



University of Tsukuba

EDL Annual Symposium

Environmental Diplomatic Leader
Education Program

Laboratory of Advanced Research B,
Room110 (oral presentation)
Room 112 (poster presentation)
University of Tsukuba

February 17, 2012 (Friday)
10:00-17:30

2011



Strategic Funds for the Promotion of
Science and Technology

Introduction

It was my great pleasure to hold an Environmental Diplomatic Leader (EDL) Education Program Annual Symposium with guests, Prof. Josef R. DesJardins, College of St. Benedict and St. John's University, as an invited professor and a member of the external evaluation committee of the EDL program, Mr. Toshihide Fukui, Director for Environmental Science and Technology, Environment and Energy Division, Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Government of Japan, and Prof. Yutaka Tsujinaka, a vice president of the University of Tsukuba and a chair of the steering committee of the EDL program.

The 2011 academic year is the third year of the EDL program. The program has 51 master's and doctoral candidates from nine countries now. Last June, four students graduated from the program and became the first generation of Environmental Diplomatic Leaders. We have another 11 candidates who will graduate this coming March.

We have educated these outstanding students through an EDL Special Lecture entitled "Meet the Leaders"; international internships in Tunisia, Mongolia and Paris; domestic internships in Minamata and Isahaya, Kumamoto and Nagasaki prefectures; English presentation and debate; Introduction to Global Health and Project Cycle Management (PCM) workshop. All the candidate students seem to be greatly improved through participation in these valuable courses.

Fortunately, the EDL Program received the highest grade 'S' in a mid-term appraisal by MEXT in January 2012. I would like to present my sincere congratulations to all the participants in this program. I will continue the EDL program as it is one of the most important international education programs at the University of Tsukuba.

Finally, I would like to present my sincere appreciation to all who have contributed to the EDL program.

A handwritten signature in black ink, appearing to read "M. Tsujimura". The signature is fluid and cursive, with a large, sweeping flourish at the end.

Maki Tsujimura
Program Leader of the EDL

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【Note】 The slides in the report are arranged left to right and top to bottom.

Awards in 2011

In the 2011 annual symposium a Best Presentation Award and Best Poster Award were awarded to those students who made an outstanding contribution to the oral or poster presentation sections.

1) Best Presentation Award: **Bingbin Ni**

-M2 student

-Title: Solutions against Water Quality Degradation in Minjiang River (闽江), Fuzhou (福州市), China

2) Best Poster Award:

Chekirbane Anis

-D2 student

-Title: Aquifer Salinization Mechanisms Caused by Surface Water – Ground Water Interaction in a Small Coastal Plain, CapBon, Northeastern of Tunisia

Yingxin Zhao,

-D2 student

-Title: Study on Adsorptive Removal of High Ammonium Nitrogen of Organic Wastes Using a Novel Ceramic Adsorbent

Wataru Yamada

-M1 student

-Title: Distribution of Oxygen-18 and Deuterium across the Tunisia



Mr. Bing Ni



Yingxin Zhao, Chekirbane Anis, Wataru Yamada



MEXT Strategic Funds for the Promotion of Science and Technology

Strategic Program for Fostering Environmental Leaders

Environmental Diplomatic Leader (EDL) Education Program at University of Tsukuba

文部科学省 科学技術戦略推進費 戦略的環境リーダー育成拠点形成事業

筑波大学「環境ディプロマティックリーダーの育成拠点」

Environmental Diplomatic Leader (EDL) Education Program Annual Symposium

2011 年度 環境ディプロマティックリーダー・シンポジウム

Aim: The academic year of 2011 is the third year of the EDL program. The program has 51 master's and doctoral candidates from nine countries now. Last July, four students graduated from the program and became the first generation of Environmental Diplomatic Leaders. We are looking forward to another 11 candidates who will graduate in March 2012. Most of the activities of this program, such as the training courses, domestic and international internships, EDL special seminars, and the EDL café and debate were productive and useful through the 2011 academic year. To make more progress next year, the Annual Symposium will both review and evaluate our activities during 2011 and request suggestions and comments.

目的: 「環境ディプロマティックリーダーの育成拠点」プログラムは、2011 年度で3年目に入り、9カ国から51名の学生が履修しています。2011年7月に最初の履修生4名が修了し、2012年3月にはさらに11名が修了する予定です。プログラムの履修科目をはじめ、国内と海外インターンシップ、スペシャルセミナー、EDL カフェとディベートなどの活動は着実に・効果的に実施されています。本シンポジウムは、2011 年度の取組を概観し課題と展望について意見交換を行うとともに、プログラム履修学生による活動・研究報告を行い、今後のさらなる発展を期します。

Date: February 17, 2012 (Friday) 10:00-17:30

日時: 2012年2月17日(金) 10:00~17:30

Place: Laboratory of Advanced Research B, room110 for oral presentation and room 112 for poster presentation, University of Tsukuba

場所: 筑波大学 総合研究棟 B110 公開講義室(口頭発表)、112 講義室(ポスター発表)

Contact: EDL office (TEL:029-853-4958 E-mail: edlep@envr.tsukuba.ac.jp)

問い合わせ先: EDL 事務局 (TEL:029-853-4958 E-mail: edlep@envr.tsukuba.ac.jp)



科学技術戦略推進費

Strategic Funds for the Promotion of Science and Technology

Program

<u>10:00-10:10</u>	<u>Opening Remarks</u> Yutaka Tsujinaka , <i>Vice President, University of Tsukuba</i> Toshihide Fukui , <i>Director for Environmental Science and Technology, Environment and Energy Division, MEXT, Japan</i>
<u>10:10-10:30</u>	<u>Keynote Address</u> Maki Tsujimura , <i>EDL Program Leader, University of Tsukuba</i>
<u>10:30-10:50</u>	<u>EDL Activities in 2011</u> Takahiro Endo , <i>EDL Associate Professor, University of Tsukuba</i>
<u>10:50-11:10</u>	<u>Voice from EDL Students</u> Xiaogang Sun , <i>EDL Assistant Professor, University of Tsukuba</i>
<u>11:10-12:00</u>	<u>Reports of Internship</u> Hoang Thanh Tung (Tunisia, July 2011), EDL candidate Jie Zhang (Mongolia, August 2011), EDL candidate Wataru Yamada (Minamata, November 2011), EDL candidate
<u>12:00-13:00</u>	Lunch
<u>13:00-15:00</u>	<u>Oral Presentation by EDL candidates (who will graduate in March 2012)</u> Naoto Aizawa , Possibility of Inland Aquaculture Development in the Northeast Pará, Brazil Takuya Shiraishi , Grazing Impact on Above-Ground Biomass and Species Diversity along Altitudinal Gradient in Alpine Meadow on the Qinghai-Tibetan Plateau Yusuke Sugamoto , Measurement of Primary Productivity at Boulder Shore and Its Contribution to the Coastal Ecosystem Chengshan Jia , Economic Impacts of Tourism on the Local People's Livelihood in the Phoenix Mountain National Forest Park in Liaoning Province, China Aijun Zhu , Guidelines for Participatory Municipal Solid Waste Management Planning in Beijing Shuang Sun , Comprehensive Comparison through LCA of the Municipal Wastewater Treatment Technologies in Beijing Bingbin Ni , Solutions against Water Quality Degradation in Minjiang River (闽江), Fuzhou (福州市), China Shuanghong Li , A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China Meihua Li , One Child Policy in China —KAP (Knowledge Attitude Practice) Study in Yanbian Autonomous Prefecture — Shuozhi Wang , Interactions between Fungi and Bacteria Associated with Degradation of PAHs



15:00-17:00 Poster Presentation (EDL students who will not graduate in March 2012)

Poster presenters will stand by their posters to share their research and answer questions.

15:00 – 16:00: uneven numbered poster (1, 3, 5, ...)

16:00 – 17:00: even numbered poster (2, 4, 6, ...)

No.	Name	Title
1	Kazuyo Nagahama	Prospects of Sustainable Forest Management: Community-based Forest Management in India
2	Gonchig Gantulga	The Establishment of Sustainable Livestock Farming Extension in Galshir, Mongolia: Challenges and Possibilities of Integrated Governance
3	Natsagsorj Natsagsuren	Evaluation of Factors Affecting the Soil Moisture in the Semi Arid Regions in Mongolia
4	Khishigsuren Nyamsambu	Pastureland Use Planning in Bayan, Mongolia Using Remote Sensing Data and GIS Applications
5	Pham Tien Dat	Monitoring Mangrove Forests Using Multi-temporal Satellite Remote Sensing Data in Hai Phong City, Vietnam
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16	Mizuho Takahashi	Use of Hydrological Tracers to Assess Groundwater and Surface Water Interaction in Lebna Watershed, Cap-Bon, North East Tunisia
17	Wataru Yamada	Distribution of Oxygen-18 and Deuterium across the Tunisia
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19	Jie Zhang	Interaction between Shallow and Deep Groundwater Resources in Baiyangdian Lake Watershed, China
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21	Chen Jie	Study on the Preparation of Particle Catalyst TiO ₂
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31	Yadmaa Tseveenkhanda	The policies for wetland preservation in Mongolia
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35	Shuhong Li	Reutilization of Soybean Residue for Production of Polysaccharides by Edible Mushroom under Solid State Fermentation

17:00-17:15

Comment

Prof. Joseph R. Des Jardins, *Vice Provost and Academic Dean*
Professor - Department of Philosophy
College of St. Benedict and St. John's University

17:15-17:30

Future Perspective

Naomi Wakasugi, *EDL Professor, University of Tsukuba*

18:00-20:00

Reception Party





Environmental Diplomatic Leader (EDL) Education Program
Annual Symposium
 17th February, 2012; University of Tsukuba

What should EDL aim?

Maki TSUJIMURA, Ph.D.
 Leader of EDL Education Program,
 Associate Professor in Hydrology and Hydrogeology
 Faculty of Life and Environmental Sciences, University of Tsukuba

Background

Policy Paper “Innovation 25” (Cabinet, Government of Japan, June 2007)

- ... The Japanese government will encourage the graduate level education program of the “environmental leaders” ...


Call for “Graduate level education program of International Environment Leaders” by Strategic Funds for the Promotion of Science and Technology, Ministry of Education (MEXT), Japanese Government (January, 2008)

- 17 proposals by 17 universities have been adopted by MEXT from 2008 to 2011
- Budget scale: 700,000 to 800,000 USD/year

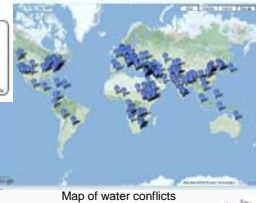


Global water scarcity


Projected Global Water Scarcity, 2025



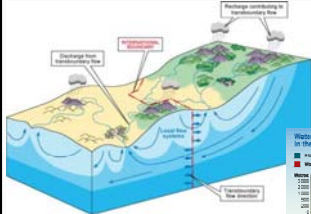
(By International Water Management Institute)



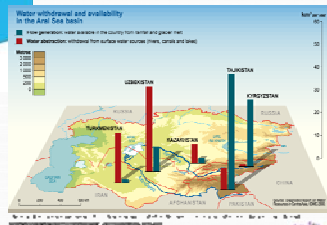
Map of water conflicts
 (By Pacific Institute)




Environmental Diplomatic Issues on Water



Unbalance of Intern river issues
 (Diagnostic Report on Water Resources in Central Asia, ICWC, 2000)

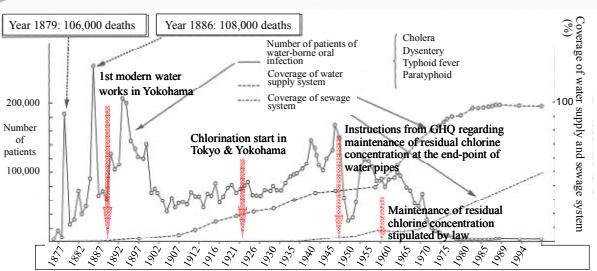


Groundwater transboundary aquifer
 (International Shared (Transboundary) Aquifer Resources Management, UNESCO-IHP, 2001)



Public Health Improvement and Water Supply in Japan

(by Prof. Hashizume (Tama Univ))



Year 1879: 106,000 deaths
 Year 1886: 108,000 deaths


Number of patients of water-borne oral infection
 Coverage of water supply system
 Coverage of sewage system

Cholera
 Dysentery
 Typhoid fever
 Paratyphoid

1st modern water works in Yokohama
 Chlorination start in Tokyo & Yokohama
 Instructions from GHQ regarding maintenance of residual chlorine concentration at the end-point of water pipes
 Maintenance of residual chlorine concentration stipulated by law

• Improvement of water supply and sewage system
 → Breaking the fecal infection
 → Drastic decrease of oral infection (especially the highly virulent infection which decreases the mobility of the patients)


(Source: Water Supply Division, Ministry of Health, Labor and Welfare)




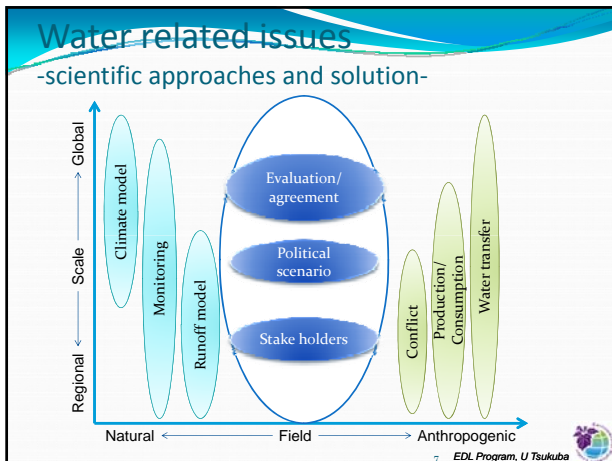
Why should EDL learn Global Public Health?

“EDL can save human life by their own work” - (by Dr. Wakasugi)

- Four million deaths of children could be saved by preventing environmental risks (Dr. Hirabayashi; Source: WHO)
- Human lives are lost by air pollution (1.2 million), water contamination (2.2 million), food shortage (3.5 million) and infectious diseases (12 million) per year (Source: WHO)







EDL should be a intern negotiator?

EDL should learn skills of negotiation and debate, but not need to be a negotiator

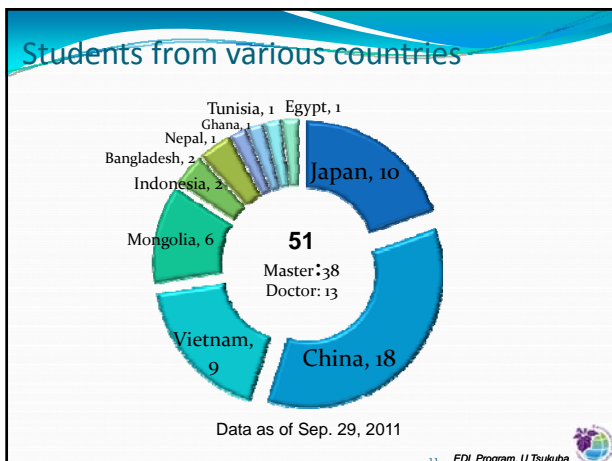
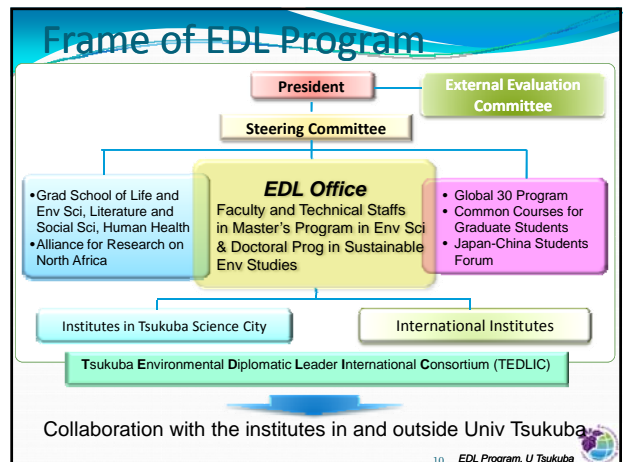
EDL Negotiator

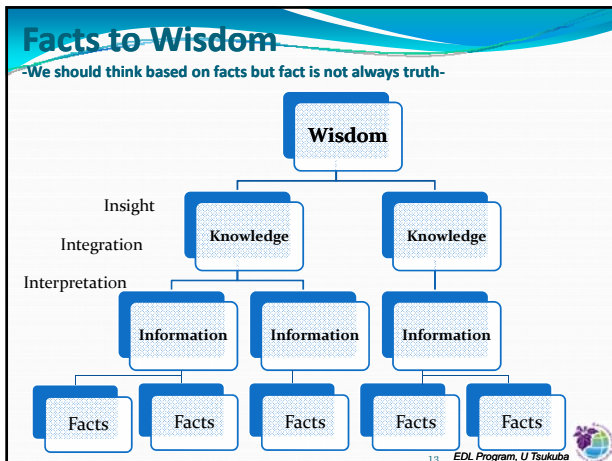
Global issues, Sci info, Culture

Regional Interest National Interest

Source: Earth Negotiations Bulletin (ENB); <http://www.iisd.ca/climate/cop16/>

EDL Program, U Tsukuba





Wisdom Infrastructure

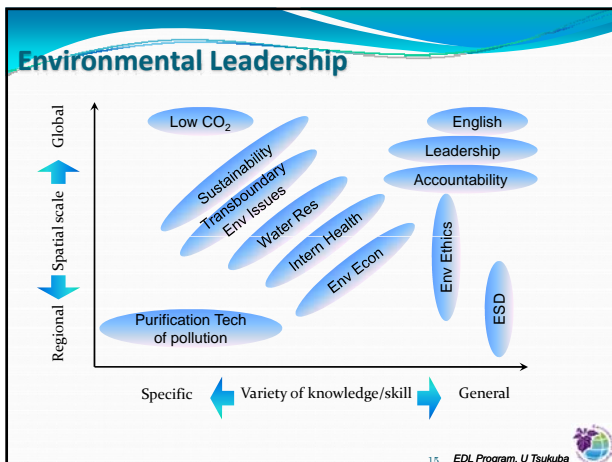
Global Environmental Issues

- Complex causality
- Trans-boundary problems

The abilities to coordinate various stakeholders can be exerted well where there is **"wisdom infrastructure"**

EDL Program: Fostering wisdom based on natural/social/human sciences

Source: Dr. Endo
EDL Program, U Tsukuba



A tree of EDL 2011FY

Branches: Application, Balance, Performance

Fruit: Solutions, Interaction, Sustainability, Real leaders

Trunk: Skills, Wisdom, Comprehensive perspective

Roots: Ethics, Respect, Vocation / Justice

Revised from Gordon & Berry (2006)
EDL Program, U Tsukuba

A way to EDL

The flowchart details the path to EDL. It starts with 'Environmental specialist' (Env Sci Eng, Kasumigaura Water Work Office, Waste Management Plant, NPRI, Env Ethics, Forest Sustain, Env Space Info) and 'Diplomatic ability' (Env Policy, English Presentation Debate, Env Pol Eval, Culture Eco). This leads to 'Leadership' (Env Issues for Children, Water Treatment Technology, Health Issues on Mercury in Minamata, Population and Env Future, Global Warming: Adaptation and Mitigation, Water, Culture, Environment). The path continues through 'Master Thesis' (Study on Industrial Waste Water Management Policy in Hanoi, Vietnam), 'EDL Certificate', 'Certificate Supplement', 'EDL', 'Vietnam Minst Nat Env', and finally 'Tsukuba EDL Int Consortiumium'.

Certificate

The first EDLs received certificate from Prof Yamada, President, Univ Tsukuba (July 2011)

EDL Program, U Tsukuba

Future

- Tsukuba Environmental Diplomatic Leader International Consortium (TEDLIC)
 - Networks of graduates, EDL candidates, collaborative organization and University of Tsukuba
 - Internship in your home countries
- International program for environmental leaders
 - Expansion of topics (waste management, adaptation/mitigation against climate change etc.)
- Apply to Funds for the graduate program educating specialist of water security and water environment



Remarks

- EDL Program get the highest grade “S” in mid-term evaluation by MEXT.
- Environmental Leadership needs abilities of S & T, communication / implementation and wisdom.
- Importance of knowledge bridging natural science and human / social science.
- Solutions are found in the field / region.
- You will construct a new feature of EDL.



Environmental Leadership Education Program Annual Symposium
University of Tsukuba, 2012/2/17



EDL Activities in 2011

Graduate School of Life and Environmental Sciences,
University of Tsukuba

Takahiro ENDO

What is an Environmental Diplomatic Leader?



