tea break		
	11:00—12:30	Theory and Practice of Environmental Assessment in Asia (1)		No.1 Yuanjing hall
	12:20—14:00	Lunch and break		Taishan C hall
	14:00—17:40	Theory and Practice of Environmental Assessment in Asia (2)		No.1 Yuanjing hall
23rd Aug	8:30—12:00	Theory and Practice of Environmental Assessment in Asia (3)		No.1 Yuanjing hall

AIC2019 Presentation Timetable

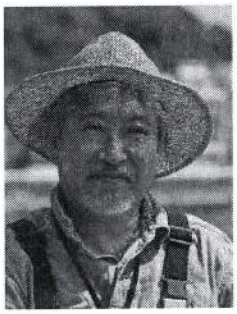
22nd Aug（11:00—12:30）		
11:00—11:10	Opening remarks by Clara U	
11:10—11:30	Towards Ethical Commerce -the first university of RE100 in Japan	Prof. Takako Hashimoto Chiba University of Commerce
11:30—11:50	Reforming EIA System - A Comparative Review	Prof. Wu Jing Nankai University
11:50—12:10	Water Quality Assessment of the Four Major Rivers in Korea	Prof. Lee Jong Ho Department of Urban Planning & Real Estate, Cheongju University
12:10—12:30	EIA Implementation during Construction of Central-Wan Chai Bypass	Mr. Mohamed Hasan Isa Hong Kong Institute of EIA
22nd Aug（14:00-17:40）		
14:00 – 15:40 Session Chair - Prof. Akira Tanaka Co-chair – Mr Freeman Cheung		
14:00—14:20	Strategic approach for windfarm development	Prof. Takehiko Murayama Tokyo Institute of Technology
14:20—14:40	China's photovoltaic development strategy	Xu Yuan Associate Professor The Chinese University of Hong Kong
14:40—15:00	The Effect of Green House Gas Emission Trading System and The Strategies of Airlines : A Case Study of South Korea	Park Sung Sik Associate Professor Korea National University of Transportation, Dept. of Flight Operation & Aeronautical Science
15:00—15:20	Climate Change Impact and EIA System	Prof. Mitsuru Tanaka Hosei University
15:20—15:40	The Key Roles of Comprehensive SEA & EIA for Carbon Capture and Storage in Japan	Kentaro Nakamura/ Prof. Kenichiro Yanagi Meiji University

15:40—16:00	Tea Break	
16:00 – 17:40 Session Chair - Prof. Lee Sang-Don Co-Chair – Prof. Kenichiro Yanagi		
16:00—16:20	Case Study of Quantitative Ecological Impact Assessment on Satoyama Ecosystem	Prof. Akira Tanaka Tokyo City University
16:20—16:40	Practice of Environmental Impact Assessment in Hong Kong: The case of Lei Yue Mun Waterfront Enhancement Project".	Ms. Jenny Tsang Environmental Protection Officer Hong Kong SAR Government
16:40—17:00	Impacts of urban development and human activities on two mangrove ecosystems along shenzhen river: a comparison study between Mai-po and Fu-tian Mangrove nature reserves	Dr. Jinping Cheng The Hong Kong University of Science and Technology
17:00—17:20	Building Asian Connection to Control over the Transboundary Air Pollutants	Dr. Jung Jong-Gwan Senior Research Fellow Chungnam Institute(CNI)
17:20—17:40	Research on assessing the effectiveness of green tax reform-An evidence from a panel data analysis in China	Lai Xiaodong Associate Professor South China Normal University

23rd Aug（8:30—12:30）		
8:30 – 9:50 Session Chair – Prof. Li Wei Co-Chair – Prof. Kim Myungjin		
8:30—8:50	Slowly but Steadily: South Korea's integration of the social safeguards in EIA system	Ms. Lee Eunyoung Gaia Consult Inc.
8:50—9:10	Trends of Biodiversity Offsets in Japan	Takafumi Kawamura Tokyo City University
9:10—9:30	Building the First World Class Thoroughbred Training Centre and Racecourse in Conghua, China – Design, Implementation, Opportunities and Challenges	Mr. Samuel Kwong Senior Manager Hong Kong Jockey Club

9:30—9:50	Assessment on Social Impact related to Coral Offset	Shingo Takeda Tokyo Institute of Technology
9:50—10:20	Tea Break	
10:30 – 12:00 Session Chair - Mr M H Isa Co-chair – Prof. Takehiko Murayama		
10:20—10:40	Case study of biodiversity offset in airport-Sunshine coast airport, Australia	Chun Chen Tokyo City University
10:40—11:00	Study on Community Renewable Energy Project in Yogyakarta, Indonesia	Sita Rahmani Tokyo Institute of Technology
11:00—11:20	EIA follow-up : Applications of Smart Technologies for Environmental Monitoring & Audit in Hong Kong	Ms. Clara U Hong Kong Institute of EIA
11:20—11:40	Analysis of the current situation of apple orchard soil in Qixia City, Shandong	Zhuo Huimin Shandong University
11:40—12:00	USR (University Social Responsibility) for achieving SDGs Activities	Miyuki Sadayuki Chiba University of Commerce
Close Ceremony - Prof. Kin Che Lam		

Resume of guests



Akira Tanaka MLA, Dr.
Professor of the School of Environment, Tokyo City Universty.
Chiar of International Relationship Committee, Japan Soceity for Impact Assessment Major: Biodiversity Offset Banking, Habitat Evaluation Procedure, Landscape Planing, Ecological Restoration, Biodiversity Green Infrastructure.
Hobbies: Traveling, Fishing, Kayaking, Gardening.
He has been working for organizing Asian Impact Assessment Conferences, AICs since the first AIC was held in Tokyo in 2003.

KENTARO NAKAMURA
PhD student at Graduate School of Law, Meiji University
I major in environmental law as a Ph.D. student in Graduate School of Law, Meiji University. My current research theme is the legal framework for implementing CCUS. I also have over 20 years of experience in industrial pollution control measures at the Japan Industrial Environment Management Association (JEMAI).

TAKEHIKO MURAYAMA,Professor of Tokyo Institute of Technology. Vise president of Japan Society for Impact Assessment, Director of International Association for Impact Assessment, Member of Committee on Environmental Impact Assessment of Central Environmental Council organized by Japan Ministry of the Environment.

Dr. Ken-ichiro Yanagi

Professor of Faculty of Law, Meiji University

SPECIALIZED AREAS

Environmental Law and Environmental Assessment

- "Compact Environmental Law & Policy" (Seibunsha 2015, in Japanese)
- "A Comprehensive Study on the Environmental Assessment Law" (Seibunsha 2011, *in Japanese*)
- "The Environmental Assessment Reader" (Gyosei 2002, *in Japanese*)
- "Environmental Law & Policy" (Seibunsha 1999, *in Japanese*)

RELEVANT EXPERIENCE

- Chairman of 2020 Tokyo Olympic and Paralympics Environmental Assessment Review Board
- Chairman of Tokyo Metropolitan Environmental Impact Assessment Council
- Chairman of Japan Society for Environmental Sciences
- Chairman of Japan Land and Environment Institute
- Chairman of Kawasaki City Environmental Impact Assessment Council
- Chairman of Saitama Prefecture Environmental Impact Assessment Technology Review Board
- Chairman of Tokyo Prefecture Koto Ward Environmental Council
- Committee member of the Ministry of Environment's Pollution-related Health Damage Administrative Appeal Board

Takako Hashimoto, Ph. D.
Vice President, Chiba University of Commerce (Professor)
Director, International Center, Chiba University of Commerce

In 2015, she has become Professor of Chiba University of Commerce. In 2015, she stayed at University of California, Los Angeles as a visiting researcher. She has become Director of Institute of Economic Research, Chiba University of Commerce in 2016 and the Vice President of Chiba University of Commerce in 2018. She has served as an Associate Editor of Journal of IEICE Data Engineering and Information Management and IPSJ Transactions On Databases (TOD). She is an Board Member of the Database Society of Japan and IEEE Japan Council. Currently, she has focused on the data mining research and the social media analysis, especially topic extraction from millions of tweets related to the East Japan Great Earthquake. She's also conducting global researches for achieving sustainability development goals using information technologies.

SHINGO TAKEDA
Ph.D candidate
Tokyo Institute of Technology
(Course: Global Engineering for Development, Environment and Society)

I hold a BSc degree in Veterinary Medicine from Azabu University, Kanagawa, and a ME in Bioengineering from Soka University, Tokyo. I have worked mainly on natural resource management and safeguard both in the projects and administrative offices of Japan International Cooperation Agency (JICA). The works I was engaged covers ecological researches, safeguard review and supervision, protected area management, environmental monitoring, and impact evaluation. More specifically, I have been putting my effort to the biodiversity offset that considers ecosystem services during my works in safeguard office and in current doctoral study. I lived and worked in Thailand, Djibouti, Republic of Palau, Ethiopia. Additionally, I undertook various missions such to Nepal, India and Tanzania, Vietnam, Pakistan, Indonesia, PNG, Vanuatu, and Lao PDR.

MITSURU TANAKA
Born in 1952.
Graduated from the Graduate School of Science, Tokyo University. Master's degree.
Worked at Kawasaki City Government from 1978 to 2001.
Since 2001, works as a professor at Faculty of Social Sciences, Hosei University in Tokyo.
Dean of Faculty of Social Sciences, Hosei University from 2014 to 2016 Since 2016, President of JSIA (Japan Society for Impact Assessment)

TAKAFUMI KAWAMURA
I belong to Akira Tanaka office, Graduate school of the Environment and Information Studies,Tokyo City University.
I study Japanese style biodiversity offset.

My name is Chen Chun, I'm a junior of department of restoration and built environment, faculty of environmental stuides at Tokyo City University.
I study about biodiversity offset in laboratory now.
I was born in China, but I have been in Japan for seven years.

Sita Rahmani
Affiliation: Graduate Student at Murayama Lab, Tokyo Institute of Technology, Japan
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Biography

Sita Rahmani has a Master of Engineering degree in Environmental Planning and Policy Science from Tokyo Institute of Technology, Japan. Her main interest is in environmental management and regional development issues. After finishing Bachelor study, she has worked in Indonesia as Research Assistant in various project funded by city government, Ministry of Public Works, and foreign university. Sita is now affiliated to the Dept. of Transdisciplinary Science and Engineering at the Tokyo Institute of Technology in Japan.

