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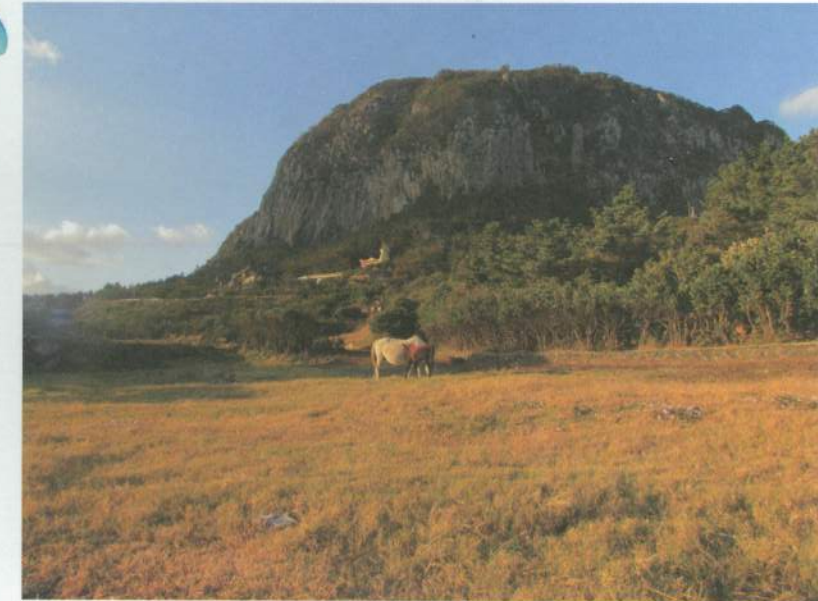
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The Impact Assessment We Want 4th Korea-China-Japan Tripartite EIA Conference



October 16 and 17, 2015

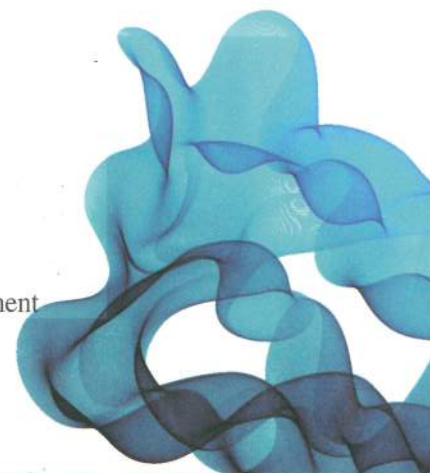
K-water Academy
Daejeon, Korea

Organized by:

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Greetings

Good morning, ladies and gentlemen. I am Dongkun Lee, president of the Korean Society of Environmental Impact Assessment. I am delighted that K-Water has hosted the 4th Korea-China-Japan Tripartite EIA Conference.

First, I would like to thank Vice Minister, Yeon-man Jeong, of Ministry of Environment for his congratulatory message and words of encouragement to the conference participants. As an environmental impact assessment specialist who wrote a doctoral thesis on the subject, his insights are informed, and valuable to the discourse. I also would like to express my sincere gratitude to Mr. Gye-woon Choi, CEO of K-Water, for the company's invaluable support in providing the venue as well as financial assistance. I thank him for sending a congratulatory message. Further, let me extend my warm thanks to all of the specialists from China, Japan, and other countries for participating in this conference.

Today, the conference features a keynote speech, special session and four sessions containing a total of 23 oral and 18 poster presentations.

We are pleased to have Ms. Shirley Lee, one of the Board of Directors of the International Association for Impact Assessment, as the keynote speaker presenting "IAIA Vision and Impact Assessment." She has helped establish Hong Kong's regulatory bases for environmental impact assessment.

In the special session "Sustainable Development and Water Resources Management," Professors Jong-ho Lee from Korea, Akira Tanaka from Japan, and Weihong Zhu from China, as well as Dr. Le Dang Hoan from Vietnam, will present case studies from their respective countries. Through their presentations, we aim to raise awareness on the role of environmental impact assessment for sustainable development in Asia.

Professor Lee is a former president of Korean Society of Environmental Impact Assessment. He has been certified as one of the top Korean impact assessment specialists in water resources. Professor Tanaka has played an active role in habitat analysis and the establishment of an international network for ecological restoration. Professor Zhu has conducted research on North Korea's wetlands, thus making her contributions valuable to the development of environmental impact assessment in North Korea. Dr. Hoan is not only an environmental expert but also a poet. He has translated many poems written by five Korean poets, including 80 poems by Yong-woon Han, into Vietnamese.

The four sessions, following the special session, will cover topics on 1) Development and Impact Assessment; 2) Military, Mitigation, and Radioactive Waste; 3) Ecosystem and Water; and 4) Environmental Planning and Public Participation. These sessions will highlight the experiences of different countries through oral and poster presentations. Although the presentations have yet to begin, let me assure you that the materials submitted earlier to the organizers contain invaluable contents. For instance, the environmental impact assessments conducted in Korea, China, and Japan have used the best practices and yielded optimal empirical results. Therefore, a discussion among experts from three countries during the sessions will produce sound solutions that will foster sustainable development required in our society.

I would like to conclude my remarks and wish all the participants and other foreign visitors the best. I hope that many of you will participate in the Technical Visit tomorrow.

Thank you all for honoring us with your presence.

October 16, 2015

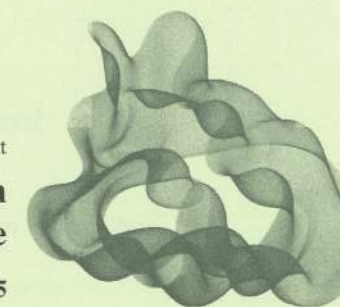
Dong-Kun Lee, President of Korean Society of Environmental Impact Assessment (KSEIA)

The Impact Assessment We Want

4th Korea-China-Japan Tripartite EIA Conference

October 16 and 17, 2015

K-water Academy
Daejeon, Korea



Keynote Address

IAIA Vision and Impact Assessment

Shirley Lee: *Director of IAIA; Hong Kong Institute of EIA, Hong Kong
Special Administrative Region, China,*

Miguel Coutinho: *Past President of IAIA; IDAD, Portugal*

IAIA Vision and Impact Assessment

Shirley Lee¹, Miguel Coutinho²

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² IAIA Past President; IDAD, Portugal

Keywords: IAIA, Impact Assessment, decision makings, capacity building

Abstract

As the leading global forum for developing best practices in impact assessment for informed decision makings on policies, programs, plans and projects, IAIA annually brings together participants from many disciplines and professions from over 120 nations. The current 1,600 members include corporate planners/managers, public interest advocates, government planners/administrators, private consultants, policy analysts, university teachers and students.

IAIA is unique in its mix of professions and provides outstanding opportunities for interchange; not only to advance the state of the art for impact assessment applications from local to global perspective, but also to develop international and local capabilities to plan, assess and manage the consequences of developments to enhance the quality of life for all. To ensure professional specialty interests are fully addressed, IAIA offers a number of special interest area sections.

IAIA activities seek to (1) develop approaches and practices for comprehensive and integrated impact assessment, (2) improve assessment procedures and methods for practical application, (3) promote training of impact assessment and public understanding of the field, (4) provide professional quality assurance by peer review and other means, and (5) share information networks, timely publications, and professional meetings.

To fulfill its mission of providing opportunities for advancing innovation and communication of best practice in all forms of impact assessment so as to further the development of local, regional and global capacity in impact assessment, IAIA has been actively collaborating with local affiliates and branches, including that of Korea and Japan. A closer tie with China is currently being pursued through the ACEE and CSES.

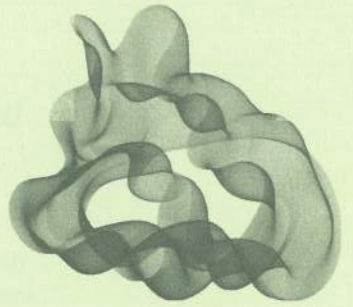
The rapid pace of infra-structural developments in Asian countries also drives IAIA to establish stronger partnership with development banks and financial sectors operating in Asia such as the Asian Development Bank. It is also important to maintain tripartite meeting activities which will no doubt foster further opportunities for more sharing, collaboration and capacity building for IA professionals in the Asia Pacific region.

Reference:

Data extracted from the current IAIA Web

The Impact Assessment We Want
**4th Korea-China-Japan
Tripartite EIA Conference**

October 16 and 17, 2015
K-water Academy
Daejeon, Korea



**Special Session:
Sustainable Development and Water Resources Management**

Chair : Myungjin Kim (NIER) and Takehiko Murayama (TIT)

Water Resources Development and Official Development Assistance

Jong Ho Lee
Cheongju University, Korea

**Applying Habitat Evaluation Procedure to Quantitative Habitat Impact Assessment for
Dam Removal Project**

Akira Tanaka¹ and Hirohito Yagi²
¹*Tokyo City University, ²EA International LLC, Japan*

Role and Result of Environment ODA in Vietnam

Le Dang Hoan
the Institute of Environmental Research for Agriculture Countryside, Vietnam

**North Korea Development and EIA: Focus on Wetland Ecosystem Survey in Tumen
River Basin**

Weihong Zhu
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Water Resources Development and Official Development Assistance

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Keywords: Water Resources, ODA, Governance, Resident Participation, SEA, EIA

1. Introduction

Lately environmental impact assessment (EIA), resident participation and governance have become more active than before in Korea. So in case of dam construction, movement policy cannot be realized in the name of public or national interests without resident participation.

This study will analyze impact assessment, resident participation and governance in the cases of water resource developments in Korea, and those of ODA projects. The direction for impact assessment, resident participation and governance for the recipient country will be suggested.

2. Water Resources Development and ODA

2.1 Case Study of Korea's Dam Development

In the case of Youngweol Multipurpose Dam, there had been long and serious conflicts between central government versus resident and environmental NGO about the its location and ecosystem conservation, and in the long run the development was cancelled.

Hantan River Dam Project also had brought about great conflict between central government and Korea Water Resources Corporation versus and resident and environmental NGO. Finally the dam project was decided as flood control dam construction and installation of artificial storage pocket after long dispute.

2.2 Korea's ODA Projects

Common problems of some Korea's ODA Projects can be summarized as generation of many emigrants, deprivation of existence foundation, soil erosion, shortage of agricultural water and wrong prediction of cost & profitability.

3. Conclusion

The result of this study can be summarized as introduction of resident (public) participation and governance, implementation of SEA and EIA based on the guideline of OECD DAC in the procedure of ODA projects. Finally, ODA should be done not for the interests of donor countries' economic interests, but for that of recipient countries. ODA had better be implemented by them and of them.

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Applying Habitat Evaluation Procedure to Quantitative Habitat Impact Assessment for Dam Removal Project

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²EA International LLC, Japan

Keywords: Dam removal, Habitat Evaluation Procedure (HEP), Habitat Suitability Index (HSI) Model, Ayu (*Plecoglossus altivelis*), alternatives evaluation, consensus building

Abstract

The objective of this study is to identify the possibility of Habitat Evaluation Procedure (HEP) application, into EIAs for infrastructure removals including dams, in order to build consensus from the view of biodiversity conservation.

We applied HEP to alternatives evaluation for the first dam removal in Japan, Arase Dam

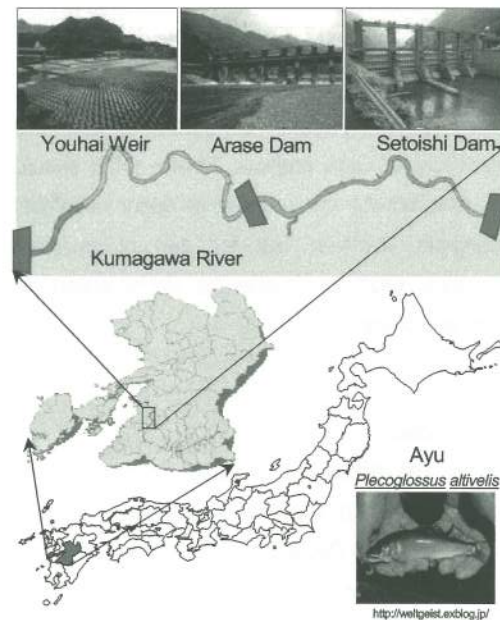


Figure 1. Study Area

Table 1. Alternatives of Habitat Impact Assessment

Alternatives	Conditions
A1	Some gates are closed. No removal.
A2	All gates are open. No removal.
A3	Arase Dam removal
A4	Arase Dam removal and Yohai Weir improvement
A5	Arase Dam removal, Yohai Weir improvement and Setoishi Dam removal

and two adjacent dams at Kumagawa River by using *Plecoglossus altivelis*, which is the most important aquatic resource and the symbol of ecosystems of the river.

The habitat suitability of *Plecoglossus altivelis* consists of river bed configuration (SI1), the velocity of flowing water (SI2), the depth of water (SI3), the turbidity of water (SI4) and obstacles for the juvenile fish to ascend (SI5). We found that the habitat suitability will be five times as high as current conditions if we remove two dams and modify one dam.

This study started in 2010 when Arase Dam removal had not been decided, because local NGOs and fishermen's cooperative association asked authors to do HEP analysis by using *Plecoglossus altivelis*, and it finished in 2012. Removal of Arase Dam was decided in 2011, started 2012, and will complete in 2018.

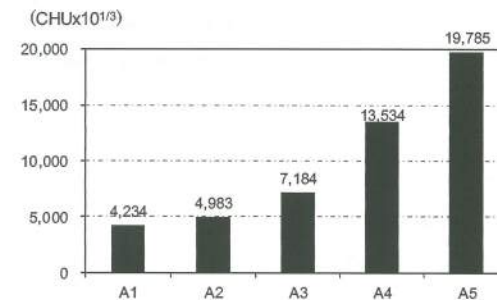


Figure 2. Cumulative Habitat Unit of each alternative

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Role and Result of Environment ODA in Vietnam

Le Dang Hoan

The Institute of Environmental Research for Agriculture Countryside

Keywords: ODA, donors, Development, Loans, development

1. Introduction

ODA is one of important issue in Vietnam and development countries. Every year many donors in the world have meeting for considering and deciding to supply ODA for Vietnam.

Since 1993 to 2014, 51 donors (28 both sides, 23 many-sides donors) have committed US\$ 89.5 billion of ODA for Vietnam. Among them Japan is the biggest both sides donor, the second is France and the third is South Korea (~USD 2.33 billion). WB is the biggest in 6 Development bank donors; the second is Asia Development Bank (ADB).