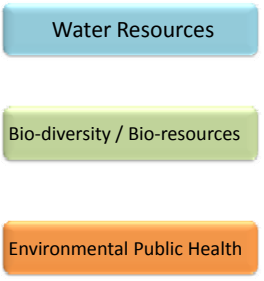
Environmental Specialist
Water environment • water resources/
Bio-resources • bio-diversity /
International public health

Diplomatic Ability
Bird's view /
Communication skill

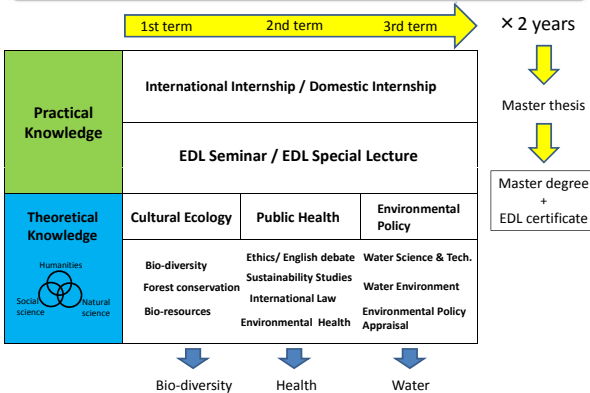
Leadership
A sense of duty /
application skill /
Management

Environmental Diplomatic Leadership Program

- Master's (2 years) / PhD (3 years) courses
- Analytical and problem-solving skills in environmental issues germane to water resources, biodiversity/bio-resources, and public health in Asia and Africa.
- Policy making, management, and diplomatic negotiation



A Model Study Plan in Master's Program (2 years)



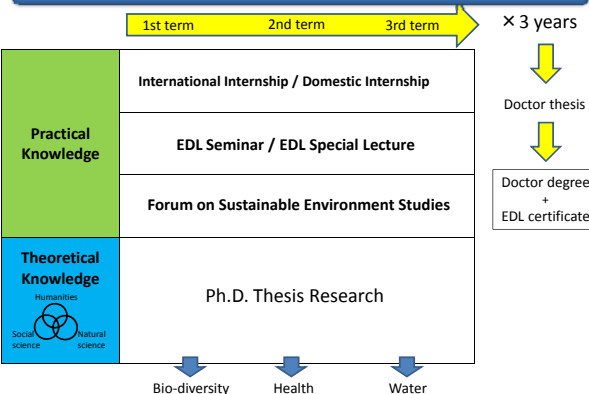
1st term 2nd term 3rd term → × 2 years

↓ Master thesis ↓
Master degree + EDL certificate

Practical Knowledge	International Internship / Domestic Internship		
	EDL Seminar / EDL Special Lecture		
Theoretical Knowledge	Cultural Ecology	Public Health	Environmental Policy
	Bio-diversity Forest conservation Bio-resources	Ethics/ English debate Sustainability Studies International Law Environmental Health	Water Science & Tech. Water Environment Environmental Policy Appraisal

↓ Bio-diversity ↓ Health ↓ Water

A Model Study Plan in Master's Program (2 years)



1st term 2nd term 3rd term → × 3 years

↓ Doctor thesis ↓
Doctor degree + EDL certificate

Practical Knowledge	International Internship / Domestic Internship
	EDL Seminar / EDL Special Lecture
	Forum on Sustainable Environment Studies
Theoretical Knowledge	Ph.D. Thesis Research

↓ Bio-diversity ↓ Health ↓ Water

International internship-France / Tunisia-

Date: July 12 – 22, 2011
Visiting site: Paris / Tunis, Monastir, Sfax, Gabes, Jerba

Purpose:

- First-hand experience of water policy / health policy at international level
- Fieldworks on water management, climate change adaptation, bio-resource management and public health policy in arid area

Collaborative organizations: The alliance for research in northern Africa, Univ. of Tsukuba, Institut National Agronomique Tunisie, Jica office of Tunisia, UNESCO, Pastur institute

Accomplishments:

1. Experience on activities of international organization
2. Deepening of understandings on geographical landscape, water shortage, waste problem, public health, and energy problem in arid region
3. Debate experience at International symposium



UNESCO in Paris

Traditional water harvesting system in Tunisia

International internship -Mongolia-

Date: August 27 – September 3, 2011

Visiting sites:

- Baganuur mining (Coal mining)
- Experimental irrigation farm of Mongolia University of Science and Technology
- Drinking wells for Ulaanbaatar city

Purposes:

- On-site education on water and energy problem in developing countries in semi-arid area
- Fieldworks on experimental irrigation farming

Collaborative organization: Institute of geo-ecology, Mongolian Academy of Sciences, Institute of meteorology and hydrology, Mongolia and Mongol University of Science and Technology

Accomplishments:

1. Understanding on management for renewable resources (groundwater) and non-renewable resource (coal mining)
2. Understanding on the meaning of irrigation farming in nomadic society



On-site education groundwater system in UB city



Experimental farm of MUST

7

Domestic Internship

Date: November 27 – December 1, 2011

Visiting sites:

- Atomic bomb museum (Nagasaki)
- Isahaya-bay reclamation project (Nagasaki)
- Unzen volcanic park (Nagasaki)
- Minamata disease museum (Kumamoto)
- Shirakawa river basin (Kumamoto)

Purpose:

- On-site education on "on-going" environmental problems in Japan
- Learning from the past environmental problems

Accomplishments:

1. Understanding on negative aspects of rapid economic development
2. Direct conversation with Minamata disease patient
3. Trade-off problem between huge public works and environmental conservation in Isahaya



Isahaya-bay reclamation project



Dialogue with a Minamata disease patient

8

Collaboration with young scientists

Purpose:

- Improving research through discussion with young scientists of various background

International symposium

- "The roles of environmental leader in arid region" (Tunisia)
- "Natural resources and the roles of environmental leaders" (Mongolia)



Field tour with young Mongolian researchers



Discussion with Tunisian young scientists



Poster session with Mongolian young scientists

9

Collaboration with future environmental leaders

Lectures:

- Kumamoto university "Fundamentals of Groundwater"
- Gifu university "Special lecture on evaluation of water environment in Asia"

Joint international symposium

- "GeIK-EDL-APIEL Joint International Symposium -Integrated Approach to Environmental Challenges in Asia-

Joint field tour

- "Ecosystem services and groundwater in Kumamoto" (2011) (With Kumamoto University, University of Tokyo)
- "Minamata Disease tour (tentative)" (2012) (With Kumamoto University, University of Tokyo, Kyusyu university)



GeIK-EDL-APIEL Joint international symposium (Photo: GeIK)



Joint field tour in Kumamoto

10

PCM (Project Cycle Management) workshop

Date: Dec. 2-3, 2011

Instructor • Moderator: Mr. Ohsako Masahiro (PCM Tokyo)

Assistant: Ms. Keiko Takahashi (Y's consulting office)

- **Purpose:** Improvement of ability for problem finding, project planning, project implementation and policy making

- **Theme: How to cope with urban waste**

- **Accomplishment:** fast-hand experiences on coordination of stakeholders, policy making and consensus building



11

"Meet the Leaders" (2011)

- Talents and knowledge indispensable for a leader
- Understanding on global environmental problems
- Basic knowledge and quality for a cosmopolitan

Date	Lecturer	Affiliation	Lecture title
Sep 30 2011	Kolchiro Matsuura	The former director-general of UNESCO	Humanity and civilizations
Oct 28 2011	Kiyoko Ikegami	the director of Tokyo Office, UNFPA	Population and the Environment - A Growing Problem in a Shrinking World
Nov 10 2011	François Dabis	Institute of Public Health, Epidemiology and Development, Bordeaux University, France	AIDS as a global issue - current state in the world and future perspective -
Nov 24 2011	Shunji MATSUOKA	Graduate School of Asia-pacific Studies, Waseda University	Global Sustainability and International Environmental Cooperation
Jan 20 2011	Mitsuo Ichikawa	Professor emeritus of Kyoto University, Director of Japan Monkey Centre	Conservation of Tropical Rain Forests and Indigenous Peoples in Africa

12

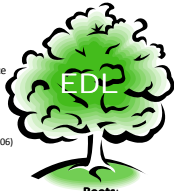
Special Lectures on Environmental Ethics

- Ethics and Economics
- Future generations, animal rights and bio-centric ethics
- Ethics and Ecology – the Land Ethic
- Deep ecology and eco-feminism
- Environmental Justice
- Sustainability



Prof. Joseph Desjardins, College of St. Benedict and St. John's University, USA

Branches:
Application
Balance
Performance



Revised from
Gordon & Berry (2006)

Fruit:
Solutions
Interaction
Maintenance

Trunk:
Skills
Wisdom
Insight

Roots:
Ethics / Respect / Vocation / Justice



13

EDL Cafe and Debate

- Free discussion on various social issues: Environmental problems, nuclear power-plant etc.
- Organized and conducted by EDL candidates

Debate topics

Future of nuclear power plant and energy problems



Mass media on Fukushima nuclear power-land and reaction of various countries



How to deal with nuclear wastes?:
Construction plan of nuclear waster treatment plant in Mongolia

14

EDL English Writing Center

Introduction to English Presentation and Debate (Profs. Matsui and Watanabe)

- English proof by professors and English native speakers
- How to make effective a power-point file
- How to make an attractive presentation



Improvement of writing and speaking skills



15

Public Relations

1. Website



3. E-learning system



2. Newsletter (Quarterly)



4. Symposium on environmental educations

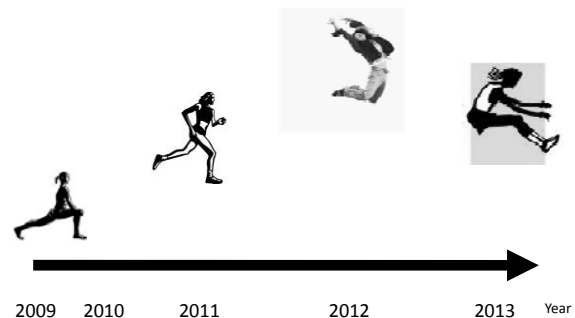
16

EDL Activities in FY 2012(tentative)

- International internship in Kyrgyz
 - Networks of graduates, EDL candidates, collaborative organization and University of Tsukuba
- Joint domestic internship in Minamata
 - Kumamoto Univ., Univ. of Tokyo, Kyusyu Univ.
- Program for international cooperation of universities in Japan
 - Credit exchange and double degree system
- Education leading program for Doctoral students
 - Degree program on water environment and energy

17

Conclusion: Hop, Step and Jump!



18

Voice from EDL Students

SUN Xiaogang (EDL Assistant Professor)

Questionnaire Design

To understand both the **majority** and **personal opinions** of the EDL students

*public relations of the EDL

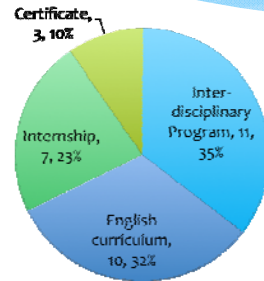
*Concept, curriculum, and vision of the EDL

*Major activities of the EDL in 2011

1

PR of the EDL

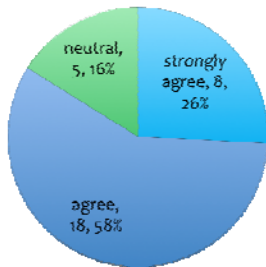
What attracted you most to the EDL Program?



2

Curriculum design

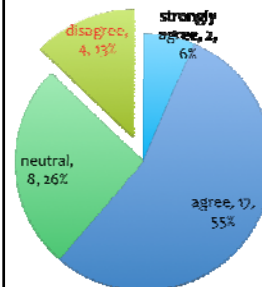
The curriculum provides students with a **comprehensive knowledge** on environmental issues.



3

Curriculum design

The curriculum provides students with **applied skills** to deal with environmental problems.

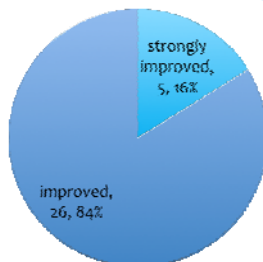


Suggestions:

- “It would be better if some environmental issues can be presented not only just the characteristics but also the **proper and specific solutions**.”
- “We would like to be improved at **practical skills**: collecting the sample, analysis or debate more.”

4

Will your abilities and capacities to solve environmental problems **be improved** after your studies in the EDL program?



5

What kinds of **abilities** will be improved?
(multiple choice: n=31)



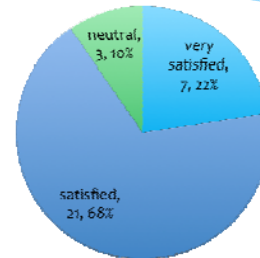
6

Evaluating EDL Activities in 2011

- * Lectures
- * International and Domestic Internship
- * EDL seminar & “Meet the Leader”
- * EDL Café and Debate
- * Student Support

7

Lectures



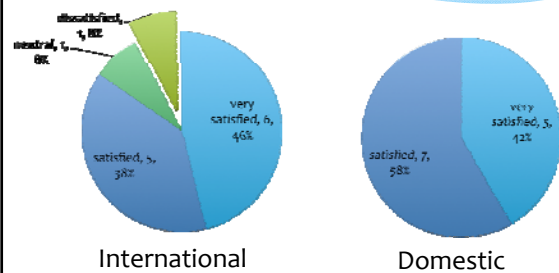
8

Suggestions for lecture

- * “The **contents of the lecture** should not only be the result or introduction of the lecturers’ research or wonderful work, but also the way of their thinking about the world, about the deep reasons causing the environmental problems, the poverty, and some other problems in this world.”
- * “lectures should be more interesting and concise”; “More scientific lectures are expected.”
- * In developing countries, governments do not or sometimes cannot emphasize upon protection of environment and allocation of budget is too insignificant in this regard. Some ways out to implement stronger environmental governance should be included and discussed.

9

Internship



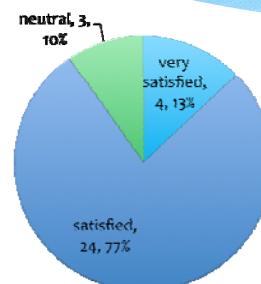
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Suggestions for Internship

- * “We only followed a planned program. Some places were interesting to visit, however, the internship was not productive. More basic knowledge should have been acquired before the internship”
- * In some cases, students were very tired when it took more time for travelling than in planned places.
- * It should have more international internship in other developing countries from the tropics to arid countries
- * Internship overlapped with other seminar or classes.

11

EDL Seminar & “Meet the Leader”



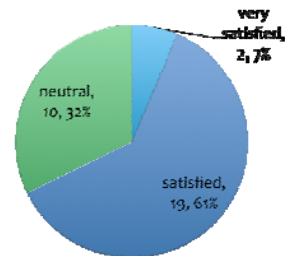
12

Suggestions for the EDL Seminar & “Meet the Leader”

- * It was great opportunity for students to take lectures from top specialists in environmental issues. It would be better if you could provide an opportunity to talk with them more frankly.
- * Hope the EDL could plan some “communicating games” between leaders and students.
- * Give a detailed introduction about the speaker before every lecture.
- * “Invite more foreign lectures from different countries”

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EDL Café and Debate



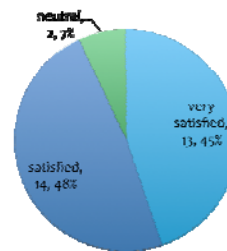
14

Suggestions for the EDL Café and Debate

- * We should hold EDL Café and Debate more frequently. Everybody should have a chance to organize one topic which he/she majors.
- * More discussion and information exchange among students, and between students and professors.
- * In EDL Café, students sit with their groups and it is not active. It will be better if we communicate together.

15

Student Support



Comments:

EDL office staffs are very kind and patient, they helped us a lot.

Credit check list should be checked at each term as someone may miss or forget some important lectures.

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Other suggestions and recommendations for further progress of the EDL in 2012

- * The EDL program should provide small funds to support EDL students attending international congress, conferences, and workshop.
- * In order to encourage students to study effectively, it is better to provide scholarships for excellent students who have publications in the international journals, proceedings.
- * Use “facebook” for more communication

17

Many encouragements from EDL students

- * “I have joined EDL program for more than 1 years. EDL helped me improve my communication skills and give us many chance to talk to famous leaders all over the world. I hope more and more excellent students could join in this program and share their experience with others.”
- * “I appreciate great efforts for every EDL staffs. I hope we will success to be Environmental Diplomatic Leaders and utilize the special skill. It's my pleasure that there are some opportunities to get some merits and special jobs with EDL certificates”
- * “I really appreciated to EDL program with special and professional knowledge for me. I learned much than I could image from EDL program. Also thanks to EDL program's support for me not only on study but also on daily life”

18

International Internship Report- Paris and Tunisia July 12 – 22, 2011

Hoang Thanh Tung

During the internship, we spent one and a half days visiting the UNESCO Headquarters and the Luis Pasteur Institute in Paris. The rest of the time, we visited many places in Tunisia. Although this was a short period, we had chances to get a lot of knowledge and impressions about the lifestyles, the culture, and environmental issues.

In Paris, UNESCO was the first place we visited. UNESCO stands for the United Nations Educational, Scientific and Cultural Organization. The letters of UNESCO are imprinted in the minds of people meaning that we all are eager for peace. Education means there are many programs for education. Communication means to improve the communication of information. Science means a dedication to nature and science. Dr. S.Zandaryaa gave us a wonderful presentation about UNESCO's International Hydrological Program. This allowed us to learn how to establish an international cooperation framework to deal with complicated water issues. If UNESCO reminds us of peace, development, and harmony between people and environmental nature, the Luis Pasteur Institute (the second place we visit in Paris) helped us to have inspiration about the creativity, hard work, and dedication of human beings.

In Tunisia we visited many places, and each place we visited helped us to have a broad view on public health and environmental issues, especially how to deal with environmental problems in arid regions such as Tunisia. In Tunisia and at the Luis Pasteur Institute, we learned that human beings have to face increasing health problems due to anthropogenic reasons. Some regions have to face serious problems due to infectious diseases. We also understood that prevention is much cheaper than cures in terms of environmental protection. The TAPARURA coastal depollution project is a typical example of the high cost people have to pay for industrial activities in the project area. Tunisia is located near the Mediterranean Sea, so aquaculture is a potential industry in this country. Together with fishing activities, the fish production has increased in recent years. The RUSPINA Fishing Company invested a lot of money to establish fishing production in this area. It was initially successful, but faces some environmental problems in the future because they lack an environmental impact assessment. Water scarcity is a big problem in many Africa countries and Tunisia is no exception. Changing seawater into tap water is very essential. Therefore, the Tunisian Government established a desalination station on Djerba Island, where there is the most severe water shortages in Tunisia. The success of this project plays an important role in supplying water throughout the region. People always find solutions once they have encountered difficult situations, and visiting the 5th Season Farm in El Hamma Oasis proved this conclusion. Similar to Djerba Island, this region also faces a serious water scarcity, and the people have to use underground water for agricultural production. They pump water from 1000 m deep to get the water but the water is at a high temperature of about 70°C and contains a high salinity concentration. This is a difficult case for irrigation. However, the 5th Season Farm has turned this disadvantage into an advantage by using the high temperature water to warm up the green house and to generate energy. The high salinity concentration in the water helps to accumulate the sugar in tomatoes, so they can grow tomatoes in the winter time and sell it at high price to European market.

In conclusion, the international internship is valuable for environmental diplomatic leaders to have a chance to increase their knowledge through direct experiences and to share that knowledge with international friends. It also promotes our inspiration of creativity and leadership.

University of Tsukuba
筑波大学

Environmental Diplomatic Leader
Strategic Funds for the Promotion of Science and Technology
Strategic Program for Raising Environmental Leaders

Strategic Funds for the Promotion of Science and Technology

International Internship Report Paris and Tunisia

12 – 22 July 2011
Prepared by Internship Group

EDL Annual Symposium
17 February 2012

UNESCO HQ in Paris

Introduction to UNESCO

UNESCO Building

Angel of Nagasaki

A walking man

Doctor Sarantuyaa Zandaryaa introduced UNESCO's International Hydrological Programme

Tunisia Pasteur Institute & CITETE

Dr. Al-Gallas Nazek

Three emerging issues of global concern

Losing food quality control

Human Activities on food security

Climate change

Population increased

Vaccines

Zoonosis

"the national center have been analyzing 3000 food samples per year from different places, most of them contain salmonella, shigella and other dangerous bacteria"

Desalination station in Gualala, Djerba

Current Water Problems

On the way to Djerba Island

Severe Water Scarcity

Traditional Water Storages

Water is Rare and Precious

Established Desalination Station

Automatic Water Supply Control

Water Processing System and Experiment Laboratory

Drinkable Water After Processing

The 5th Season Farm in El Hamma Oasis

Problems with water

- Water scarcity → use ground water at high temperature (1000m, 70°C)
- High salinity concentration

Solutions to problems

- Heat for greenhouse
- Energy generation
- Accumulate the sugar in tomatoes

Development in water use

Ground water → Pesticide → Fertilizer → "Kitchen for tomatoes"

Desalinated water → "Kitchen for tomatoes"

Recycled water → "Kitchen for tomatoes"

Water for seedlings

Production increase in winter with low cost and can export at high price to international market

La Sème Saison Farm

France, Austria, Germany, Italy

University of Tsukuba
筑波大学

Environmental Diplomatic Leader
Strategic Funds for the Promotion of Science and Technology
Strategic Program for Raising Environmental Leaders

Strategic Funds for the Promotion of Science and Technology

"One Must Work, One Must Work, I Have Done What I Could"
-Luis Pasteur, September 28th 1895-

Thank You for Your Attention

International Internship in Mongolia August 27th ~ September 3rd, 2011

Jie Zhang

The 2011 Mongolian Internship activity, supported by the EDL program, was held from the 27th of August to the 3rd September, 2011. In total, 4 teachers and 11 students from University of Tsukuba, and more than five teachers from Mongolia, as the local guides, took part in this international internship.

During the internship, what we mainly focused on was natural resources; especially the water resources and mineral resources in Mongolia. We visited various water supply systems, such as household wells, production wells in the Sanzai area, spring water in Dambadarjaa, and an independent water supply system for the Termo Power Plant. Mineral resources are also a very important natural resource for Mongolia, which contributes much to the national economy. Coal, gold, copper are the main three mineral resources. During the internship, we visited a coal mine area named Baganuur. During this visit, we learnt about some environmental problems induced by mining, such as waste of groundwater resources, pollution on surface water, destruction of land, soil erosion and the risk of dust pollution.

Some economic facts also were observed during the internship. According to some statistical data, Mongolia relies on agriculture and mining in a large way. Consequently, there is little manufacturing and they have to import large amounts of heavy or light industrial products from vehicles to even toothbrushes. The automobile brands in Mongolia are almost exclusively from Japan and Korea, and many electrical appliances and light industrial products are from China. Therefore, the factors of its geographic location seem to influence Mongolia significantly.

We didn't have enough time to learn about some details regarding the social system in Mongolia except by visiting a temple in the Terelj tourist camp. During this visit, what surprised us most is that we found both an elephant carving representing Indian culture and a dragon carving, which is a Chinese symbol, existing in the same temple building, which perhaps suggests that both Tibetan Buddhism and Indian Buddhism have influenced the form of the Mongolian religion.

Special and extreme climatic conditions created the unique landscape grasslands of Mongolia which charmed us deeply. We had reasons to focus on this vast grassland for a very long time, because we think Mongolia is just standing at the start of her rapid growth and it's believed that there are opportunities as well as challenges for Mongolia.