Education

- Doctoral Degree / starts at the end of September 2019
- Master of Engineering / 2017 – 2019
  Tokyo Institute of Technology (Japan), Environmental Planning and Policy Science (Murayama Lab), Dept. of Transdiciplinary Science and Engineering, Major in Global Engineering for Development, Environment, and Society
- Bachelor of Engineering / 2011 – 2015
  Universitas Gadjah Mada (Indonesia), Urban and Regional Planning, Department of Architecture and Planning, Faculty of Engineering

Publication

Iswanto, Rahmani, Sita and Roitman, Sonia (2019). Sukunan village, Yogyakarta, Indonesia. Environmental sustainability through community-based waste management and eco-tourism. In Sébastien Darchen and Glen Searle (Ed.),*Global Planning Innovations for Urban Sustainability* (pp. 90-105) Abingdon, Oxon United Kingdom: Routledge.

Abstract of submitted papers

Water Quality Assessment of the Four Major Rivers in Korea

Hong Myung Kim[1], Jong Ho Lee[2], Sung Ryong Ha[3]

[1,3]Chungbuk National University, Korea

[2]Cheongju University, Korea

Keywords: River, Water Quality, Weir. Paired-comparison, Statistics

1. Introduction

The Korean government carried out the Four Major Rivers Restoration Project for 4 years (FMRP, 2009- 2012 year) with the aim to reduce flooding, droughts and to improve water quality, economy and so on. About 20 billion USD was invested to FMRP that includes river-bed dredging, construction of dams and weirs and extending of a discharge area of flow and capacity of agricultural reservoirs (Lah et al. 2015). FMRP is a strategic policy plan as well a large-scale development project that effect on hydrology, water quality, ecology and functions of all rivers in South Korea. Despite the importance of FMRP, it was not considered the environmental impact assessment enough and left over many problems including socio-economic and nature environment. In summer, harmful cyanobacteria were abruptly increased in water bodies (Lee & An 2018). This study aims to assess quantitatively whether river water quality had changed or not due to the construction of weirs in the four major rivers.

2. Methodology

This study used statistical analysis methods to evaluate the gap between two independent samples of water quality data. Two independent samples mean the two water data observed before and after the weir construction and were collected from the 16 weirs of the four major rivers: Han-gang, Nakdong, Geum, and Youngsan. Water quality indices collected: DO, BOD, COD, SS, T-N, T-P and Chl-a. The normality of two samples tested using Shapiro-Wilk method. When the outcomes of two water samples are normality (parametric), they were tested with paired T-test to determine the mean difference between the two groups. If the normality test outcome is not normally distributed, we used the Mann Whitney U test as a nonparametric test (Helsel et al., 2002: Meierhofer et al., 2019).

3. Results

BOD was degraded at the 5 sites of weirs among 16 weirs. COD was deteriorated at 10 sites. However, water quality indices such as SS, T-N, T-P were improved at 11, 5, 10 weir sites, respectively. Water quality of SS, T-N and T-P were apparently improved at the three major rivers such as Geum-gang, Youngsan-gang and lower part of Nakdong-gang because of intensive investment by the Korea Government to improve the removal efficiency of nutrients.

4. Conclusions

The water quality deterioration of the BOD in 16 weirs of the four major rivers occurred at 5 sites. In addition, COD deterioration occurred at 10 sites. SS was improved at 11 weirs. T-N and T-P were improved at 5 sites and 10 sites, respectively because the government invested heavily in improving the removal efficiency of T-N and T-P through the advanced technology of wastewater treatment facilities in line with the Four Major Rivers Restoration Project.

References

Helsel, D. R., Hirsch, R. M., (2002) Statistical Methods in Water Resources Techniques of Water Resources Investigations, Book4, chapter A3. U.S. Geological Survey, pp 117-136.

EIA Implementation during Construction of Centre-Wan Chai Bypass

Mr M H Isa

Hong Kong Institute of Environmental Impact Assessment

Abstract

The Central – Wan Chai Bypass and Island Eastern Corridor Link (CWB) is a strategic road along the north shore of Hong Kong Island to relief traffic congestion along the existing trunk road connecting Central and North Point. Its construction and operation, managed by the Highways Department (HyD) of HKSAR, is a Designated Project under the Environmental Impact Assessment Ordinance (EIAO). Comprehensive EIA had been conducted and completed in 2009 in accordance with the EIAO by the HKSAR Government. Following the approval of the EIA Reports, an Environmental Permit (EP) which imposes conditions to govern the construction and operation of the CWB was issued to HyD in 2009.

Due to the traffic jammed most of the time on a day, every day, throughout the month. To allow drivers to go beyond Wan Chai and North Point with minimum disturbance to the existing public and residence, road widening, tunnel construction, expansion of the existing link as well as widening of the existing flyover are carried out in different stages.

CWB is a mega-scale infrastructure project in close proximity to the local community. Its construction involves dredging, reclamation and road construction, posing nuisances to the neighborhoods. To effectively oversee its environmental performance, a number of environmental matters needed to be tackled. This include not only air, noise, waste water and waste nuisance created but part of the area was used as a ship berthing so sediment deposited took place for ages. So, one of the major issues for the project site is 'Contaminated Sediment' which is assessed in accordance with the Government technical circular ETWB TC(W) 34/2002 so that these may be disposed of to relevant designated dumping site as the last resort.

To allow the general public to know whether the works are carried out as per the Environmental Impact Assessment, Environmental Monitoring & Audit and the Environmental Permit, in this digital era, all relevant monitoring data i.e. air, noise, water samples, etc., collected at weekly or monthly intervals are put up on the website such that anyone at anytime can look at. Furthermore, specific procedure is set up to release these data to the media for any emergency situation(s).

The Key Roles of Comprehensive SEA & EIA for Carbon Capture and Storage in Japan

Prof. Dr. Kenichiro Yanagi, Kentaro Nakamura

Meiji University, Japan

Keywords: Carbon Capture and Storage (CCS), Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) law, Long-term management

1. Introduction

Japan's Long-term Strategy under the Paris Agreement submitted to the UNFCCC Secretariat on 26 June 2019 emphasizes importance of early adoption of the CCS (carbon dioxide capture and storage) and CCU (carbon dioxide capture and utilization) in the society. However, the current status of CCS in Japan is still in the demonstration stage, and many policy and legal issues need to be addressed. In particular, establishment of comprehensive SEA and EIA for CCS will play major key roles for early social implementation. This study aims at developing a comprehensive policy and legislative framework for commercializing CCS in Japan.

2. Long-term Management

IEA Model Regulatory Framework (2010)[i] recommended that each jurisdiction needs to ensure long-term management (i.e. careful site selection; monitoring; effective regulatory oversight; and implementation of remediation measures to eliminate or limit the causes and impacts of leakage). Long-term liability is one of the most critical elements of long-term management for CCS. SEA assists in the policy and planning stages of the whole CCS project life[ii]. EIA ensures the baseline of project performance especially for the permit stage, and a monitoring process takes the place of EIA, ensuring the sustainable management for the life cycle.

3, Key Issues of Adopting the SEA/EIA Framework in Japan

The current CCS law under the Act on Prevention of Marine Pollution and Maritime Disaster in Japan has yet to include a provision for long-term management. Regulatory obligation for conducting SEA and EIA has not been adopted in the existing policy and legal framework. There are more specific issues to be addressed in the act.

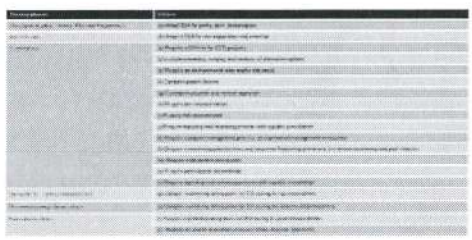

Table 1: Designing Assessment Criteria

4. Conclusions

The proposed SEA/EIA framework will then be practically integrated to prepare for commercialised CCS in Japan. However, discussion of detailed existing and potential criteria and uncertainties of methods for environmental impacts and liability issues due to the application of CO2 capture, transport and storage is not the central focus of this study.

**This study is supported by "Grants-in-Aid for Scientific Research (KAKENHI,17H04488), Japan"*

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[i] IEA 'Carbon Capture and Storage Model Regulatory Framework" (2010).

[ii] IEA GHG,. "*Environmental Assessment for CO_2 Capture and Storage*" (2007).

Case Study of Quantitative Ecological Impact Assessment on Satoyama Ecosystem

Akira Tanaka
Tokyo City University, Japan
Keywords: Biodiversity Conservation, Habitat Evaluation Procedure, Biodiversity Offset, Compensatory Mitigation

1. Background and Objective

Satoyama ecosystem is a secondary natural environment formed and sustained through a long-term interaction with human society. However, Satoyama currently holds the same or a higher level of importance as wilderness in its role serving as foundation for biodiversity. Thus, conservation of Satoyama is an unavoidable challenge to conserve biodiversity. As illustrated by "Three Lines, One List" approach promoted by Current Chinese President Xi Jinping in 2016, conservation of ecological environment is being acknowledged as a critical task by governments around the world.

Unlike wilderness conservation which requires simply restricting human impacts, maintenance of Satoyama ecosystem demands constant management activities done by humans. Due to these characteristics, Satoyama is confronting both "overuse" problem, e.g. loss of land due to development, as well as "underuse" problem, e.g. deterioration due to decreasing economic value of Satoyama.

In order to promote conservation of Satoyama ecosystem including biodiversity offset as compensatory mitigation, this research suggests key points and tasks to focus on when performing Environmental Impact Assessment (EIA). This is for ecologically sound and quantitative evaluation of negative and positive impacts caused by a development project and a civil Satoyama conservation movement.

2. Methods

An "overuse" case of residential development of a Satoyama ecosystem in the city of Yokohama was studied along with the "underuse" case of Satoyama ecosystem management activities performed by an NPO in Aichi prefecture. The characteristics of these two evaluations were then listed to perform comparative analysis.

3. Discussion

1) HEP allows the evaluation of both negative and positive impacts since it quantifies the changes in physical environment of habitats of evaluation species.

2) Evaluation species are the ones chosen to represent a given ecosystem, e.g. species at higher trophic levels, keystone species, typical species, and threatened species. Thus, the type and degree of impacts can be assessed more specifically.

3) When evaluation area is consisted of more than one ecosystem—for instance, a combination of water area and forests—comprehensive assessment can be performed by selecting representative species for each ecosystem.

4) Using polygons to divide evaluation area enables more accurate assessment, but it requires additional preparation tool such as GIS. While using mesh can simplify the process, extra attention is required in order to avoid the intrusion of subjectivity when deciding the value of each mesh.

References

Tanaka, Akira (2006) Theory and Practices for Habitat Evaluation Procedure (HEP) in Japan, Asakura Publishing Company, LTD. 280pp.

This study was supported by JSPS KAKENHI Grant Number JP18K11732.