ODA for environmental projects in Vietnam is not as large as other fields like transportation, energy and industry. The ODA for environmental projects focuses on treatment of wastewater, water supply and solid waste, only USD about 8 billion among USD 89.5 billion ODA for Environmental field.

2. Focus on Issues

2.1 General ODA in Vietnam

ODA in Vietnam from 1993 to 2014 year focuses on transportation; energy and industry; agriculture and development of rural areas; environment and other fields.

2.2 ODA in Environmental Field in Vietnam

The ODA in the environmental field for Vietnam focuses on policy making; institutional development; capacity building; development planning; investment projects/programs.

Korea ODA for Vietnam focuses on capacity building in environment protection for key industries in Vietnam; training in Korea and expert dispatch (grant aid), by loan such as investment projects and equipment supply.

2.3. Problems in ODA for Vietnam

In fact ODA is very important for development of economy and promotion of environment protection in Vietnam, but with ODA always accompany strict conditions and tied provisions such as priority policy in tender for ODA supplied donor's tenderers; the equipment, technologies, materials for implementation of ODA projects have to be supplied from donor's countries. The results are low competition and sometimes practice's implementing costs of ODA projects are higher than other kind of investment projects in the countries.

Besides, ODA received countries have to supply fixed amount input capital for implementation of projects. That's why Vietnam Government has decision for National ODA projects management regulation, decided four levers managements like Project Management Board, Head of Project, Project Management Organization and ODA's National Management organization.

3. Conclusion

In past time many countries have used ODA fund for social-economy development very successfully, like Korea, Japan, Thailand, China, and Indonesia. In the countries there were a suitable ODA managements systems, centralized and distributed responsibilities based on legal framework. Vietnam Government hopes that ODA fund from donors of the world will be used successfully and do best for improvement policies to receive more and more results as trust of donors.

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North Korea Development and EIA: Focus on wetland ecosystem survey in Tumen river basin

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Keywords: Tumen River; Wetland Ecosystem, Migratory bird habitat

1 Introduction

Tumen River is the key international river between China, Russia and DPRK of Korea. It's very important to analyse the wetland ecosystem environment in Tumen River. Especially in DPRK, DPRK has conducted several follow-up assessment such as a general investigation of wetland in 1997 and investigation of protected areas during 2000-2001 to update the database and identify threats to conservation. Nonetheless, there are pressing issues threatening the country's ecosystem, such as degraded mountainous forest due to deforestation. The habitats for migratory birds being under pressure due to development and agriculture, and serious biodiversity loss due to anthropogenic factors. In order to effectively manage and protect these habitats, we conducted field survey and ecological change analysis to estimate current ecological condition.

2 Methods

2.1 Field Survey

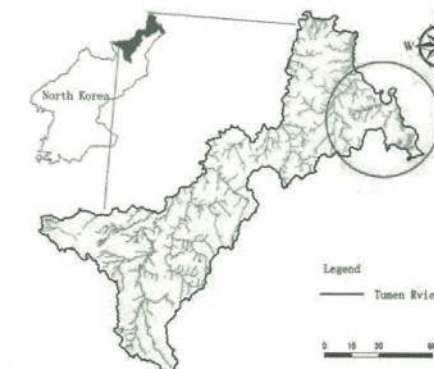


Figure 1: Wetlands location in Rason(DPRK)

To understand the condition of current wetland system for migratory bird, we investigated wetlands in delta area, located in downstream. The survey was conducted with a team of international experts.

2.2 Ecological change analysis

To analyse the changes of wetland, Landsat TM and OLI image data was used for extracting the landscape information of North Hamgyong Province in Tumen River of DPRK in last 40 years. The dynamic degree, transfer matrix, landscape index ecological risk index are used to analyse landscape characteristics and rules of the wetland ecosystem.

3 Results and Conclusion

3.1 Wetland and habitat for migratory bird

Species findings are as follows: Manpo, Sobonpo, Dongbonpo were estimated to support more than 20,000-22,000 waterbirds during the time of field survey. The area had undergone human conversion in the past decades and is now temporarily stabilized. The composition of wetlands and limited disturbances provides high quality stopover and breeding habitats for birds in the lower Tumen River and its delta. It is also a part of an integrated and transboundary ecosystem among China, DPRK and the Russian Federation.

3.2 Ecological change from 1976 to 2014

The changing in the scope of the wetland is inconspicuous, with decrease of 1.2%. A large number of lakes and wetlands, marsh wetland, river wetland changed into artificial wetlands, such as paddy field, reservoirs and paddy pools. Since the 1970s, Ecological security has deteriorated in the study area, especially the downstream deteriorated seriously.

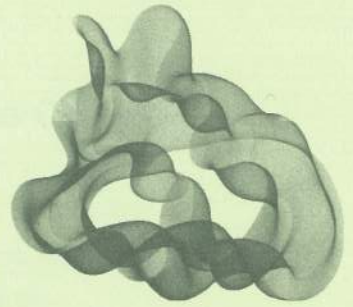
3.3 Recommendation

There are too many economic and tourism development plan in Tumen River border zone. such as TREZ (Tumen River economic zone) , Maofeng international tourism zone and so on. But related EIA are urgently needed. It is important to establish standardized EIA system of border area by field survey, and to provide scientific support to the tumen river border area economic sustainable development .

So, We have 6 recommendations for Tumen river transboundary habitat. 1) Strengthen Habitat Management; 2) Designation of Ramsar Sites(Wetlands of International Importance); 3) Baseline and long-term monitoring; 4) Building local capacity for monitoring and management; 5) Stepping up international cooperation and eco-tourism planning; 6) Suggested sequence and windows of opportunities to implement recommendations actions.

The Impact Assessment We Want
**4th Korea-China-Japan
Tripartite EIA Conference**

October 16 and 17, 2015
K-water Academy
Daejeon, Korea



Session I Development and Impact Assessment

Chair : Shirley Lee (HIEIA) and Jong-Gwan Jung (CNI)

Flood Prevention Projects in Hong Kong as Climate Change Resilience Measures

Shirley Lee

Director IAIA; Hong Kong Institute of EIA, Hong Kong Special Administrative Region, China

How Much are People Willing to Pay for Installing Soundproof Walls?

In-Chul Bae¹ and Chung-Ki Lee²

¹Korea Expressway Corporation Research Institute, ²Korea National Open University, Korea

An Analysis of Social Impacts Induced by a Development Project in Tanzania: a Case of Airport Expansion

Nyandaro Mteki Takehiko Murayama and Shigeo Nishikizawa
Tokyo Institute of Technology, Japan

A Study for Offshore Wind Farm Site Selection

Taeyun Kim
Korea Environment Institute, Korea

Flood Prevention Projects in Hong Kong as Climate Change Resilience Measures

Shirley Lee

Director IAIA; Hong Kong Institute of EIA, Hong Kong Special Administrative Region, China

Keywords: Flood Prevention, EIA, Climate Change, Storm water Storage

1. Introduction

Serious floodings in Hong Kong has been a recurrent problem in both rural and urban areas, causing substantive losses to residents living close to flooding blackspots. From 1989 to 2014, the Hong Kong government spent about US\$3.5 billion on 84 major flood prevention projects to eliminate 121 flooding blackspots.

2. Recent progress in flood prevention

Consultancy studies have been undertaken to review the drainage capacities of existing urban storm water collection systems including river channels and their capacities to deal with the increasing pace of urbanization and development needs as well as the impacts of climate change.

Drainage improvement works recommended will be implemented in phases to benefit the public with a better and safe living environment. This paper will present two examples:

- (1) The Hong Kong West Drainage Tunnel and
- (2) The Happy Valley Underground Stormwater Storage Scheme

3. Implementation of EIA findings

EIA studies were conducted for these projects and mitigation measures recommended and implemented as Environmental Permit conditions with extensive public consultation. Construction impacts were monitored and made available to continuous scrutiny by the public through web site reporting.



Figure 1: Happy Valley Underground Stormwater Storage Scheme: movable weirs

4. Conclusion

These flood prevention projects, completed or on-going, demonstrate that major infra-structures, when planned and designed with careful consideration of their benefits and negative impacts on the environment, can be effective resilience measures to combat, or at least substantially reduce the effects of sudden and torrential rainfall that are becoming frequent incidents due to the impact of climate change.

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Happy Valley Underground Storm Water Storage Scheme, Hong Kong

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How Much Are People Willing to Pay for Installing Soundproof Walls?

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Keywords: Soundproof Wall, Social Benefit, Willingness to Pay, CVM

1 Introduction

There has been currently much active research as to how to estimate the social cost or benefits of reducing road traffic noise. The policy for it has a positive effect on human life and we need to understand how much benefit the sound proof walls have. Most of the research opt for the willingness to pay for it, which we try to estimate in the domain of the expressways in Korea.

2 Methods and Results

2.1 Methods

We use the contingent valuation method(CVM) in calculating the public willingness to pay for the environment goods. It is generally believed to be one of the most popular methods used for quantifying the value of non-market goods or services. To this end, a survey of 600 households was implemented on the effects of installing soundproof walls around the expressways. The survey has been conducted for two weeks from 15th June till 30th June in 2011 by the specialized agency, Research Prime Inc..

2.2 Results

According to the estimating results, annually willingness to pay per household are 1,678, 1,952, and 2,413 Korean won for the 5m, 10m, and 15m soundproof walls in Seoul Metropolitan Area respectively. If we convert them into 5-year term social willingness to pay by offering 5% discount rate, they come to 598, 695, and 859 hundred million won for the three walls as stated above respectively. That is worth 2.12%, 2.45%, and 3.04% of the toll revenue, and 1.82%, 2.12%, and 2.62% of the road construction cost of Korea Expressway Corporation in 2011 respectively.

3 Conclusion

The results contribute to provide us with the quantitative information on the effective value of soundproof walls, their environmental assessment, and decision-making about optimal investments. The business of installing soundproof walls for improving the expressway environments proves to have 1.67, 1.93, and 2.39 times the worth of other facility cost for constructing improved roads in Korea. Therefore, it is inferred that increasing investment in soundproof walls potentially has a positive effect on improving the expressway environments.

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An Analysis of Social Impacts Induced by a Development Project in Tanzania; a Case of Airport Expansion

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Department of Environmental Science and Technology, Tokyo Institute of Technology, Japan

Keywords: SIA, Land Acquisition, Involuntary Resettlement, Livelihood

1 Introduction

Emerging concepts stress a need for Social Impact Assessment (SIA) to go beyond the old traditional act of predicting impacts to the process of managing the social issues of developments. Local people are dissatisfied with compulsory land acquisition in Tanzania. The objective of this study was to ascertain whether or not the displaced have restored their pre-project living standards, and also to assess their level of participation in the resettlement program.

2. Methodology and Results

2.1 Survey method

The survey involved questionnaire with the displaced and interviews with stakeholders. The questionnaire evaluated the changes in the livelihood standards.

Table 1: Items included in a questionnaire

Social Item	Parameter
Source of income	Main source, Additional source, Monthly earning
Employment opportunities	Employment opportunities
Land	Legitimate ownership, Size of land, Business facilities in the area
House and Sanitation	House condition, Number of rooms, Types of latrine
Transport services	Optional modes of commuting, Access roads
Water services	Source of water supply, Proximity to water source Monthly amount used in buying water
Electricity services	Presence of electricity in the house, Presence of electricity in a ward area
Market availability	Presence of a market, Distance to the nearest market Monthly expenditure on foods
Education services	Number of schools, Distance to the nearest facility Change of school after relocation
Health services	Number of health facilities, Distance to the nearest facility Health facility for women and children
Social integration	Engagement in social groups, Family separation after relocation Availability of prayer house

The project site is in Dar es Salaam region, which is the most industrialized and commercial city in Tanzania (Fig.1).

2.2 Overall satisfaction level

As shown in figure 2 below, majority of resettlers were very unsatisfied with respect to all the social items evaluated.



Figure 1: Map of the study area

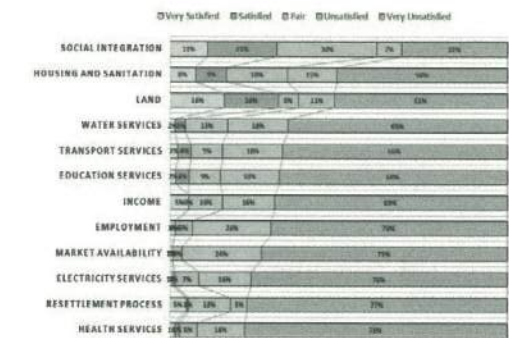


Figure 2: Satisfaction level in each category

Resettlers experienced lost in income sources and lack of employment opportunities after relocation. Also, many of them failed to finish constructing their houses after relocation. A new area lacks electricity, water services, health facilities and a market.

3. Conclusion

The findings revealed that resettlers' living conditions have been greatly damaged. This negative experiences is a results of, lack of a nationwide legislative system to address involuntary resettlement issues, the failure of the local government to implement the planned activities to develop the new area and, the failure to settle the conflicts the displaced faced with the host population.

A study for offshore wind farm site selection

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¹ Korea Environment Institute, South Korea

Keywords: EIA, SEA, Renewable Energy, Offshore Wind Farm

1 Introduction

Surrounded by water on three sides of the country, South Korea has an advantage in developing marine energy sources; thus, research on renewable marine energy sources, such as offshore wind power has been conducted. However, offshore wind power projects are being delayed due to negotiations with residents, scenic issues, and profitability. In this study, we suggest strategies for offshore wind farm site selection and evaluate feasible offshore wind farm sites in the coastal areas. (Ministry of Knowledge Economy, 2010)

2 Method

Based on previous studies, we classified the criteria considered for offshore wind farm site selection into four categories, including energy resources and profitability, conservation areas and view protection, human activities, and marine environment and ecology. In order to use these categories efficiently, we used marine spatial techniques from GIS and the investigated resources available in the country. A large amount of marine spatial data collection has been done and four different scenarios were designed for the offshore wind farm site selection around Jeju Island. First, Scenario 1 analyzed the site for the offshore wind farm while considering energy resources and profitability, whereas Scenario 2 added the criteria of conservation areas and view protection to the results of Scenario 1. Scenario 3 additionally focused on the criteria of human activities, whereas Scenario 4 further considered the criteria of the marine environment and marine ecology.