Mongolia in Our eyes

by Group of International Internship in Mongolia

Environmental Diplomatic Leader Education Program Annual Symposium 2012

2012-02-17

A brief introduction: Mongolia Internship

August 27th – September 3rd, 2011

- Members:
- Main visiting places

	Nationality	number	Date	Site
Teachers or guides	Japan	4	Aug.27 th	Narita → Ulaanbaatar
	Mongolia	5+	28 th	Baganuur, Tereji
	Japan	5	29 th	Tereji; Tsoujin Boldog
Students	China	4	30 th	Sanzai area; Goodoi gap; Sharga Morit area
	Indonesia	1	31 st	Teruo Power Plant circuit
	Nepal	1	Sep.1 st	Mongolia-Japan Center Building
			2 nd	Mongolia-Japan Center Building
		3 rd	Ulaanbaatar → Narita	

- Charming Mongolia:** Special and extreme climate conditions created the unique landscape-grasslands of Mongolia. For us, they are beautiful and attractive. For local people, they are simply a part of their life.
- Chance and challenge:** We think Mongolia is standing at the start of his rapid growth. It's believed that there are a chance as well as a challenge for Mongolia. The chance is that, in modern times, with more advanced technology and management modes than at any time before, Mongolia have the ability to deal with various environmental problems. They can break the traditional development mode seen in western countries or Japan, which is to pollute the land firstly and then restore it. This is the challenge for Mongolia.

Due to this, we have reasons to focus on this vast grassland country for a very long time.

Part I Environment and natural resources

Water resources in Mongolia

Water supply system

- Production well in Sanzai area
 - Inconvenient to transport, store and use
- Household well in Sanzai area
 - High cost, frozen in winter

Drinking water supply sources

- Spring in Dambadarjaa for drinking water
 - Weak in anti-pollution
- Independent water supply system for Teruo Power Plant

Part II Economic facts

Mining industry

- The exploration of the Baganuur coal mine began in 1925 with the help of the former Soviet Union.
- The deepest coal layer is 106 m below the ground surface.
- Used for power plants and heating system in winter.
- The annual total amount of coal produced is 3 million tons. It is believed that 500 million tons are still below the ground now, so Mongolian coal mining could last for maybe another 200 years.

The proportion of each industry to GDP (Source: Mongolian Statistical Yearbook 2009)

Mineral resources-related environmental problems

- Groundwater waste.
- Pollution on surface water . (Potential risk on Groundwater)
- Destruction of land, soil erosion, and the risk of dust pollution.

Worries: The increasing population of Ulaanbaatar means a increasing demand for energy. To fulfill these demands, more coal mining factories will be set up in near future. The possible environmental condition of Mongolia will become more severe.

Part II Economic facts

Foreign trade

% of value added of Mongolia (2005-2007)

	Agriculture, hunting, forestry and fishing	Mining and quarrying	Manufacturing	Electricity, gas and water supply	Construction	Wholesale, retail trade, restaurants and hotels	Transport, storage and communication	Other activities
2005	24.7	24.6	4.1	3.2	2.4	10.0	12.5	21.7
2006	21.9	33.6	3.9	2.9	1.9	9.0	10.1	20.4
2007	23.0	32.6	4.5	2.5	1.9	8.5	10.7	20.5

(Source: UN Statistic Yearbook 2008)

It's clear that Mongolia relies on agriculture and mining & quarrying in a large part. On the contrary, there is few manufacturing, which means they have to import large amount of heavy & light industry products, from vehicle to even a toothbrush

Automobile brand are almost from Japan and South Korea

Products made in China

External packing has had no changes.

Part III Society

Religion with mixed cultures

While in the field, we can find religion in Mongolia mixes many different kinds of cultures.

Mongolian temple located in Tereji tourist camp

- Mongolia has long been a land of varied religions, and Genghis Khan set a tradition of great religious tolerance.
- About 85% of Mongolians practice some form of Buddhism, and the 5% of Muslim Mongolians are from Kazakh tribes in the west. Christianity now holds about 10% of the country (A guide to Mongolia religion, online source).

An elephant carving: the representative of Indian culture

A dragon carving: the Chinese symbol

It suggests that both Tibetan Buddhism and Indian Buddhism have influenced the form of Mongolian religion.

EDL Internship in Kumamoto and Nagasaki

Wataru Yamada

We EDL members visited Kumamoto and Nagasaki prefectures from Nov 27th to Dec 1st, 2011. All of the places gave us very precious knowledge and insight.

■ Isahaya land reclamation project

We EDL members visited Isahaya Bay on Nov 28th. Isahaya Bay is tidal land facing the Ariake Sea and a very controversial area because of its land reclamation project. In 1992, the construction of the embankment was started to prevent floods and develop new farmland. Eventually, 7 km embankment was constructed and 680 ha farmland emerged.

However, after the construction of the embankment, it was reported that the decrease in aquatic resources were 50 % and the biodiversity was damaged dramatically. Additionally, a lack of scientific basis caused more controversy.

■ Minamata disease

We visited Minamata Bay on Nov 29th, the third day of the internship. Minamata is called the birthplace of public hazards in Japan. Minamata disease is a central neurological disease. The first case happened in 1956. The cause is methyl mercury discharged from the Chisso company's factory.

We visited the Minamata Disease Museum and heard a story from a victim, Ms. Ueno, an 84 year old lady. She also lost her husband and daughter to this disease. The symptoms were terrible. The patients and their families had to endure exceptionally compared to others.

In some means, environmental pollution is a cost translation in the economic process. During economic growth, governments and companies prioritize benefits while sacrificing the local people. The same tragedies could happen in developing countries. We should support to those countries bearing in mind the tragedy of Minamata.

■ Kumamoto groundwater use

We visited the Kumamoto plain on Dec 1st, the last day of our schedule. Historically, this area has been blessed with plentiful groundwater resources. We saw some water management which has been continuing since the Japanese Middle Ages.

However, in recent years, the groundwater level is dropping because of a decrease in paddy fields which have an important role in order to recharge groundwater. Local administration started the promotion of the recharged groundwater from fallow paddy fields through subsidies. This is good example of groundwater flow processes able to sustain groundwater use.

■ Accomplishment of internship

We EDL members visited a lot of places. Isahaya Bay taught us the vulnerability of biodiversity and the importance of proper scientific survey. Minamata gave us a chance of think of environmental public health. The Kumamoto plain showed us good examples of sustainable groundwater use. This internship was very meaningful for future environmental leaders.





EDL internship in KUMAMOTO and NAGASAKI

Nov 27th – Dec 1st, 2011 M1 Wataru Yamada

- Isahaya Land reclamation
- Minamata Disease
- Kumamoto Groundwater
- Accomplishment

Isahaya Reclamation

- 680ha farmland & 7 km embankment
 - Flood Control
 - Flat and Huge Farmland





↓

- Decrease of 50% in aquatic resource
- Depletion of the biodiversity

<h3>Opponents</h3> <ul style="list-style-type: none"> • The change of tidal wave → depletion of DO and purification power of tideland → depletion of fishery yield 	<h3>Supporters</h3> <ul style="list-style-type: none"> • The embanked area is only 3% of Ariake sea. → there is no relation with the depletion of fishery yield.
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↓



Both sides have justice. Little Scientific Basis.

Minamata Disease

The first case happened in 1956.



- Cause: Mercury
 - Waste water from Chisso factory
 - Biological concentration
- Dramatic symptom
 - Ms. Ueno, an 84 years old lady.
 - She lost her husband and daughter
- Environmental pollution = cost translation in economy
 - In economic growth, government and companies prioritize benefit while sacrificing local people.
 - We should support developing countries which have environmental risk, bearing in mind the tragedy in Minamata.

<http://www.minamata195651.jp>

Water resource in Kumamoto area




- Geological structure
 - Volcanic action of Aso mountain
→ high water permeability
→ easy to recharge groundwater
- 100% of water use depends on groundwater
- Decreasing in groundwater
 - Decreasing of paddy field recharging 46% of groundwater in Kumamoto area

<http://www.city.kumamoto.kumamoto.jp>

Water management

- Hanaguri Ide
 - Artificial water way in 17 century.
 - Removing volcanic ash.
 - Supplying irrigation water to 181ha.
- Kengun spring water source
 - Quarter of water use in Kumamoto area.
 - Biggest flowing well in Japan.
- Groundwater recharge from paddy field
 - Promotion by subsidy
- Sustainable groundwater use
 - Water management from ancient period.
 - Understanding of groundwater enable adequate water use.

Accomplishment of internship

Kumamoto	Water Resources: Hydrology, Contamination, Treatment		
	International Diplomacy	Env. policy Internat. law	Practicum & Research
Isahaya Bay	Biodiversity and Bio-resources: Ecosystem, Biomass, Satoyama		
	Cross-cultural Communication	Env. Ethics & Governance	Transboundary Study workshop
Minamata	Environmental Public Health: Infection, Preventive medicine		

<http://edl.envr.tsukuba.ac.jp>

Possibility of Inland Aquaculture Development in the Northeast Pará, Brazil

Naoto Aizawa

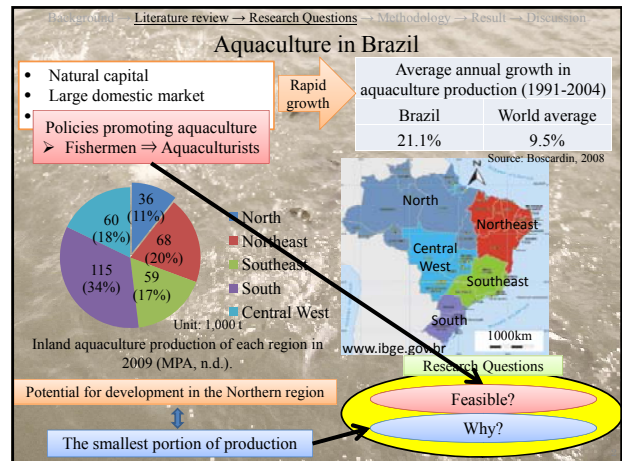
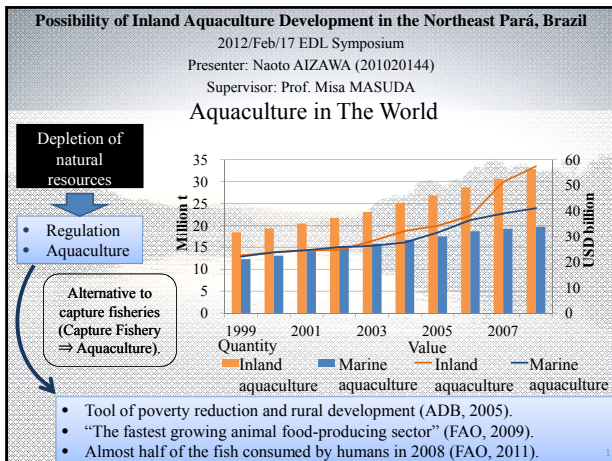
Wild fishery resources have faced depletion because of overfishing and the production from capture fisheries has stagnated. Attention to aquaculture as an alternative source of fish supply has increased globally. This same tendency has been observed in the Amazon. In Brazil, Many researchers emphasize the favorable natural conditions for fresh water fish cultivation in the North region (the bulk of the Amazon) which would increase fish production through a consolidation of aquaculture. Further, Brazil has a policy that promotes the transformation of fishermen into aquaculturists. Despite the favorable conditions, the Northern region has represented the lowest aquaculture production. Previous literature has pointed out several constraints. However, in the Northeast region of Pará state, the constraints have not been clearly identified.

This study aimed to examine the reasons for the low aquaculture production in this region as well as the feasibility of the policy which promotes the transformation of fishermen into aquaculturists. I conducted a field survey on inland aquaculture during the period between August-September, 2011. As there were no official data about the total number of the aquaculturists in the region, I visited as many inland aquaculturists as possible by adopting a snowball sampling and conducted semi-structured interviews.

A very limited number of the respondents cultivated fish after registration because they could not count on any public support. They mentioned that direct selling to consumers was the main form of commercialization and there was no regular selling to large retailers. This situation implies that the bulk of the production is not reflected in any statistical data. Aquaculture in this region is a good business which brings high profits in a small area and with little labor. Moreover, no producer claimed any difficulty in selling fish in the local markets and most of them intended to expand their nurseries. None of the respondents had ever engaged in capture fisheries.

At the study site, capture fisheries and aquaculture were practiced in different and distant places; capture fisheries in the rivers or lakes, and aquaculture inland. The basis of their livelihood is also totally different. Therefore, capture-based production is not easily substituted by culture-based production, and the policy needs to be reconsidered.

Keywords: Brazilian Amazon, Pará state, public support, culture-based animal production, inland aquaculture



Background → Literature review → Research Questions → Methodology → Result → Discussion

Field survey in the Northeast Pará

Semi-structured interviews with aquaculturists at 22 nurseries adopting “snowball sampling” from Aug. 8 to Sep. 6, 2011.

Situation:

- 1 public and 21 private nurseries.
- Scattered in the vast rural area ⇒ too large to be examined precisely.
- Among 21 private nurseries:
 - Activity as a side job → 18.
 - Agriculture, apiculture, and cattle grazing as other sources of income → 16.
 - Fisherman as previous profession → 0.
 - Aquaculture as an informal activity (Possession of all the documents required → 1. / Reliance on public support → 4. / Regular selling to large scale brokers or retailers → 0).
 - Production growth and optimal situation (Expansion of water surface → 19. / No difficulty in selling → 21.)

Typical landscape of rural area

Source: www.ibge.gov.br

Background → Literature review → Research Questions → Methodology → Result → Discussion

Two different “fisheries”

Supervised by the same public organs

Form of the production	Capture fisheries	Aquaculture
Locations of the production	Rivers and lakes	Inland
Producers	Fishermen	Agriculturists, cattle-farmers, and apiculturists
Basis of the production	Capture-based production	Culture-based production

Source: Field Survey, 2011

The policy promoting the transformation of fishermen into aquaculturists needs to be reconsidered.

Inland aquaculture

- Difficulties in primary data collection
- Few obtainments of the documents required
- Main form of commercialization: directly to final consumers
- Expansion of water surface
- No difficulty in selling

Reality not reflected in official data

Large land distribution & abundant water → Low pressure on the environment

Long-term viability → Production increase

Background → Literature review → Research Questions → Methodology → Result → Discussion

Evaluation points

- Relation between my research subject and the actual situation of the environmental problem:
 - ✓ Depletion of fish resources
 - ⇒ Regulation on capture
 - ⇒ Aquaculture as an alternative to capture fisheries
- Technology or policy dealing with the environmental problem:
 - ✓ Promotion of aquaculture
 - ✓ Promotion of the profession change:
 - Fishermen ⇒ Aquaculturists
- Contribution of my research:
 - ✓ Pointing out:
 - Difference between capture fisheries and aquaculture
 - ⇒ Necessity of reconsideration of the policy
 - Unreliability of data on inland aquaculture

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Grazing Impact on Above-Ground Biomass and Species Diversity along Altitudinal Gradient in Alpine Meadow on the Qinghai-Tibetan Plateau

Takuya Shiraishi

Rangeland degradation is a global concern, affecting not only the lives of human beings but also the grassland ecosystem. Rangeland degradation is well known throughout the Qinghai-Tibetan Plateau (QTP) in China. Considering its socio-ecological importance, the establishment of a sustainable rangeland management system is of great importance. To propose an appropriate management plan for rangelands, it is critical to demonstrate the current status of the grazing intensity on the meadow and its impact on the ecosystem. In this research, I focused on biomass and species diversity on a summer-autumn pasture in the QTP, aiming at describing the grazing impacts on (1) biomass, (2) species diversity and (3) their relationship along an altitudinal gradient.

My results showed that the grazing impact on biomass was severest at the lowest (3600 m) and the second highest altitudes (4000 m). The grazing impact on different growth forms of plants (i.e. graminoids and forbs) showed different spatial patterns. Graminoids were grazed at all the altitudes to a certain proportion (ca. -62% relative to the original amount), while forbs showed positive responses to grazing at the second lowest (3800 m) and the highest (4200 m) altitudes (ca. +92% relative to the original amount). The grazing impact on species diversity was severest at the highest altitude (4200 m), with the community structure greatly altered from the natural vegetation. Grazing has broken the positive relationship between biomass and species diversity observed in natural vegetation.

In dealing with rangeland degradation, recent Chinese policy includes three approaches; (i) rodent eradication, (ii) sedentarization of pastoralists, and (iii) the abandonment of livestock raising. My research has implications on the third policy, which is implemented over a wide range of rangeland based on the theory that “only the complete elimination of livestock can restore the rangeland’s productivity”. My results showed that grazing showed positive effects on the biomass and species diversity in some cases, and these impacts differed greatly among altitudes and growth forms of plants. Therefore, I insist that the implementation of “abandonment of livestock raising” without taking into account the spatial variation of those grazing impacts is inadvisable ecologically. To realize sustainable rangeland management in the QTP, it is necessary to conduct a vegetation survey and make accurate predictions about the grazing impact on the ecosystem considering the spatial variation as the first step. Then, based on these results, a more effective rangeland management system should be developed.

Background

What's Qinghai-Tibetan Plateau (QTP) like?
Socio-ecologically important ecosystem

- Sustainably used as rangeland from pre-historical times
- High productivity
- High biodiversity

during short growing season (Shimono et al. 2010)

Area: 2.5 million km²
 Altitude: 2000~5000m (FAO 2003)

Number of livestock ↑
Overgrazing
 (Du et al 2004)

Rangeland degradation
 (Harris 2010)

Sustainable rangeland management
 -> Critical to clarify how grazing affects the ecosystem

Background

What's already studied about grazing impact in QTP?

- Vegetation
 - Productivity ↓
 - Species diversity ↑ (Gao et al 2009)
- Carbon dynamics (Cao et al 2004) etc

•Wide range of alt.
 •Low accessibility
 -> **Limited info**

Objectives

To describe the current status of the grazing impacts on...

- (1) above-ground biomass (AGB),
- (2) species diversity (H'), and
- (3) The relationship b/w AGB and H' on summer-autumn rangeland focusing on **altitudinal** and **yearly** variation

↓
 Implications for **rangeland management** of summer-autumn rangeland on the QTP

Results

Potential Natural Vegetation

Forbs (High Altitude)
 Graminoid (Low Altitude)

Unique distribution of natural vegetation
 <- Unique distribution of meteorological conditions

Grazing Impacts

- Grazing impact on biomass
 - Alt: severe at 3600m and 4000m
 - Year: No trend (but some variation)
- > Different b/w growth forms: graminoid ↓ (-62%) at all the altitudes
 forbs ↑ (+92%) at 3800m and 4200m
- Grazing impact on diversity
 - Alt: severe at 4200m (similarity with natural vegetation ↓↓)
 - Year: No trend (but great variation)
- Grazing impact on the relationship b/w AGB and H'
 Positive relationship **broken**

Different grazing impacts at diff. altitudes
 <- Different feeding behaviors by livestock at diff. altitudes

Conclusion

On summer-autumn rangeland in the QTP...

Climate, Topography → Variable abiotic factors (e.g. Unique distribution of humidity) → Meteorological condition

Meteorological condition → Natural Vegetation (Above-Ground Biomass, Diversity)

Livestock → Natural Vegetation (Above-Ground Biomass, Diversity)

Natural Vegetation (Above-Ground Biomass, Diversity) → Grazed Vegetation

Livestock → Grazed Vegetation

Variable biotic factor (e.g. Feeding behavior by livestock)

← Examined in this study
 ← To be examined in future studies

High heterogeneity in abiotic and biotic factors along the slope caused high heterogeneity in grazing impacts on vegetation

Relation b/w my research subject & the actual situation of env. problem

~~Rangeland Degradation concerned on the QTP~~
 (Long et al 2003)

↓
 Appropriate rangeland management necessary

↓
 Critical to evaluate the grazing impacts on grassland

↓
 Lack of detailed info on **summer-autumn rangeland** due to low accessibility

↓
 My research provided scientific data to solve this problem focusing on the topographical characteristics of the site.

↓
Basic information for establishment of appropriate rangeland management system

↓
 Accumulated info on **winter-spring rangeland**

Policy used in dealing with such env. problem & Contribution of my research

1. Rodent eradication
2. Sedentarization of pastoralists
3. Retire livestock, restore pastures (退牧还草) (Abandonment of livestock raising)

Assumption:
 Only the **complete elimination of livestock** can restore the rangeland's productivity

BUT!!

My results:
 Grazing **increased** biomass and diversity at some altitudes

HOW TO IMPROVE THEN?

- vegetation survey
- prediction of grazing impact

Considering **Spatial heterogeneity**

↓
Sustainable rangeland management system

Source: www.gqt.org.cn
 Source: www.qhagri.gov.cn

Measurement of Primary Productivity at Boulder Shore and Its Contribution to the Coastal Ecosystem


Yusuke Sugamoto

Intertidal boulder shores are the habitat of not only benthic organisms but also primary producers such as periphyton and macroalgae. However, it is still unclear as to how much organic matter is produced and about the flow of organic matter because intertidal boulder shores have a lot of environmental variety compared to other intertidal flat areas like tidelands. The main reason for the variety is the increased surface areas on bounding stones, and such areas lead to a habitat for primary producers. The elucidation of Primary Productivity (PP) at intertidal boulder shores might be an important finding in terms of the basis of the coastal ecosystem. Therefore, the measurement of PP and the elucidation of its contribution to the basis of coastal ecosystem are the main purposes of this study. Particularly, PP by periphyton macroalgae and phytoplankton, that might be main primary producers in the study site, was focused on. Observations were conducted almost every month from November, 2010, to November, 2011. The organic carbon and chlorophyll *a* as the biomass and PP of the primary producers were measured. To measure the PP, ^{13}C tracer method was used to estimate the dynamics of the organic carbon. Also, the stone surface areas of the bounding stones were measured to estimate the biomass and PP at the unit area. As the result of the observations, high values of biomass and PP were found in winter. This was due to the population of macroalgae, especially *Ulva* sp. The biomass and PP of the *Ulva* sp. in organic carbon at the unit of the stone surface area was approximately 4 and 7 times higher than that of periphyton, respectively. After winter, the population of *Ulva* sp. decreased, and mainly biomass and PP of periphyton were noted. Although the seasonal changes in biomass and PP were not significant, the differences between the sampling points were distinct. The points where the mean values of biomass and PP were higher were nearer to the low tidal line. The reason for this result might be related to the difference of emersion and submersion time caused by the differences of the levels at each of the sampling points. Additionally, as the result of the comparison of the biomass and PP between periphyton and phytoplankton, both the biomass and the PP of periphyton were much higher than that of phytoplankton at lower levels. The maximum difference was approximately 27 times in biomass and 9 times in PP. Therefore, it was suggested that the periphyton on the stone surface contributed to the biomass and PP as primary producers more than phytoplankton at the intertidal boulder shore.