Table 1: Comparison table

	Yokohama project	Aichi project
Type of human activities	Residential development business	Satoyama conservation activities
Type of satoyama ecosystem (Area)	Deciduous broad-leaved forest, paddy field (33.6ha)	Deciduous broad-leaved forest (4ha)
Evaluation target	Effects of development project and mitigation measures on the habitat of evaluation species	Effects of conservation activities on the habitat of evaluation species
Evaluation species used for HEP	Genji firefly (*Luciola cruciate*), Heike firefly (*Luciola lateralis*), Japanese brown frog (*Rana japonica*), Montane brown frog(*Rana ornativentris*)	Japanese luehdorfia (*Luehdorfia japonica*)
Evaluation area division method	Polygon	Mesh
Evaluation results	The negative impact of the development project could be evaluated biologically and quantitatively for each evaluation species	The positive impact of the conservation activities could be evaluated biologically and quantitatively for each evaluation species
Main issues	It takes time to divide and calculate	Limitations of a single species evaluation

Practice of Environmental Impact Assessment in Hong Kong: The case of Lei Yue Mun Waterfront Enhancement Project

Jenny TSANG (Presenter) and Matthew TANG

Environmental Protection Department,

The Government of the Hong Kong Special Administrative Region (HKSAR),

The People's Republic of China

Abstract

The Environmental Impact Assessment (EIA) Ordinance has been implemented in HKSAR since April 1998. It serves to avoid, minimise and control adverse environmental impact of designated projects through the application of EIA process and the Environmental Permit (EP) system. It has provided an important platform for striking a balance between environmental protection and development. The EIA process is transparent and all statutory documents under the EIA Ordinance are available on the internet for public to access. The public can actively participate in the EIA process by providing comments on the scope of the EIA study during the scoping stage and can comment on the findings of the EIA study during the review stage of the EIA report. This paper will present the mechanism of the statutory EIA process in Hong Kong using the example of Lei Yue Mun Waterfront Enhancement Project, which involves construction of public landing steps and various modification works of the existing waterfront area to enhance its tourist appeal. The EIA processes including project definition, screening and scoping, EIA report preparation, public consultation, EIA report approval, and issuance of EP will be covered in this paper. The way how the planning and design of the Project has been enhanced through the EIA process including public comments received and proactive initiatives from the project proponent will also be elaborated.

Building Asian Connection to Control over the Transboundary Air Pollutants

Jong-Gwan Jung
Chungnam Institute, Korea
Keywords: SDGs, Environmental governance, Transboundary air pollutants, Particulate matter

1. Introduction

It is forecast that air pollution will only expand in scope due to anticipated phenomena such as population, economic growth and urbanization in all Asian countries. And it is further expected that even should fierce problems in particular areas be resolved, pollutant emission volumes within countries as a whole will continue to increase. In this regards, humanity must confront problems posed by its own population, resource and energy consumption. Economic expansion to meet peoples' wants of enhancing their lives is a pressing policy task. But resolution of local challenges in areas such as pollution policy and natural conservation, as well as response to regional environmental issues, must be pursued simultaneous to that development. Whether this can be achieved lies at the heart of the SDGs.

2. Key air pollutants issue

A subset of fine particles called secondary organic aerosols, has a greater total mass, and is thus more dangerous to human health. These particulate matters were identified as the most lethal of the widely dispersed air pollutants. Linked to both heart and lung disease, they kill an estimated 6 million peoples each year all the world.

However traditional pollution control strategies are focused on keeping particulate matters from escaping into the atmosphere, such as wide range dispersion. This method could significantly affect the future design and implementation of air pollution control strategies. And air quality regulators would have to rethink the models that inform air quality rules. The formation of secondary compounds in the atmosphere as gaseous byproducts were thought to incorporate themselves into fine airborne drops of liquid that would then dissipate quickly as the drops evaporated. And inorganic secondary particulate species are directly related to their precursor gases SO2, NOx and NH3, with rather well known sources mostly related to fossil fuel burning and agriculture. By contrast, sources of organic aerosol are widespread and their relative contributions remain uncertain.

3. Factors of transboundary control

To overcome the complex attribute between economic growth and human health, and much trial and error produced substantial results in controlling transboundary air pollutants. The design of a new environmental policy system is based on environmental governance initiatives, which are rooted in principles of harmonious coexistence and public participation.

In this context, we can derive some factors responsible for this successful cooperation to secure safe air quality in Asian region as follows;

- Achievement of Asian regional consensus that partulate matter damage to health be stopped.
- Distinction between perpetrators and victims, and relative clarification of their relationship.
- Innovative efforts to deal with air quality by some local governance.
- Consolidation of Asian regional system based on global minimum criteria.

- Establishment of the Polluter Pays Principle as a system to allocate the burden of solution for air pollutant measures.

4. Conclusions

Responding to the transboundary air pollutants is extremely difficult because particulate matters, the main substances contributing to regional conflict due to transboundary dispersion, is inextricably linked with industrial and heating activity itself and human ways of life. In the face of global demands to reduce air pollutant emissions, Asian countries are torn between going along or improving immediate living standards. In the long run living standards for peoples of every country will require not only a better understanding of regional air quality but also a clearer commitment to future generations.

References

DiGiovanni, F., Coutinho, M., Guiding Principles for Air Quality Assessment Components of Environmental Impact Assessments, 2017, pp. 14-18.

Kumar, P., Morawska, L., Martani, C., Biskos, G., Neophytou, M., Di Sabatino, S., Bell, M., Norford, L., Britter, R., The rise of low-cost sensing for managing air pollution in cities. Environ. Int. 75, 2015, 199–205. doi:10.1016/j.envint.2014.11.019.

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M. Beekmann, A. S. H. Prévôt, F. Drewnick, In situ, satellite measurement and model evidence on the dominant regional contribution to fine particulate matter levels in the Paris megacity, Atmos. Chem. Phys., 15, 9577–9591, 2015 www.atmos-chem-phys.net/15/9577/2015/ doi:10.5194/acp-15-9577-2015

Moving Slowly but Steadily: Korea's Integration of the Social Safeguards in EIA System

Eunyoung Lee

CEO, Gaia Consult. Inc.

Keywords: EIA, SIA, Environmental and Social Safeguards

1. Introduction

Korea enacted the Environmental Impact Assessment Act in 1997. The latest amendment of the country's EIA system in 2018 strengthened its integration of, among others, 1) Social Impact Assessment and; 2) Consideration of the vulnerable groups.

The Integration of the social components in EIA for the projects within the country is also a mirror image of the country's efforts to strengthen its environmental and social impact management of the project overseas invested by the country: Since its joining the Development Assistance Committee (DAC) of OECD in 2009, the Korean government has been striving to revamp its ODA policy in terms of the safeguard application on par with the internationally recognized standards.

In this backdrop, this presentation will chart out the progress of Korea's EIA system in terms of its integration of the social impact assessment (SIA) components, as part of the EIA system. After presenting the country's progress on the legalization of the components, this presentation will also aim to shed lights on the ground reality of its implementation by case-studying some of the EIA practices in the country.

In addition, the presentation will briefly summarize the country's major development financial institutions' and ODA implementing agencies' cases of the institutionalization of the social safeguard components. Some of the flagship cases to be presented will include cases of the Export-Import Bank of Korea (EDCF, the Economic Development Cooperation Fund), the Korea International Cooperation Agency (KOICA) and the Korea Development Bank (KDB).

2. Title

2.1 Title

Moving Slowly but Steadily

2.2 Subtitle

Korea's integration of the social safeguards in EIA system

The new administration of the Korean government, which has replaced the previous administration by the political overhaul driven by a wave of dramatic grass-root democratic movements (initiated by what so called "candle light revolution"), has imbibed a new Zeitgeist by explicitly focusing on inclusive economic reform, which emphasizes on the equitable sharing of the economic wealth of the country with the less privileged segments of the population such as low-income workers, the unemployed etc. While a level of resistance are visible by the invested political and economic interests, the persistent motto as such clearly is reverberating and resonating in a range of policy reforms, including the revision of the existent EIA Act so as to include the provision on the vulnerability analysis as part of the EIA.

This is not, however, a stand-alone, unanticipated interruption by a sudden regime change. As a matter of fact, there has been both endogenous and exogenous factors brewing over time to drive the country to slowly wake up the need for the

integration of the social impact assessment into it s EIA system over time.

This presentation will list up some of the key internal and external drivers as such in order to explain the recent revision of the EIA Act and the consequent movements of the major ODA and development financial institutions in the country to step forwards to substantial institutionalization of the environmental and social safeguards.

3. Conclusions

Slowly but steadily, the country is embracing the social components of the EIA and both public and private financial institutions in the county are moving towards mainstreaming the environmental and social risk managements of the overseas development projects they are financing.

Being a safeguard practitioner, who has worked for years for the above-listed institutions' formation of the safeguard policies as well as for individual overseas development projects in its application of the newly development safeguard policies vis-a-vis the international safeguard standards (such as those of IFC, ADB and WB), the presenter will also share her first-hand experiences to illustrates some of the key challenges and dilemmas that have been identified in the course of her development consulting experiences, while suggesting some practical ways forwards. The lessons as such will provide some valuable resources for kick-starting discussions among the key policy makers and stakeholders to identify what further measures to be taken to fine-tune the introduced policies and to make them more viable and effective. This presentation claims that the eruptions as such would be irreversible regardless of the future regime changes of the country.

References

EIA Act of the Republic of Korea (Enacted in 1997, latest amended and effective as 2018).

Regulation on the Preparation of the EIA Statement] (Enacted in 2001, last amended and effective as 2018)

EDCF Safeguard Policy (2016)

Trends of Biodiversity Offsets in Japan

Takafumi Kawamura[1], Takeru Shiroki[1], and Akira Tanaka[1]

[1]Tokyo City University, Japan
Keywords: Compensatory Mitigation, Biodiversity Offset, EIA, Watershed, No-net-loss, Green Region

1. Introduction

As illustrated by "Three Lines, One List" approach promoted by Current Chinese President Xi Jinping in 2016, conservation of ecological environment is being acknowledged as a critical task by governments around the world.

"Green Regions" (Tanaka, 2017) are constructed to balance development impacts and conservation effects in ecological units (watersheds). To realize Green Regions, "Watershed banking" is needed.

Up to now, previous studies on technical and political issues in Japanese style biodiversity offsets have not focused on the ecological unit of watersheds.

Therefore, we organize and analyze trends of biodiversity offsets in Japan as a basic study about feasibility of Watershed Banking in Japan.

2. Method

We collected 3 type information from 3 sources: the Internet, academic literature, and interview surveys, and analyzed them according to 14 perspectives on biodiversity offset by Tanaka (2014) modified by the author (ref. 2.2.: 14 perspectives in analyzing).