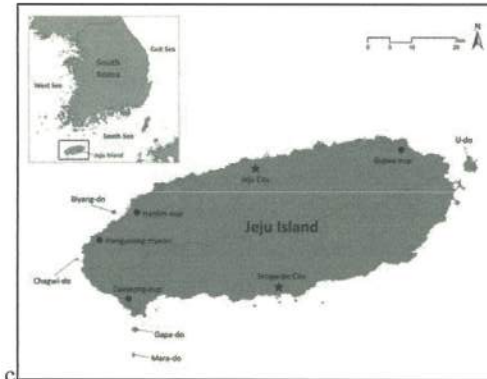


Figure 1. Jeju Island in South Korea

3 Conclusion

The results show that offshore wind farms can be located in a wide range of east and west coast of Jeju Island considering energy resources and economics only. However, when taking four categories presented in this study – energy resources and economics, conservation areas and landscape protection, human activities, and the marine environment and marine ecology – into account, the feasible offshore wind farm sites significantly decreased than before when the energy resources and economics were considered only.

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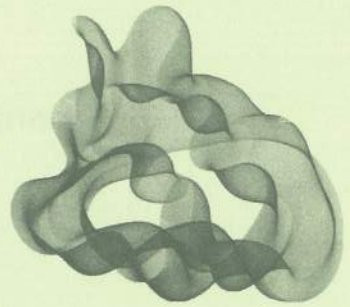
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The Impact Assessment We Want

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Session II Military, Mitigation and Radioactive Waste

Chair : Sang Hee Lee (NIER) and Shinsuke Otaguro (EA-Intl)

Noise Mitigation Measures on Korean Highway

Chulhwan Kim Taesun Chang and Hyejin Kang
Korea Expressway Corporation Research Institute (KECRI), Korea

Impact of Radioactive Waste after Nuclear Disaster: Controversy on Siting Process of Disposal Facilities

Takehiko Murayama¹, Shuta Komoto² and Shigeo Nishikizawa¹
¹Tokyo Institute of Technology, ²EX Research Institute Ltd., Japan

Behavior of Explosive Compounds (TNT and RDX) at a Military Shooting Range in Korea

Bumhan Bae¹, Bumjoon Kim¹, Ahreum Lee¹, Junghyun Cho¹, Wonchul Choi¹ and Hanyoung Jang²
¹Department of Civil & Environmental Engineering, Gachon University, ²Waters Korea, Korea

Hazard Analysis of Biological Products Manufacture at Korean Agro-industrial Complex

Sang-Pyo Hong
Cheongju University, Korea

State's Obligation to Conduct Transboundary Environmental Impact Assessment for Nuclear Activities and a Regional Framework Proposal in East Asia

HA Lisi
Wuhan University, China

Noise Mitigation Measures on Korean Highway

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¹Korea Expressway Corporation Research Institute (KECRI), Korea

Keywords: Road Traffic Noise, Noise Mitigation, Highway

1 Introduction

Over 80% of urbanization rate and over 60% of population live in the apartment house in Korea. Because of this, we have many noise problems with apartment house and highways. In regard to the highway, 856 complaints have received in late 5 years..

2 Mitigation Measures

Noise barrier is the most common measure to mitigate road traffic noise. The expected mitigation level by the barrier is around 15dB at most. From the acoustic point of view, just 2 properties are required for noise panel, one is the transmission loss and the other is absorption coefficient. For designing the noise barrier on highway, we use our own noise calculating software called KHTN. This software has a unique noise source model measured from Korean highways and pavements. For getting more shielding performance in addition to the noise barrier, NRD the noise reducing devices are available. It can reduce the noise by reducing edge potential of the barrier. We can expect additional 1~3dB to the noise barrier. About 20 types and shapes of NRDs have been used commercially in Korea. For the test of NRDs, a reasonable test method have been studied and suggested. The test facilities have been set in Korea Expressway Corporation Research Institute for use official test of NRDs. We use highway noise spectrum for evaluating NRD's performance. Around 0.5~1.8 dB are reduced compared with equal height noise barrier for the 14 NRD samples and less performance may be expected for the low-noise pavement. Around 1.5~3.0 dB are reduced when the NRDs are attached to the noise barrier additionally for the same samples. Low-noise pavement is a good solution because the noise can be reduced regardless of receiver position.

But, durability of noise reduction is the crucial point for field use. So, Long-term test have been carried out in Korean highways. The noise level from low-noise pavement is lower than that of cement pavement by around 6 dB at high frequency range. From the test results, the noise from asphalt noise is lower than cement pavement by around 3 dB and the noise from low-noise pavement is lower than asphalt pavement by around 3dB. The noise tunnel is the most effective noise mitigation measure when if they are enough length. But, because of the safety and amenity, it is not be preferred to the maintenance authority. Expected noise reduction level is around 15~25 dB.

3 Conclusion

Korea is one of the highest dense of population in the world. So we have many noise problems in common life, such as construction noise and traffic noise. Especially, traffic noise is one of the most annoying problems today in Korea, because of highly raised apartment house around roads. For abating the road traffic noise, more complicate noise assessment models and methods will be studied and developed.

Impact of radioactive waste after nuclear disaster - Controversy on siting process of disposal facilities –

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¹ Tokyo Institute of Technology, Japan
² EX Research Institute Ltd., Japan

Keywords: Radioactive waste, Siting process, Participation, Adaptive process

1 Background and Purpose

After an nuclear accident in March 2011, radioactive substances was spread out surrounding areas. That led huge amount of radioactive wastes. Not only in Fukushima, but in wide areas, local municipalities are forced to manage this kind of wastes. Japan Ministry of the Environment (MOE) proposed disposal process. Despite the ministry's efforts, current siting processes generate strong local oppositions. After reviewing current situation of this issue, this paper suggests viewpoints for the resolution as well as lessons learnt in waste issues after disasters.

2 Method

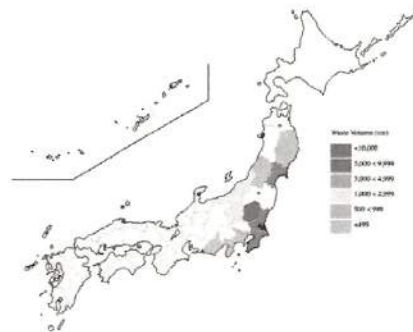


Figure 1 Distribution of radioactive wastes

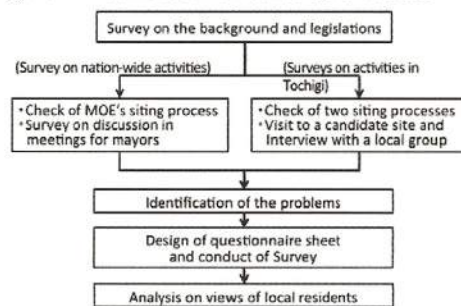


Figure 2 Framework of this research

After the accident, radioactive substances distributed around Fukushima prefecture (Fig.1). We conducted a survey according to the diagram in Fig.2. In particular, questionnaire survey for the public in Tochigi Prefecture was implemented in January 2015.

3 Results

Table 1 Siting activities in Tochigi

Date	Topic
2012/9/3	MOE ordered Yaita City to construct a final disposal site.
2013/10/22	Signatures of rejection were handed out to MOE.
2013/2/25	MOE decided to give up the construction plan in Yaita.
2014/7/30	MOE ordered Shioya Town to construct a final disposal site.
2014/7/31	Citizen group of the objection handed out their opinion to governor of Tochigi.
2014/11/9	Written request on rejection of the plan was handed out to MOE.

After MOE implemented siting process mainly in scientific manner, MOE held mayors' meetings in relevant areas, and collected their opinions. Table 1 shows siting activities in target area. According to our survey, only 36% of respondents agreed with current process. While MOE tries to decide one facility in each prefecture, the number of respondents supporting temporary storage is nearly the same as that supporting MOE's policy.

4 Conclusion

While MOE emphasizes scientific consideration a rational process, adherence of initial framework still leads quite strong opposition of local communities in final candidate sites. Change from DAD (Decide, Announce and Defend) to participatory and adaptive process would be necessary.

Behavior of explosive compounds (TNT and RDX) at a Military Shooting Range in Korea

Bumhan Bae¹, Bumjoon Kim¹, Ahreum Lee¹, Jung Hyun Cho¹, Wonchul Choi¹, and Hanyoung Jang²

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² Waters Korea, Korea

Keywords: RDX, TNT, Surface Runoff, Plant uptake, Transfer to herbivore

1 Introduction

Contamination of toxic and recalcitrant explosive compounds (TNT and RDX) in military shooting range is a worldwide problem (Rylott et al., 2005). Behavior of explosives compounds at a military shooting range

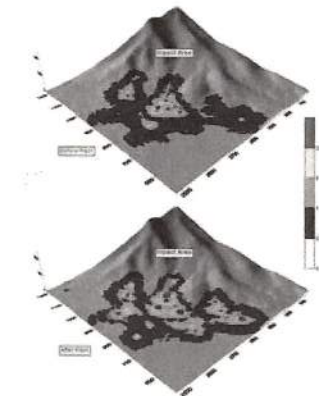


Figure 1: Distribution of RDX in the surface soil before and after heavy rainfall

in the Republic of Korea was monitored for 7 years as a part of post-EIA (environmental impact assessment) to provide data for remediation plans through better understanding of explosives migration routes to nearby Hantan River at which a flood control dam is under construction.

2 Materials and Methods

2.1 Monitoring activity

The monitoring activities are as follows; (i) monthly sampling of 12 soils, 3 water and underlying sediments (ii) seasonal sampling of 20 soil, 5 water, and 3 ground water (iii) seasonal sampling of 10 dominant plants and corresponding rhizosphere soil samples from 2011 to 2012 (iv) seven samples of animal excretion in 2012. In winter, sampling activity stopped due to unpaved icy roads and snow covered UXOs.

2.2 Analysis

Explosive compounds in water, soil, and plants were analyzed by HPLC (USEPA SW-846). UPLC-MS/MS method was developed for qualitative analysis of explosive compounds in animal excretion.

3 Conclusion

Surface runoff during heavy rainfall was the most significant migration route of explosives to Hantan River. RDX was found in ground water but the concentration was less than 1 mg/L. TNT concentration was higher in the plant roots whereas RDX concentration was higher in aerial parts of the plants. In animal excretion, RDX was higher in elks that feed on plant leaves, whereas TNT was higher in bores that feed on plant roots and seeds. This is the first report that verifies the transfer of explosives in soils to wild animals through food chain.

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Hazard Analysis of Biological Products Manufacture at Korean Agro-industrial Complex

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298 Daesung-Ro, Cheongwon-Gu, Cheongju, Chungbuk Province, 363-764, Republic of Korea

Keywords: Environmental Hazard Analyst, Biological Products Manufacture, CRS

1. Introduction

Biological Products Manufacture (BPM) factories which are located at Korean Agro- industrial Complex (KAC) in rural area have been controlled by the government that has propelled to achieve the environmental criteria. For addressing environmental hazard of BPM at KAC, Chemical Ranking and Scoring System (CRS) was applied to Pollutants Release and Transfer Registers (PRTR) data.

2. Environmental Hazard Analysis

To analyze the environmental hazard of BPM at KAC in rural area, 28 specific hazardous water contaminants such as heavy metals, formaldehyde and diethylhexylphthalate from 4 manufacturers were analyzed based on U.S.EPA Method and Korean Official Experiment Criteria of Water Contamination.

From discharged water contamination analysis, 0.13 mg/l Cu and compounds was detected at only one BPM. The other 27 specific hazardous water contaminants except Cu and compounds were not analyzed within the detection limit. However, the concentration of 0.13 mg/l Cu and compounds can fulfill even the standards of drinking water. BPM at KAC in rural area can be regarded as allowable level of environmental hazard according to the analysis of 28 specific hazardous water contaminants.

Most companies of BPM are usually considered as handling infectious microorganisms and highly hazardous toxins, consequently the BPM impact on

human health and ecological stability around KAC in rural area should not be disregarded.

3. Conclusion and Discussion

To overcome this uncertainty of BPM at KAC in rural area, environmental hazard was calculated on the basis of water contamination by utilizing CRS. From the CRS logic, environmental hazard of BPM in Korean rural area can be estimated as acceptable, but the further study of accurate biological risk assessment is required to alleviate and minimize the risk of highly dangerous intrinsic characteristics of BPM.

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State's Obligation to Conduct Transboundary Environmental Impact Assessment for Nuclear Activities and A Regional Framework Proposal in East Asia

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Keywords: Transboundary EIA, Nuclear activities; Public Participation; Regional Framework

1 Introduction

It has been considered as a requirement under general international law that States have the obligation to undertake an EIA where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context. However, as the International Court of Justice has pointed out in the Pulp Mills Case, general international law does not specify the scope and content of an EIA; the scope and content of EIA vary in each industry. Civil nuclear activities may cause severe damage to human life, property and environment, and the consequences of a nuclear disaster may spread across borders. Therefore, it is necessary to clarify the meaning of state's obligation to conduct EIA in nuclear context.

2 EIA in a transboundary context

2.1 The evolvement of transboundary EIA

At present, EIA, as Domestic legal idea, has been recognized as Customary International Law in nature.

2.2 Difficulties in implementing transboundary EIA rule

It is difficult to transplant a theory from domestic context to transboundary context. The key elements of a successful EIA regime in domestic context are unified legal framework and institutional coordination, of which International Law is fundamentally lacks.

3 Transboundary EIA in nuclear context

3.1 Content of transboundary EIA in nuclear context

This section discusses the stages of nuclear activities that need transboundary EIA; and the substantive contents of transboundary in the siting, construction and operation of nuclear activities

3.2 Assessment methodology

A success EIA must be based on explicit indication of predictive methods and underlying assumptions as well as the relevant environmental data used, this section explains the method selection of transboundary EIA for nuclear activities

3.3 Procedural Requirement

In a transboundary Context, State is under the liability to inform and to consult other States that likely to be affected before the commencement of the nuclear activities.

4. Regional Framework for the transboundary EIA for nuclear activities in East Asia

China, Japan and Korea are all in a strong demand of energy and all have a number of nuclear reactors on their coastal lines. It is impossible for one State to include transboundary EIA into its domestic legal system without "reciprocity". A regional framework on transboundary EIA for nuclear activities would be a good solution to the already exiting nuclear development and forthcoming "renaissance" of

nuclear energy in this region. The regional framework shall be based on an agreement between the due parties; a joint commission should be established under this agreement.