Keywords: Intertidal boulder shores, Primary productivity, Periphyton, Macroalgae, ^{13}C tracer method

Intertidal boulder shore 1

- Spatial structures created under and between stones are complicated, and such spaces lead to habitat for organisms (Raffaelli and Hawkins, 1996)
- Increased surface areas due to bounding stones can contribute to increasing habitat for primary producers such as periphyton and **macroalgae**
 - *Ulva* sp. in winter to spring
- Tidal fluctuation causes further environmental variety in terms of the difference of submerged time



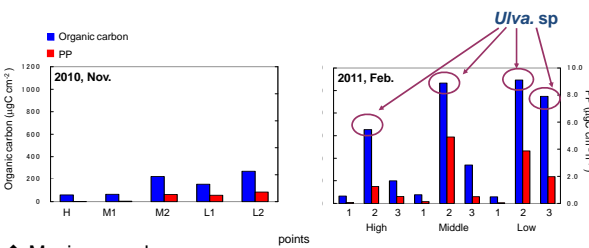
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- The measurement of primary productivity (PP) at intertidal boulder shore is important to discuss biodiversity at coastal area
- ¹³C tracer method is useful to estimate the flow of organic carbon produced by primary producers

Purpose

Elucidation of PP in terms of the basis of coastal ecosystem and biodiversity

Organic carbon and PP in 2010, Nov. and 2011, Feb 3



◆ **Maximum values**

Organic carbon


- 4 times higher in the second observation

PP


- 7 times higher in the second observation

◆ ***Ulva* sp. was strongly related to the huge difference about organic carbon and PP in two observations**

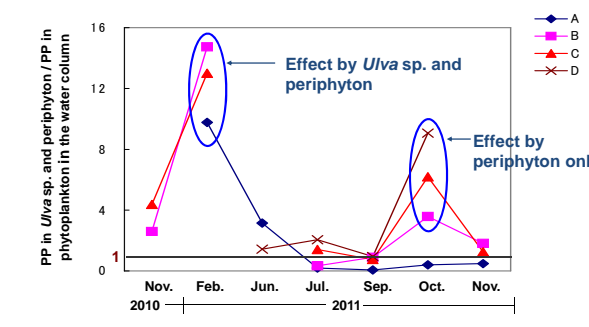
Stones covered by *Ulva* sp. 4



Stones not covered by *Ulva* sp.



Comparison of PP in periphyton, macroalgae and phytoplankton 5



PP in *Ulva* sp. and periphyton was about 15 times at a maximum higher than that in phytoplankton

Conclusion 6

- Ulva* sp. was strongly relating to PP in winter
- PP in *Ulva* sp. and periphyton at unit area contributed to the PP in coastal ecosystem more than phytoplankton especially at lower zones.

◆

- In order to measure PP quantitatively at intertidal boulder shore, it is important to focus on seasonal change and distribution of primary producers
- The finding of PP at intertidal boulder shore will contribute to preservation and improvement of biodiversity at coastal area

Economic Impacts of Tourism on the Local People's Livelihood in the Phoenix Mountain National Forest Park in Liaoning Province, China

Chengshan Jia

The Chinese government has recognized the continuing importance of the construction of forest parks. Theoretically, tourism in forests is expected to satisfy forest resource conservation and income generation for the local residents. Based on a study of the Wolong Nature Reserve (WNR) in Sichuan Province, however, the income generated by tourism was unevenly distributed among the local people and outsiders. The Phoenix Mountain National Forest Park (PMNFP) was selected as a case to examine whether tourism contributed to the income generation of the local people, and how it was distributed among the stakeholders.

Preliminary surveys of secondary data collection and interviews with key informants were conducted; for the next step, interviews using structured questionnaires were conducted from April to May, 2011. Of a total of 552 households in L village located near the park gate, and C village located 2.5 km from the gate, 116 were randomly selected to compare incomes, land acquisition, and the compensation situation. Thirty tourist groups that visited the PMNFP from May 14 to 16, 2011 and 27 officers of the PMNFP were also interviewed.

The core zone of PMNFP was a national forest, while the other zones were used as a collective forest of surrounding nine villages when the area was designated as a forest park in 1989. While the number of tourists was decreasing, the park's revenue was slightly increasing in line with a rising ticket price during the period from 2000 to 2010. To enhance the tourism objectives, the local government has undertaken land acquisition from the local people and introduced private investment in commercial spots and hotel development since 2010. Only 50% of the local people could be paid compensation at a quarter of the promised amount from the government. The results of the household survey revealed that tourism activities in the PMNFP made a larger economic impact on the livelihoods of the local people in the village with favorable location. Forty-nine households engaged in the tourism business out of 70 samples in L village and obtained twice the income of C village. Additionally, employment opportunities related to tourism for the two villages were less advantageous than those for outsiders. The perceptions of C villagers were more dissatisfied than L because of the smaller compensation and advantageous employment opportunities related to tourism. Professional skills are the main reasons which lead to an uneven income distribution between the two villages and outsiders, and among the villagers.

The nine villages that lost the collective forest might have some expectations from tourism. However, the tourism management of the PMNFP by the local government did not satisfy an appropriate income generation for the local people, and the incomes were unevenly distributed as the previous study reported on the WNR in Sichuan Province. The inequities both existed in the income distribution among local people and the employment opportunities between local people and outsiders. To ensure an equal opportunity to the surrounding villages, vocational training should be provided, along with proper compensation for land acquisition.

Economic Impacts of Tourism on the Local People's Livelihood in the Phoenix Mountain National Forest Park in Liaoning Province, China

University of Tsukuba
EDL Program
Chengshan Jia

筑波大学
University of Tsukuba

Background and Objective

- The Chinese government has established forest parks for tourism since 1982 (Yao et al. 2007).
- Forest parks are divided into 3 levels in China (Wu and Wu, 2007):
 - National Forest Park
 - Provincial Forest Park
 - Municipal Forest Park

Tourism in forest parks is expected to balance forest resource conservation and income generation of local residents. However, whether co-benefits can be realized is questioned (Jiang, 2005).

Objective

- Forest resource conservation
- Income impact to local people

Why PMNFP?

Sichuan Province → Development phases → Representative sample → Comparison study → Liaoning Province

WNR → Infant Stage → Eastern Liaoning landscape tour → Location → PMNFP

Tourism revenue in China (CNTA, 2008; 2009; 2010; 2011)

Study site and methods

Method

- Interviews using structured questionnaires were conducted from April-May 2011 to following respondents:
 - 116 households (HH) were randomly selected from two villages
 - 30 tourist groups visited PMNFP in 14/05/2011-16/05/2011
 - 27 officers of PMNFP.
- The household survey questionnaire consists of: household members, land tenure, income of 2010 and employment.

Land policy and compensation

Forest land use in the PMNFP

Period	Land use					
	Core zone			Buffer zone and Experimental zone		
	National forest					
	Collective forest					
	Property	Use right	Use permission	Property	Use right	Use permission
1989-2001	National	National	Forbidden	National	Personal	Free
2002-2008	National	National	Forbidden	National	Personal	Restrictive
2009-2011	National	National	Forbidden	National	National	Forbidden

Processes of land acquisition between C and L village

- Logging, including firewood, had been prohibited with no compensation.
- For 2011, only 50% of the land-acquired households had been paid compensations.
- The paid amounts in both villages were just around 1/4 of the promised amounts from the government.

Perceptions of PMNFP administration toward the local people

Perceptions of the officers related with forest tourism in PMNFP (N=27)

Questions	Option	%
What do you think is the goal of tourism in forest park development? (single choice)	Conserve forest resource	96.3
	Increase revenue	3.7
	Provide working opportunity to local people	0.0
	Make the county more famous	0.0
How do you evaluate the impact of tourism in forest park to forest resource? (single choice)	Destructive	3.4
	Negative impact to some extent	20.7
	No impact	24.1
	Has facilitate resource protection	51.7

Livelihood in the PMNFP, 2011

- Most of the officers thought the goal of forest tourism is to conserve forest resources.
- They did not pay much attention to the economy of the local people.

Conclusion and recommendations

Decreasing tourist volume, Decreasing government investment, Limited fame in nationwide

Measures

The officers attempted to conserve forest resources and to increase park revenue.

Land acquisition → Location → Forest policy → Skill

Auction concessions → Inequity → Local people → Inequity → Local people ↔ Outsiders

Impacts

- Inequity both in the income distribution among local people and the employment opportunities between local people and outsiders.

Recommendation

- Vocational training should be provided, along with proper compensation for land acquisition.

Guidelines for Participatory Municipal Solid Waste Management Planning in Beijing

Aijun Zhu

Beijing, the capital of China, has a land area of approximately 1368.32km² with an urban population of about 19.61 million in 2010(NBSC)¹. Over the past three decades, MSW (Municipal Solid Waste) generation in Beijing has increased tremendously from 1.04 million tons in 1978 to 6.19million tons in 2007. The average generation of MSW in 2008 was 1.1kg/capita/day (BMCCA)².

Currently, almost 80% of the MSW generated in Beijing is land filled, 10% is incinerated and 10% is composted (Hongzhong, 2010). If these trends continue, the amount of waste will surpass the capacity of the transfer stations, treatment plants, and final disposal sites. In addition, due to environmental and health problems occurring in the vicinity of the current waste treatment and final disposal plants, residents are showing a strong rejection to the construction of such facilities. Solid waste management facilities represent long-term commitments of public resources that can dramatically alter the quality of life in a community.

In order to address these urgent challenges, this research paper proposes the introduction of an integral waste management system that includes not only technological and logistics aspects associated with waste collection, treatment, and disposal, but will also incorporate the local community and stakeholder's participation, in the process of recycling and material sorting. Using an integrated evaluation and assessment methodology including Life Cycle Assessment and Life Cycle Costs, as well as social assessment tools, we will introduce guidelines that will help design not only environmentally friendly and economically affordable, but also socially acceptable, waste management practices.

Keywords: Waste management, Municipal Solid waste, LCA, IWM II, Participatory

¹ National Bureau of Statistics of China 2010

² Beijing Municipal Commission of City Administration and Environment

Guidelines for Participatory Municipal Solid Waste Management Planning in Beijing

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Aijun ZHU

Research Objective

Scenarios modeling

Result analyses

Conclusion



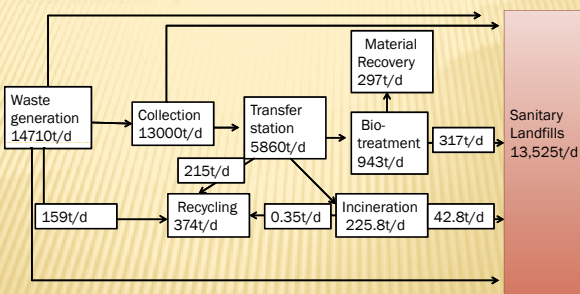
Optimize the MSW Management System in Beijing

- landfill rate diversion
- Global Warming Potential
- Carbon Financial Potential
- Acidification

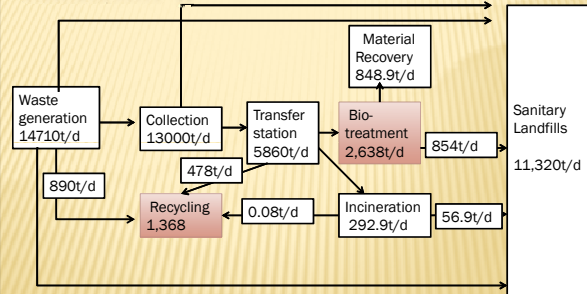
Recommend Guidelines for New Management System

- public and private participation

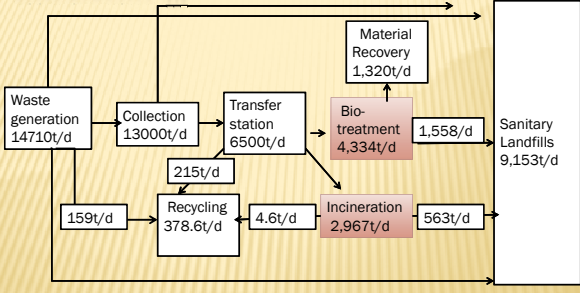
SCENARIO I



SCENARIO II



SCENARIO III



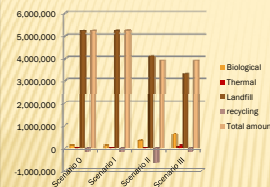
Research Objective

Methodology

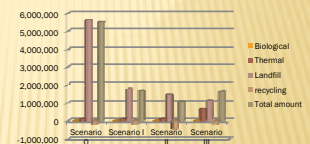
Scenarios modeling

Result Analyses

Final Disposal Amount Comparison



GWP comparisons result (t/year)



	Scenario 0	Scenario I	Scenario II	Scenario III
Landfill diversion rate	8%	8%	23%	38%
Overall Recovery Rate	4.57%	4.57%	15.07%	11.56%

	Scenario 0	Scenario I	Scenario II	Scenario III
Recovery Rate	2.5%	2.5%	9.3%	2.5%

Comprehensive Comparison through LCA of the Municipal Wastewater Treatment Technologies in Beijing

Shuang Sun

One of the main impacts of the rapid urbanization and economic growth in China is the increasing generation of municipal wastewater in major metropolis. To address this challenge, the government has been promoting the construction of wastewater treatment plants. Most of the treatment technologies have been selected based on contaminant treatment efficiency and cost. In addition, there are an increasing number of innovations in this field that could have potential benefits for the environment and society.

The preferred technologies are Anaerobic-Anoxic-Oxic (A₂/O), Oxidation Ditch (OD), and Intelligent Controlled Sequencing Batch Biofilm Reactor (ICSBBR). A₂/O is a mature technology which has been implemented globally. However, this traditional technology is believed to have a poor performance in terms of GHG emissions and energy consumption. An Oxidation Ditch is a more advanced technology and could provide advantages in contaminants removal, but it is disadvantaged by the high construction and maintenance costs and skilled worker requirements. ICSBBR is a new approach that could have potential benefits in terms of both the environment and economy. This study analyzes these three wastewater treatment plants in terms of Life Cycle Assessment (LCA) and uses Beijing as our study area. As for environmental impacts, the study proposes energy consumption, air emissions, and wastewater pollution. In the case of economic analysis, we will calculate the operation cost in a defined period.

The final results suggest that the introduction of new treatment technologies will benefit not only the environment but will also be beneficial in terms of cost.

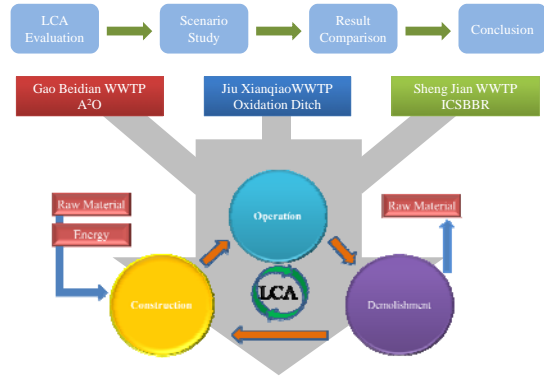
Keywords: Municipal wastewater, Waste treatment technology, Intelligent Controlled SBBR, Life Cycle Assessment (LCA), Beijing

Comprehensive Comparison through LCA of the Municipal Wastewater Treatment Technologies in Beijing

Graduate School of Life and Environmental Sciences
University of Tsukuba
Higano Lab, Sun Shuang
Instructor: Yoshiro Higano

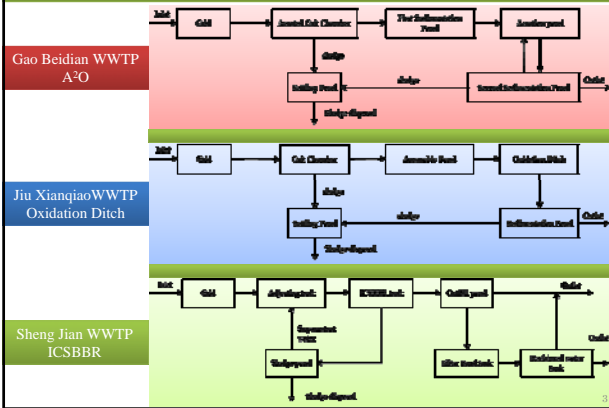
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Research Framework



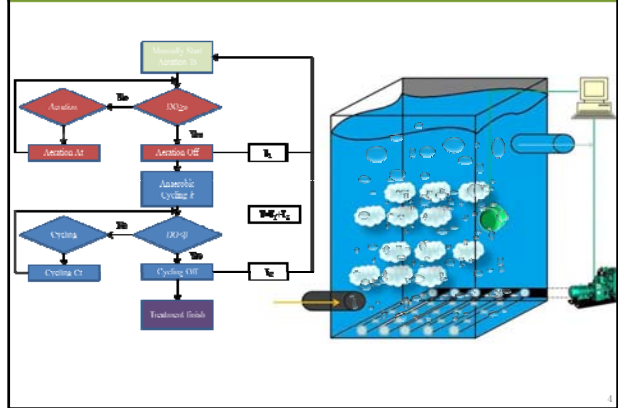
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Target Technologies



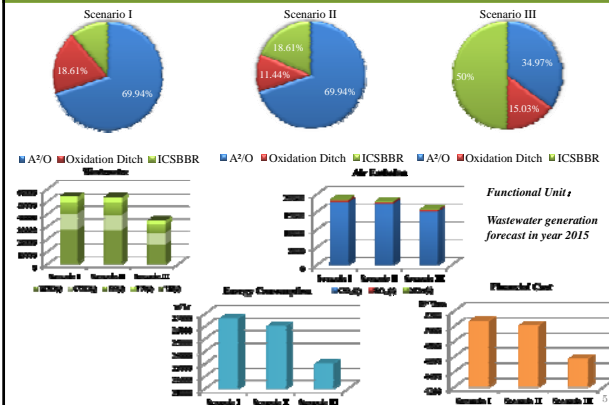
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ICSBBR



4

Scenarios Design and Result



5

Conclusion and Future Plan

- The introduction of ICSBBR could reduce the environmental impacts and financial cost
- Improvement and promotion could benefit the previous wastewater treatment industry
- The relationship between local GDP change
- Implementation and further research about ICSBBR

6

Solutions against Water Quality Degradation in Minjiang River (闽江), Fuzhou (福州市), China

Bingbin Ni

Recent land use/cover change (LUCC) in Fuzhou, one of the largest coastal cities in China, and its impact on the water quality were examined in this study. The land use/cover changes from 1989 to 2011 were obtained from the classifications of the Landsat 5 TM and MODIS images. The characterization of LUCC for each land use/cover type was extracted by using both temporal and spatial methods, and used in regression analysis and modeling against various water quality parameters at three water quality monitoring stations in the study sub-watershed.

The results showed that the land use/cover has changed dramatically in the region from 1989 to 2011, especially in built-up land, which has rapidly expanded. With the rapid economic development and population growth, the urban expansion of Fuzhou is significant, as the built-up land area achieved a net increase of 27870.71 ha in the 22 year period between 1989 and 2011, and the built-up land as of 2011 has increased by nearly 4.7 times. Bivariate regression analysis suggests that urban expansion could be one of the primary driving forces behind the variations in the $\text{NH}_3\text{-N}$ and COD_{Mn} concentrations, and model analysis also shows that the runoff load factor ($\text{NH}_3\text{-N}$ and COD_{Mn}) from urban areas (built-up land) is higher than those of other land use/cover types, which indicates that built-up land is the primary predictor for $\text{NH}_3\text{-N}$ and COD_{Mn} . The CA-Markov model and Pollutant-load model demonstrated that this relationship will remain strong in the future and that by 2038, the increased concentration of $\text{NH}_3\text{-N}$ and COD_{Mn} will correlate with the increase in built-up land. Therefore, some rational land-use planning as countermeasures against water quality degradation has been proposed in this study.

It also calls for the need for further studies to validate the land use/cover water quality relationships and the effectiveness of rational land-use planning.

Keywords: land use/cover change; water quality; model simulation; land-use planning

Environmental Dynamic Leader

Strategic Funds for the Promotion of Science and Technology

Solutions against Water Quality Degradation in Minjiang River (闽江), Fuzhou(福州市), China

倪秉斌(NI Bingbin)
M-2 (201021342)

Structure of Thesis

The relation between research subject and the actual situation of the environmental problems.

Study area: Fuzhou

Legend: Built-up land, Green built-up land, Water body

2011

Objectives:

- (1) Land use/cover change (LUCC) patterns.
- (2) Modeling the response of water quality to LUCC.
- (3) Land-use planning as solutions against water quality degradation.

Hypotheses:

Urbanization → Water quality

What kind of scientific technology/policy has been used in dealing with such environmental problems?

1989 → 2011 → 2038

CA-Markov

□ Built-up land: increased +27870 ha/469%
□ annual change rate: 20.7%
□ spatial dynamic degree: 4.007

□ Urban built-up land would expand to the surrounding sub-urban areas

Current situation: Built-up land (urbanization), Primary driving force of $\text{NH}_3\text{-N}$ and COD_{Mn}

Potential effect: Continuing to urbanize rapidly, Water quality continue to deteriorate

□ The runoff load factor ($\text{NH}_3\text{-N}$ and COD_{Mn}) from urban areas (U_1 : built-up land) is higher than those of the other land use/cover types ($U_2 \sim U_5$)

□ The concentration of $\text{NH}_3\text{-N}$ and COD_{Mn} shows an upward trend with the built-up land increasing

Pollutant-load Model, Model simulation

U_i	U_1	U_2	U_3	U_4	U_5
0.001	0.568	0.211	0.125	0.130	
0.012	0.343	0.201	0.096	0.299	
0.023	0.310	0.201	0.099	0.300	
0.040	0.540	0.209	0.131	0.501	
0.060	0.472	0.210	0.114	0.500	
0.071	0.401	0.204	0.101	0.500	

What kind of contribution will your research make to solve these environmental problems?