2.1. Type of information collected

- Similar cases of offsets
- Cutting-edge policies related to offsets
- Activities related to offsets

2.2. 14 Perspectives Analyzed

- In-kind or Out of kind offset
- Onsite or Offsite Offset, consideration about watersheds
- Relationship between Political Conservation area and Offset site
- Spatial Volume
- No Net Loss
- Timing between Offset and Development
- Usage of Quantitative Biodiversity Evaluation Method
- Responsive Organization for Initial Actions
- Funding Organization
- Mitigation Hierarchy and Multiple Plans
- Relationship with EIA system
- Direct or Indirect Offset
- Responsible Organization for Maintenance
- Liability of Offset

Table 1. List of locations, their studies and types.

No.	Pref.	Title	Type
1	Iwate	Karumai Town Basic Plan for Rural Area Promotion with Renewable Energy Generating	Policy
2	Gumma	Project of construction the SANDEN Forest Akagi Factory	Case
3	Yama-nashi	Prefectural Ordinance of EIA	Policy
4		Land Readjustment Program in Showa Town	Case
5	Chiba	Narita Airport Expansion Project	Case
6		Activity for Conservation of SATOYAMA in Shisui town	Case
7		Practical Study of SATOYAMA Banking	Activity
8		Activities of Japan Reno Aguri	Activity
9	Saitama	The Shiki City Ordinance on Nature Restoration	Policy
10	Kana-gawa	The Zushi City Ordinance for Satisfactory Urban Environment	Policy
11		Development Project in Kamigo	Case
12		Land Filling Project in Mito, Miura City	Case
13	Shizu-oka	Activities for Mainstreaming of Biodiversity in Izu-peninsula	Activity
14		Shimizu City Ordinance of Clear Stream	Policy
15	Aichi	Aichi Mitigation	Policy
16	Osaka	Mino City ordinance of Tax on Development Projects for Greening	Policy

3. Result and Conclusion

We collected 16 studies, 9 prefectures (Table1). Result of analysis of 14 perspectives on

biodiversity offset, in Japan, show biodiversity offset is becoming liable based on acts or ordinances. However, there are no guidelines set about biodiversity offset which is much needed. Hence, we propose it.

Moreover, perspective of "No net loss" is lacking since quantitative biodiversity evaluation methods are not used positively. We will develop simple evaluation method. Consideration on watersheds are not taken into account, therefore, we propose our planning process based on watershed.

Reference

Tanaka, Akira (2017) Can EIA be an effective tool for creating ecologically sustainable society?-From the aspect of "Green Region", Proceedings of Impact Assessment and Post Management , the 1st Vietnam-Japan-Korea-China EIA Conference, p.13.

Assessment on Social Impact related to Coral Offset

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Keywords: biodiversity offset, ecosystem services, corals, social consideration, developing countries

1. Introduction

Biodiversity offset became popular mainly in developed countries, and many cases focuses on ecological validity (Gelcich et al., 2017). But, social aspect should also be focused especially in the developing country because local livelihood largely rely on natural resources and is lost by plotting of development area. While in the offset site, the other social impact, such as tradeoff, conflict, additional loss, are also arise in terms of resource use i.e Ecosystem Service (ES).

Less cases of offset for marine resources especially for corals are reported. However, the needs in development project at coastal area where corals inhabit are recently increased in developing countries.

In this circumstance, we proposed an approach to mitigate above mentioned social impacts for the coral offset. Offsetability[1], dependency[2] to ES and accessibility[3] are studied as an approach and tested in a coral offset in Vanuatu. Additionally, continuity of ES was considered to prepare affordable offset site management plan.

2. Method

Three (3) offset candidate sites (Ifira East, Iririki, East and Fatumaru) were selected in the Port-Vila bay based on result of rapid assessment (Fig.1).

Fig.1 Map of Port-Vila bay. Circle indicates candidate sites (circle).

Then biological and social survey was conducted at candidate site to grasp its biological states e.g. coral cover, species composition of corals and surrounding ambient environment and to understand social characteristics e.g coral-related activities and its condition. Eventually, offsetability, dependency, and accessibility were evaluated.

3. Results & Discussions

Offsetability and dependency and accessibility were varied site by site even within small area. Moreover, social characteristics and its relationship to ES are different among the candidate site. As a whole, well balanced site was Fatumaru. It is expected that such site is advantageous to mitigate the social impacts.

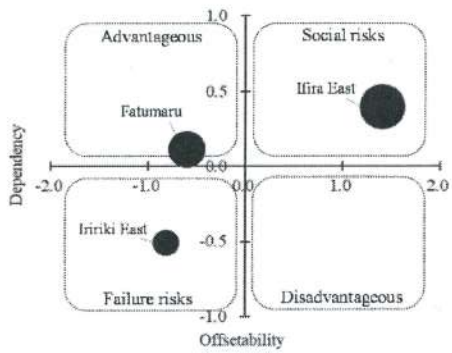

Fig. 2 Advantage and disadvantages of the candidate site. Size of lavel indicates advantage in accessibility

We also found that accessibility and existence of target objectives such as fish and beautiful environment are the important factor to continue using ES. This finding would be useful to suggest alternative site of affected ES in the offset site management plan.

4. Conclusions

Advantages and disadvantages to be offset site are supposed be localized within small area in development countries. Through the approach we proposed, those localized characteristics become clear and counter measures against the social impact become taking into considerations. Therefore this approach is expected to greatly contribute to other coral offset cases.

References

Gelcich et al.(2017). Achieving biodiversity benefit with offsets: Research gaps, challenges and needs. Ambio. 46(2):184-189.

[1] The "offsetability" means how likely it is that an offset can compensate

[2] The "dependecy to ES" means magnitude of engegement to Ecosystem Service.

[3] The "accesibility" means easeness of access for Project Affected Persons (PAPs) and offset site managers

EIA follow up – Applications of Smart Technologies for Environmental Monitoring and Audit in Hong Kong

Clara U

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Abstract

In Hong Kong, the Environmental Monitoring and Audit (EM&A) requirements are often specified in the Environmental Permit subsequent to completion of the EIA report for the designated project as a mean for EIA follow-up. Hong Kong has more than 30 years of experience in EM&A to ensure the mitigation measures recommended in the EIA report are properly and timely implemented, to verify the EIA predictions and assumptions are valid and to monitor the actual performance to pre-empt impacts. The presentation will share with audiences the potential applications of Smart Technologies in EM&A against specific activities of sensitive designated projects which include Technological Surveillance to substitute the traditional Physical Surveillance; to identify the potential environmental impacts as early as possible and to act promptly on suspected offence with the aid of artificial Intelligence function and to promote the use of mobile devices to go for paperless and instant on-site information retrieval mechanism in improving the efficiency of handling environmental complaints.

Impacts of urban development and human activities on two mangrove ecosystems along shenzhen river: a comparison study between Mai-po and Fu-tian Mangrove nature reserves

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Abstract:

Mangrove ecosystems possess high conservation value by providing vital habitats to a great variety of wildlife. Rapid urban development has posed serious environmental impacts on mangrove ecosystems around the world. This study examined the impacts of urban development and human activities on two mangrove ecosystems along shenzhen river, namely Maipo and Fu-Tian Mangrove nature reserves. Our study shows that Fu-Tian mangrove nature reserves were more heavily impacted by urban development and human activities as demonstrated by the high nutrient levels in the water samples. While more active environmental management strategies were observed in the Maipo mangrove nature reserves, metal contents in sediments from Mai-Po mangrove nature reserves were observed to be much higher than that in Fu-Tian. In view of the fact that economic expansion is likely to rise around the Greater Bay Area, regular monitoring and vigilance is recommended in order to better conserve the mangrove wetland habitats in this region.

Building the First World Class Thoroughbred Training Centre and Racecourse in Conghua, China – Design, Implementation, Opportunities and Challenges

Mr Samuel Kwong

Senior Manager

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Abstract

Conghua Racecourse is designed and is now operating to the highest international standard for equine industry, environmental protection and long term sustainability development of Conghua. The key sustainability features include: redevelopment from an existing facility with enhancement on green coverage; balanced cut-and-fill during site formation; 100% reuse of greywater via the onsite sewage treatment plant (2000m3/day capacity); zero discharge of operation wastewater into the nearby Liuxi River – a drinking water source of Guangzhou city; rainwater harvesting & first flush collection in the onsite lagoon (72,320m3 capacity); firefighting wastewater management; activated carbon odour control at the stables; fully enclosed stable waste management for odour and secondary environmental impacts prevention; key equipment noise insulation; comprehensive monitoring programme (online monitoring for water discharges and regular monitoring for air quality, noise and radiation); ISO14001 based environmental management system; and comprehensive emergency response and prevention management.

Spread across 150 hectares, Conghua Racecourse can house over 660 horses. It has three racetracks, an uphill gallop track, spelling paddocks, an equine swimming pool, horse walkers, a farriery and an advanced veterinary hospital equipped with an X-ray unit, operation suites and rehabilitation unit. With its world-class facilities, internationally recognised equine disease-free zone and highly skilled workforce and management, Conghua Racecourse is positioned to support equine industry by bringing both employment and economic development while harmonising with the natural & social environment of Conghua.

This paper will evaluate the opportunities and challenges during design and implementation of the Racecourse especially ensuring compliance with the EIA requirements, protecting the delicate environment in Conghua, securing an equine disease-free zone, and enhancing the community. It will also explore the possibility of applying the learnings to other projects and locations in Hong Kong.

How does Risk Perception influence Public Participation Behavior in NIMBY projects – Analysis Base on Theory of Planned Behavior

Yao Xinyue，He Jia*，Bao Cunkuan*
（Department of Environmental Science and Engineering,Fudan University, Shanghai, 200433）

Abstract: In China, from opposing the implementation of PX projects to opposing the construction of public projects such as waste treatment plants and substations, "nimby" events arise frequently, which becomes a thorny problems even a formidable "gap" often encountered during nimby projects construction. The root of nimby dilemma lies largely in the difference of risk perception of different stakeholders and the coping strategies and behaviors stem from it. However the public participation behavior regulated by law provides a possible way to resolve the nimby conflict. This study proceed from the practical problems of nimby project construction in China, from individual angle, taking the planned action theory as the research framework, discusses the influencing factors, influencing paths and influencing degrees of "risk perception - public participation behavior". A structural equation modeling procedure was applied to the examination of the influences of risk perception on attitudes towards public participation, subjective norms, perceived behavioral control, and public participation intention, to analysis the relations between these constructs and past participation behaviors, as well as the direct impact of risk preference, knowledge and experience, interests and trust on risk perception and the indirect impact on public participation behavior. The research model was tested empirically using a sample of 988 residents who nearby a waste incinerator. The results show that risk perception has a significant impact on public participation attitude and willingness to participate, while knowledge, experience, interests and trust have a significant impact on risk perception level. In addition, the past behavior of public participation has a significant impact on the level of public risk perception. Findings indicate the complex relationship between public engagement and public perception of risk. Managers can adjust the level of public risk perception through knowledge, experience, interests and trust, public participation would be an effective way to resolve nimby conflicts.