5. Conclusion

Transboundary EIA is a newly accepted customary international law rule, its scope and content varies in different subjects. In a nuclear context, transboundary EIA shall be implemented throughout the whole process from siting, construction and operation of nuclear activities. The environmental impacts shall include multiple environmental factors, covering all possible impacts that may arise in nuclear activities. Necessary information and efficient consultation shall be provided to and carried out with most likely affected States and population. China, Japan and Korea should take steps to fulfill their obligation under International Law, and seek regional cooperation with its neighboring States, collectively, to address the common challenges faced them in civil nuclear industry.

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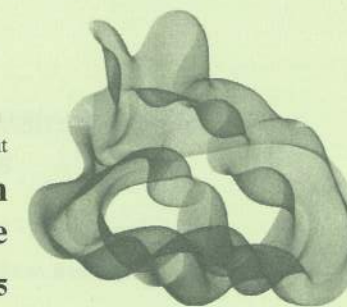
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K-water Academy
Daejeon, Korea



Session III Ecosystem and Water

Chair : Akira Tanaka (TCU) and Changwan Seo (NIE)

Management of Fine Sediments Considering Water Quality and Aquatic Ecosystem in Streams

Jungsu Park¹, James R. Hunt², Woosuk Lee¹, Sangchul Hwang and Kiho Gang¹
¹K-water, Korea, ²University of California, Berkeley, U.S.

A Case Study on Mitigation of Contaminated Military Gunnery Range in the Catchment Area of Flood Control Dam Using Eco-complex Structure

Won-Suk Cheong Soo-Young Park, Hyeon-Cheol Kim and Han-Joong Kim
K-water, Korea

The Changes in Emission Properties of Nonpoint Source Pollutants since 1995 in ChungcheongRegion, Republic of Korea

Sang Hee Lee, Soo Hyung Lee, Jiyeon Kim, Jaeyeop Whang, Youngdae Ji and Seungju Whang
Geum River Environmental Research Centre, National Institute of Environmental Research, Korea

The Study on Development Method of Plan Design in "Satoyama Banking": Investigation of Prospectus

Ayaka Matsumiya and Akira Tanaka
Tokyo City University, Japan

The Effect of Drought to Source Water Quality and Water Treatment Process in the Lake Paldangho

Taehoon Kim¹, Kwansoo Seok¹, Youngmi O¹, Yunduck Kim¹,
Byungsoo Park², Taehee Kwon² and Choeljin Kim¹
¹Seoul Metropolitan regional division, K-water, ²Paldang office, K-water, Korea

Management of fine sediments considering water quality and aquatic ecosystem in streams

Jungsu Park¹, James R. Hunt², Woosuk Lee¹, Sangchul Hwang and ¹ Kiho Gang¹

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Keywords: Fine Sediment, Ecosystem, Water quality, Dam

1 Introduction

Fine sediment is an important factor in the determination of water quality and the maintenance of aquatic ecosystems. Thus, estimation of fine sediment sources, transport and storage is essential during water resources development. Theoretical models for fine sediments within watershed are not predictive and management decisions are based on empirical power-law models based on continuous measurement of suspended sediments. Field measurements are rare in Korea which limits the ability for proper management of watershed environment. This research briefly explores the limitation of power-law models and alternative approaches that require the collection of continuous sediment data. The presentation also introduces an example of sediment management effort in current dam construction project in Korea.

2 Importance of measurement for sediment data collection

One of the most commonly used models for estimating fine sediment transport is a power law model $Q_s = aQ^b$, where Q_s [MT] is the fine sediment transport rate, and Q [L^3/T] is the flow rate. The empirical coefficients a and b vary spatially and temporally. However previous researches suggest that fine sediment transport rate often does not follow a single power law in natural streams. Besides orders of magnitude variability is often observed in Q_s at a given Q . This research briefly explores the reason of this bias and suggests importance of collecting high frequency sediment data and alternative models which are essential for improving the watershed environment.

3. Management of Sediment in Yeongju Dam construction project

Yeongju Dam construction started in 2009 and completion is expected soon. The dam is located in Naesung stream which is the first branch of Nakdong River. Naesung stream is one of the most well-known sandy streams in Korea. Contaminants such as nutrients present in the water column are filtered by the sandy bed which maintains the water quality and sustains the stream ecosystem. The downstream sediment supply is often reduced after dam construction which may alter downstream ecosystem. Thus, various efforts are considered to minimize effects of Yeongju dam construction which would provide an exemplary model of sediment management downstream of a large dam.

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A case study on mitigation of contaminated Military Gunnery Range in the catchment area of flood control Dam using Eco-complex structure

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Keywords: Military Gunnery Range, Explosive contamination, Phytoremediation, Risk Assessment, Eco-complex structure

1. Introduction

Management of nonpoint source in a watershed plays an important role for steady water quality or to protect the ecological environment (Lynch 1985, Choi 2008). The military gunnery range is one of the nonpoint source threatening human health and wild animals (Ryu 2007, Choi 2011). The "D" military gunnery range is located in the catchment area of a Hantan river flood control dam. The polluted area in the "D" gunnery range drew attention in the process of the construction project of a flood control dam in Hantan River being carried forward and emerged as a task to be resolved necessarily in order to protect the hydro-ecological system of Hantan river. Therefore, K-water prepared the eco-complex structure in the gunnery range to reduce the pollution-diffusion.

2. Investigation of pollution

Soil and ground water pollution of the "D" Military Gunnery Range has been monitored every quarter. The contaminants are classified as heavy metals and explosive materials. For instance, figure 1 has shown a level of TNT in the "D" Military Gunnery Range.

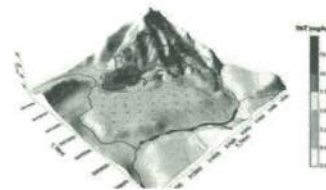


Figure 1. TNT level of surface soil (depth 0-0.1m)

3. Installation of Eco-complex structure

The eco-complex structure was prepared to control the discharging contaminants in the gunnery range. This structure is classified into prevention of pollution-diffusion and remediation method of contaminated soils (figure 2). The structures to prevent pollution-diffusion are consisted of the settling basin with 49,000m², roughly 1.2km vegetation waterway and 1.8km dike against soil erosion.

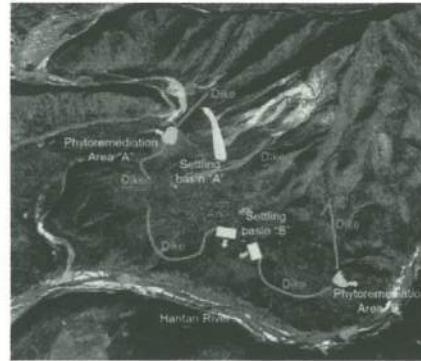


Figure 2. Scheme of Eco-complex structure

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The Changes in emission properties of nonpoint source pollutants since 1995, in Chungcheong region, Republic of Korea

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Keywords: nonpoint source pollutants

1 Introduction

The pollutant emission properties of sites for 6 land uses have been monitored in Chung-cheong region which occupies 16.11% of the Republic of Korea in 2014. The emission properties were compared to those from the monitoring results in 1995 since anthropogenic, environmental and technological changes would affect the properties.

2 Results and Discussion

2.1 Changes in the climate and land uses

The monthly precipitation trend of 2014 was similar to those of 1995. The annual precipitation of 1995 and 2014 were 1053.3 and 1173.8 mm respectively.

Regarding land areas, the percentage of urban (8.33%) and forestry area (65.0%) were increased but that of agricultural land (26.7%) was decreased in 2014 when compared to those (6.0, 60.6 and 33.4% respectively) in 1995.

2.2 Changes in emission properties of NPS

Regarding EMCs, SS, COD and T-P were decreased but BOD, T-N and NH₃-N were increased in urban area. The EMCs of T-N and NH₃-N were also increased in paddy and farming lands but the EMCs for SS were increased only in paddy land whereas those were decreased in farming and forestry area in 2014 when compared to those in 1995.

Considering the contribution to total emission loads, these from agricultural land were dominant when compared to the contribution of urban and

forestry land both in 1995 and 2014 except the T-N for forestry in 2014. Despite the low EMCs of all 6 water quality factors for forestry in 1995 and 2014, the large area (up to 65.0% of coverage) led to high contribution to the total emission loads. In urban area, populational growth led to the increases in the contribution to the total emission load for BOD. However, the improvement of sewage or waste treatment capacity of agricultural area including stock farms led to the decrease of the total emission loads.

3 Conclusion

The changes in emission properties were recognized and these were affected by the land uses. Despite the changes, the contribution from agricultural land to pollutant emission was dominant when compared to those from the other land uses. These changes would be due to the socioeconomic, environmental and natural changes and technical developments, etc. Therefore, further studies needed to find which changes would lead to major effect on the pollutant emission properties from nonpoint source

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The Study on Development Method of Plan Design in "Satoyama Banking" - Investigation of Prospectus -

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Keywords: Prospectus, Biodiversity Offset, Biodiversity Banking, Satoyama Conservation

1 Introduction

The purpose of this paper is to explain items that should be considered when establishing a Japanese version of the biodiversity bank (: Satoyama bank) using the concept of prospectus in the U.S. This paper outlines the structure of the U.S. prospectus and suggests how to make a prospectus for target land of a "Satoyama bank" in Chiba City, Chiba Prefecture.

2 Research results

2.1 Outline of a prospectus

The concept of a mitigation rule originated with the Clean Water Act of Federal Regulation. The purpose of this rule is to restore and maintain the ideal chemical, physical and biological qualities of water resources. In this rule, the United States Army Corps of Engineers prohibit the discarding of garbage into wetlands, rivers and other water bodies without permission. In addition to this rule various guidelines were made. But concern has been raised regarding the interpretation of those guidelines because they were created for different purposes and with different backgrounds. Therefore, the Compensatory Mitigation for Losses of Aquatic Resources (: Final Rule) was enacted to establish a basis for a mitigation bank rule. In this rule, a sponsor wanting to establish a mitigation bank is required to submit a prospectus.

2.2 Honker Bay conservation bank prospectus and application to "Satoyama banking"

At Honker Bay, situated near Sacramento, California an advanced biodiversity banking system has been established. We have applied the Honker Bay prospectus to target land items of a typical Japanese Satoyama landscape (Table1).

3 Conclusion

First, unlike Honker Bay, people are permitted to use the target land for the Satoyama banking. Therefore, in order to apply the Honker Bay prospectus to the Japanese case, we suggest that items about user and utilization need to be added. Second, the land area of Japan is much smaller

than that of the U.S. Satoyama is a boundary between natural area and artificial area. Therefore, we suggest that this prospectus needs an item about landscape.

According to the above results, this study explains items that should be considered when creating a prospectus for establishing a biodiversity bank in Japan and for developing a method of designing a plan for "Satoyama banking" in a target land area in Chiba City, Chiba Prefecture.

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Table1:Applying prospectus for target land

Prospectus items	
Bank Sponsor	Non-profit organization (Satoyama conservation activities)
Property Ownership	Land owner A
Purpose of Bank	To provide compensation for impacts on species including: <i>Rana japonica</i> and <i>Sasakia charonada</i> .
Location	Chiba City, Chiba Prefecture
Land Use and Zoning	Applicable to urbanization control area on the basis of the City Planning Act. Applicable to nature conservation zone on the basis of the Chiba City Master Plan Concerning City Planning.
Size of Bank	16 acres
Site Description	Conservation for rice paddy field and second-growth forest or Conservation for rice paddy field.
Bank Goal	To preserve, protect, restore, enhance and manage habitat beneficial to <i>Rana japonica</i> and <i>Sasakia charonada</i> .
Proposed Credits	Conservation for rice paddy field and second-growth forest can conserve 3.58ac for 30 years. Conservation for rice paddy field can conserve 2.47ac for 30 years.
Service Areas	<i>Rana japonica</i> grassland around rice paddy fields and wetlands of the hills from lowland in Japan. <i>Sasakia charonada</i> thicket in part of Hokkaido and from Aomori Prefecture to Kagoshima Prefecture.

The effect of drought to source water quality and water treatment process in the Lake Paldangho

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Keywords: Drought, Blue-green algae, Water quality, Taste and odor removal

1. Introduction

Because of climate change and drought in 2015, the rainfall in the Han River basin was less than 50% compared to the past five years. It caused the shortage of storage capacity and discharge reduction in the upstream dams and increased residence time in the Lake Paldangho. In addition, high temperatures and lots of sunshine developed the growth of Blue-green algae in water resource. And the water treatment plant introduced advanced process such as Ozone, GAC (Granular Activated Carbon) to remove taste and odor caused from Geosmin and 2-MIB (Methyliso-borneol) which were produced and emitted by Blue-green algae. In the conventional treatment without advanced treatment process, pre-chlorination was converted to mid-chlorination and PAC (Powdered Activated Carbon) was used to remove Geosmin and 2-MIB

2. The increase of taste and odor in source water

In the lake Paldangho, the concentration of TOC (Total Organic Carbon) increased every year. Especially, in September in 2015, it was 3 times higher value (3.1mg/L) than the average (1.0mg/L) in past 5 years. In addition, the water temperature is more than 2 degrees higher than the previous years. This made the periods that the Blue-green algae was dominant much longer and the concentration of Geosmin and 2-MIB increased. In 2015, the concentration of 2-MIB has risen up to 70ppt, the maximum value in 10 years, and the period that 2-MIB exceeded 20ppt was more than 20 days. This result is more than 4 times longer than previous 10 years.

3. The removal of Geosmin and 2-MIB in WTP

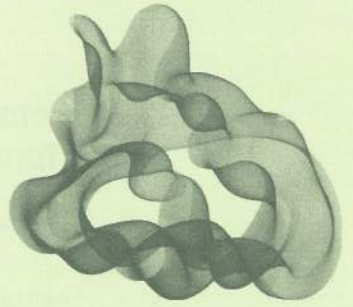
The removal efficiency of Geosmin and 2-MIB in advanced treatment process was approximately 100%. Geosmin could be removed in GAC process but 2-MIB was removed more easily in oxidation process such as Ozone. In conventional treatment process, the maximum removal efficiency of Geosmin dissolved in raw water was 70% when 30ppm of PAC was added. According to our Jar-test result, 30ppm of PAC could absorb and remove 47ppt of dissolved Geosmin and the other particulate Geosmin (not dissolved) could be removed by coagulation. 2-MIB occurred as fully dissolved type in source water and difficult to be removed than Geosmin. The minimum feeding rate of PAC to remove 2-MIB was 15ppm. In full-scale WTP, the removal efficiency of 2-MIB was 40% to 60% when 20ppm to 40ppm of PAC was added.