The increase of nutrient loads such as nitrogen and phosphors in the river due to land use/cover changes (LUCC) in the surrounding areas has been one of the major sources of water pollution or eutrophication. (Krenkel, Novotny, 1980; Lewis, Sauder, 1984)

Remote sensing (RS), Geographic Information System (GIS) → Land use/cover change (LUCC) detection → Quantification of the impact of LUCC on water quality degradation

Pollutant-load Model → Predict the future water quality change based on LUCC

CA-Markov Model → Predict the future water quality change based on LUCC

Understanding the relationships between land use/cover change and its impact on water quality can be very useful and helpful when making proposals for land-use planning which related to water quality improvement.

References:

Senap S., Sanem O., 2009. Land use-cover change processes in urban fringe areas: Trabzon case study, Turkey. *Scientific Research and Essay*. 4(12): 1454~1462.

Myint S.W., Wang L., 2006. Multicriteria decision approach for land use land cover change using Markov chain analysis and a cellular automata approach. *Canadian Journal of Remote Sensing*. 32: 390~404.

Oki Kazuo, Yasuoka Yoshifumi, 2008. Mapping the potential annual total nitrogen load in the river basins of Japan with remotely sensed imagery. *Remote Sensing of Environment*. 112(2008): 3091~3098.

Thank you for your attention

A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China

Shuanghong Li

Background

Plains in the Yangtze River basin in China are located within the flood plain of the Yangtze River that runs into the Yellow Sea. Since the first riverside city was built in present-day Zhouzhuang town, waterscapes in this region have developed specific characteristics along the riverside. Regional characteristics have been derived from various cultures that developed along the northern bank of the Yangtze River. These regions built numerous small canals and waterways. After China enforced its reform policy and opened its markets, new urban development ensued with housing construction and the expansion of roads, drastically changing people's lifestyles. This trend of modernizing China with Western culture and lifestyle has affected traditional ones that depended on waterscapes and other environmental heritage. This study aims to understand the spatial structure and history of the riverside district of Rugao (Fig1, Fig 2).

Purpose

The purpose of this research is to understand the spatial formation of Chinese riverside cities by tracing past studies on the geographical and historical characteristics of waterscapes in Rugao City. My research specifically focuses on the formation of the city's unique circular water routes (both exterior and interior).

Methods

In mid-September and mid-October 2011, I conducted two fieldwork studies in Rugao City. I surveyed ancient canals alongside the castle and the surrounding stone buildings to trace the legacy of ancient urban planning and waterscapes. My research collected a number of historical maps (Fig3), photographs, and documents of Jiangsu province to understand the changes in the urban waterscapes of Rugao City. Historical maps and photos can reveal the scale of changes that have happened from the 14th century to the present.

Results

Regarding this issue, aesthetics were considered during the maintenance and development of Chinese cities, and as environmental issues have become a topic regarding sustainable development, and with sustainable urban environment becoming important each day, we must consider this in urban development. Considering the spatial configuration and future involvement with the city and the urban ways in the future, we need to consider such developments and construction in urban environmental planning from the perspective of sustainable development. Communities, families, and individuals living in the city, while recognizing that the lifestyles will change, basic environmental knowledge is required in urban development, and efforts must be devised during the planning. In the urban environment, urban planning is rarely common in China, and a people-driven approach protecting culture and traditional lifestyles in the traditional urban space, are very important.



Figure1 Location of Rugao

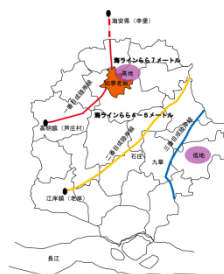


Figure2 Boundary Line

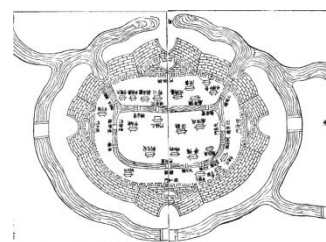


Figure3 Urban Space in Qing Era

A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China
Environmental Sciences 201021348 李 双红

Background and purpose


- The development has not been sustainable;
- Traditional culture is disappearing;
- Waterscape is disappearing.

Purpose


- Trace changes in Rugao waterscape;
- Understand Rugao urban planning from Feng-shui principles.
- Examine how traditional sustainable waterscape may be maintained in rapidly changing Rugao city development.

Main sources for Analysis

- Observed the riverside district of Rugao City twice in 2011.
- Used a number of historical maps, photos, historical documents to understand the changes in urban waterscape of Rugao City.
- Contrast with traditional Chinese culture, Feng-shui composition and water role of Feng-shui space.



Exploitation of Rugao




Waterscape and Temple


1

A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China
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1. Changes in Inner-Canal Routes



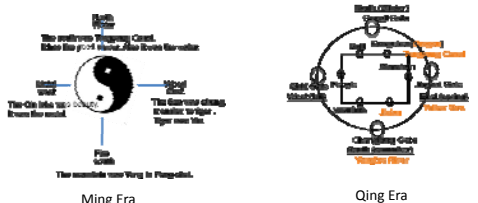
2. Changes in outer-canal routes



2

A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China
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3. Changes in Feng-shui



Ming Era

Qing Era

Conclusions

- The Cultural Revolution destroyed many temples and old gardens, including Rugao.
- The Tongyang Canal is losing its traditional function.
- After 1995 the shape changing of the two big roads the composition was changed

3

A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China
Environmental Sciences 201021348 李 双红

Have you described the relation between your research subject and the actual situation of the environmental problem in detail?

My research is about the urban space of riverside district Rugao City, in China. Recently, depends on the development the environment is changed with economic. Then over land use, the waterscape was disappeared. In purpose to protect the environment, the waterway should be reused as soon as possible.

What kind of scientific technology or policy has been used in dealing with such environmental problems?

In the research area has a special location. There are so many waterways and canals, so reuse these waterways, such as develop the new traffic system on the canal. Master Rugao with different historical environment in the development of the city and the changes, and clarify that waterscape was vandalized in Rugao.

4

A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China
Environmental Sciences 201021348 李 双红


What kind of contribution will your research make to solve these environmental problems?


Spatial configuration of future involvement with the city and the urban way of the future, we need to consider such a development and construction of urban environmental planning from the perspective of sustainable development. And their communities, families, individuals living throughout, while recognizing that the lifestyle will change, the basic environmental knowledge that is required when such expertise in urban development, efforts must be devised during the planning it considered. In the urban environment, urban planning is rare common in China and people-driven approach and say very short, while protecting culture and traditional lifestyle traditional urban space, now a big city urban environment that create living space but space issues.

5

A Study on the Evolution of Medium and Small Riverside District Urban Space in Rugao City, China
Environmental Sciences 201021348 李 双红

Thanks for your attention!



6

One-child policy in China

— KAP (Knowledge Attitude Practice) study in Yanbian autonomous prefecture —

Meihua Li

Population growth is known as one of the driving forces behind environmental problems, because the growing population demands more and more non-renewable resources for its own use. Facing a so called “population explosion” during the last two centuries, the population policy of the country and the people’s perception and behavior towards childbearing played a key role in adapted population growth.

China is a developing country with the largest population in the world. Promoting family planning is a basic national policy in China. The one-child policy in China is characterized by its strictly enforced population growth control by the Chinese government. A pronatalistic policy has been adopted by many modern states, in general, and it is rare that a government directly intervenes in the number of children permitted in a family. That is why this policy has attracted the attention of policy makers and researchers related to population issues. However, few studies on how people, particularly women, understand, accept and adhere to this policy have been reported. It is also interesting to compare knowledge and practice for child numbers in Yanbian Autonomous Prefecture in the northeast of China, where the Han majority group and several minority groups live together and where the permitted child numbers are different; one for the former, and two for the latter.

A cross-sectional KAP (Knowledge, Attitude, Practice) study was performed in two high schools in Yanbian, northeast China, during August 2011, using structured questionnaires which were answered by respondents (students, their mothers and their grandmothers) independently.

As a result, the knowledge of the respondents about the policy was significantly higher in the Han people than in the Korean people; this might indicate the Han people’s greater interest in the policy because the one child policy is strictly enforced in their case. The one-child policy was generally accepted and perceived as successful by three generations and by both ethnic groups. However, negative impacts such as an increased number of abortions and fines paid for children were observed. The high preference for a less strict two-child policy shown by this study could be a suggestion for China’s population policy in future.



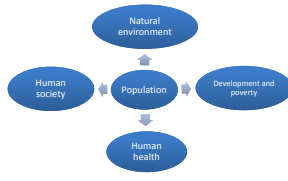

One-child policy in China

– KAP (Knowledge Attitude Practice) study in Yanbian autonomous prefecture –

Name: Li Meihua
Student Number: 201021349
Academic Supervisor: Naomi WAKASUGI
Sub-supervisor: Maki TSUJIMURA, Xiaogang SUN

1

Background



In 1979, Chinese government introduced the one-child policy, because

- China had a quarter of the world's population, while it occupies just 7 percent of world's arable land.
- Two thirds of the population were under the age of 30 years.
- The baby boomers of the 1950s and 1960s were entering their reproductive year.

Objectives

- To obtain real and specific information on women's perception and understanding of the one-child policy.
- To compare the knowledge, attitude and practice of the one-child policy among three generations, student, mother and grandmother.
- To see whether the different policy contents of Han and Korean people result in different acceptance or satisfaction with the number of children allowed.

2

Methodology


1. Documentary investigation

2. Questionnaire survey

- Cross-sectional KAP (Knowledge, Attitude, Practice) study
- In two high schools in Yanbian from 29th August to 7th September, 2011 by using a structured questionnaire

Questionnaire items

Knowledge of the one-child policy	Practice the one-child policy
Attitude to the one-child policy	Family planning Contraception Abortion Number of live children



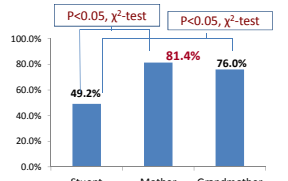
Study area

Personal information

Age
Ethnic group
Years of school attendance
Own income

3

Mothers' highest knowledge



Han people's higher interest

Ethnic group	Correct rate
Han (66 persons)	77.2% (51/66)
Korean (95 persons)	58.9% (56/95)

P<0.05, chi^2-test

Generally accepted, but prefer to two children

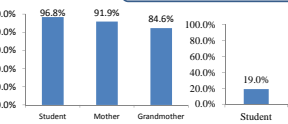


Figure 2. Choice of "I think the one-child policy has succeeded in China"

Figure 3. Choice of "two-child policy" as an alternative to the one-child policy

Figure 4. Children number for "How many children do you want in the future, if there is no child limit?"

4

Difficulties in contraceptives

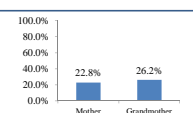


Figure 5. Choice of difficulties in contraceptives

	Mother	Grandmother
Husband did not cooperate	1/62	3/53
It is harmful for the body	20/62	11/53
I could not get the contraceptives	4/62	3/53

Pregnancy & live baby-delivery

Pregnancy number/woman
Mother: (mean: 1.98, SD:0.93)
Grandmother: (mean: 2.82, SD: 1.07) P<0.01, t-test

Live baby-delivery number/woman
Mother: (mean: 1.28, SD:0.48)
Grandmother: (mean: 2.27, SD: 1.06) P<0.01, t-test

Pregnancy & paid children

Group	Total pregnancy numbers	Total delivery of children numbers	Children numbers and fine payment
Mother (60 persons)	117	74	11
Grandmother (53 persons)	127	109	4

5

Discussion

1. Knowledge
 - Differences among generations
 - Differences between ethnic groups
2. Attitude
 - Generally accepted, but preference to two children
3. Practice
 - The number of pregnancy per woman decreased.
 - At the same time, difficulties in contraceptives, increased number of abortion and paid children can also be observed.
4. The high preference for a less strict two-child policy shown by this study could be a suggestion for China's population policy in future.

6

Potential impact of climate change on rice production in Bangladesh

Hossain Md. Shahadat

This study assesses the impacts of future climatic changes on paddy rice yield in Bangladesh based on the SRES A1B climate change scenarios derived from Atmosphere-Ocean Coupled General Circulation model (IPCC). We used a crop growth simulation model, CERES- Rice which can simulate the effect of heat and water stresses on yield. This model is validated to the past yearly change of Aman (Wet season rice) and Boro (Dry season rice) yield and model performance was quite high having correlation coefficient between observed and estimated yield during the calibration period (1982-2007) was 0.761 to 0.824 and 0.718 to 0.821 respectively for Aman and Boro season rice.

The future changes in paddy rice field were estimated with applying climate change scenario into the CERES-Rice model. The future paddy rice yields in 2050s (average of 2046-2065) and 2090s (average of 2081-2100) were projected to decrease in all over Bangladesh estimated on an yield reduction average of 8.2% and 17.8%, 12.6% and 28.3% compare to 2000s for the Aman and Boro season rice respectively where northwestern part shows most vulnerability to future changes. Rising temperature causing heat stress in both flowering and maturing stages as well as rainfall variability causing water stresses to the rice crop has been observed. Rice maturity period is projected to shorten by 8% and 14% for Aman season where 12% and 19% for Boro season in 2050s and 2090s because of higher temperature rise in Boro season compare to Aman season. Future rise in carbon dioxide can have some positive effect on rice yield to some extent, but their effect is not significant compare to the negative effects of temperature. Earlier sowing dates can help to adapt the yield loss of Boro-Aman rice cropping patterns in some extent by growing another crop and increasing the cropping intensity, but other adaptation options also should be considered that can help farmers in the long run.

Keywords: Bangladesh, Climate change, CERES-Rice model, Rice production, Boro-Aman rice cropping pattern

Potential Impact of Climate Change on Rice Production in Bangladesh

Hossain Md. Shahadat
M2, 201021344
26/01/2012

1

Introduction

Bangladesh is a low lying country, mostly flat, situated in the eastern part of South Asia

- ✓ Rice is the staple food in Bangladesh
- ✓ Placed 4th in world most rice producing countries (after China, India & Indonesia)
- ✓ Need to increase the rice yield in order to meet the growing demand for a high population increase in future (160 million present to 300 million by 2050)

In future, there will be a steady increase in temperature and rainfall in South Asia (IPCC, 2007) and research shows that rice production is vulnerable to those changes.

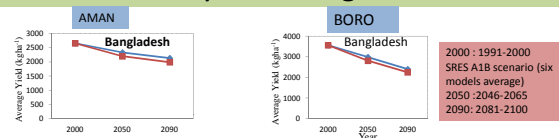
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Rice seasons & model dataset

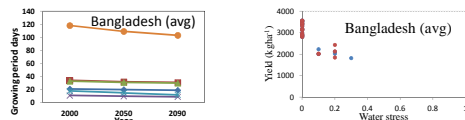
	AMAN	BORO	Source
Cultivar	BR11	BR3	Hussain,1995
Simulation Date	1 Jul	1 Dec	Two weeks before planting
Planting date	15 Jul	15 Dec	Hussain, 1995; Mahmood,1997;
Plant population(plants/m ²)	50	50	Latif et al,2005; BRRI,2007
Row spacing (cm)	20	20	Hussain,1995
Sowing depth	6	6	Mahmood et al,2003; Hussain,1995
Transplant age(days)	30	35	BRRI,2007; Mahmood et al,2003
Transplant temp. (C)	28	22	BMD observations
Irrigation	Rainfed	860 mm	BBS,2005b
Fertilizer type	Urea	Urea	Hussain,1995
Fertilizer (kg N/ha)	Yearly data	Yearly data	Latif et al,2005; BRRI, 2007
Applications (days after transplanting)	40,80,120	40,80,120	

3

Results :Future yield changes & stresses



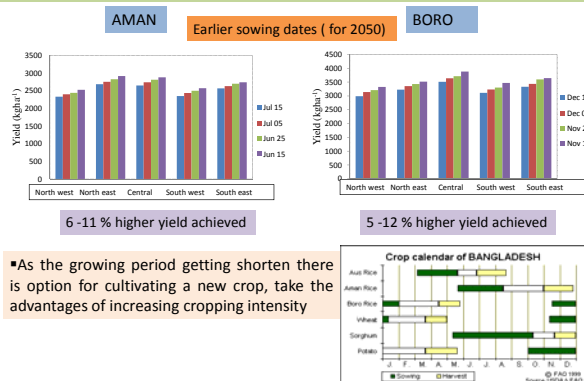
- Boro (13-28%) yield decreases more than Aman (8-18%)
- High rise of CO₂ concentration in future have some positive effect



- Growing period decrease observed ,especially in the maturing stage
- For Boro rice, high temperature rise cause high evapotranspiration demanding more water. If there is more water used as input than the fixed 860 mm, yield loss will be reduced.

4

Results : Adaptation for Boro-Aman cropping pattern



- As the growing period getting shorten there is option for cultivating a new crop, take the advantages of increasing cropping intensity

5

Summary

- For both Aman and Boro season rice, CERES-Rice model shows yield reduction in mid and last of the century, where Boro season rice is more sensitive than Aman.
- Boro rice is irrigated by groundwater and in future dependency on groundwater is uncertain. As rainfall increases in monsoon (Aman) season and decreases in dry (Boro) season, water management for Boro season is going to be crucial.
- Early transplanting can mitigate some impact, but for yield sustainability Boro-Aman cropping pattern have a good amount of potential.

6

Interactions between Fungi and Bacteria Associated with Degradation of PAHs

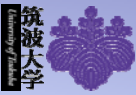

Shuozhi Wang

Although bacteria play dominant roles in microbial bioremediation, few of them have been reported that were capable of degrading high-molecular-weight (HMW) organic pollutants since they are thermodynamically stable, hydrophobic and being always absorbed to solid particles. However, many soil fungi can degrade those pollutants, although they rarely completely metabolize them. The fungal ability to degrade xenobiotics has attracted attention due to their predominance and multiplex pathways. Diverse ligninolytic fungi have been confirmed as effective strategies to remove pollutants. Therefore, we are searching for a new biodegradation strategy which could combine the cooperation of fungi and bacteria to degrade HMW pollutants. This study investigated the relationship between fungi and bacteria associated with the degradation of HMW-polycyclic aromatic hydrocarbons (PAHs).

Through a combination of the methods of acclimation-isolation and an analysis of PCR-RFLP, four strains of soil bacteria and seven strains of soil fungi were obtained due to their capabilities of removing phenanthrene, fluoranthene and pyrene, respectively. All the strains obtained in this study were identified using DNA sequencing (bacterial 16S rRNA gene and fungal 26S rRNA gene).

The maximal pyrene degradation rate (67%, 28 days) was obtained after using a co-culture of mixed fungi and bacteria, in soil conditions, compared with 39% for mixed fungi only and 56% for mixed bacteria. The denaturing gradient gel electrophoresis (DGGE) profiles showed dynamic changes clearly in the microbial communities during the cultural process. *Pseudomonas* sp. TKB 1, *Ralstonia* sp. TKB 3, and *Rhodococcus* sp. TKB 4 exhibited clear increase after week two in the co-culture in contrast to the separated cultures of the fungi and bacteria. However, the filamentous fungi (*Fusarium* sp. TKF 4, *Trichoderma* sp. TKF 7, etc.) decreased at the end of the co-culture. As we supposed, the outstanding degrading effect in fungal-bacterial co-culture was due to the middle metabolic products which were catalyzed by fungi might be more accessible to a bacterial metabolism. To verify this hypothesis, the metabolites analyzes were performed using a pure culture with pairs of fungi and bacteria at liquid conditions. 1-Hydroxypyrene and 1-methoxypyrene were identified as the main metabolic products of pyrene derived from the fungal strain of TKF 4, *Penicillium* sp. TKF 5, TKF 7. Furthermore, bacterial strains of TKB 1, *Labrys* sp. TKB 2 were confirmed to be capable of removing 1-hydroxypyrene effectively using as sole source of carbon and energy (above 60%, 28 days). On the other hand, 1-hydroxypyrene showed a metabolic toxicity to TKF 5 from which colonies could not be detected at a concentration of 30 ppm. The hyphae of TKF 5 harboured large numbers of rod-shaped bacteria (TKB 2) on the surfaces when pyrene was added into the fungal-bacterial co-cultures (scanning electron microscopy, SEM).

In conclusion, our study offered a new bioremediation strategy in which the co-existence of soil bacteria and fungi may be applied to promote the degrading efficiency of PAHs. The HMW-pollutants that could not be degraded by bacteria may be easily metabolized by fungi. Also, the middle metabolites derived from fungi may be more accessible to bacteria. Finally, the promoted degradation effects by the co-culture of fungi and bacteria need to be further analyzed in further studies, which will clarify the mechanism of the fungal-bacterial co-degradation.