Case study of biodiversity offset in airport -Sunshine coast airport, Australia-

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[1]Tokyo City University, Japan

Keywords: Sunshine Coast Airport, Biodiversity Offset

1. Introduction

Biodiversity offset has been one of the vital solutions to protect biodiversity loss by development projects. Presently, more than 100 countries have laws or policies in place that require or enable the use of biodiversity offset, or are currently considering their use. (OECD, 2016) China's President Xi Jinping has announced that protecting the ecosystem is "the most important foundation" of sustainable development. Of course, biodiversity offset will also be the important issue in Japan. In this study, we gather together materials for Biodiversity Offset Strategy (BOS) of Sunshine Coast Airport Expansion project (SCAEP) aiming to protect our biodiversity.

2. Methods

Information was collected from Sunshine Coast Airport Expansion Project's environmental impact statement documents. Our investigation focuses on: quality, space quantity, and time of four species (plants and animals, Table 1) according to "Biodiversity Offsets" that cannot be avoided by impact of human development, for example, construction of buildings, roads, etc. Results are summarized in Table 2 to be of high consideration.

3. Conclusions

The literature showed the "Biodiversity Offset" investigation prompted compensatory revegetation and restoration works to plant translocated areas with similar vegetation groups or creation of new habitats whose area is equal to or larger than that of the biodiversity loss (No net loss) by the development projects. In addition, the literature showed people involved in the project are providing long-term maintenance and monitoring.

References

Sunshine Coast Council (2016) Sunshine Coast Airport Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

Tanaka Akira (2014) Point at issue of reviewing biodiversity offset in Environmental Impact Assessment

Table 1: Subjects of BOS

	Species	scientific name
1	Mt Emu She-Oak	*Allocasuarina emuina*
2	Wallum Sedge frog	*Litoria olongburensis*
3	Wallum froglet	*Crinia tinnula*
	Wallum Rocket frog	*Litoria freycineti*
4	Ground Parrot	*Pezoporus wallicus*

Table 2: Case study of contents

Points of view	Contents
1.Quality of offset	Compensatory habitat has the same quality as loss habitat
2.Place of offset	Onsite 17.5% (14.96ha) Offsite 82.5% (70.43ha)
3.Relation with conservation area	Under the law, compensatory habitat is designated and out of conservation area
4.Area	Compensatory Habitat (85.39ha) is 10.8ha larger than lost habitat (74.59ha)
5.Option of quality	No net loss
6.Period	**Before construction:** A part of Wallum Sedgefrog, Ground Parrot and Mt Emu she-oak offsets **During construction period:** Other offsets delivery
7.Quantitatively assessment of BOS	EPBC Act Offsets Assessment Guide applied only to Mount Emu She-oak and Wallum Sedgefrog, Queensland and Australian Government offset calculators
8.Performing organization	Sunshine coast Airport
9.Investor	Sunshine coast Airport
10.Mitigation hierarchy and alternatives assessment	Alternatives and following hierarchy
11.Relation with environmental assessment	It is being considered in the extension of environmental assessment procedure
12.Subject action	Direct offsets and Indirect offsets

Study on Community Renewable Energy Project in Yogyakarta, Indonesia

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[1]Tokyo Institute of Technology, Japan

Keywords: community renewable energy, community-based management, decentralized approach, Indonesia

1. Introduction

More localized renewable energy (RE) provision has been recently recognized for mitigating issues in RE system, in example lack of utility interest and investment, end-user education, and maintenance (Madriz-Vargas et al, 2018). Community-based management is encouraged as an ideal model of running the project. This research presented 3 study cases of community renewable energy (CRE) in Yogyakarta, Indonesia, and its lesson learnt.

2. Literature Review

Having form of archipelago country, Indonesia has been facing challenges in power distribution as well as fossil fuel transportation (IEA, 2015). Considering this issue, RE is highly favorable to provide power in remote rural area or isolated island, as they have abundant local resources for energy generation. It has also been mandated in Indonesian Law of Energy No 30/2007, "energy provision by national government and/or regional government is prioritized in undeveloped, remote and rural areas utilizing local energy resources, in particular renewable energy resources". Thus, such decentralized approach is highly recommended to be implemented in Indonesia (Guerreiro and Botetzagias, 2018).

3. Methodology

Field visit to three CRE projects was held in March 2018, Province of Yogyakarta, Indonesia. Official report regarding the total number of CRE project in the province could not be found, thus initial information was gathered from interview with academics and news. Method of data collection were through observation and interviewed with local people and key stakeholders. Qualitative approach was conducted, using comparisons analysis in table.

4. Result and Discussion

All of study cases have community management team who operate and manage daily maintenance of the project. During project deployment, the team was trained to do basic operational and maintenance. However, all these team is not equipped with ability to do major repairmen and do not have their own network for service of damage. Therefore, the team depends on external support to repair technical problems. Untreated technical problem could affect project to stop. Projects that have local support are likely to continue its operations (case 1 and 3). Hence, future project of community renewable energy is recommended to build supporting network that are reachable by community management team, preferably local-based, in order to work closely with the team. The team should also perform consistent daily maintenance for technical problem prevention. Even though all the study case area has been electrified and RE project (especially for case 2 and 3) is used as a complimentary system, commitment to continuing project operations should always be the priority.

Reference

Guerreiro, S., & Botetzagias, I. (2018). Empowering communities–the role of intermediary organisations in community renewable energy projects in Indonesia. Local Environment. https://doi.org/10.1080/13549839.2017.1394830

International Energy Agency. (2015). Indonesia 2015 - Energy Policies Beyond IEA Countries. Retrieved from www.iea.org/t&c/.

Madriz-Vargas, R., Bruce, A., & Watt, M. (2018). The future of Community Renewable Energy for electricity access in rural Central America. Energy Research and Social Science. https://doi.org/10.1016/j.erss.2017.10.015

Table 1. Comparison of three CRE projects

	Banyumeneng	Serut	Kedungrong
	(1)	(2)	(3)
arted operation	2009 (scale-up 2014)	2011	2012
chnology	Solar power	Solar power	Micro-hydro power
ilization	Water pumping system	Household lamp & communal use	Household lamp
wer capacity	8,000 Wp	15 kW	30 kW
nstruction cost	IDR 250 million	IDR 200 million	IDR 330 million
rrent situation	Working	Not working since 2016	Working
e/month	IDR 15,000	IDR 7,500	IDR 7,000
m of household	88 families	64 families	35 families
ectricity in the village (on/off id)	On grid	On grid	On grid
nancing model during nstruction	Grant	Government budget	Government budget
rtners/donors	University, NGO Energy, government, private sectors	National ministry	Public work province
mmunity management	Yes	Yes	Yes
cal support for repairment	Yes Energy consultant supports major maintenance	No Problems are reported to the Ministry in Jakarta	Yes Public work office receives report if problem happens

A study of distiributions of marine endangered species and risk map to coastal development impacts on South Korea

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Korea Environment Corporation

Keywords: Marine endangered species, Risk map, Coastal development, Hbitat managed, EIA

1. Introduction

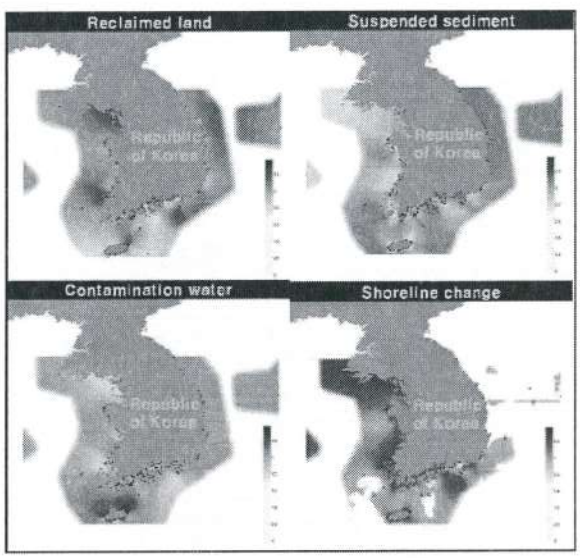
Marine endangered species(**MES**) is highly likely to be extinction or population decline due to artificial environmental changes. Also, the habitat information of MES is closed to the public. Therefore, it is difficult to check the habitat of MES, when prepare EIA stage. This study aims to provide basic data to EIA stage, that distribution information of MES in coastal area.

2. Materials and Methods

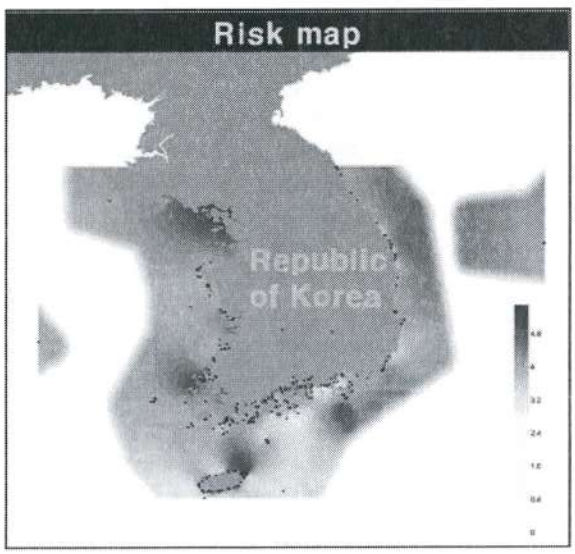
The target MES(17th species) were consider the impacts and range of EIA in coastal. The map of risk to coastal development impacts(**MRCDI**) was analysed the biological characteristics of each MES. MRCDI was mapping by Surfer ver.12 and risk level layered by frequency of distributions of MES.

3. Results and Conclusions

The MRCDI according to the impacts of coastal development is as shown in Figure 1.



The MRCDI considering the overall MES is as shown in Figure 2.



MES which is sensitive to water pollution MES was dominant(at a high frequency) the west coast and Jeju Island. MES which is sensitive to Shoreline change was dominant the west coast and southern coast(Figure 1). The overall MRCDI confirmed that there was a high risk of damages to the MES due to coastal developments in northern coast of Jeju Island and Sourthern coast in Korea. This is because of the favorable habitat for MES (only within semi-closed fortresses, water depth and sedimentation favorable to *Zostera* sp., high flood intensity, etc.)

References

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Ministry of Oceans and Fisheries in Korea (2014) Conservation and management of marine ecosystems act. 59pp.