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The Impact Assessment We Want
**4th Korea-China-Japan
Tripartite EIA Conference**

October 16 and 17, 2015
K-water Academy
Daejeon, Korea



Session IV Environmental Planning and Public Participation

Chair: Sangil Hwang (KEI) and Shigeo Nishikizawa (TIT)

Tourists' Evaluation on Visual Impacts due to a Geothermal Power Plant in National Park

Shigeo Nishikizawa, Kenta Tsubakura and Takehiko Murayama
Tokyo Institute of Technology, Japan

Information Disclosure and Public Participation in Chinese EIA System

Liu Tong, Nishikizawa Shigeo and Murayama Takehiko
Tokyo Institute of Technology, Japan

**Landscape Performance and Sustainable Landscape Design:
Case Study of Stormwater Management Design**

Jinki Kim et al.
Kongju National University, Korea

A Direction of Mutual Nexus Planning between National Land and Environment

Jong-Gwan Jung
Chungnam Institute (CNI), Korea

Tourists' Evaluation on Visual Impacts due to a Geothermal Power Plant in National Park

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Tokyo Institute of Technology, Japan

Keywords: Visual Impact, Landscape, Geothermal Power Plant, National Park

1. Introduction

Geothermal power has been considered as one of the important renewable energy source and the regulation of National Parks has been relaxed since 2012 to promote geothermal developments. This study focused on visual impacts due to geothermal developments in National Parks and clarify the evaluation of tourists visiting near a geothermal power plant.

2. Method

Two types of surveys were conducted; one is on-site survey in which we interviewed key persons including developers, public officers and NPO to identify what are the major elements of visual impacts. Secondly, we selected the Ogiri power plant located in Kyushu region as a case study and conducted interview surveys on tourists near the plant. In total, we collected 191 questionnaire sheets.

3. Results and discussions

It was cleared that more than 60% of tourists neither knew nor recognized the plant in the park. Also, more than 50% of visitors feel visual impacts due to pipelines unfavorable (Fig. 1). On the other hand, only 40% or less tourists feel unfavorable in case of intermediate or distant view. This result implies that the distance between viewpoints and the subject strongly influence the landscape evaluation. Particularly, impact in near view is more significant than that of intermediate/distant one, because visual effect of near view is larger than that of distant view.

Most of tourists rated the existence of the plant by the Onami Lake as unfavorable due to its

visually sensitive area. Despite of its more distant view than that of pipeline, the evaluation result shows more negative.

Regarding the color of pipelines, green colored one is rated visually preferred option due to the impact mitigation by existence of evergreen trees. This result, however, is not consistent with the guideline of the National Park Management Plan.

4. Conclusions

- Most of tourists regarded visual impacts due to the geothermal plant as not significant apart from adverse effects on near view or highly sensitive sites.
- Tourists rated brown coloured pipelines the most unfavourable, which was different from the guideline of the National Park Management Plan.
- There was a correlation between age and visual impact evaluation, which might be related to the difference of attitude toward nuclear policy between the generations.

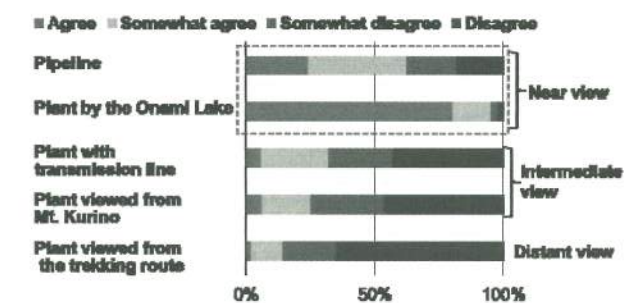


Fig. 1: Tourists' response to the adverse impacts

Information Disclosure and Public Participation in Chinese EIA System

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Keywords: EIA, Information Disclosure, Public Participation

1 Introduction

As the rapid economic development in China, a lot of construction projects have been set up and bring lots of damage to the environment. Generally, environmental impact assessments (EIAs) are required before large scale projects are proposed. However sometimes the information about EIA is not free disclosed to public, stakeholders cannot have many chances to participate in the projects. The situation of information disclosure (ID) and public participation (PP) need to be clarified.

2 Contents of ID and PP in Chinese EIA

Chinese EIA procedures are mainly divided into 6 stages: Proposal, Screening, Scoping, DEIS, FEIS and Review stages. ID/PP are set in Scoping, DEIS and FEIS stages. Table 1 shows the contents of detailed methods of ID/PP in different stages of China. Among all the methods, only using website at FEIS stage is mandatory.

Table 1: Contents of ID/PP methods in Chinese

Stage	Methods	Contents
Scoping	Poster	* First time notice (6 items): · Name and outline of the project · Name of proponent and contacts · Name of EIA consultant and contacts · Procedure of EIA · Items of collecting opinions · Ways of giving suggestions
	News	
	Website	
DEIS	Poster	* Second time notice (8 items): · General information of the project · Summary of the possible impact · Measures of relieving bad effects · Main conclusion in DEIS · Ways to get DEIS and open period · Items of collecting opinions · Ways of giving suggestions · Period of giving suggestion
	News	
	Website	
FEIS	Q. Survey	* Public involvement Q. Survey: Contents should be comprehensive and clear. PC. Participants contains of proponent/EIA consultant, public. PH. Participants contains of proponent, EIA consultant and public. At least 15 participants. The schedule is set.
	PC	
	PH	
	Website	* Final EIS

* means mandatory □ means optional, but at least use one of them

3 Methodology

This study aims to clarify the current situation of ID/PP in Chinese EIA by evaluating the situation of ID/PP from the following 4 aspects: Methods of PP, Procedure period, Quality of information and

Response from government (Table 2). According to the evaluation result, discuss the challenges of Chinese EIA.

Table 2: Items of evaluation

Evaluation Viewpoint	Target Period	Evaluation Target
Methods of PP	FEIS	Questionnaire survey Public meeting
Procedure period	Scoping	First time notice
Quality of information	DEIS	Second time notice
Response	FEIS	Suggestion and reply

4 Results

By evaluating 44 transport projects which were approved in 2014, we found that:

- Proponent tend to use more methods at FEIS stage rather than at DEIS stage.
- Procedure period of EIA is very short.
- Public meeting is merely used.

5 Discussion

Chinese EIA has been developed in that FEISs have been required to be open to public since 2014. However, some challenges still remain.

For instance, documents in upper stages of EIA procedure such as scoping documents are still not open to public. Regarding situation of PP, document based ways are mainly used while meeting based ways which can support consensus building are merely used.

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Landscape Performance and Sustainable Landscape Design – Case Study of Stormwater Management Design

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Keywords: LID, Stormwater Management, Green Infrastructure, Sustainable Landscape Design

1 Introduction

Overflows occur when sewage and stormwater pipes overflow due to rainfall, wet weather events, or system deterioration. Many communities are looking for ways to reduce overflows with resilient and affordable solutions that meet many objectives at once.

This study examines the benefits of Green Infrastructure which can be used at a wide range of landscape scales to support the principles of Low Impact Development (LID). Environmental, social, and economic benefits of Green Infrastructure were measured at three different scales.

2 Case Study

2.1 One Drop At A Time

The first residential green roof and stormwater demonstration project in the Chicago suburbs. The self-sufficient, on-site hydrologic regime includes a green roof, permeable pavement, bioswales, rain gardens, rain barrels, and a cistern, which collectively capture rainwater and treat stormwater runoff before it enters local storm sewer drains. This project also features a prairie landscape of native plants, a look which is unique yet compatible with the traditional lawn aesthetic of the adjacent residential properties.

2.2 Boneyard Creek Restoration

This project restored the curvilinear alignment of the original waterway using natural stone terraces to control erosion. The design increased stormwater holding capacity and enhanced ecological function, while creating new spaces for recreation and enjoyment. The detention basin provides 100-year flood protection in the setting of an attractive park, which along with the adjacent park, links downtown

and the university with open space, winding trails, and a wide pedestrian promenade.

2.3 Chicago Botanic Garden Lake Shoreline Enhancement Project

Restored lake shorelines and re-created native habitat functions in conjunction with innovative bioengineering techniques. Carefully designed habitats abate shoreline erosion, while offering a widely accepted visual appeal. The re-created habitats are healthy native ecosystems that support communities of native plants and animals, improving species richness, as well as lake water quality.

3 Conclusion

This study quantifies the benefits of Green Infrastructure in ecological, economic, and social spheres. Results indicate that Green Infrastructure provides not only stormwater management, but also wildlife habitat enhancement, water quality improvement, and social values.

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A Direction of Mutual Nexus Planning between National Land and Environment

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Keywords: National Land Planning, Environmental Planning, biotope mapping, spatial information

1. Introduction

Planning is a process of figuring out what needs to be done and how to do it. It is the process of applying knowledge to action or basic problem solving. It requires determining ends and means relationships. That is usually planning involves setting objectives, gathering and analyzing information, and formulating and evaluating alternative policies, plans, programs, of projects to meet the objectives. In this context, Korean government set the national subject of framework for mutual nexus planning between National Land and Environment. Through the harmony with the environment and preventing over-exploitation of national land, we can gear up the sustainable development within the context of institutional framework. Currently Ministry of Environment and Ministry of Land Infrastructure Transportation have agreed to strengthen the linkage in reciprocal collaboration for the reflection of planning process. In the stage of planning establishment, land plan has addressed the eco-friendly articles in the guideline for urban and county basic spatial plan. Equally environmental plan includes the firm-up provisions of spatial structures and functional role of the land use plan. Particularly in the stage of project development, according to the categories of development, we can provide the environmental factors to consider in each project and arrange the standard protocol for eco-friendly development. And to support the nexus system, we set up the conflict mediation unit in the policy coordination side and sharing the basic information data tools and sets.

2. Methods

Carrying capacity of some area is the number or biomass of organisms that can be sustained without adversely affecting that area. The concept of carrying capacity tries to measure the capability of an area to support and sustain a population within acceptable limits. And EIA is one of the most mandated and useful tools in environmental

planning. This method has useful applications in land use and development and is used by several localities to assess the environmental impacts of developing projects. Usually EIA has two main roles, the 1st is a planning tool which a rational means of gathering and analyzing information intended to influence management and development. The 2nd is a decision support tool which a means of influencing the attitudes of decision makers, a mechanism that has increased the status and strategies of project proponents or opponents. To keep up with these views, Chungnam Provincial Government had built up biotope mapping tools, for the application of spatial planning of local environmental data sets. This spatial environmental information system is composed of precise map drawn on a scale of 1:5,000. And it has included natural resources value and land use attributes information. Generally this tool is more easily linked to the contents and evaluation items and feedback performance. By doing this feedback process we can extend the usefulness of local biotope mapping tools for decision support on the basis of rational planning context.

3. Results and Discussion

Environmental planning applies the process of planning to environmental protection and problem solving. Therefore it can be summarized its attributes as reactive, proactive, and integrative. However national land planning is based on the complex interdisciplinary field that integrates the diverse perspectives of science, policy and design. Some of the concepts of it are elusive including sustainability and quality of life, and some of the process elements are comprehensive terms of meaning such as collaborative learning and conflict resolution.

The EIA process broadly followed that set up in nexus guidelines and comprised three distinct phases; scoping, strategic assessment, and

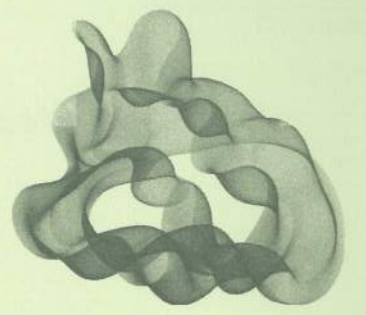
sustainability framework. Particularly biotope mapping is a useful tool for mutual linkage between national land and environmental planning. Yet it is worth of the effort to stand these conceptual, scientific, and procedural challenges to approach its inherent goals; mitigating effects of development, achieving more livable and eco-friendly places to live, and enhancing natural environmental systems.

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Poster Presentations

Evaluation of Toxicity to Water Flea for Chloride and Environment Certificated Deicers

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Keywords: toxicity, deicer, chloride, environment certificated deicer

1 Introduction

In this study, evaluation of acute toxicity to water flea (*Daphnia Magna* Straus) with deicer types was carried out in order to investigate latent ecological effect of deicer to aquatic life. Evaluation was carried out according to ES 04751.1 "Acute Toxicity Test Method of the *Daphnia Magna* Straus". [1]

2 Experimental

In order to decide concentration range of deicer solution, water fleas were put into 5 deicer solutions with various concentrations in baths equipped with air pump. EC₅₀ (concentration in which 50% of test objects are immobilized) and LC₅₀ (concentration in which 50% of test objects are died) were calculated from the recorded immobilization and death rates after 48 hours using statistical program (Trimmed Spearman-Kärber). Concentration range of deicer was 0.625 ~ 30 g/l, and 20 water fleas were put into each bath.

3 Results and Discussion

Deicers used in acute toxicity test were total 9 types such as sodium chlorides (both reagent grade and practical deicer), calcium chloride dehydrate (CaCl₂ 2H₂O), 6 types of environment certificated deicers.

Immobilization and death rates during 48 hours were shown in Fig. 1. EC₅₀ values were shown as 4.0, 4.3, 1.6, 4.6~5.7, and 1.4~3.3 g/l for practical deicing NaCl, reagent grade NaCl, CaCl₂, liquid environment certificated deicers, and solid environment certificated deicers, respectively. Tendency of LC₅₀ was similar to that of EC₅₀. LC₅₀ values for both practical deicing and reagent grade NaCl were more than 4.6 g/l, and 1.7g/l for CaCl₂. LC₅₀ values for liquid and solid environment certificated deicers were 5.3~6.3 and 1.8~3.5 g/l,

respectively. Generally, predicted concentration of deicer in expressway runoff is about 0.1~1.0 g/l.

From the overall view, calcium chloride has more toxicity than sodium chloride, and toxicity of liquid environment certificated deicers is similar to, or lower than that of sodium chloride. However, solid environment certificated deicers have more toxicity than sodium chloride.

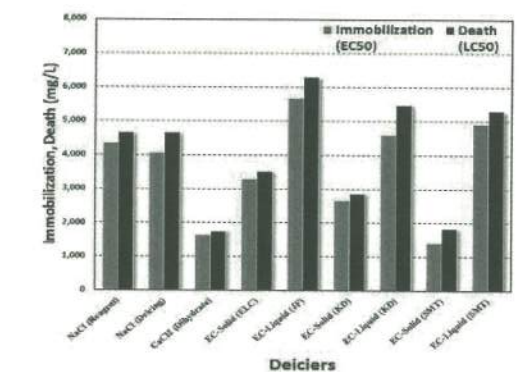


Fig. 1 Acute toxicity test results with deicer types

References

ES 04751.1 "Acute Toxicity Test Method of the *Daphnia Magna* Straus".