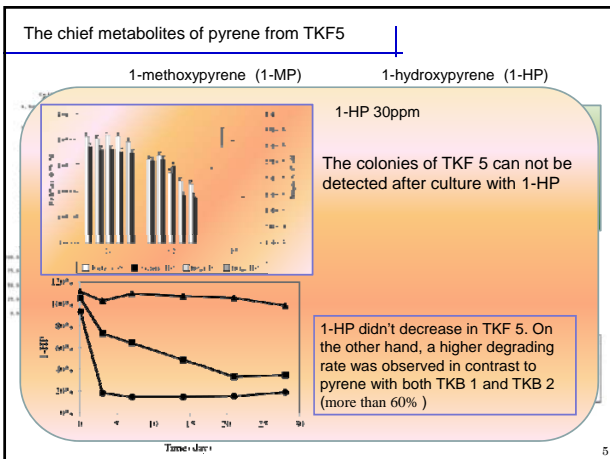
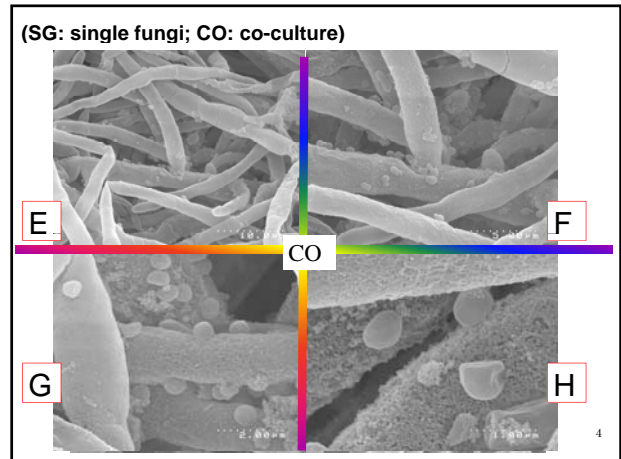
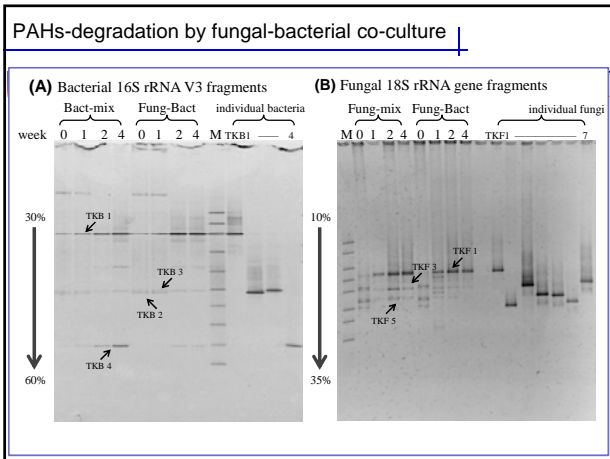
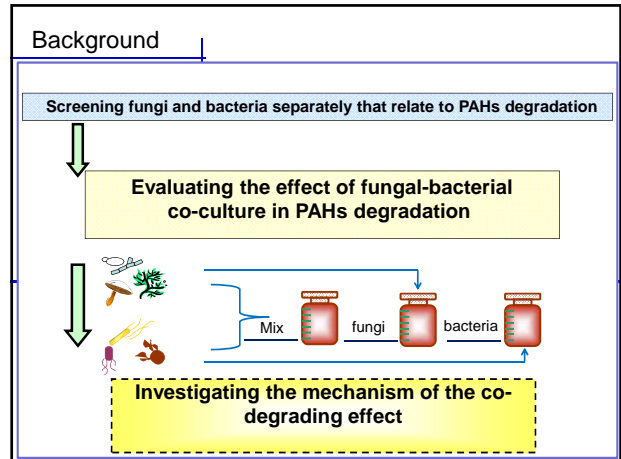
Interactions between fungi and bacteria associated with degradation of PAHs

Graduate School of Life and Environmental Sciences
Sustainable Environmental Studies

Shuozhi WANG

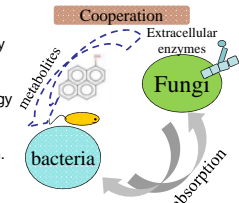
Supervisors: Hiroo Uchiyama, Nobuhiko Nomura

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Conclusion

- ❖ A higher PAHs degradation rate (67%, 28d) was obtained after in the co-culture of multi-fungi-bacteria.
- ❖ TKB 2 could stick to the hyphae of TKF 5 for which a better metabolic achievement could be supposed.
- ❖ 1-hydroxyrene and 1-methoxyrene were detected as main metabolic products from fungal strains of *Fusarium* sp. TKF4, *Penicillium* sp. TKF5, *Trichoderma* sp. TKF7.
- ❖ 1-hydroxyrene was detected to be toxic to TKF 5 while bacteria TKB 1, 2 could degrade it smoothly.
- ❖ Both chemical assay and observation of dimensional distribution were performed to clarify the fate of degradation products during the co-degrading process.
- ❖ Our study offered a new bioremediation strategy in which the co-existence mechanisms of soil bacteria and fungi may be applied to promote the efficiency of HMW-pollutants biodegradation.



6

Aquifer salinization mechanisms caused by surface Water – Groundwater interaction in a small coastal plain, CapBon, northeastern of Tunisia

Chekirbane Anis

Anthropogenically induced groundwater salinization as a consequence of its interaction with surface water is a serious problem threatening the safe use of water especially in arid regions. The Wadi Al Ayn plain is a small coastal plain located in CapBon, northeastern Tunisia. Since the 2000s, a sudden change of groundwater salinity was registered in the wells exploiting the shallow aquifer and was complained about by the local farmers. However, the groundwater's salinization origin and processes are still poorly understood. The aim of this study is to assess the surface water – groundwater connectivity in the plain of Wadi Al Ayn and Daroufa, to characterize the spatial extent of the saline groundwater plume, and to explain the processes controlling the groundwater quality variation.

Frequent field observations were conducted in 2010 and 2011, and during them, physical and geochemical parameters of stream and well water were measured. In parallel, a geophysical investigation using a Time Domain Electromagnetic Method (TDEM) was conducted based on 28 soundings covering the whole Al Ayn and Daroufa plains.

Groundwater in the study area is characterized as a shallow flowing type mostly controlled by topographical changes. TDEM soundings are effective tools for mapping the subsurface geology and the spatial extent of salt / brackish plume in the Wadi Al Ayn and Daroufa plains. The salt / brackish water plume is longitudinally found in depth usually between 45 – 75 m with a transversal extent varying between 50 – 800 m under the Wadi Al Ayn bed. In the Daroufa area, the salt plume is located between a 45 – 60 m depth and has an inland extent of 1.5 km from the shore line.

Based on the geochemical and isotopic data, a groundwater quality variation was performed. In fact, the groundwater mineralization in the study area is not a homogenous process. It is related to different sources and dynamics with space variation. The detected salinization close to the wadi was caused by the infiltration of the discharged oilfield brine in the sandy bed of Wadi Al Ayn until late 2009, while the detected salinization in the coastal area was mainly controlled by seawater intrusion.

Keywords: interaction, surface water, groundwater, hydrogeochemistry, salinization, TDEM, CapBon, Tunisia

Anis Chekirbane and Maki Tsujimura
EDL Education Program, University of Tsukuba

Introduction

Groundwater in arid and semi-arid areas is the most important renewable water resource

overexploitation

salinization

pollution

Eastern coastal plain of Cap-Bon, Tunisia

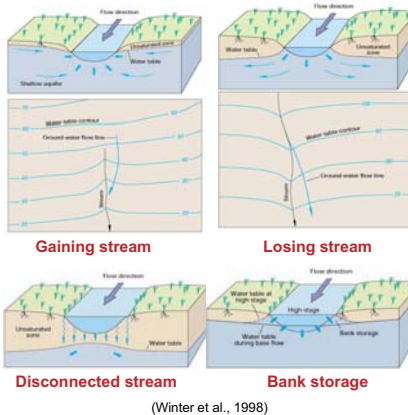
Some water wells were abandoned

Increasing demand, contaminants load, dissatisfaction of water users

Understanding the interaction SW – GW = urgent to quantify exchanges of water and contaminant fluxes between different water bodies

Sustainable water resources management

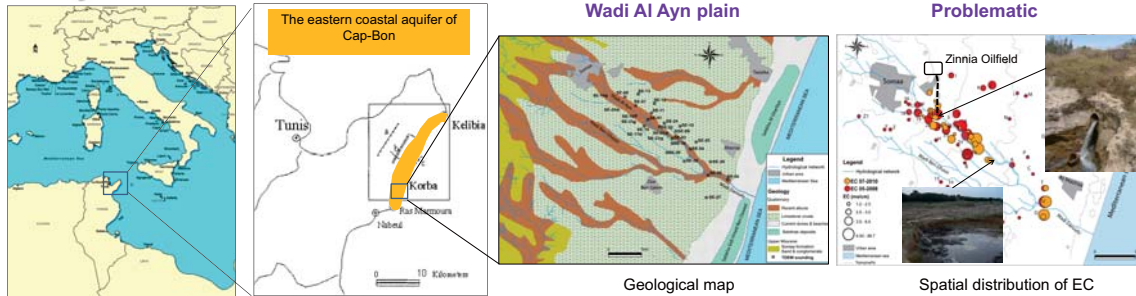
Principles of stream – GW interaction



Objectives

- ① To assess and quantify the flux exchanges between SW and GW in Wadi Al Ayn and Daroufa plains
- ② To delineate the extent of saltwater plume and to clarify the mineralization / salinization mechanisms of groundwater
- ③ To propose an adaptive management plan for connected SW and GW in Wadi Al Ayn and Daroufa plains

Study area

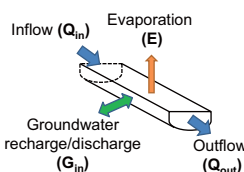
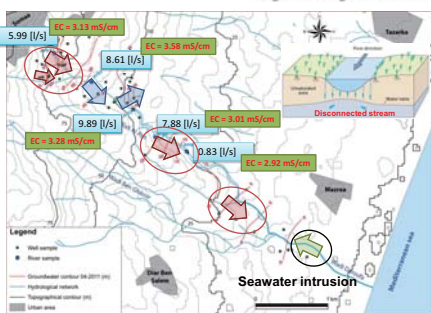


Methodology

- 5 field surveys: wadi water + groundwater
- ☐ Geophysical approach (Time Domain Electromagnetic) to clarify subsurface geology and delineate saltwater plume
 - ☐ Geochemical and isotopic data to quantify flux exchanges between SW & GW

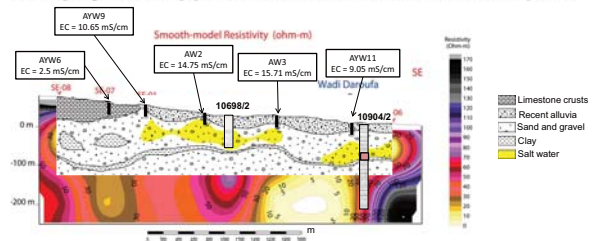
Results and interpretation

Hydrodynamic approach

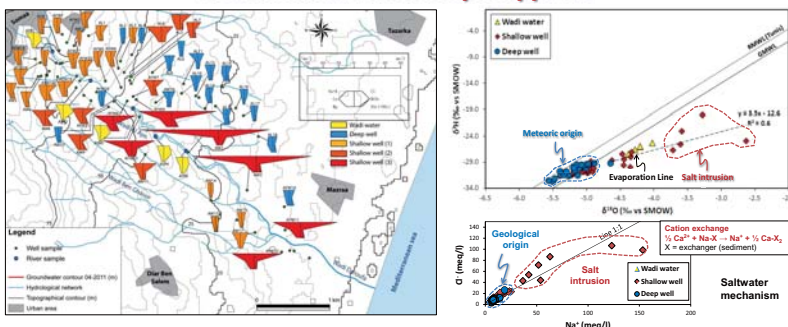


Wadi portion	Q_{in} (l/s)	Q_{out} (l/s)	E (l/s)	G_m (l/s)
AYR2 – AYR3	8.611	9.898	0.0286	1.315 (D)
AYR3 – AYR4	9.898	7.884	0.0212	-1.993 (R)
AYR4 – AYR5	7.884	0.835	0.0227	-7.026 (R)

Geophysical approach: delineation of saline plume



Geochemical and isotopic approach

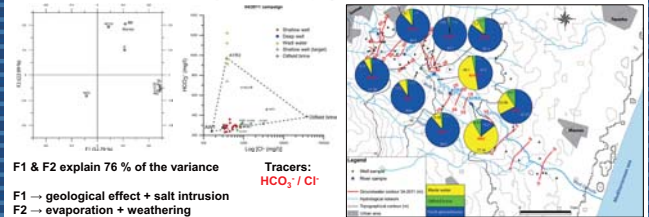


Quantification of salinization

Principal Component Analysis (PCA) + Hydrogeochemical processes

Identification of tracers and end-members

→ To quantify the contribution of salinization sources in groundwater recharge in Wadi Al Ayn plain



Need for an adaptive management approach

- ✓ Water resources management plan in Cap-Bon doesn't include any consideration of stream – aquifer connectivity
- ✓ Integrating SW – GW interaction for sustainable use of water resources in Cap-Bon is possible through adaptive management approach
- ✓ Adaptive Management is an approach that involves learning from management actions, and using that learning to improve the next stage of management (Holling, 1978). It is "learning to manage by managing to learn" (Bormann et al, 1993)
- ✓ Adaptive management zone approach: according to degree of stream – aquifer connectivity, it is possible to set specific measures
 - Gaining stream: no active management relating aquifer pollution by river water infiltration is required
 - Losing stream / bank storage: preventive measures (law delineating the sensitive area and penalizing the polluter) and curative measures (law and restriction enhancing remediation processes)

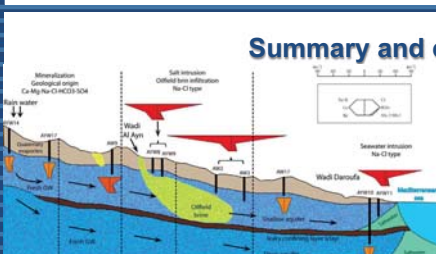
Summary and conclusion

Assessment of wadi – aquifer connectivity:

- An evident interaction is existing especially in the middle area (near AYR3), the aquifer contribute on wadi baseflow by 1.4 l/s
- In the downstream region (near AYR4 & AYR5), the wadi is recharging the aquifer with 9 l/s

Groundwater salinization:

Salinization of groundwater is due to salt intrusion: the previously infiltrated oilfield brine from the wadi bed for the middle area of wadi Al Ayn ($f = 1.3 \sim 9.5\%$)



Study on adsorptive removal of high ammonium nitrogen of organic wastes using a novel ceramic adsorbent

Yingxin Zhao

In recent years, anaerobic methane fermentation has drawn more and more attention from the standpoint of energy recovery and reuse. The high ammonium of organic wastes such as livestock waste inhibits the anaerobic digestion process. Meanwhile, as the ammonium uptake by methanogen is difficult in anaerobic digestion, large amounts of ammonium are left in the digester liquor. Not only the nitrogen resource is wasted, but also there is an excessive nitrogen discharge without treatment which results in water pollution and soil degradation.

In order to reduce the ammonium inhibition and recover nitrogen resources, a new material — a ceramic adsorbent of ammonium synthesized by Kanuma mud and Akadama mud — has been developed. Batch experiments were conducted to evaluate the performance of the ceramic adsorbent on ammonium adsorption. The optimum adsorption conditions were obtained by investigating the effects of initial ammonium concentrations (4000, 5000, 6000, 7000, 8000, 9000, 10000 mg L⁻¹), contact time (0~24 hours), the adsorbent dosage (5, 10, 20, 30, 40 g L⁻¹), and coexisting ions (Na⁺, K⁺, Mg²⁺, Ca²⁺).

The results demonstrated that the maximum adsorption capacity achieved 75.5 mg g⁻¹ when the initial ammonium concentration was 10000 mg L⁻¹ at a dosage of 20 g L⁻¹. The adsorption capacity decreased when the dosages increased during the dosage range of 5~40 g L⁻¹. Na⁺ had the greatest effect on the ammonium adsorption. The ammonium adsorption was well described by pseudo-second-order model. The results revealed that ammonium adsorption using the novel ceramic adsorbent could be a promising method to treat ammonium rich organic wastes and recover the nitrogen resources from the digester liquor.

Keywords: adsorption capacity, ammonium adsorption, ceramic adsorbent, digester liquor

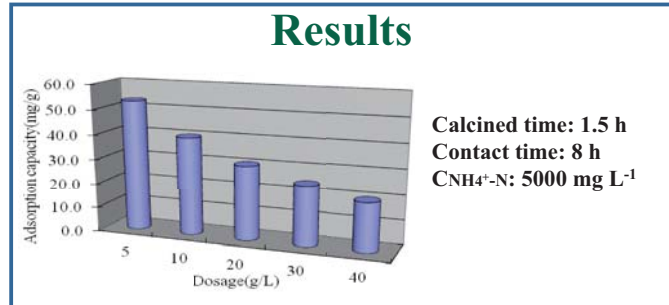
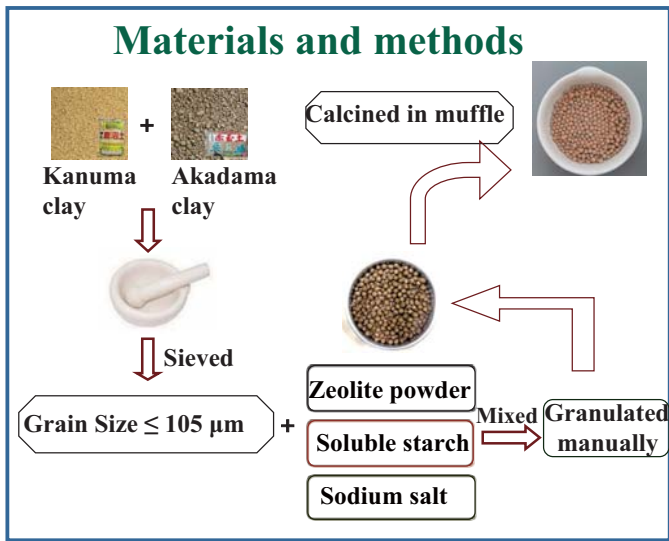
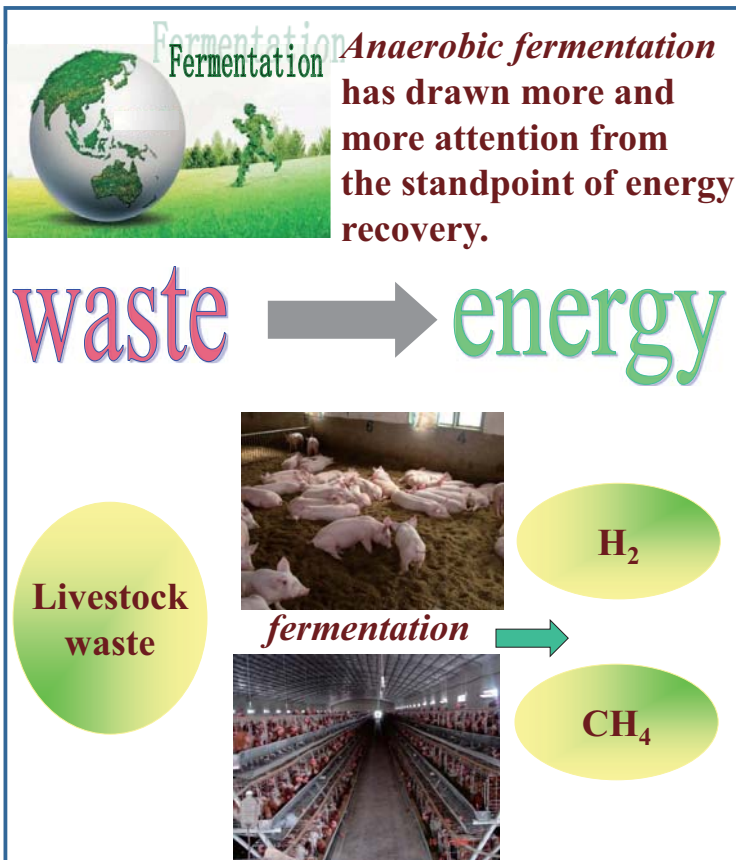


Fig.1 Effect of adsorbent dosage

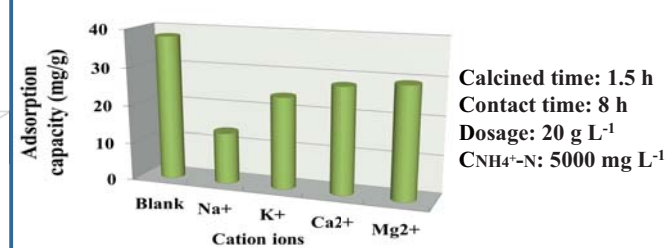


Fig.2 Effect of cation ions

- ### Problems
- A** High ammonia in organic wastes inhibits fermentation processes!
 - B** Ammonia is rich in fermentation liquor, but it is not utilized effectively.

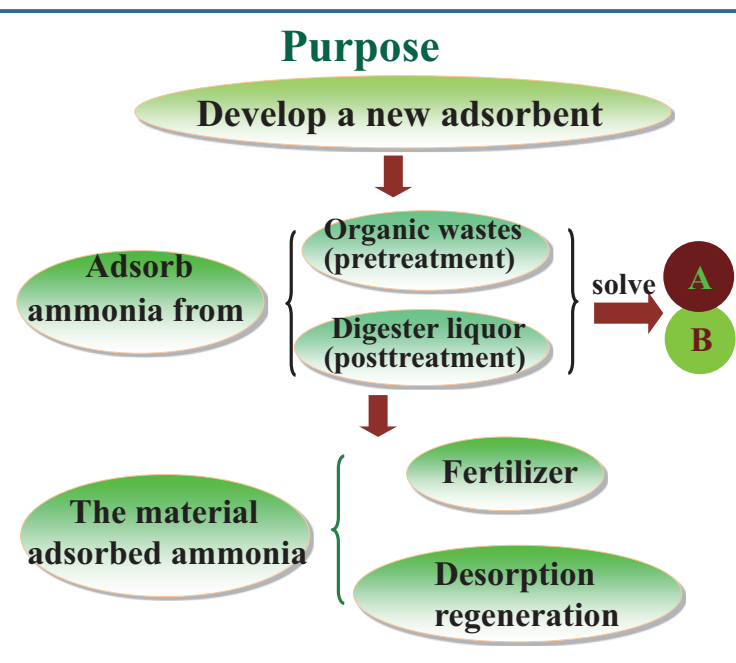


Table 1 Adsorption kinetics
CNH₄⁺-N: 10000 mg L⁻¹; Dosage: 20 g L⁻¹

Pseudo-first-order model			Pseudo-second-order model		
K ₁ (min ⁻¹)	Qe(mg g ⁻¹)	R ²	K ₂ (g mg ⁻¹ min ⁻¹)	Qe(mg g ⁻¹)	R ²
0.006218	50.47	0.83	0.000456	74.63	1

- ### Conclusions
- The maximum adsorption capacity of the ceramic adsorbent was 74.63 mg g⁻¹.
 - The adsorption capacity decreased when the dosages increased during the dosages range of 5-40 g L⁻¹
 - The NH₄⁺ adsorption was well described by pseudo-second-order model.
 - The effect order by the cation ions was Na⁺>K⁺>Ca²⁺>Mg²⁺

- ❖ Large adsorptive capacity
 - ❖ Low cost
 - ❖ Abundant source
 - ❖ Simple synthesized method
- Promising to treat NH₄⁺ rich organic wastes

Distribution of oxygen-18 and deuterium across the Tunisia

Wataru Yamada

Groundwater use in Tunisia

In their fourth report, the Intergovernmental Panel on Climate Change (IPCC) warns that temperature will increase and rainfall will decrease especially in the Mediterranean coastal areas of North Africa with a global warming increase. People in Tunisia located in north Africa largely depends on groundwater use for irrigation, which caused the drawdown of groundwater.