Road, Become a Time Machine for Exotic Plants

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Keywords: Road ecosystem, Exotic plant, Distribution, Traffic effect, Invasion

1. Introduction

Road construction entails large-scale topographical changes, transforming existing ecosystems into entirely new forms. In particular, road construction is accompanied by major changes in biotic and abiotic environments, such as changes in physico-chemical properties of growing fields depending on continuous soil layer disturbance and construction materials. The purpose of this study was to investigate 1) the effect of environmental changes on the influx of exotic plant species and 2) the tendency to spread.

2. Methods

1) Influx trend of exotic plants: Flora from total 400 annual reports of 40 sites

2) Seed dispersion analysis: *Ambrosia trifida* (8 sites), *Miscanthus sacchariflorus* (fundamental approach based on June experiment, 2019).

3. When do the exotic plants flow into a new location?

The outbreak of the exotic plant introduced at the early stage of construction (Flg.1). Topographic changes are most active in this period. Thus, bare ground, embanked, or cut slope areas are generated throughout the construction area. Exotic plants occupy an unvegetated space and settled in a new place

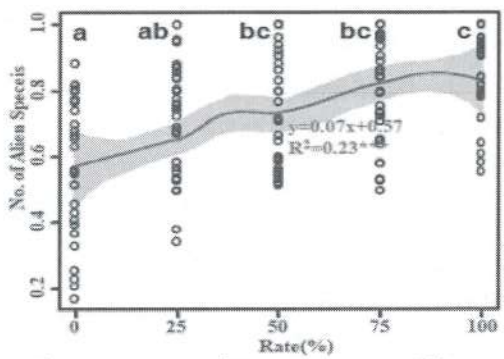

Figure 1: The percentage of construction rate (%) according to the appearance rate of exotic plants.

(unintentional introduction). Another example is used for slope vegetation and is legally located on the roadside (intentional introduction).

4. Road, it serves as a pathway for exotic plants

Plants are spreading faster and farther in the road (Nathan et al., 2012). The vehicle accelerates the diffusion according to the movement amount and the direction, and serves as a strong assistant for the diffusion of internal biotic and abiotic factors (Chu et al., 2017).

Table 1. Analysis of variance to test the effects of traffic lanes, distance from mother plants, and moving direction

Source	Df	SS	F	p
Traffic lanes (Lan)	1	6.70	10.679	0.00117 **
Distance (Dis)	5	115.88	184.585	< 2e-16 ***
Direction (Dir)	1	35.01	55.771	4.38e-13 ***
Lan x Dis x Dir	5	4.21	6.701	0.00995 **
Residuals	422	277.48		

5. Conclusion

In this paper, we called the road a time machine because the dispersal aspect of the plant was surely different in time and space between outside and inside of the road. Vehicles could be considered as a factor that increase the ability of the time machine. In the future, we plan to study whether the dispersal rates varies with the outside of road and seed characteristics.

References

Nathan, Ran, E. K. Klein, Juan J. Robledo-Arnuncio, Eloy Revilla (2012) "Dispersal kernels" In *Dispersal ecology and evolution*, Oxford: Oxford University, pp.187-210.

Chu Y, Kim J-K, Lee H. (2017) Impact on Introduction of the Alien Plants by Road Development Projects. Ecology and Resilient Infrastructure 4(3):156–68. https://doi.org/10.17820/ERI.2017.4.3.156

Evaluation of Impact on Water Quality of Weirs Installed in Han River, South Korea

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Department of Environmental Engineering, Chungbuk National University, Korea
Keywords: Han River, Weir, Water Quality

1. Introduction

In Korea, a total of 16 weirs have been installed and operated since the Four Major Rivers Project (2010-2011). After the project, environmental concerns such as water quality degradation, changes in waterside ecosystems, and accumulation of river sediments have been steadily raised. Increased residence time due to construction of the weir has increased algae and BOD concentration.

Therefore, it is necessary to evaluate the changes of the water environment due to the weir construction. However, comparing the data before and after weir installation is problematic due to other influencing factors such as weather, precipitation and pollution loads.

In this study, we developed a simple water quality model (DynCSTR) based on the mass balance theory to evaluate the impact of weirs on water quality and applied it to simulate before and after weirs installation.

2. Materials and Methods

The sites of this study are Kangcheon(KC), Yuju(YJ), and Ipo(IP) Weir located in South Han River. The concentrations of Chl-a and COD were compared between before (2004-2009) and after (2013-2018) construction of weirs.

The water quality prediction due to opening of the weir gate was conducted in 2016-2018. The model was calibrated for the same period.

The DynCSTR model was developed as Excel-VBA (Visual Basic Application) and that can simulate DO, DOC, POC, Organic-P, PO_4-P, Organic-N, NH_3-N, NO_3-N, SS and three types of algae (Diatom, Cyanobacteria, Green).

It is assumed in a completely mixed state of water body, and to use 14 ordinary differential equations are solved to simulate the water quality.

The water level and the flow rate of the input data were collected from K-water's water information portal and the solar radiation energy data was collected from the Icheon meteorological station of the Korea Meteorological Administration.

The water quality data were collected from the water environment information system. The collected data are 10 items such as water temperature, DO, SS and POC and so forth. The COD, an organic matter item, was simulated as a TOC, and the COD-TOC ratio for each weir was calculated and compared.

3. Conclusions

In the comparison of observed data, Chl-a decreased by 2.4, 3.4 and 2.5 mg/m^3 in KC, YJ and IP, respectively, while COD increased 0.15, 0.43, and 0.06 mg/L in KC, YJ and IP, respectively after weirs installation.

The impact of weir on Chl-a in weir open-scenario simulation was similar between DynCSTR and observed data, but COD showed opposite results. The simulated Chl-a decreased by 0.28, 1.73 and 2.91 mg/m^3 in KC, YJ and IP, respectively after weir opening as observed data showed. However, COD decreased either by 0.17, 0.29, and 0.38 mg/L, for KC, YJ and IP, respectively.

These results suggest that the cause of the increase in COD observed after the installation of the ware is possibly due to the increase of the organic load introduced from the watershed rather than the internal organic load due to the overgrowth of the algae. Therefore, it is necessary to apply a complete numerical model to separate the impact of weir from other influencing factors.

Acknowledgements

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Data Based Conversion of Environmental Impact Assessment using Long-Term Monitoring Data - Focusing on South Korea -

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Keywords: Environmental Data, GIS, Archives, Data Publishing Framework, Data Science

1. Introduction

Environmental impact assessment (EIA) is largely divided into strategic EIA, small EIA, EIA statement and post-environment impact survey depending on the nature or size of the development project in South Korea. In other words, it is possible to manage the entire stage of time series from the nationwide scale of planning, design, construction phase and post-management of the development project.

In order to assess the environmental impact, it is necessary to utilize various regional and environmental data. The EIA consists of a total of 22 environmental items (water quality and atmosphere etc) and carries out at least four on-site surveys per year. This is where various data are accumulated for each individual project, and where data is spatially adjacent.

2. Building Time Series Data

In Korea, the Environmental Impact Assessment Support System (EIASS) provides basic spatial information required for environmental impact assessment, and measurements for each environmental item (water quality and atmosphere etc). Nevertheless, there was a lack of information collection and utilization in EIA.

In order to solve these problems, measurements by environmental item in project areas and adjacent areas subject to EIA over the past decade were established in the form of spatial information and time series data. Based on this, the research was conducted to transform the environmental impact assessment into a more efficient data science utilization system.

Through the disclosure, At first, it can strengthen the accountability of the business entity, Second, it can be used as scientific evidence for conflict adjustment. Last, the validity of the EIA system can be strengthened.

3. EIA Archive Case

The time series environmental assessment data are as follows. First, in the last 10 years from 2007 to 2017, measured values and location information for each environmental item of projects subject to EIA were established as spatial information. The environmental impact assessment results by environmental medium include the address and coordinate information of the measurement location. Based on this, spatial information can be generated and utilized. These results are being built and expressed in WebGIS form in EIAGIS of EIASS.

4. Conclusions

In order to scientific assessment of environmental impact, it is necessary to operate an information disclosure based time series data, which can positively affect EIS contents.

Especially, information on accumulated (time and location) EIA can be used for cumulative impact assessment through monitoring of development demand concentrated in a specific area, and can contribute to scientific evaluation.

Effect of Water Level Changes on the Control of Cyanobacterial Bloom in Gangjeong-Goryong Weir in Nakdong River

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Keywords: Algal Bloom, Cyanobacteria, Nakdong River, Water Level, Weir

1. Introduction

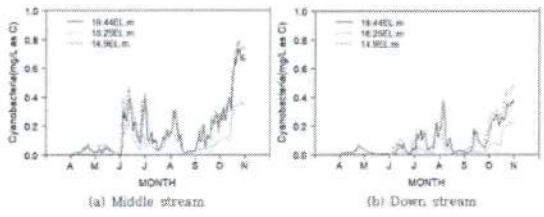
After the Four Rivers Project in 2012, eight weirs were installed in the Nakdong River, South Korea. As a result, the residence time of the water in the upstream of the weirs increased and algal bloom occurred frequently in summer due to overgrowth of cyanobacteria. Recently, government is taking steps to increase the flow velocity by lowering the water level to control algal bloom. Maintenance of critical flow velocity is effective for control of cyanobacteria dominance in the weir section (Mitrovic et al. 2003). Thus, the objectives of this study were to construct a three-dimensional water quality model (EFDC) for the upstream of Gangjeong-Goryong Weir (GGW), and analyze the effect of water level lowering on the change of water quality and cyanobacteria.

2. Materials and Method

In order to analyze the variation of water quality and cyanobacteria, the EFDC model was constructed for the Gangjeong Goryong Weir. The model was calibrated using the field data such as nitrogen, phosphorus, and phytoplankton collected in 2017. Three different weir operation water level scenarios, EL. 19.44 m, EL. 18.25 m, and EL. 14.9 m were simulated and compared to investigate the effect of weir operaton water level changes on the control of water quality and cyanobacteria bloom.

3. Result and Discussion

As a result of scenario simulation of running the water level of the weir from EL. 19.44 m to EL. 14.90 m (4.54 m drop), Chl-a and algae cell density decreased significantly. In particular, the cyanobacteria on the surface layer, which causes algal bloom, declined by 56.1% with the lowest water level (EL. 14.9 m) compared to the EL. 19.44 m. As a result of comparing of spatial distribution of cyanobacteria, the decrease effect was larger at the downstream.



(a) Middle stream (b) Down stream

Figure 1 : Spatial distribution of cyanobacteria at water surface according to the operation water level of the weir at (a) middle point and (b) downstream point.

4. Conclusions

The results of this study are in agreement with the previous studies carried in the lowland rivers of southeast Australia, in which the critical flow velocity was found to be important for controlling persistent thermal stratification and cyanobacteria bloom in the rivers.