Toxicity Evaluation of Gas from Combusted Coatings for Road Tunnel

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Keywords: Fire safety, coating, tunnel, gas toxicity

1 Introduction

Generally, interior materials such as ceramic tiles and coatings are applied on sidewall lining concrete in road tunnel in Korea. An objective of application of interior materials is mainly to improve illumination and optical guidance effects [1]. Before 2000's, ceramic tiles were mainly applied as tunnel interior materials, and coatings were also applied after 2000's. However, there were concerns that toxic gas might be generated from combusted organic coatings when fire occurred in tunnel. Accordingly, installing criteria were established that coatings should be applied in shorter tunnels than 1 km only. In this study, toxicity of gas from combusted coatings was evaluated to established improved fire safety standard.

2 Experimental

2.1 Fire Retardant

Nine coating systems were tested for evaluation of fire retardant. Specimens were manufactured by applying each coating systems on 100x100x15mm concrete panels. Fire retardant test was carried out according to KS F ISO 5660-1.

2.2 Gas Toxicity and Density

Eight coating systems were tested for evaluation of gas toxicity and optical density of smoke. Specimens were manufactured by applying each coating systems on 76.2x76.2x25.4mm concrete panels. Each test was carried out according to BS 6853 and ASTM E 662, respectively.

3 Conclusion

In the test for fire retardant material (class 3), total heat release rates of organic coatings were much lower than 8MJ/m², regulated thresholds, though almost all

surfaces were carbonized. From the results, it is thought that the test for retardant material (class 3) is insufficient for discrimination of effective fire retardant materials.

In the test for semi-nonflammable material (class 2), fire retardant performance with coating systems was more distinguishable than in the test for fire retardant material (class 3), but it is thought that upgrade of thresholds of total heat release rate is required.

In the gas toxicity test, only CO and CO₂ were generated for all coating systems. Toxicity index R for some organic coatings exceeded thresholds, whereas that for inorganic coatings was satisfied with regulated thresholds.

In the test of optical density of smoke, all test results were satisfied with regulated thresholds for both of organic and inorganic coatings.

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Reduction of Non-Point Source Pollutants by Expressway Sweeping

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Keywords: RDS, Sweeping, Expressway, Nonpoint Source, Runoff

1 Introduction

The control of non-point source pollutants from expressway can be achieved by structural devices, such as infiltration trenches, retention ponds, and sand filters and non-structural operation such as expressway sweeping. Efforts have been made for the application of road sweeping as an approved non-point source pollution control measure in Korea. However, the methods of sweeping have not been established and the reduction of non-point source pollutants by sweeping has not been quantitatively evaluated. Therefore, in this study, the pollutants load in expressways and the removal of the pollutants by sweeping were evaluated.

2 Materials and Methods

The RDS(Road Deposited Sediment) on expressway and the residual RDS after sweeping were collected by a vacuum cleaner. BOD was measured according to Tetra Tech(1986, 2006), TOC and TN were measured by an elemental analyzer, and TP was analysed according to standard methods

3 Results and Discussion

The reduction of BOD by sweeping was 62.2±21.4%, which was higher than RDS reduction (47.2±11.0%). It is attributed to the higher BOD concentration of RDS than that of residual RDS. The reduction of TOC, TN, TP, and VS was 45.6±22.4, 45.5±10.0, 43.5±29.8, and 47.2±10.9%, respectively, which was similar to the RDS reduction efficiency.

The average reduction of Pb, Mn, Zn and Fe was 8.1, 26.4, 23.6 and 26.5%, respectively, which was lower than that of RDS amount, organics and nutrients.

4 Conclusion

The results in this study showed that the RDS on highway is seriously polluted with organics and nutrients, and almost of them is associated with 63 μm ~ 2 mm particles. However, the pollutants of RDS, especially BOD, can significantly be removed by sweeping, suggesting that sweeping can greatly contribute to the reduction of NPS pollution from highways.

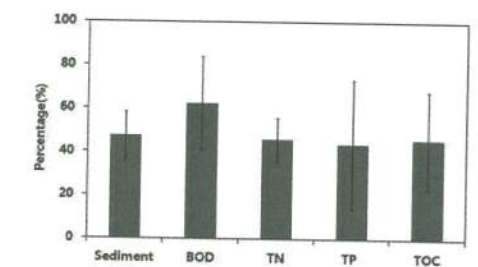


Fig 1. Pollutants Reduction by Expressway Sweeping

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Changes in water quality characteristics at the period of trial impoundment

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1 Introduction

Impoundment of reservoir brings changes on river environment such as hydraulic characteristics, Trial impoundment, water quality and ecosystems. So the analysis of major factors influent on water quality changes to newly impounded reservoir is needed. By investigating changes in the water quality environment with the test flooding conducted in Gunwi dams and examined the environmental impact of the dam reservoir and downstream river after test flooding.

2 Title

2.1 Method

Gunwi dam is Located in Wi stream the tributary of Nakdong river, Korea and trial Impoundment was conducted to test safety of dam facilities during 2009 to 2011. Survey point was the upstream and downstream sections of the dam along with two locations in the reservoir. We examined the changes in water quality as compared to the construction previous survey data. The change of COD, TN, TP of inflow and outflow was studied based on the inflow and outflow data.

2.2 Results

Storage capacity of the test impoundment was gradually rising, depending on rainfall runoff flowing into the city, lowering the water level of 15m was done over a period of about two months at 5 ~ 7 CMS discharge of effluent testing.

Also increased influx of COD and nutrients with the water level rising in accordance with the impoundment, thus Chl-a was also raised. As the water level decreases by discharge, water quality is stabilized to a previous state.

In a review of the inflow and outflow changes, COD, TN, TP emissions in the survey period of January-February

2011 the reservoir - was equivalent to 58.5 ~ 64.9% of discharges emissions entire period.)

Because of the nutrients and COD load discharged by the freshwater inflow from the initial process within a short period of time to the dam downstream of the dam, it was expected to stabilize water quality effects such as prevention of algae outbreak at the time of the fresh water.

3 Conclusion

By early discharging the initial pollution load to downstream, that the residual dust and bush growth and potential causes of water quality deterioration such as nutrient activity of the agricultural land of the untreated (such as the roots of the trees), but expect the effect has been deleted most during the period of about one year of test flooding. It is expected to be able to bring about an effect of shortening the period leading to the stabilization of water quality.

A Study on the Alternative Prevention Facilities of Existing Wild-life Fences

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Keywords: Roadkill, Wild-life fence, Wild animals' accident prevention, black spot

1 Introduction

For the plans for wild animals' accident prevention which are being now applied to expressways, wild-life fences(1,418 km) and eco-dorridor(64 places) were installed and have been operated. But the plans for prevention are mostly being done relying on wild-life fences and monotonous application is being done ignoring the nature of black spots with various ecological characteristics. There are the plans for accident prevention which can be applied according to ecological characteristics except wild-life fences, but alternatives cannot be explored due to the absence of studies or standards to apply them to fields.

This study tries to establish effective plans for accident reduction and explore economic and efficient plans for prevention by presenting alternatives which can be applied to field.

2 Results and Discussion

2.1 Alternative Options for Each Facility

The alternative options(an animal traffic warning signs, an animal detection electronic display, an animal repellent, an evacuation ramps and animal prevention road surface) for each facility are for protecting wild animals crossing over roads rather than preventing the inflow of wild animals into roads.

2.2 Alternative Options for Wildlife Fences

The welding roll net-type wildlife fence, the wire-Type wildlife fences and the improved fixed knot net wildlife fences are suggested as alterative option for a wildlife fence. It is found that the installation cost of these wildlife fences are lower than of the existing diamond-shape type and the fixed knot net type.

3 Conclusion

In this study, there was an investigation on various optional measures that are currently being discussed to reduce a wild animal accident incidence rate in a low cost and high efficient manner while we are considering a change in the type of wildlife fences.

There are establish effective plans for accident reduction and can explore economic and efficient plans for prevention by presenting alternatives which can be applied to field.



Figure 1: Alternative Options for Each Facility

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Evaluating the Effectiveness of Ecological Corridors by Using CVM

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Keywords: Ecological Corridor, Social Benefit, Willingness to Pay, CVM

1 Introduction

Road-kill accidents on expressways cause considerable social and economic costs. Therefore, it is critical to minimize the frequency of occurrence through taking appropriate actions such as accident prevention and reduction programs or tools including eco-corridor installation. Due to the constraints in allocating available public resources, it may help decision-makers to determine where to put priorities when taking actions. The objective of this study is to estimate how much people are willing to pay for installing eco-corridors around the expressways in Korea.

2 Methods and Results

2.1 Methods

We use the contingent valuation method(CVM) in calculating the public willingness to pay for the environment goods. It is generally believed to be one of the most popular methods used for quantifying the value of non-market goods or services. To this end, a survey of 1,400 households was implemented on the effects of installing eco-corridors around the expressways. The survey has been conducted for two weeks from 15th June till 30th June in 2011 by the specialized agency, Research Prime Inc..

2.2 Results

According to the estimating results, annually willingness to pay per household is 3,124,83 Korean won. We can also confirm that the amount of willingness to pay increases according as the household income increases, but that the increasing degree doesn't. The size of household proves to have little to do with the average amount of willingness to

pay. The impact of environment friendliness is estimated to be 6.3767, which means a more eco-friendly household is willing to pay an additional 6,370 won than the less one on average.

3 Conclusion

The results indicate that the coefficient of business friendliness is estimated to be 4,7009, thus a household more keenly recognizing the status of the road-kill and the ensuing issues is willing to pay about an additional 4,700 won than the less one on average. This implies that the willingness to pay can be promoted by an active public relations on the seriousness of road-kills and environmental problems.

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Comparative study on estuary wetland monitoring systems between China and South Korea

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Keywords: Estuarine wetland, Chongming Dongtan National Nature Reserve, Nakdong estuary wetland reserve, monitoring system

1 Introduction

Estuary is the meeting point between rivers and oceans, part of land as well as part of oceans that results in the combination of fresh water and salt water. Because of special physical, chemical, biological and environmental characteristics, estuary wetlands have a variety of functions. Nowadays, China and South Korea both pay attention to research the estuary wetlands, but there is a little comparative research about wetlands between two countries. This research aims to reveal the differences of wetlands research according to Chongming Dongtan National Nature Reserve and Nakdong estuary wetland reserve.

2 Methods and Materials

2.1 Location and study sites

Chongming Dongtan National Nature Reserve has 241,55km², located in Chongming Island which is the third largest island in china and the largest estuarine alluvial island in the world. Nakdong Estuary Wetland Reserve has 32.20km² and located in busan saha-gu, sinpyeong-dong, jangnim-dong, dadae-dong, gangseo-gu, myeongji-dong.

2.2 Research methods

This study reviews the estuary wetlands related book, papers and reports. Besides, directly receives information through examining Chinese spot-Chongming Dongtan National Nature Reserve and interviewed relevant staff.

3 Conclusion

Estuary belongs to inland wetland in China, but it belongs to coastal wetland in Korea. Chongming Dongtan National Nature Reserve begins the research

from 2006, and keeps every year. It mainly does 6 kinds of research projects, flora, invertebrates, fish, banding, water birds and marco-zooplankton. Workers of reserve make the research of banding, the other research projects accomplished by university professors.

According to wetland reserve specific research, Nakdong estuary wetland reserve also begins the research from 2006, and examines the survey every 5 years. It mainly does 10 kinds of research projects, topography, geology, sediment, vegetation, flora, terrestrial insects, invertebrates, amphibians and reptiles, birds, mammals, hydrological, zooplankton, phytoplankton (Ministry of environment, 2012).

References

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Discharge of toxic water pollutants in industrial wastewater

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Keywords: Toxic water pollutants, Wastewater, Heavy metals, VOCs

1 Introduction

Industrialization has led to increased disposal of toxic pollutants like as heavy metals and VOCs into the aquatic environment. These pollutants are known to be highly toxic to aquatic life and human health even at low concentrations. Therefore, these are more strictly regulated compared to organic pollutants as effluent limitation of industrial wastewater in Korea. In special area such as a drinking water source, a nature reserve, a manager of facility should be obliged to do not detection of toxic water pollutants in raw wastewater.

2 Methods and Materials

2.1 Target facilities

53 industries in 14 industrial categories were investigated and 8 heavy metals and 14 Volatile organic compounds were analyzed in 106 samples.

Table 1: Toxic water pollutants to analysis in wastewater

Items	Toxic water pollutants
Heavy metals	Cyanide, Copper, Lead, Arsenic, Selenium, Mercury, Cadmium, Chromium ⁶
VOCs	TCE, PCE, Benzene, Vinyl chloride, Carbon tetrachloride, Dichloromethane, 1,1-dichloroethylene, 1,2-dichloroethane, Chloroform, DEHP, Acrylonitrile, Bromoform, Naphthalene, Formaldehyde
Others	1,4-dioxane, Phenols

2.2 sampling



Figure 1: sampling site scene of industrial wastewater

3 Conclusions

Copper(93.7%), phenols(67.6%), 1,4-dioxane(49.1%), formaldehyde(54.1%), lead(48.6%), chloroform(25.9%), cyanide(26.1%), DEHP(23.6%) were detected more frequently than others. Moreover, relatively high concentration of copper(70.4 mg/L), phenols(7,934 mg/L), 1,4-dioxane(1,402 µg/L), TCE(1,238 µg/L), dichloromethane(1,375 µg/L), acrylonitrile(1,684 µg/L) were detected in some facilities. The target compounds were below the effluent limitations in all of the facilities. However, great attention for facility management should be paid to maintain below the effluent limitations for toxic pollutants.

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Initial flux from the submerged soil at the impoundment of dam reservoirs

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1 Introduction

In this study, we examined in each land use by status, the impact on water quality due to soil elution from the submerged land in flooded soil water storage at the time due to dam construction.

2 Title

2.1 Method

At the elution experiments, acrylic column was made to reproduce the water situation of early dam impoundment.

Analysis item for measuring the change in water quality, water temperature, DO, pH, Conductivity is measured for basic water quality and COD, T-N, T-P was analyzed as the index item of water pollution. Soil was sampled by land use situation before it is submerged. And it is examined the effects of soil flooding on water quality in two different dissolved oxygen condition of overlying water, aerobic and anaerobic.