For sustainable groundwater use, it is essential to understand the groundwater system.

Stable isotopes as tracers

Stable isotopes such as ^{18}O and ^2H can be good tracers to follow the groundwater flow. In the phase transitions such as evaporation, deposition and melting, these stable isotopes show the different behavior by isotopic fractionation resulting from a difference in mass. This fractionation varies with the temperature and humidity, leading to various isotopic ratios. Using this mechanism, we can estimate the process of groundwater recharge quantitatively. If the water is not affected by phase transition, the ratio could be maintained until the water is discharged on the ground. Comparing the groundwater with the water from the rainfall, rivers and lakes in the recharging area, we can calculate the contribution ratios of various water courses from the recharging area to the groundwater recharge.

Isotopic Mapping

Kendall (2010) pointed out that large scale spatial isotope studies of water cycle can provide important insights into the groundwater recharge process. Kendall (2001) also showed the effectiveness of isotopic mapping by taking surface water samples over large areas, because surface water can be representative value of rainfall water of whole basin.

High resolution isotopic mapping also can help us to identify the important sites such as the recharge areas in the surface and groundwater flow system.

Objective and Methodology

The objective of this research is to show isotopic map and to clarify the groundwater recharge process across the Tunisia.

Sampling survey was conducted from July 7th to 11th and, from Nov 12th to 20th in 2011. Water samples were taken mainly from river across the whole of Tunisia. We measured electrical conductivity, ORP, and pH in situ. We also analyzed the stable isotopes (δD , $\delta^{18}\text{O}$) in laboratory.

However, in southern area, wadi river were dry up even in rainy season. Then we took water from some Magels (traditional water tank to collect rainfall during rainy season). Magel is covered by concrete and prevent evaporation effect. Then the water in Magel can be integrated value of rainfall during rainy season.

Results and Discussion

Stable isotopic values were plotted on river system map and compared with topographic map. Generally, isotopic values in eastern coastal area tended to be relatively high ($\delta\text{D} = -27.6 \sim -6.9 \text{ ‰}$, $\delta^{18}\text{O} = -4.4 \sim 0.1 \text{ ‰}$). Meanwhile, values in western inland area were relatively low ($\delta\text{D} = -41.9 \sim -27.7 \text{ ‰}$, $\delta^{18}\text{O} = -7.9 \sim -4.5 \text{ ‰}$). This tendency is remarkable especially in Mejerda River watershed located in northern Tunisia. Isotopic values along the mainstream increased with distance from coast to inland (inland effect).

However isotopic values at some points located in northern coastal area were low. These values were lower than average precipitation value at nearest observation point of IAEA. There is a possibility that these low values come from not base flow, but a short time rain event.

More sampling are planned in gap area on the map and, in same points to see seasonal change.

Keywords: groundwater, stable isotope, tracer, isotopic mapping

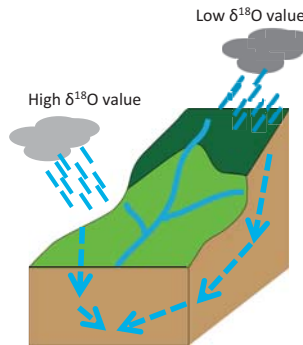
Introduction

- Water problem in the world
 - The feature of semi-arid and arid area low rainfall, high potential evapotranspiration
 - groundwater as resource is important
- The over exploitation with increasing of irrigation water
- Northern Africa (the forth assessment of IPCC(2007))
 - increase in temperature
 - decrease in rainfall especially in Mediterranean coastal area
- The appropriate management of groundwater
 - figuring out groundwater recharge processes

- Water resource in Tunisia
 - Ministry of Land, Infrastructure, Transport and Tourism, MLIT(2007): groundwater covers 70 % of total water use in Tunisia
 - the importance of groundwater as resource
 - Kouzana (2009): The over exploitation in Cap-Bon, the coastal area in Tunisia
 - sea water intrusion because of groundwater drawdown
 - Dassi (2005): The estimation of the groundwater resource using the isotope as tracer in Merguellil basin, Tunisia
 - surface water to the groundwater recharge
- Surface water is important as water resource in Tunisia.

Stable isotopes ($\delta^{18}\text{O}$, δD) as tracers
Stable isotopes → tracer to follow the ground water flow.

Stable isotopes of Oxygen	
^{16}O	^{18}O
Exist rate	99.757%
	0.205%



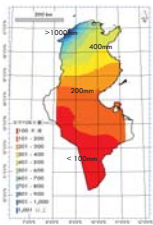
Isotopic Mapping

- The Map drawn based on plotted isotopic value.
- Kendall (2001):
 - Large scale isotopic map → important insight into the groundwater recharge process.
 - Effectiveness of isotopic mapping by surface water
 - Surface water is easy to take.
 - Surface water reflect very recent rain.
 - Large river ≙ integrated value of rainfall in basin.
 - reducing the large spatial variability (heterogeneity) of isotopes
- Reasonable isotopic map
 - Spatial distribution of surface water (≙ rainfall)
 - variable information of groundwater recharge.

Objectives

- Making the Isotopic map of surface water across the whole Tunisia.
- Clarifying the groundwater recharge process across the Tunisia.
- Tracing the hydrological cycle across the whole of Tunisia.
- Contribution to the water management in Tunisia.

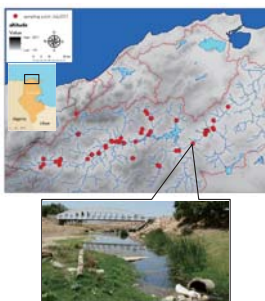
Study area: Tunisia



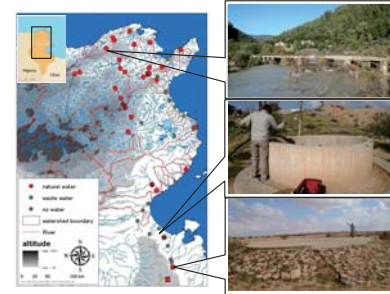
Annual mean precipitation (Kawachi, 2011)

- Climate
 - Northern part Mediterranean climate Precipitation: 600 mm/year
 - Middle part semi-arid climate Precipitation: 290 mm/year
 - Southern part arid climate Precipitation: 0-155 mm/year

2011/7/7~11 (dry season) Mejerda River Watershed



2011/11/12~20 (rainy season) Whole land of Tunisia

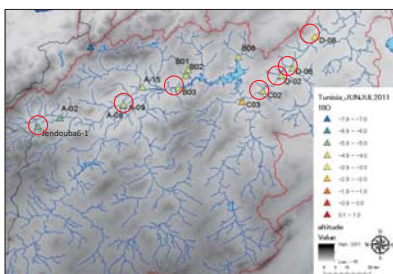


Methodology

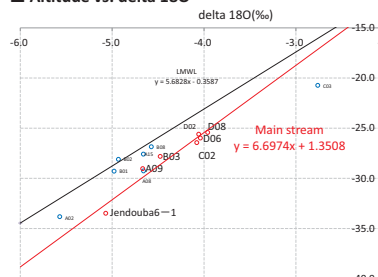
- Field measurements EC, pH, ORP
- Laboratory analysis stable isotope ($\delta^{18}\text{O}$, δD) inorganic ion (Na^+ , K^+ , Mg^{2+} , Ca^{2+} , Cl^- , NO_3^- , SO_4 , HCO_3^-)
- Sampling points(dry season) River: 40
- Sampling points (rainy season) River: 36, Dam: 3 Well: 2, Magel: 2 Spring4,

Results and Discussion

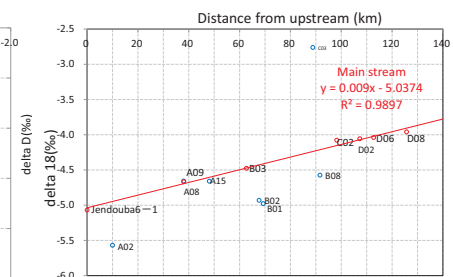
Mejerda River watershed



Altitude vs. delta 18O

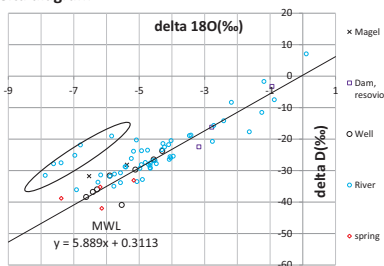


Altitude vs. delta 18O

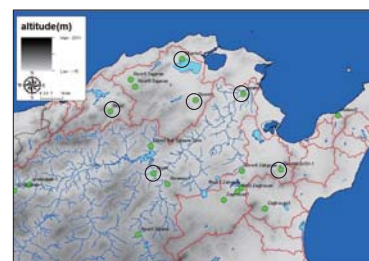


Whole land of Tunisia

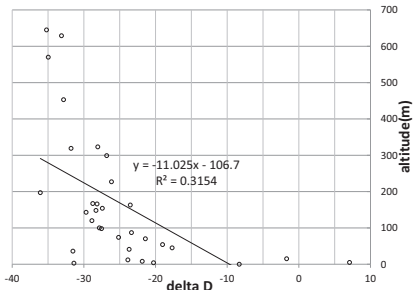
Delta diagram



Northern area of Tunisia

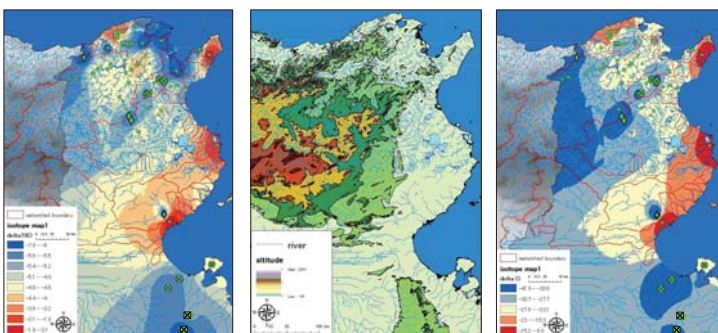


Altitude vs. delta D



Future work

Isotopic Maps



Conclusion

- Mejerda River
 - far from sea → low value of isotope } inland effect
 - D-excess → relatively flat
- Northern tip area
 - Some points in northern area ≙ relatively low $\delta^{18}\text{O}$ } possibility of difference of air mass
 - Different tendency with IAEA precipitation data.
- North peninsula (Cap-Bon) and Mid coastal area
 - Coastal area ≙ high value } altitude effect
 - Inland, mountainous area ≙ low value
- Southern area
 - Relatively low value of wells and Megals.

Prospects of sustainable forest management: Community-based forest management in India

Kazuyo Nagahama

It has been widely recognized that forests have various functions, i.e. forest products, soil and water conservation, recreation, and CO₂ sequestration. Deforestation leads to the deterioration of these functions. To cope with deforestation, the Indian government has taken several initiatives.

In 1988, the new Indian National Forest Policy went through a drastic shift away from economic exploitation toward the conservation of forest resources. This new policy also recognized the importance of the needs of the forest-dependent population for firewood, livestock feeding, non-timber forest products, and timber for domestic use. Following this new agenda, the Ministry of the Environment and Forests issued a directive to adopt the policy of Joint Forest Management (JFM).

JFM is a concept of developing partnerships between forest user groups and the State Forest Departments (SFDs) on the basis of mutual trust, jointly defined roles, and responsibilities with regard to forest protection and development. It also aims at decreasing serious poverty among the forest dependent people.

The formal recognition of local villagers as co-managers of the forests and legitimate users of forest products has been accepted by local communities, and since its inception, the area under JFM has increased. As of 2006, 27% of Indian forests (17.3 million hectares of forest land) have been reserved for 85,000 JFM scheme under FD/FPC partnership control. The Japan Bank for International Cooperation and the World Bank have also provided financial support for JFM initiatives.

In spite of the proliferation of JFM across India, however, this policy has been subjected to growing criticisms and concerns among many scholars and non-government organizations (NGOs). It is said that the committees receive few benefits from JFM, and concerns about the inequitable distribution of benefits among the committee members, which could have an adverse impacts, are also presented.

On the other hand, there was a region in which decentralized forest management had been adopted almost 60 years before the initiation of JFM, such as the self-initiated forest protection groups, Van Panchayats (VPs) in Uttarakhand.

The question in this study is to what extent such local institutions have successfully achieved sustainable forest management. VPs are the best example of age-old institutions, and therefore they may provide useful insights into the implementation of JFM.

Keywords : Community-based forest management, Joint Forest Management (JFM), Van Panchayats (VPs), Forest Protection Committee(FPC), Forest Department (FD),

The Establishment of Sustainable Livestock Farming service in Galshir, Mongolia: Challenges and Possibilities of Integrated Governance

Gonchig Gantulga

Water, grazing land, and mobility are central to most pastoral livelihoods in arid landscapes. Today, the subject of dry land pastoralism includes is concerned about land degradation and desertification.

Twenty percent of Mongolia's 2.8 inhabitants are pastoralists who herd 32 million head of livestock. Half of the nation's population depends directly or indirectly on the pastoral economy for its livelihood.

Traditional common resource conservation based livestock farming practice may useful today. Historically, the governance of Mongolian pastoralists featured three stages such as being kinship based (tribe), family based, and collective based farming. Today, Mongolian pastoralists live under an informal institutional system. Therefore, it is necessary to clarify the challenges and possibilities of Integrated Governance in Mongolia.

My research objective is to find a potential form of integrated governance for sustainable livestock farming in Mongolia. Therefore, it is important to describe, how traditional livestock farming practice can reestablish for today's socially, economically, environmentally changed condition. My research framework have been focused on local good governance, a healthy environment, healthy food, and herders' empowerment.

My survey was conducted in Galshir which is located in the eastern central part of Mongolia. Pastoral related various issues include such things as water, climate change, biodiversity loss, mining activities and a weak of decision making process. Huge changes of environment, economy and social condition have been main cause of overgrazing in last twenty years.

Some important issues were identified in the research. A very weak institutional arrangement process has been implemented due to a poor livestock farming policy over the last twenty years. There are poor efforts for the empowerment of both the farmers and public workers, in the Galshir soum. I found that they haven't any clear policy for the avoidance of natural disasters, the improvement of rangeland, and the use of traditional farming practice as well as the use of modern farming development tools.

It is time to reestablish a sustainable livestock farming system. It should be implemented under both top down and bottom up policy. Under this policy, local livestock farming service may develop a participatory learning system that should be implemented locally educated professional officers.

Evaluation of factors affecting the soil moisture in the semi arid regions in Mongolia

Natsagsorj Natsagsuren

Land cover with insufficient and unstable soil moisture is predominant in north-eastern Eurasia. This is true especially in the arid and semi-arid region which covers Mongolia, where there is an annual precipitation ranging from a few mm/y to 300 mm/y. Therefore, the development of an integrated approach to evaluate the soil moisture is key for a better understanding of the natural potential during climate change. The observed data are quite useful when investigating the soil moisture change in both the spatial and the temporal distribution, and they should be analyzed with the observed soil moisture data.

The previous studies in hydrology and climatology suggest that the soil moisture might have an influence on the climatic conditions in Mongolia, however there were few papers to investigate the relationship between the soil moisture and climatic conditions, especially for the prediction of soil moisture. For this purpose, a step regression analysis of the soil moisture for over a long time period is necessary using the observed soil moisture and the meteorological data.

The objective of this master's thesis is to predict the temporal and spatial distribution of the soil moisture content through a correlation analysis using the observed data and to make clear the important factors affecting the future soil moisture conditions.

Firstly, a correlation analysis of the observed soil moisture data in the selected stations is performed to make clear the relationship between the soil moisture certain parameters such as: precipitation, temperature, humidity in the atmosphere, and then to predict the soil moisture in the future. A preliminary regression analyses for four different natural zone's stations were performed. For example: A forest steppe area (Bulgan, Tsetserleg) has more correlated forecasted atmospheric factors, especially for precipitation. In Steppe regions, forecasted air and surface temperature with daily wind factors were correlated (Darkhan, Undurkhaan, Ugtaal, Baruun-Urt). In the Gobi Desert, can make forecasts from previous precipitation and it's evapotranspiration (Dalanzadgad, Saikhan).

After the correlation analyses, a spatial distribution map of the soil moisture will be produced for every variety of natural zone. The results of the present study would contribute much to the construction of a prediction system to improve the agriculture and nomadic activities in Mongolia.

Keywords: soil moisture, prediction, air temperature, precipitation, step by regression

Pastureland use planning in Bayan, Mongolia using remote sensing data and GIS applications

Khishigsuren Nyamsambuu

1. Background

Mongolian pasturelands remain as state-owned lands and do not receive appropriate regulations and plans to preserve and use them. The study area is facing its exceeding carrying capacity due to an absence of pastureland use management although the economic conditions in this area strongly depend on livestock production. The semi-arid steppe of Bayan, in the central eastern part of Mongolia, was chosen for a field investigation in this study. In this area, the land is mainly used for grazing. In recent years, unmanaged pastureland use is still causing many problems.

2. Objectives

- 1) Exploring an optimal spatial resolution of remote sensing data that corresponds to the spatial distribution of percentage of vegetation cover and NDVI
- 2) Determination of the relationships between the vegetation biomass and accumulated NDVI
- 3) Mapping pastureland productivity
- 4) Recommending a proposal for pastureland use planning

3. Materials and methods

The percentage of vegetation cover was carried out at 200 sites in the ground survey area in the summer of 2010 and field work of the vegetation biomass were conducted at 50 sites by field survey in the summer of 2011. Photos of the ground cover at 1 m² were taken to compute the percentages of the ground surface components such as green grass, senescent grass, bare soil and shadows using unsupervised classification. To estimate from the satellite images and to make a multi temporal analysis, a spatial correlation of the distribution of the percentage of vegetation cover were analyzed among the field sampling data by a semivariogram analysis in geostatistics. The vegetation biomass data of 2003 has been used to determine the relationships between the vegetation biomass and the accumulated NDVI. This relationship will be used to develop an algorithm to estimate the vegetation productivity from the satellite imagery.

4. Results and discussions

To determine the spatial resolution for each pixel in the remote sensing data, the spatial correlation of ground sampling points in that area has reached up to 130 m for green grass, 170 m for dried grass, and 110 m for the total grass. For this reason, the results suggest that more than 130 m resolution remote sensing data can provide only summary information on the grassland through whole study area, whereas with high resolution data with less than a 130 m resolution would make it possible to study the fundamental spatial distribution of aboveground biomass, namely the individual zones with different vegetation productivity. Therefore, a similar percentage of data points recorded closely together at 90 and 50 m, the high spatial resolution satellite data with 90 and 50 m of pixel size are preferred in an area with green grass in sandy loam, gravelly soil and green grass in sandy clay loam saline soil, respectively.

The maximum spatial resolution would probably be around 560 m, 140 m and less m, respectively, for the non-overgrazed, moderately overgrazed and severely overgrazed pastures. However, the semivariogram of vegetation biomass showed no range. Thus, the remote sensing data with much more precise resolution data is preferred for the vegetation biomass related study in this area.

The results also have shown a significant correlation between the vegetation biomass and the accumulated NDVI. In each location of the sampling points, the correlation coefficient between the accumulated NDVI and the vegetation biomass were 0.81 and 0.78.

5. Conclusion

After choosing the appropriate spatial resolution satellite imagery using geostatistics, land managers, and herders, can use the estimate from the spatial distribution of vegetation cover in areas of different productivity to plan the pastureland utilization efficiently. As well, the pastureland uses planning with locations from these designs along with the seasonal campus and the moving distances of livestock are beneficial. Moreover, as many authors have reported, different land cover types usually have different variogram patterns. Regarding such kind a conclusion, in this study, the spatial distribution of the vegetation coverage was strongly dependent on different environmental conditions.

The accumulated NDVI has given a significant estimate of the vegetation biomass for a vegetation productivity analysis. After developing the pastureland productivity map in this area, better ways of pastureland-use planning would be proposed.

Monitoring Mangrove Forests Using Multi-temporal Satellite Remote Sensing Data in Hai Phong City, Vietnam

Pham Tien Dat

Mangroves play an important role in protecting dyke systems and defending against the impact of big storms. However, these forests are under severe threat because of the rapid growth of population, migration to the coast, insufficient governance, poor planning as well as uncoordinated economic development.

Hai Phong city is located on the Northern coast of Vietnam where mangroves are distributed between Zone I and Zone II among four mangrove zones in Vietnam. This city is vulnerable to rising sea levels associated with climate change and tropical cyclones, which are forecasted to become more prevalent and stronger as climate change intensifies. Mangrove forests in the city have decreased dramatically due to intensive and extensive shrimp aquaculture.

The objectives of this research were to map the locations of mangroves and analyze their changes in Hai Phong, Vietnam from 1989 to 2010 using different sensors including optical sensors: LANDSAT, SPOT, and microwave sensor: ALOS PALSAR. Object-based classification was used to improve the accuracy assessment of post satellite image processing. Moreover, Geographic Information System (GIS) and Remote Sensing data were applied for analyzing how the mangroves had changed throughout the period 1989 – 2010.

The findings of this research showed that mangrove loss was approximately 985 hectares and the annual rate of this loss was 50 hectares in Hai Phong. Nevertheless, mangroves have expanded in several districts thanks to good mangrove conservation and management. The overall accuracy of satellite imagery processing for the years 2006/07 and 2010 were 89%, 82%, and the Kappa coefficients were 0.87 and 0.79, respectively. This research indicates the potential of multi-temporal satellite remote sensing data together with an object-based classification approach and GIS tools for mapping mangrove forest in the coastal zones.

Keywords: Mangrove change, GIS, Satellite remote sensing, Object-based classification, Optical imagery, ALOS PALSAR.