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Effect of attached microbial community growth on river water quality

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Keywords: Attached microbial community, Self-purification, Epiphyte, artificial substrate, Growth change

1. Introduction

attached microbial community is a major primary producer of middle and upper stream ecosystems, occupying an important position in river ecosystems and closely related to river water quality changes. Currently, the study of attached microbial communities is mainly focused on the qualitative analysis of species in ecology field, and the study of attached microbial communities related to river water quality is rare. The purpose of this study was to investigate the effects of environmental factors such as flow rate and roughness of stream attached microbial communities on stream, and to evaluate pollutants influxing into stream, Physico-chemical analysis was performed.

2. Method & Results

2.1 Method

The first survey point was selected (P1) before the effluent (P1), the second survey point after the effluent (P2), and the third survey point (P3) 2 km away from P2. At each site, three kinds of artificial substrate were installed at intervals of about 10 cm, and field monitoring was carried out at intervals of one week. flow rate and velocity were measured in the field and total nitrogen and total phosphorus were analyzed by indoor measurement. The attached microbial community of the installed artificial attachment plate was collected using distilled water and a brush, and then the biomass was measured ash-free dry weight (AFDW) and chlorophyll-a (Chl-a).

Table 1: Three types of artificial substrate for growth of attached microorganisms.

Type of artificial bricks	Composition	Size(mm)
CB	Concrete	390 ×190 × 100
RCB	Red clay	240 × 70 ×150
RCB + Acrylic	Red clay + Acrylic	190 × 85 × 5mm

2.2 Results

The biomass of attached microbial communities according to the type of attachment plate showed significant difference in attachment microbial community in the order of CB> RCB> RCB + Acrylic, Biomass analysis showed that the growth of Attached microorganisms increased at a slower point than at higher flow rates.The growth of Attached microbial communities was found to influence the pollutant reduction of water quality in rivers.

3. Conclusions

In this study, the effects of attached microbial community on the water quality of streams and the factors affecting the growth of attached microbial community were identified. It is expected to contribute to the assessment and management of the utilization of attached microbial communities as a method of river management. Further research will also be needed to identify the effects of growth characteristics of artificial substrate replacement and seasonalattached microbial

KSEIA and IAIA for the Future

Sookjin Jeon, Jong-Gwan Jung, and Myungjin Kim

Korean Society of EIA
Keywords: Mission, Activities, KSEIA, Journal of EIA

1. Impact Assessment

The future of IA is the future of KSEIA (Korean Society of EIA) and IAIA (international Association of IA)? For the future KSEIA and IAIA how and what do evolve or revolve? We believe two societies should play an important role for impact assessment.

Caldwell (1988) mentioned EIA should not be understood as a "technological fix" or a panacea for environmentally "bad" decisions; it was intended as a reform in priorities affecting the environment and in procedures for administrative decision-making. Wolf (2000) addressed the 21th century will be a century of rapid changes, actions and innovations. Impacts, trade, finance, and communication will be globalized. These drivers will shape impact assessment (IA), and a new generation of IA is needed.

2. KSEIA and IAIA

2.1 Vision and Mission

KSEIA established in 1992, its missions are to contribute to enhance the quality of impact assessment, promote academic exchange and professional working, encourage participation in IAIA as IAIA affiliate. IAIA from 1980 is the leading global network on best practice in the use of impact assessment for informed decision-making regarding policies, programs, plans and projects.

IAIA's strategic Plan 2016-2018 has been implemented the four strategic focus areas to extend IAIA's reach, strengthen IAIA's partnerships and collaborations, enhance IAIA's knowledge sharing and capacity-building mandate, and ensure IAIA's organizational sustainability. Next three year plan is being prepared.

2.2 Conferences and Publications

KSEIA and IAIA conferences are organized to focus attention to specific issues and other events take place periodically. The KSEIA has published the Journal of EIA since 1992. IAIA's quarterly journal, Impact Assessment and Project Appraisal (IAPA) provides a one-source link to the latest ideas in the wide-ranging field of impact assessment. Besides journal several IA related publications are published by two societies.

3. For the Future

The future of IA is the future of KSEIA and IAIA. Two societies prepare a responsible EIA tools and facilitate opportunities for sustainable futures. IA professionals are asked to solve uncertain knowledge of the impact situation and highly contested views.

IA practitioners should not only anticipate future problems and possibilities, they should also create and facilitate opportunities for participation by all interested and affected parties in envisioning desirable futures and designing viable alternatives for securing and sustaining 'the future we want' (Kim and Wolf, 2014).

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Study on Compensation methods of EIA for Introduction of Impact Mitigation Regulation

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Keywords: EIA, IMR(Impact Mitigation Regulation)

1. Introduction

Korea EIA has played a role of reducing the environmental impacts from the various types of development using lots of ways. However, EIA system has a limitation and weak point in preventing destroy of national environmental. As an alternative, Impact Mitigation Regulation(IMR) of German is discussed by Korea Ministry of Environment.

There are lots of development types, in particular, road construction does not have lots of options in selecting the route because it is impossible to change the starting point and end point of the road. Thus it's not easy to avoid and exclude preservation areas have conservation values ecologically without cancelling the project.

After all, in order to reduce the environmental impact without avoidance of the specific site. Compensation measures can be considered. It is composed of 'mitigation' and 'substitution' is discussed to reduce the harmful impacts by the road construction.

Before, the introduction of IMR in Korea, it requires lots of consideration regarding present system and social consultation for settlement of the system. Among the steps, this study deals with reduction measures as a 'Compensation' of IMR in road construction projects. In order to achieve our goals, we investigate EIA reports to find which methods can be used and examined how to apply the methods as a compensation briefly.

2. Reduction method List of EIA

Table 1: List of Reduction Measures of Road Construct Project

No	Measures	content
1	Transplanting trees	The trees are located in project area.
2	Eco bridge	Connecting two nature(habitats)
3	Microhabitat	The small-scale habitat requirements of a specific animal or plant
4	Substitution- habitat	Human-made habitats act as substitutes of original habitat
5	Wild-Life Fence	Not only reduces wildlife-vehicle collisions but also guides the animals towards these safe crossing opportunities
6	Ecosystem Disturbance Creatures	Removing and managing ecosystem disturbance creature threatening native species
7	Road Slope Revegetation	Recreating biodiversity as using native species
8	Conservation of top soil	Reusing top soil for ecological restoration,
9	Bird strikes Prevent	Collision between a bird and transparent wall(Road soundproofing wall)
10	Escaping Facility on Waterway	Helping escape from artificial waterway(U, V box)

This study has employed an assessment report data of a highway construction project. Through the report we found 10 representative measures as shown table 1 for reducing the harmful impact to the ecosystem. These measures are used for conservation of habitats of animal and plant or restoration of natural environment. Among them, Wild-life fence and bird strikes prevent wall reduce damage to the animal during road operation.

3. Conclusion

IMR has a benefit to protect the natural environment as calculating and suggesting quantitative loss and reduction range. It makes a balance point between development and preservation. In this study we examine some reduction measures suggested an EIA report at the aspect of cost and application of the measures. This study found that the imbalance between cost and effect can cause restrict application of the methods by the cost problem and lack of relating researches like evaluating the effect of the ways ecologically. For the soft landing of the system, some researches are required for assessing function and structure of ecosystem quantitatively.

Table 2: Comparison result of reduction methods of EIA

Categories	Unit/Creteria	Cost (USD)	M/S
Transplanting trees	Fine tree, R25, 1ha	0.4 (million)	M(+) & S
Eco bridge	Width 30m	4 (million)	M(+++)
Microhabitat	10 sites, for otter	4,000	M(+++)
Substitution - habitat	1ha, agricultural land use	0.4 (million)	S(+)
Wild-Life Fence	Circumference of 1ha	0.32(million)	M(+++)
Ecosystem Disturbance Creatures	1ha, plants	6,000	M & S (++)
Road Slope Revegetation	1ha	0.32(million)	M(+++)
Conservation of top soil	1ha	10,000	M(++)
Bird strikes Prevent	Circumference of 1ha, height 6m	0.08(million)	M(+++)
Escaping Facility on Waterway	1ha, 30m between sites	4,400	M(+++)

M: mitigation, S: Substitution

+: degree of application

References

Ministry of Environment, Environment Impact Assessment Act, 2018

Projection of Water Temperature Variation due to Climate Change in Stratified Reservoir in Korea

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Keywords: climate change, CE-QUAL-W2, RCP 4.5&8.5, GCM, water temperature

1. Introduction

In the fifth report (AR5), the IPCC stated that the surface temperature of the earth will rise 1.8-4.0℃ in the present century due to future climate change in all scenarios evaluated by AR5. As a result, the frequency and intensity of extreme events are also projected to increase. Climate change is expected to result in higher water temperatures and stronger stratification strengths in reservoirs, and which will also have a significant impact on domestic water resources in Korea (Fang and Stefan, 2009; Jung et al., 2011). In this study, the change of water temperature and thermal stratification structure in Soyanggang Reservoir are projected using the climate data generated using a GCM model (HadGEM2-AO) with RCP 4.5 scenario.

2. Materials and methods

The climatic data generated by the HadGEM2-AO model with the RCP 4.5 were downscaled for Soyanggang Reservoir basin . Daily inflow data were generated by runoff modeling using the SWAT. And the long-term water temperature simulations were performed in the reservoir using CE-QUAL-W2 (W2), a two-dimensional hydrodynamic and water quality model. The model performance was evaluated using AME, RMSE, and NSE.

3. Conclusions

W2 was calibrated with the historical data observed from 2005 to 2015. The error between prediction and actual measurement of the water level, upper (5m below water surface) and lower (5m above bottom) water temperatures in the reservoir were evaluated. AME values of simulated water level, upper layer water temperature and lower layer water temperature were 0.283 m, 1.808 ℃ and 0.880 ℃, respectively, and RMSE was 0.410 m, 2.177 ℃ and 0.982 ℃. NSE showed a high value of 0.97 or higher for water level and upper layer water temperatures with very high seasonal variability, while a low value of 0.227 for lower layer water temperatures with very low variability. As a result of future simulations using the calibrated model, the upper layer and lower layer water temperatures were projected to rise 0.0191°C/year($p<0.05$) and 0.008°C/year($p<0.05$), respectively in response to the projected atmospheric temperature rise rate of 0.0279°C/year($p<0.05$). In the analysis of annual average seasonal water temperature changes, the upper layer temperature showed the smallest increase in autumn and showed the tendency of the water temperature rising by the widest margin in summer. For the lower layer temperature, they tended to rise in the order of spring-summer-fall-winter. In addition, with the increase of the future temperature, the stratification strength of the reservoir is projected to be stronger, and the number of the days when the temperature difference of the upper layer and the lower layer becomes greater than 5°C also increased.