Analysis has been focused on implementing the level of contribution of pollution sources and elution volume analysis of to the water body.

2.2 Results

Results of the flux experiments under aerobic conditions, farm soil showed highest COD elution amount per unit area of the submerged soil (32.6%, contribution rate by land use).

In the case of TP, high flux rate appeared at the soil of farm (67.4%).

In the case of TN, high flux rate appeared at the soil of rice paddy (34.3%).

Trend similar to the aerobic conditions appeared under anaerobic conditions, but in the case of COD, showed

a high flux rate in the paddy soil (33.7%).

In the case of TP, was higher in the farm(65.6%). A result of examining the differences in flux due to changes in the submerged area with the reservoir water level fluctuations, effect in response to changes in storage capacity of water and submerged area, effect of submerged soil to the water quality has changed

3 Conclusion

Elution amount is increased by increasing the submerged area as water level becomes higher, but the influence to the water quality is decreased with a dilution effect due to the increase of the storage capacity.

Concentration of volatile organic compounds in urban area and remote islands in Incheon, Korea

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Keywords: VOCs, PCA, O₃, Remote islands, Anthropogenic sources

1. Introduction

It is well documented that urban ozone pollution is directly linked to its precursors of volatile organic compounds (VOCs). In an urban industrial complex metropolis, source apportionment of ambient VOCs could become extremely challenging. This study investigates characteristics of ozone precursors using principal component analysis (PCA) in both urban area and remote islands which have rarely studied. This methods discussed are potentially applicable to other environmental pollutants with complex sources.

2. Method

2.1. Sampling site and periods

A total of 32 ambient samples were collected from May to June in 2015 at 4 remote islands in Incheon, western Korea during high-level ozone seasons. Measurement of urban air quality was made at a photochemical assessment monitoring site (PAMS) located in an industrial complex during same period as island. Gas chromatography (GC/FID) systems with dual-columns were used to analyze VOCs in all of the areas.

2.2. Principal component analysis

In this study, PCA was applied to differentiate the influence of potential sources. It was performed by utilizing the orthogonal transformation method with Varimax rotation; only components with eigenvalue greater than unity were retained because they can account for a meaningful amount of variance.

3. Results and discussion

VOCs were discriminated by the first 3 principal components (PCs) which together explained 84%. Variable loading plot for the first two PCs in Incheon is

shown in fig. 1. PC1 (58%) has relevance on various chemicals such as toluene, propane, ethane, n-butane, i-butane, and m,p-xylene originated mainly from vehicle exhaust gas due to incomplete combustion. Weak influence of ethylbenzene and n-hexane from industrial release was separated in PC2 (18%), respectively. In an urban-industrial complex area, toluene was the most dominant contributor to ozone formation as well as ambient VOCs concentrations. Moreover, air quality of the measured urban area was much more 4 times polluted than that of remote islands in terms of PC1 which includes various and harmful VOCs.

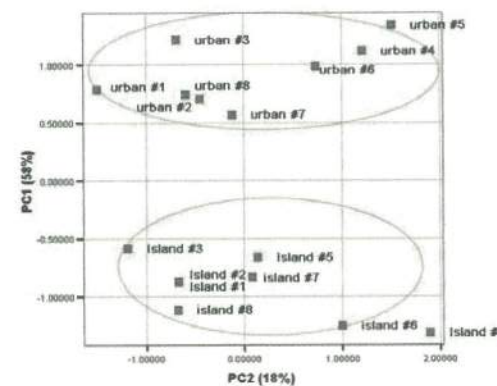


Fig 1. Variable loading plot for the first two PCs.

Statistical Analysis of Reasons and Corresponds to Measure Human Odor Perception

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Keywords: Odor Perception, Odor Pollution, Analysis of Correspondence, Risks and Concerns on Odor

1 Introduction

The purpose of this paper is to analyze statistically human odor perception based on survey results. It is very hard to measure odor perception and beliefs about risk of the residents. Even though the sense of smell basically gives rise to the perception of odors, the odor perception is very subject to be meditated by such reasons as risks, financial concerns and social or personal responsibilities due to odor pollution. This is why the sense of feeling smell is complex and odor perception is mostly influenced by many factors unique to each individual as well as external environmental factors

2 Statistical Measurements

First, Analysis of Correspondence, ANACOR, is a multivariate technique. It seems conceptually similar to the principal component analysis, PCA, but it is applied to categorical data rather than continuous data from survey results. Measuring categorical data from the results, this paper tries to find out complex characteristics of odor perception.

In addition, multiple regression analysis is also applied to find out which factors are influencing the odor perception. Multiple regression method is helpful to explain relationship between independent variables (reasons as risks, financial concerns and social or personal responsibilities) and a dependent variable (human odor intensity). The regression results would suggest various implications regarding residents who answered the survey.

3 Conclusion

It is statistically proven, according to ANACOR, the many demographical characteristics have contributed to human odor perceptions. Of course, it is well explained the practical considerations of the surroundings of living places have a significant effect on odor intensity the residents might feel.

Acknowledgement

This was supported by Korea National University of Transportation in 2015

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Odor Measurement and Source Contribution Analysis from Outlets of Air Pollution Control Facilities in Cement Industry

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Keywords: Odor Contribution, Cement Manufacturer, Odor Substance

1 Introduction

As the quality of life has been improved, we've been interested in the pollution not recognized in the past, the sense of odor pollution. Since the odor is recognized as one of the pollutions, there have been many complaints among residents who live near the workplace. Many Kinds of odor due to emissions from industrial complex occur and result in lots of different variations depending on the types of businesses, manufacturing processes and so on.

Odor is instantaneously generated and disappears through the air diffusion. Therefore the quantitative contribution of the odor concentration is expected to be important. In this study, 22 offensive odor substances were measured and odor contribution was evaluated based on such measurement results

2 Range of the research

2.1 The subject of study

Three cement and five quicklime manufacturers in D-gun of Chung-buk area are chosen as the subject of our research.

2.2 Contents and method of research

Odor measurement and source contribution analysis mainly focused on such total eight manufacturers as cement and quicklime manufacturers. Substance of odor was 22 offensive odor substances of Malodor Prevention Act and odor measurement followed the Odor Pollution Test Method. Contribution of odor substance was evaluated using the Weber-Fechner law, after charting the relationship between odor intensive and field measurement concentration.

3 Conclusion

Following the research results, acetaldehyde type of carbonyl compound was proven to be the high concentration which is better than other offensive odor substances. Also, acetaldehyde was over 50% in Contribution evaluation of odor substance.

Acknowledgement

This was supported by Korea National University of Transportation in 2015

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Heavy Metal Accumulations of Feral Pigeon (*Columba livia*) Eggshell for Environmental Monitoring

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Keywords: Feral pigeon, Eggshell, Heavy metal, Environmental monitoring

1 Introduction

Feral pigeon egg has been a good indicator for heavy metal accumulation monitoring. In this study, we reviewed especially the characteristics of feral pigeon eggshell relating to heavy metal accumulations. We firstly reviewed the characteristics of 19 avian species eggs and secondly, of feral pigeon eggshell and content.

2 Results

2.1 The accumulations of avian eggs

The CV values of the egg contents were mostly lower than the eggshells. This indicates that the egg contents can be more homeostatically controlled than the egg shells.

2.2 The accumulations of feral pigeon's eggs

The lead (Pb) and cadmium (Cd) of the internal organs (blood, liver, bone) had mostly higher concentrations in

Table 1: The comparison of coefficient of variations between egg shells and contents

Heavy metal	No.	Egg shell			Egg content		
		Std.	Avg.	CV	Std.	Avg.	CV
As	7	1.5	1.5	1.0	0.2	0.3	0.7
Fe	4	410	1,349	0.3	58	100	0.6
Zn	14	16.9	17.2	1.0	15.3	53.7	0.3
Cu	11	1.5	2.8	0.5	1.4	3.5	0.4
Mn	8	1.4	1.6	0.9	0.9	1.7	0.5
Pb	10	4.7	3.2	1.5	1.7	1.5	1.1
Cd	6	0.2	0.2	1.0	0.3	0.3	1.1

the Fp(hg) site than in the Fp(hp) site. Also, eggshells of the Fp(hg) site had higher concentrations than the Fp(hp) site. However, egg contents did not showed the differences.

3 Conclusion

Feral pigeon eggshell can more reflect the variations of heavy metal concentrations in habitat environments than egg content, and also has the possibility to show the differences among heavy metal pollution sites.

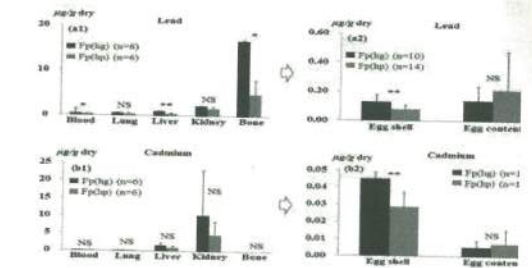


Figure 1: The concentrations of Pb and Cd in feral pigeon's internal organs and eggs

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A Research of Odor Acceptance by Accessing Cultural Diversities among Residents

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Keywords: Odor Acceptance, Cultural Theory, Cultural Diversity, Industrial Complex

1 Introduction

The more modernized a society become, the more residents are expecting the government to perform a major role in solving the pollution problem. This is because the government is generally believed to get rid of any possibility of market failure. Among a number of air pollutions, odor pollution has become a major issue in Korea especially among people who live nearby industrial complexes.

2.1 Research Theory

People recognize order of their own way of perception. This is why order acceptance may differ person by person. Therefore public sector, the government must intervene to solve odor problems in industrial complexes. This paper tries to understand odor acceptance among industrial complex residents using primarily the cultural theory which focused on the diversities among residents. Based on cultural theory, we expect to classify the research sample into a few groups representing their own interest and perception on odor acceptance.

2.2 Research Sample

To do quantitative analysis, we distributed and collected survey sheets using direct person to person interviews of residents who are currently living nearby Cheong-Ju industrial complex with the support of the city government officers.

3 Conclusion

It is proven the odor acceptance and damage perception due to the odor may be different due to the cultural diversities among residents who have already

sensed odor in their living places. Cultural diversity could play an important role in the odor acceptance of residents.

Acknowledgement

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Noise Impact Assessment with Noise Map

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Keywords: Environmental Impact Assessment, Noise Impact Assessment, Noise Map

1 Introduction

In the stage of the environmental impact assessment for a development project, the evaluation of the noise impact about the residential facility around a development region is performed with various noise prediction equations at the time of construction and operation. However, because of the simple approach method, the existing noise prediction method has the limitation of not describing the complex noise environment according to business enforcement. Therefore, as an alternative, the noise impact assessment with a noise map is performed, and this paper introduces the present status of the noise impact assessment with a noise map in the environmental impact assessment of a development project.

2 Present status of noise impact assessment with noise map

The application of a noise map for the purpose of environmental noise management is briskly progressed with Europe as the center. In Korea, the basis regulation of the noise map application for environmental noise management was made, and the regular work of constructing noise maps and preparing the action plans according to noise map results is being progressed.

In the stage of environmental impact assessment, the noise impact assessment with a noise map is performed in the residential concentration region with a high-rise building. The existing noise prediction method calculates the noise levels of a high-rise building with a modification factor, and has the limitation of not describing the complex noise distribution according to the shape and distribution diversity of a high-rise building. The commercial programs with SoundPLAN, Cadna-A, and IMMI are applied to compute the noise level and express the noise distribution visually about a

high-rise building. Because the various foreign noise prediction equations are included in the programs, the guideline for applying the programs effectively in the stage of environmental impact assessment is prepared.

3 Conclusion

In the stage of the environmental impact assessment for a development project, the necessity of applying a noise map is increased because of the limitation of not describing the complex noise impact including a high-rise building. Therefore, based on the regulation for noise map application, the guideline for using a noise map in the stage of environmental impact assessment is prepared.

Considering pheophytin pigment in estimation of algal derived particulate organic matter in brackish water

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Keywords: Organic Matter, Algae, Contribution, Pheophytin-a, Brackish water

1 Introduction

There are two major sources of OM in lake waters: allochthonous, i.e. derived from the catchment area, and autochthonous, i.e. produced by primary producer within aquatic system. With progressing eutrophication, autochthonous OM becomes increasingly important and primary production by algae, especially phytoplankton, is one of the key process that influence water quality in many water systems. Therefore, it is very important to estimate the contribution of phytoplankton to OM in understanding the metabolism in aquatic ecosystem and in management of water quality. Generally chlorophyll-a (Chl-a) is used as a measure of phytoplankton biomass. And the ratio of particulate organic carbon (POC) to Chl-a is used as an indicator of contribution of phytoplankton to OM. On the other hand, pheophytin-a is a primary degradation product of Chl-a, and its concentration, relative to Chl-a, is useful for estimating the general physiological state of phytoplankton population. The objective of this study was to estimate the contribution of phytoplankton to POC in a brackish water, Lake Sihwa, in Korea.

2 Results and Discussion

2.1 Concentrations of POC, Chl-a, and Pheo-a

POC concentration varied from 1.0 to 76.6 mg L^{-1} , with maximal concentrations occurring in the middle parts of the study area in spring of 2005 and 2006. Concentrations of Chl-a and Pheo-a varied from 1.3 to 942.9 $\mu\text{g L}^{-1}$ (mean 71.0 $\mu\text{g L}^{-1}$) and 1.4 ~ 1,545.5 $\mu\text{g L}^{-1}$ (mean 59.9 $\mu\text{g L}^{-1}$), respectively, and corresponded closely with variation in POC.

2.2 Relationships between POC and , Chl-a and Pheo-a

From the positive linear relationships between POC and phytoplankton pigments (POC with Chl-a ($r=0.93$), total Chl-a ($r=0.88$), and Pheo-a ($r=0.81$)), it is suggested that phytoplankton was a significant component of POC in the upper regions of brackish Lake Sihwa. On the other hand, the ratios of POC/Chl-a and POC/total Chl-a (Chl-a+Pheo-a) were 82.9 and 35.9, respectively. The ratio of POC/total Chl-a is similar to those reported in previous studies, including 40-60 in estuaries. This study suggests that Pheo-a concentration is considered in estimation of POC concentration from phytoplankton pigments in aquatic systems with high content of Pheo-a, like an upper region of brackish Lake Sihwa.

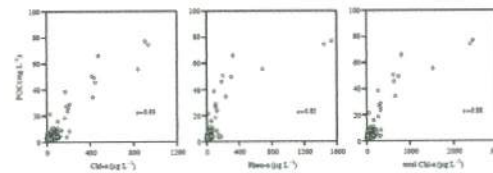


Figure 1: Correlations of POC against Chl-a, Pheo-a, and total Chl-a concentration in Lake Sihwa.

ASSESSMENT OF NOM CHARACTERISTICS FROM SOURCE TO TAP

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Keywords: Full scale drinking water treatment plants; natural organic matter; LC-OCD

1. Introduction

Efforts on desired drinking water quality require understanding the role of natural organic matters during drinking water treatment (DWT). The amounts and characteristics of NOM in surface water depends on climate, geology, and topography. NOM concentration depends on the source and seasons (R. Fabris et al., 2008). The aim of this study was to evaluate NOM characteristics in each unit process of full scale DWT plants using liquid chromatography-organic carbon detection (LC-OCD), biodegradable dissolved organic carbon (BDOC13-d), and specific UV absorbance (SUVA). Also, this study provided a better understanding of NOM characteristics by comparing full scale conventional and advanced drinking water treatment plants.

2. Material and Methods

Samples were taken in each unit process of full scale DWT plants for every month (2011-2013) from Goyang advanced DWT plant (Gyeonggi-do, Korea). Goyang advanced DWT consists of rapid sand filtration (RSF), ozonation, GAC filtration, and disinfection (chlorine). Comparing NOM characteristics with a conventional DWT, samples from Ilsan DWT plant (Gyeonggi-do, Korea) were also taken. Tap water samples were collected for multiple times from four selected households in Gyeonggi-do. LC-OCD can be used to effectively monitor polar NOM components with a lower SUVA (Her et al., 2008). BDOC13-d was calculated as the difference between the initial dissolved organic carbon (DOC) and the measured DOC that contacts microorganisms after 13 days. BDOC13-d can be an indirect index of microbial growth.

3. Results and Conclusions

Raw water sample's DOC concentration of August was approximately 200 $\mu\text{g/L}$ higher than that of January. Higher DOC concentrations were due to the dry summer months. The result of LC-OCD shows that the DOC removal in January and August was similar between 40 and >99%. However, the BP fraction varied in each unit process. August's water temperature was higher than January (i.e., low viscosity of water); therefore, removal efficiencies by coagulation were decreased. Fig. 1 shows changes in LC-OCD between advanced (Goyang DWT) and conventional (Ilsan DWT) drinking treatment process. BB and LMW Neutrals were removed more in advanced treatment process including ozonation and GAC.

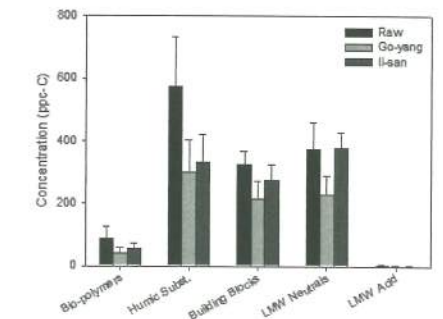


Figure 1: DOC in Raw water, Goyang (advanced DWT), and Ilsan (conventional DWT) (n=8-12)

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ON-LINE SPE AND MASS SPECTROMETRY FOR THE ANALYSIS OF HORMONES AND BISPHENOL A IN SURFACE WATERS

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1. Introduction

Among contaminants of emerging concern (CEC) in water, hormones, nonylphenol and bisphenol A has come under the spotlight in recent decade in terms of biological effect, occurrences and persistency. The main analytical stream of this compounds are based on solid-phase extraction and liquid chromatography with tandem mass spectrometry (SPE-LC-MS/MS). This proven method has been provided sensitive and reliable data. However, there are needs for improvement both sample preparation and mass spectrometry. Because conventional SPE needs large sample volume, time and labors and cartridge, there is limited monitoring data for the environment. In this paper, we report a fast and accurate analytical method by online pre-concentration with high resolution mass spectrometry for hormones, nonylphenol and bisphenol A in water.

2. Material and Methods

Target of this study were : 17- β -estradiol, ethinyl estradiol, estradiol, equilin, estrone, bisphenol A and nonylphenol. Samples were prepared from a stock solution of hormones and phenols mixture in methanol. Calibration solutions were prepared from the stock solutions, resulting in 10 levels of hormones and phenols for analysis. For online pre-concentration liquid chromatography, EQUAN MAX (Thermo Scientific) model was used. This system is based on column switching technique. Orbitrap Exactive model (Thermo Scientific) with positive electrospray ionization was used in present study. The resolution for the full scan experiment was set at 50,000 and the mass range 100-350 amu was monitored. Data and spectral confirmation was analyzed using Xcalibur 2.1 software. Limits of detection (MDLs), quantitation (LOQs), precision, recovery etc. were validated for above methods.

3. Results and Conclusions

The extracted chromatogram of target hormones and phenols are shown in Figure 1. In this experiment, the compounds tended to lose a proton to form the [M-H]⁻ species. Due to the 2nd LC pump was consisted of ultra-pressure (18,000 psi), sharpen chromatogram and fast retention time were achieved. Unfortunately, the sensitivity of nonylphenol was poor. The m/z of an ion was measured to within 5ppm allows the determination of a unique elemental composition. Therefore, HR full scan data can closely match the expected/theoretical mass with the observed mass greatly increases the reliability of identification.

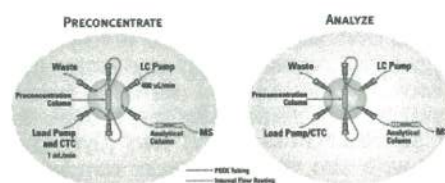


Figure 1. Column switching based online SPE

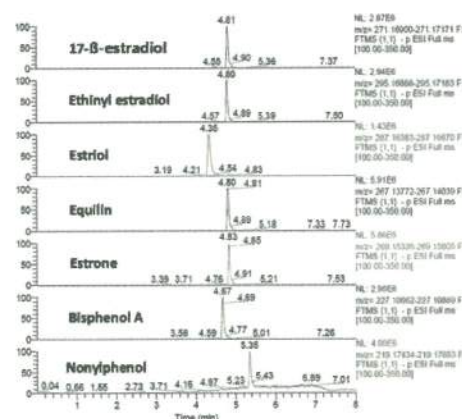


Figure 2. Extracted ion chromatogram of target hormones and phenols from high resolution full scan MS (mass accuracy: 5 ppm)

Calibration curves using HPLC water were tested in order to assess linearity range. Injection volume was 1 mL with 10 pg/mL to 2 ng/mL samples. For all compounds, good linearity above 0.995 was obtained except for nonylphenol, showing background noise in low concentration ranges. This shows that online pre-concentration with HR full scan data providing available performance without internal calibration standard references.

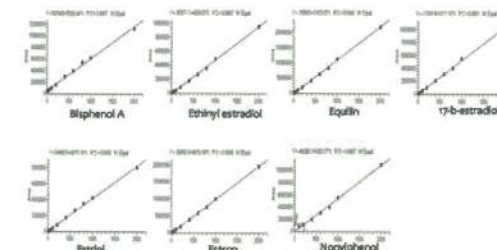


Figure 3. Linearities with 10 concentration ranges between 10 pg/mL to 2 ng/mL based on external calibration

Method detection limits (MDLs), quantification limits (PQLs) and QC test were assessed using different two spiking samples. Precision under 10% and accuracy of QC samples (n=10) are comparable to the reference ranges. A surface water samples (n=40) were analyzed by 1mL injection with HR full scan MS as previously described. Among target compounds, 17- β -estradiol were frequently detected above PQLs. Distribution of this compound showed different patterns compared to pesticides and pharmaceuticals from the same area. Non point or multi input sources such as domestic or wastewater can be considered. The online pre-concentration with Orbitrap based HR full scan method provided an excellent method of detecting hormones and phenols, providing HR mass spectral information. The online pre-concentration method can save more than 80-90% sample preparation time, solvent, labors etc. Online pre-concentration and HR full scanning mass spectrometry provides quick and accurate analysis

compared to current main stream, conventional SPE-LC-MS/MS methodology.

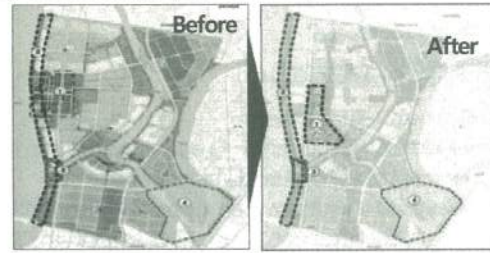
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Acknowledgment

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- ② Habitat space in west-Nakdong riverside : 100m from water management level
- ③ Feeding space on west-Nakdong riverside : 66 thousand m²
- ④ Wetland eco-park(660 thousand m²) : habitat and feeding



space Figure 3. Overview of the areas that require protective measures

3.3. Protected Space Plan for Coexistence with Migratory Birds

A sustainability plan was developed that involves the separation of a conservation zone, buffer zone and eco-experience zone to protect migratory birds and establish harmonization with people for coexistence with migratory birds by considering the overall surrounded environment.

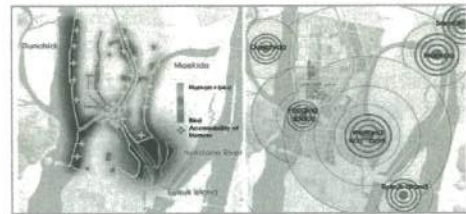


Figure 4. Spatial plan of coexistence with migratory birds

3.4. Basic Ecological Spacing Plan

The basic concept of Eco-Delta City is to set up 'Blue Stitch 33 mile' which refers to the development of the waterfront city along the riverside which stretches 33 miles and will incorporate nature(green area, water, wind), landscapes, and culture. The basic concept consists of 3 mains scopes, river, city, and ecology. The basic ecological spacing plan is as follows:

- **River Scope** : Delta Esplanade(3 miles) along the west Nakdong riverside for birds, Waterfront with Culture(5 miles) at the junction where 3 rivers converge, Blue Pulse Corridor(5 miles) along the Pyung River for people to be close to nature and enjoy fresh air, and Macdo Friendly River (2 miles) along the Macdo River for people to enjoy the scenery and having lasting memories.
- **City Scope** : Meta Culture Park(5 miles) is a central

park for culture, Delta River Walk(1.3mile) for reflecting.

- **Eco Scope** : Co-existent Habitat for migratory birds, Delta Bird Farm along the migrating route

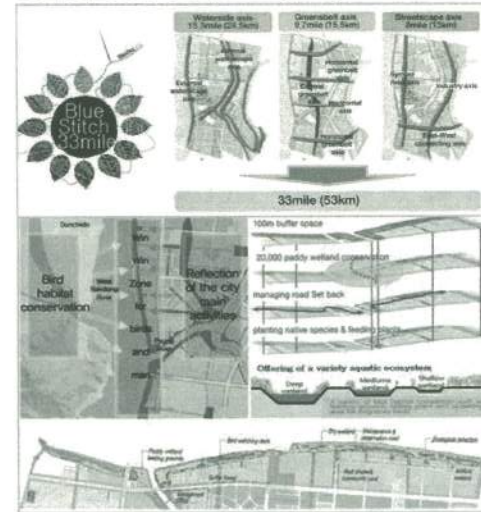


Figure 5. Basic Concept(Blue Stitch 33 mile)

Figure 6. Delta Esplanade(100m with birds)

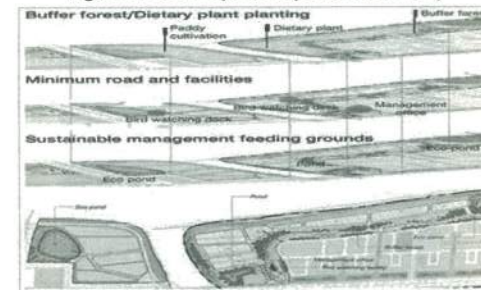


Figure 7. Delta Bird Farm(66,116 m² for birds)

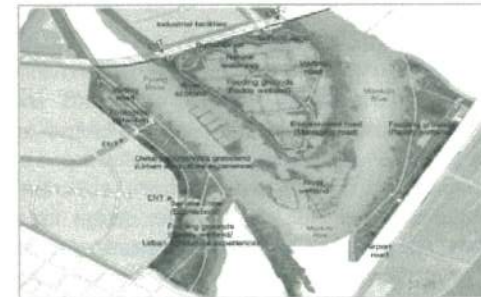


Figure 8. Co-existence Habitat

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Status and Application of the Ecosystem and Nature Map

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Keywords: Ecosystem and Nature Map, National Ecosystem Survey, Ecological Data, SEA, EIA

1 Introduction

The Korean Ministry of Environment for managing natural resources and ecosystem uses the Ecosystem and Nature Map. A space information for natural environment is produced in various subjects such as forest type map, land cover map, biotope map, and widely used it. But the Ecosystem and Nature Map has difference in that the map is graded from information of ecological data of the country.

2 Definition and History

The Ecosystem and Nature Map is graded on ecological data - ecological value, naturalness, landscape value, etc. of mountain, inland wetlands (rivers, lakes etc.), farmlands and cities, etc. (Figure 1), and it was introduced in Natural Environment Conservation Act in 1997.



Figure 1: The Concept of the Ecosystem and Nature Map

In 2005, the first draft Ecosystem and Nature Map was opened to the public and it was announced in 2007. It was produced for the secondary draft in 2012.

3 Process and Status

The map is consisted with three Grade Zones that mainly classified by the results of National Ecosystem Survey including data of vegetation, fauna, flora, endangered species, wetland and landform, etc., and separated managed zone (Figure 2).

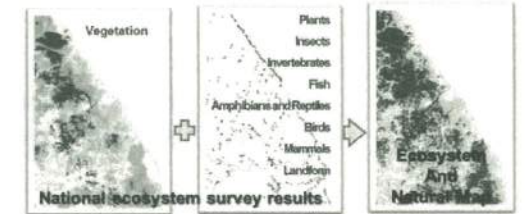


Figure 2: Mapping Process of the Ecosystem and Nature Map

In the secondary draft, the map had occupied areas that were 1st Grade Zone of 9.8%, 2nd Grade Zone of 45.52% and 3rd Grade Zone.

4 Applications

The map has been offered sources of important information to ecological conservation and restoration, land-use and development planning, and policy making etc. Additionally, it has an important role in strategic environmental assessment (SEA) and environmental impact assessment (EIA).

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