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Research on assessing the effectiveness of green tax reform -An evidence from a panel data analysis in China

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Abstract: The adequate response to global climate change and low carbon economy development has become a worldwide concerned subject. This paper selected the green tax system in China as a research target and assesses the effectiveness of green tax on the environment through an empirical analysis. The panel data from 2005 to 2015 in different cities in China are employed, it analyses the impact of resource tax, excise tax, vehicle purchase tax and pollutant discharge fees on environmental pollution, and finds that resource tax has a significant effect in the East and Midwest of China. The effectiveness of excise tax on integrated pollution is not statistically significant. Compared to the Midwest, Eastern China 's green tax had a much better performance on reducing environmental pollution. Pollutant discharge fees indicates a significant negative correlation to integrated pollution. Vehicle purchase tax exits a mesomeric effect to environmental pollution. In addition, the relevant policies recommendations are proposed against different tax types.

Keywords: green tax, analysis, environmental pollution, mesomeric effect

Research Center for Strategic Environmental Assessment Nankai University

The Research Center for Strategic Environmental Assessment Nankai University was established in 2004, and is the earliest established strategic environmental assessment research institution in China. The research center is the deputy director unit of the Environmental Impact Assessment Professional Committee of the Chinese Society For Environmental Sciences, and the first batch of environmental assessment units recommended by the Ministry of Ecology and Environment. There are 18 backbones at present, including 5 professors and 6 associate professors. The academic committee consists of 13 senior experts in the field of internal environmental assessment. Thomas B Fischer, Maria Rosario Partidario, Juan D.Quintero, and Lin Jianzhi (Hong Kong, China), etc. are invited as visiting researchers.
Xu He, the current director of the center, is a professor and doctoral tutor at Nankai University and a new century talent of the Ministry of Education. He is also an editorial expert of Intergovernmental Panel on Climate Change (IPCC) AR5 RE editorial expert, a vice chairman of the China Environmental Impact Assessment Committee, and an associate editor of Environmental Impact Assessment Review (SSCI & EI)--the top journal in the international environmental assessment field.

The research center conducts national and local strategic/plan environmental assessment consulting and research projects, technical training, and academic exchanges and cooperation with domestic and foreign research institutions, etc. main business. Also, it has been reserving professional talents for the society. We have undertaken more than 60 international, national, provincial, and ministerial fund projects related to the plan environmental impact assessment, and more than 100 consulting projects for enterprises and governments. The geographical scope covers Beijing, Tianjin, Xinjiang, Sichuan, Guangdong, etc. several provinces and cities. We have undertaken a large amount of research work on technical methods, technical specifications, or guidelines for national strategic/plan

environmental assessment. These theoretical and practical works have promoted the formulation and implementation of the Environmental Impact Assessment Law of the People's Republic of China and the Technical Guidelines of Plan Environmental Impact Assessment HJ/T130-2003 (on trial).

In addition to conducting consultations and researches on environmental assessment, the research center has also established the "China Strategic Environmental Assessment Academic Forum" and has successfully held five sessions. Since 2009, the center has organized a seminar on China's plan environmental assessment for many years supported by International Association for Impact Assessment (IAIA) and published the special issue for the first time in the Environmental Impact Assessment Review and the Journal of Environmental Assessment Policy and Management. At present, the research center has established a cross-regional international cooperation and exchange network between Europe, China, and Hong Kong. It has carried out international cooperation and exchanges with the United States, Britain, Japan, Denmark, Australia, Mexico, Switzerland, and other countries to promote the globalization of China's strategic/plan environmental assessment.

At present, the research center has published more than ten books related to strategic/plan environmental impact assessment, including Introduction to Environmental Impact Assessment (Bilingual Edition), Strategic Environmental Assessment, Theory and Practice of China's Strategic Environmental Assessment, and Policy Strategic Environmental Assessment, Research on Technical Methods of Plan Environmental Impact Assessment, Energy Plan Environmental Impact Assessment, China Strategic Environmental Assessment from a New Perspective of Climate Change, Health Impact Assessment, and Effectiveness of Strategic Environmental Impact Assessment, etc..

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Route of Wenchang 1-day Tour

文昌 1 日游
Wenchang 1-day Tour

D1	海口→文昌→海口 Haikou →Wenchang →Haikou	用 餐：午餐 Dinner: Lunch	住 宿：无 Accommodation: None

8:00 海口鲁能希尔顿酒店出发。

8:00 Haikou Luneng Hilton Hotel departure.

乘车经过铺前跨海大桥前往文昌铜鼓，车程约 80 分钟。

It takes about 80 minutes to Wenchang Tonggu by bus after crossing the sea bridge in front of the pavement.

◇【铜鼓岭】（游览约 90 分钟）铜鼓岭山美石奇，传说动人，素有"琼东第一峰"之美称。铜鼓岭主峰海拔 338 米，三面环海，地貌奇特，植被繁茂；景区有神庙、和尚屋、尼姑庵等古迹，有仙殿、仙洞、风动石、银蛇石、海龟石等奇岩异石。

[Tong gu ling] (about 90 minutes of tour) Tong gu ling Mountain is famous for its beautiful stone, moving legend and "the first peak in Qiong dong". The main peak of Tong gu ling is 338 meters above sea level, surrounded by sea on three sides, with peculiar landform and flourishing vegetation. There are temples, monk houses, nuns and other monuments in the scenic area, including fairy halls, fairy caves, wind-driven stones, Silver Snake stones, turtle stones and other strange rocks.

乘车约 30 分钟到达下一景区

About 30 minutes by bus to the next scenic spot.

◇【石头公园】（游览约 60 分钟）石头公园由三部分组成：第一部分气势磅礴，石头重的达数千吨，形状千姿百态，造型有的像海龟，有的像古猿，有的像恐龙。涨潮时，海浪涌进岩洞，发出惊天动地的雷鸣声，海涛拍岸时，满天浪花，星星点点。景区周围还有神庙、和尚屋、尼姑庵等古迹，有仙殿、仙洞、风动石、银蛇石、海龟石等奇岩异石。

[Stone Park] Stone Park (about 60 minutes of tour) consists of three parts: the first part is magnificent, weighing thousands of tons of stones, with a variety of shapes, some like turtles, some like ancient apes, some like dinosaurs. When the tide rises, the waves rush into the cave and make earth-shaking thunder. When the waves hit the shore, the sky is full of spray and stars. Around the scenic spot are temples, monk houses, nuns and other monuments, including fairy halls, caves, wind-driven stones, Silver Snake stones, turtle stones and other strange rocks.

乘车约 30 分钟，前往餐厅享用海南菜特色午餐（用餐时间约 40 分钟）

Take a bus for about 30 minutes and go to the restaurant for a special lunch of Hainan cuisine (meal time is about 40 minutes).

午餐后乘车前往下一景点，乘车时间约 40 分钟。

After lunch, take a bus to the next scenic spot for about 40 minutes.

◇【好圣村】（游览约 60 分钟）好圣村原是龙楼镇红海村委会的一个自然村，坐落于文昌市铜鼓岭山脚下，毗邻铜鼓岭国际生态旅游区，被打造为航天科技小康村、文明生态村。

[Haosheng Village] Haosheng Village was originally a natural village of Honghai Village Committee of Longlou Town. Located at the foot of Tongguling Mountain in Wenchang City, it is adjacent to Tongguling international Ecotourism Zone and has been built into a well-off space science and technology village and a civilized ecological village.

参观下一景区，乘车时间约 30 分钟。

Visit the next scenic spot. It takes about 30 minutes by bus.

◇【东郊椰林】（游览约 60 分钟）东郊椰林椰树成片，椰姿百态，有红椰、青椰、良种矮椰、高椰、水椰等品种，共 50 多万株。当地农民能徒手飞快地爬上 20 多米高的椰树，摘下椰果，娴熟的技艺令您惊讶。

文昌 1 日游
Wenchang 1-day Tour

	[East Suburb Coconut Forest] (about 60 minutes of tour) East Suburb Coconut Forest coconut trees into pieces, coconut in all shapes, there are red coconut, green coconut, improved dwarf coconut, tall coconut, water coconut and other varieties, a total of more than 500,000 plants. Local farmers can climb up 20 meters tall coconut trees with their bare hands and pick coconuts. You are surprised by their skillful skills. 15:30 游玩结束后乘车返回海口鲁能希尔顿酒店，乘车时间约 80 分钟。 After the 15:30 tour, we will return to the Luneng Hilton Hotel in Haikou for about 80 minutes.
注：行程、景点游览顺序、游览时间仅提供参考标准，具体视天气及游客实际游览情况而定。 Note: Tour itinerary, tour sequence and tour time only provide reference criteria, depending on weather and actual tourists.	
收费标准：500 元/人 Fee standard: 500 yuan per person	
【产品执行基本标准说明】 [Description of Basic Standards for Product Implementation]	
费用已含 fee use Already contain	【住宿标准】无 [Accommodation Standards] No Accommodation
	【用餐标准】含午餐，正餐海南农家特色围桌 10 菜 1 汤，午餐餐标 50 元/人； [Dining standard] Contains lunch, featuring 10 dishes and 1 soup for Hainan farmers' special table, and 50 yuan per person for lunch.
	【旅游用车】指定委派 GPS 安全监控系统配置空调旅游车（海南省调度中心实行滚动发班，确保每人一个正座） [Tourist Vehicle] Designate GPS safety monitoring system to configure air-conditioned tourist vehicle (Hainan dispatching center carries out rolling shift to ensure one seat per person)
	【导游服务】持有导游资格证书的专业导游全程优质服务； [Tourist Guide Service] Professional tour guides with tour guide qualification certificate provide excellent service throughout the whole journey.
	【旅游保险】海南旅行社责任险（最高保额 80 万元/人）。旅游意外险（最高保额 10 万元/人）。 [Travel Insurance] Liability Insurance of Hainan Travel Agency (maximum insurance amount is 800,000 yuan per person). Travel accident insurance (maximum coverage of 100,000 yuan per person).
	【景点门票】行程中注明含的景点第一道门票。 The first ticket of the scenic spot is indicated in the itinerary.
费用不含 fee use No contain	1、自由活动期间交通费、餐费、等私人费用。 Private expenses such as transportation, meals and so on during free activities. 2、行程中未提到的其它费用：如特殊门票、游船（轮）、景区内二道门票、观光车、电瓶车、缆车、索道、动车票等费用。 Other expenses not mentioned in the itinerary: such as special tickets, cruise ship (ship), two tickets in the scenic area, sightseeing car, battery car, cable car, ropeway, motor ticket and so on. 3、个人购物、娱乐等消费。 Personal shopping, entertainment and other consumption. 4、因交通延误、取消等意外事件或不可抗力原因导致的额外费用，及个人所产生的费用等。 Additional expenses caused by traffic delays, cancellations, accidents or force majeure, as well as personal expenses, etc.