Forest Land Conversion Dynamics: A perspective of the South-Eastern Peninsula of Bangladesh

Fakir Muhammad Munawar Hossain

Introduction

Bangladesh has a high population density, 964 persons per km² in 2011 (BBS, 2011), and forest land conversion has been a major problem in forest protection. After the enactment of the National Forest Policy in 1994, the Bangladesh government gave emphasis on protecting forest lands through conversion. The permanent conversion of forestland due to encroachment came to be regarded as a serious problem, especially in the hills and plain land sal forests (Ali, 2003). Against this backdrop, there is an increasing demand to understand the actual situation of forestland encroachment and to take effective measures for the prevailing encroachment conditions. Although there has been comprehensive studies on forestland encroachment in Bangladesh (Iftekhar and Hoque, 2005), more information should be accumulated. In this study, we selected the Teknaf Wild Life Sanctuary (TWS) in Cox's Bazar, the South Forest Division, and clarified the historical background of encroachment and socio-economic conditions of the encroachers.

Methods

We used the encroacher list prepared by the Whykong Forest Range Office in the sanctuary. Out of the total of 315 encroachers listed, 72 respondents (23%) were selected by a random sampling method. From key informant interviews, we derived information of the historical background. In household surveys, we asked the basic household characteristics, encroachment and livelihood patterns, and their perceptions regarding forest and biodiversity conservation.

Results and Discussion

Between 1940-1975, the government introduced an informal forest villager system, in which a few persons lived inside the forest and undertook patrolling as unofficial forest guards. They gradually became the local elite, and engaged in forestland conversion. Even though the government changed the idea on encroachment, these people continued to remain inside the sanctuary. They are now acting as a catalyzing agent. According to the field survey, there have been respondents who have newly started encroachment since 2005 (Fig.). Hence, to prevent further expansion of the occupation by the existing local elite who have lived inside the area, rather than new encroachers, would be a necessary step.

Acknowledgement: We would like to thank the Grant-in-Aid for Specially Promoted Research (NO: 19002001), JSPS, and the Japan International Co-operation Center for their financial support and arrangements, and the people of the Whykong Forest Range for their hospitalities.

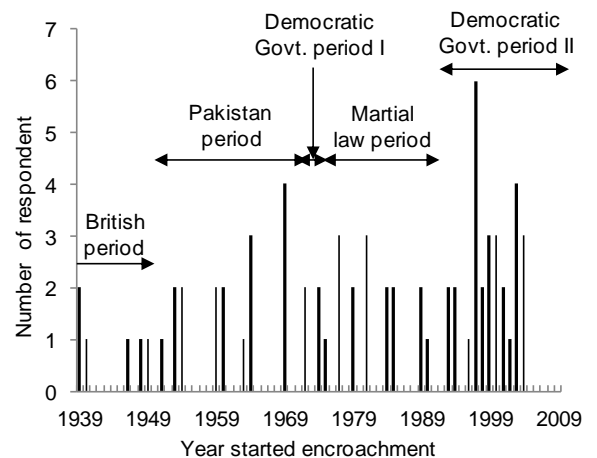


Fig. Year-wise forest land encroachment trend
Source: Field survey (2010-2011)

Policy for Risk Management in Rice Value Chain to Adapt with Climate Change in Vietnam

Hoang Thanh Tung

Rice is the most important crop in Vietnam; it is also the livelihood of over 50% of the population. Rice has an enormous role in national food security and partly contributes to the world thanks to its exportation. Rice export volumes had increased from 3.48 million tons to 6.05 million tons between 2000 and 2009. Thus the role of rice production in food security has grown internationally, rather than just nationally over the past decade and that makes Vietnam the world's second largest exporter just behind Thailand. However, rice production, recently, had to face increasing difficulties due to climate change, especially in the Mekong River delta and the Red River delta, which dominate more than 70% of the total rice production area. Although the rice yield gradually increased in all regions, it has significantly fluctuated from 2000 due to extreme weather events such as unusual flood flows, heavily precipitation, and typhoons. More seriously, farmers seem to not have benefited much from the remarkable achievement in rice production and exportation. The problem is that the more rice farmers have produced, the less profits they have received compared to other stakeholders in the value chain, while they are the most vulnerable and disadvantaged people due to climate change.

The government has clearly recognized that climate change adversely affects rice production, yet it does not have any specific policies for risk management. This research aims to promote risk management focusing on risk identification, risk assessment, risk analysis and the adaptation of measures and policies. To achieve this objective, a literature review, a key stakeholder interview, meetings with experts and focus group discussions are deliberately conducted to collect information about what is considered as risk in the rice value chain, how present farmers, stakeholders and the government respond to risk and what kind of policy measures should be implemented. The problems in rice production and the market require reforming current policies and proposing new risk management mechanisms and institutions to ensure and equally allocate a shared risk and value among all participants in the value chain. Besides, the government policies should promote the positive cooperation of the community; both private and public sectors have to confront the increasingly negative impact of climate change on rice production.

Keywords: Risk management, Value chain, Climate change, Institutions

THE SPATIAL AND TEMPORAL COMPLEXITY OF LAND USE CHANGE IN TROPICAL REGION: CASE STUDY OF JAVA ISLAND

Yudi Setiawan

Analysis of the multi-year time series of land surface attributes and their seasonal evolutions indicate a complexity of land use change, especially in tropical regions. This paper explored the spatial and temporal complexity of land use change considering the land cover dynamics, in other words, distinguishing the actual and temporary changes of the land surface attributes. This study is based on the hypothesis that consistent land use has a typical, distinct, and repeated temporal pattern of vegetation index inter-annually, and then a pixel representing a land use change while that inter-annual temporal dynamics changed.

We analyzed the dynamics pattern of the long-term image data of the wavelet-filtered MODIS EVI from 2001 to 2007. The change of dynamics pattern was detected by differentiating the distance between two successive annual patterns, which then indicates a land use change. Moreover, we defined the type of changes by performing the pattern clustering method, and then were validated by ground check points and statistics data sets.

The temporal pattern analysis was able to detect the actual change event, either by conversion of land use type or by vegetation growth. The land use change that was detected by the change of temporal pattern, can be categorized into: 1) agricultural development (including some change trajectories such as: mixed garden changed to intensive agricultural cropping and developing a paddy field in mangrove), 2) urban development (e.g. mixed garden or upland converted into built-up), 3) deforestation (either naturally or man-made changes), 4) changes in mangrove area and 5) considering the plantation management (such as changes in plantation commodity).

Meanwhile, the temporary changes of land surface that have been also understood by this study explained that the climate regime was an important factor which affected the temporal vegetation dynamics of land use types, especially agriculture land, namely paddy rice field, upland and plantation. For example, many agricultural lands became barren land, and the cropping system was changed and the planting time was postponed which was caused by the extreme dry season which was influenced by ENSO in July-September 2006. The spatial and temporal dynamics analysis would provide sufficient, significant, and useful information regarding the patterns of land surface change, improve an accurate database of land use and cover change and assist further research in understanding the dominant process of land use change allocation and to take it into consideration when land use change models are made.

Keywords: Land use change, temporary pattern analysis, wavelet transform, Java

Genetical analysis of dehalogenation reaction and its application

Zhang Wanjun

Many halogenated compounds are produced as herbicides and pesticides, and several of them cause severe environmental pollution. Environmental bioremediation technologies, owing to eco- friendly, cost-effective, and natural technologies are widely used to remove pollution around the world. Over the last few decades, many bacteria that can grow on halogenated compounds, have been isolated, and there were many investigations focused on the enzymatic cleavage of the carbon-halogen bonds. Although numerous reports and reviews on microbial dehalogenation activities are available, this process is not, as yet, completely understood. Therefore gene-scale information becomes critical in pursuing such research directions. In this study, we focus on the dehalogenation reaction and clarifying the genetic characteristics, and we hope that the study can contribute to the development of environmental bioremediation technologies.

In our laboratory, the bacterium that can degrade chloral hydrate has been obtained, and it was identified as *Pseudomonas* and was named LF54. The degradation product was determined by gas chromatograph(GC). The Chloral hydrate was transformed into 2,2,2-Trichloroethanol, 2,2-Dichloroethanol, step by step.

In general, the biodegradation process is a biocatalysis process by enzymes which are translated by DNA on either genomes or plasmids. As we know, many of biodegradation genes were on plasmid. So, I tried to extract the plasmid from the LF54, at first, but it couldn't be extracted, so we think that LF54 doesn't have a general plasmid and the degradation gene is probably on the genomic DNA.

In my study, we used the Transposon Method to find out the dehalogenation gene with the transposome inserted and inactivated the gene randomly so that the gene can be sequenced from genomic DNA directly. About 3800 mutants were picked up to make the insertion mutant groups. In the first screening, a colorimetric method was used and 96 mutants were picked up which produced Cl^- less than others. In second screening, GC was used and the mutant with a 2,2-Dichloroethanol peak disappeared and was picked, lastly, the dehalogenation gene could be obtained.

The mechanistic and structural information will allow us to investigate the structural activity relationships of dehalogenating enzymes, increase our understanding of the causes of recalcitrance of various problem compounds, at a molecular level, and also enable the construction of modified dehalogenases as biocatalysts for the transformation of specific problem compounds.

Keywords: Dehalogenation, Bioremediation, Genetical analysis, Transposon, Insertional inactivation mutant

Comprehensive Evaluation of Environmental Policy Utilizing Reclaimed Water to Effectively Accomplish Sustainable Development in Tianjin, China

Nan Xiang

Water shortages and water pollution problems are becoming more and more serious nowadays, and it has given rise to the use of reclaimed wastewater as an additional source of water supply and an efficient method of reducing and preventing water pollution. Tianjin is a rapidly growing city in both population and economy while the water scarcity is intensifying and water pollution is increasing. Reclaimed water reuse in this city has just begun. This study aims to find out the potential to realize sustainable development utilizing reclaimed water, and to prove the feasibility of the local government's plan in Tianjin. This study mainly utilizes computer simulations to accomplish a comprehensive evaluation with LINGO programming. The simulation model will forecast the social and economic developing trends of Tianjin with the introduction of developed technology. According to the scenarios, this research can assist policy-making on implementing reclaimed water utilization to realize environmental and economic development in Tianjin from 2010 to 2020. Furthermore, it can provide a specific development plan to establish a sustainable development target, such as construction plans for new sewage plants, financial support, and reclaimed water distribution. Simulation results show that reclaimed water can be effective in saving water resources, reducing water pollutants and improving the economic development in the catchment area.

Keywords: Reclaimed water reuse, Socio-economic and environmental modeling, Simulation

Regulation of virulence determinants production and biofilm development in *Pseudomonas aeruginosa* clinical isolates

Hao Fang

Introduction

Pseudomonas aeruginosa can be identified in a range of infections, particularly those with a tendency to become chronic, such as lung infections in patients with cystic fibrosis, those related to venous ulcers and infections associated with in-dwelling medical devices. The most well-known virulence property of *P. aeruginosa* is its ability to produce Elastase, alkaline protease, rhamnolipids, pyocyanin and a range of exotoxins. The expression of many of these factors including pyocyanin is known to be differentially regulated through quorum-sensing systems in response to prevailing environmental conditions. Pyocyanin (PCN) is a blue redox-active secondary metabolite that is produced by *P. aeruginosa*. PCN is readily recovered in large quantities in sputum from chronic lung infection patients who are infected by *P. aeruginosa*. Despite *in vitro* studies demonstrating that PCN interferes with multiple cellular functions, its importance in clinical infections is uncertain. *P. aeruginosa* produces the cell-to-cell signal molecule 2-heptyl-3-hydroxy-4-quinolone (The *Pseudomonas* quinolone signal; PQS), which is integrated within a complicated quorum sensing signaling system. PQS signaling plays an important role in *P. aeruginosa* pathogenesis because it regulates the production of diverse virulence factors including pyocyanin. So the objective is to study the PQS regulation of pyocyanin production in *P. aeruginosa* clinical isolates.

Materials and Methods

Strains: 6 clinical isolates are from a local hospital in Tokyo and *P. aeruginosa* PAO1 was used as a wild type.

Pyocyanin production: grow a culture of the strains overnight in a LB medium and adjust the O.D. level to 0.01, and incubate the strains in shaking and static as well as anaerobic conditions within 48 h. Collect 1.2 ml of the culture medium and centrifuge it at 15000 rpm for 3min. Move the supernatant to a new tube and add 0.6 ml chloroform to mix, then centrifuge at 15000 rpm for 3min. Move the down layer to a new tube and add 0.2 N HCl 200 μ l. After mixing, detect the absorbance of the upper layer at A520.

PQS assay: Use a Thin Layer Chromatography method to detect the PQS production. Stationary phase samples were centrifuged (15000 rpm, 2 min), 1 ml of the supernatant was collected into new tube. PQS was extracted from 1 ml of supernatant with 800 μ l of solvent A (ethyl acetate: acetate=10000: 1). Mix with vortex, separate the two layers by centrifuge (15000 rpm, 2 min), 650 μ l of the upper layer was collected into new tubes and dried. Extracts were resuspended in 30 μ l of solvent B (solvent A: acetonitrile=1: 1). Add 5-10 μ l extracting samples onto a TLC plate and use solvent C (methylene chloride: acetonitrile: 1,4-dioxane=51: 6: 3) for expansion, and then take PQS photos at UV-366 nm.

Discussion

The clinical isolate from mouse blood did not show a high ability of producing biofilm compared with other clinical isolates. However, it could produce much more pyocyanin than the *P. aeruginosa* wild type PAO1 and other clinical isolates in static culture. PQS and O₂ are essential for pyocyanin production of clinical isolates, but the need for O₂ amount is quite different between the D4 strain and the wild type.

Keywords: *Pseudomonas aeruginosa*; clinical isolates; pyocyanin; PQS

Removal of Phosphate by Kanuma mud through adsorption method from Aqueous Solution

Yang Shengjiong

Phosphorus is an essential nutrient element in water environments for the growth of aquatic plants and algae. A large amount of phosphorus in water body is often responsible for algal blooms and eutrophication, especially in lakes, reservoirs and coastal areas. It causes a lot of environmental damages.

Kanuma mud, a kind of inorganic soil, is very abundant in Japan especially in Kanuma city which is widely used in agriculture and horticulture. It was used in the fluoride removal in aqueous, but few studies have been reported on phosphorus removal through adsorption methods using Kanuma mud. Therefore, an attempt was performed to investigate the efficiency of phosphorus removal using Kanuma mud in slightly polluted water solutions.

The Kanuma mud was manually smashed and sieved, and particles less than 300 μ m were selected. The samples were washed with distilled water for five times and dried at temperature of 60° C. Thermal treatments were also prepared at a temperature of 120° C last for 24h after washing.

The results showed that the Freundlich isotherm model fitting plots with determination coefficient R^2 0.962 better fitted the experimental data than the Langmuir isotherms model. In order to determine the rate constant for adsorption, the pseudo-first-order and pseudo-second-order kinetic model were used, the results of this study show that the kinetics of phosphate adsorption in the Kanuma mud can be well described by the pseudo-second-order model.

The phosphate adsorption by Kanuma mud can be easily affected while changing the pH value. The results showed that the best removal efficiency of phosphate was seen at pH value of 5.7, and the phosphate uptake decreased sharply with the increasing of pH value, especially at a pH of 12; and also decreased slowly as the pH value was decreased.

Windbreak trees for reduction of Evapotranspiration in Agricultural land in the Nile-Delta, Egypt

Tatsuki Shimizu

Egypt is one of the countries which are suffering from food and water shortage through its rapid population growth and arid climate. In addition, Egypt is completely reliant on its water resources from the Nile-river for agriculture. In such a situation, the government set up a project which is about water saving for agriculture to expand agricultural lands into desert areas. Windbreak trees are part of the project as one of the methods to reduce evaporation in agricultural areas as a water saving idea. My thesis is an evaluation of the effects which windbreak trees have to reduce evaporation as an objective. To evaluate the effect, it needs quantitative analysis, measurement and simulation. Especially in measurement, I must negotiate with local people, and in order to present to them, I also need to use English.

Due to this, the EDL program is very effective for me. I have improved these skills in the EDL program, for example, lectures which are held completely in English, opportunities to make English presentations, reports which I write in English, and my master thesis which will be written in English. These opportunities and experiences enabled me to improve my English skills in speaking, writing, reading, listening and presentations and to use English in daily life. The best experience which I think that played very important role in acting in Egypt was my Mongolian internship, because I gained some experienced on-sight in Mongolia, and I could apply those experiences for my thesis in Egypt.

Now I'm planning to do some overseas cooperation in the near future in the environmental field. These precious experiences, such as on-sight works and negotiation skills, which I developed in the EDL program will help me in any process during my overseas works.

Keywords: Windbreak tree, Evaporation decrement, Wind profile, Arid climate

Use of hydrological tracers to assess Groundwater and Surface water interaction in Lebna watershed, Cap-Bon, North East Tunisia

Mizuho Takahashi

Groundwater is usually the major water resource in semi-arid regions, such as the Lebna watershed in Cap-Bon, North-East Tunisia. However sea water intrusion into the coastal aquifers, a decline in groundwater levels, and the deterioration of water quality due to excessive groundwater usage are on-going problems. For the sustainable use of water resources and to understand the process of groundwater recharge, it is important to understand the surface and groundwater interaction.

This project used hydrological tracers to map the groundwater flow system in the Lebna watershed, and clarified the surface water and groundwater interaction, the groundwater recharge process, and influence of the sea on the Lebna dam, and this area's water balance.

In May and July of 2010, water samples were collected from rivers, dams and the wells in the Lebna watershed and their pH, electrical conductivity, water temperature, and groundwater level were measured. The groundwater level data was combined with data on the spatial distribution of the stable hydrogen and oxygen isotope ratios to clarify the groundwater and surface water interaction.

Our findings show that on the left bank of the dam, the groundwater seems to flow into the Lebna dam, but on the right bank, 2 flow systems seem to exist. In one system, the groundwater flows from the uplands to the lowlands, while in the second system groundwater flows from the dam to the lowlands and recharges the groundwater watershed.

In July, September, and November 2011 I focused on the lower basin of the dam and made more detailed maps of the water table. In addition, I have analysed seasonal differences because of the precipitation and irrigation effect between Summer and Winter.

Keywords: surface water and ground water interaction, semi-arid area, stable isotope of $\delta^{18}\text{O}$ and δD , Cap-Bon, Tunisia

Groundwater Flow System in Tay Island region, Dong Thap province, South-west Vietnam

Nguyen Thi Thu

The groundwater has been contaminated with high concentrations of arsenic on Tay Island, Dong Thap province, Viet Nam, and it has been studied by the Mekong Research Group* since 2008. The study of the groundwater flow system was studied to clarify the mechanism of the contaminated arsenic in groundwater. The studies on the dynamics of the groundwater showed that the seasonal groundwater level fluctuations are similar to the movements of the Mekong River, and its effects are stronger than the effects from precipitation. However, the exchange of surface (river and channel) water and groundwater has not been clarified clearly yet. Moreover, according to a survey in January 2012, the shallow groundwater is used for irrigation in the dry season, and the deep groundwater is a clear water resource and with the surface water, it is used for daily use. Thus, the study on the interaction between the surface water and groundwater; showed that the shallow groundwater and deep groundwater is important to assess the water resources in this area.

The method of stable isotopes is used to evaluate the quantitative process of recharge and discharge between the surface water and groundwater. It is also used to investigate the interaction between the shallow and deep groundwater. Besides, the over-exploitation of shallow groundwater is concern in that it will affect the deep groundwater and change the groundwater quality and quantity. Therefore, monitoring of the groundwater quality and quantity seasonally is necessary for sustainable water resources management.

To clarify the objectives, water samples of river water, shallow and deep groundwater were taken and were analyzed in the laboratory. The chemical and isotopic analysis, a geological survey, and irrigation conditions survey will be conducted the next time.

Keywords: shallow groundwater, deep groundwater, surface water, recharge, stable isotope

*Mekong Group is short name of the Groundwater Arsenic Research Group at Mekong Basin

Interaction between Shallow and Deep Groundwater Resources in Baiyangdian Lake Watershed, China

Jie Zhang

It has been understood that groundwater resources account for most of the world's water resource and contributed to social and economic development, especially in arid and semi-arid areas. To clarify the mechanism of the groundwater flow system is the basic precondition before making an effective policy to keep sustainable development.

Research on groundwater flow systems now mainly focus on groundwater at a shallow depth. However, one fact is that with the great depletion of shallow groundwater and a decrease in water quality, the use of groundwater resources has been sought at a deeper depth. Therefore, we must pay more attention to the deep groundwater from the beginning if we are going to consume deep groundwater on a large scale.

For a research area, the Baiyangdian Lake Watershed in China is facing big problems in groundwater use, such as a rapid decline of the water level and groundwater contamination. Due to these reasons, local development is relying on deep water resources more and more, and consequently the research focusing on deep groundwater are more needed than ever before.

For this purpose, the first field survey was completed in June, 2011. In total, 80 water samples are collected from rivers, springs, and groundwater at different depths. Both ion and isotopic analysis results show a weak interaction between shallow and deep groundwater in the plain area. The influence of polluted surface water on shallow groundwater is considerable. Due to this, the potential risk of hydraulic shallow groundwater connecting with deep groundwater should not be ignored. Long-term monitoring is necessary.

Keywords: interaction, deep groundwater, Baiyangdian, sustainable development

Application of Life Cycle Assessment in Evaluation of Wastewater Treatment Process in ChongQing Province

Wenyu Huang

As the world water crisis, especially in China gets more and more serious, the need to improve environmental quality through wastewater treatment has become a very useful tool for water reuse and recycling. Meanwhile, since the Twentieth century, a great deal of natural energy and resources have been consumed in the world, thus, constructing a sewage treatment plant which is efficient and has less adverse impacts on the environment is necessary. Hence the government should pay more attention to advance of the wastewater treatment processes and policy.

This presentation will apply Life cycle assessment (LCA) technology to the evaluation and selection of the wastewater treatment process. LCA is an effective means in determining sewage treatment processes scientifically. The whole life cycle of municipal wastewater treatment plants is divided into three stages: the construction stage, operation stage, and removal stage. Not only the environmental load, but also the economic and technical factors are contained in the LCA model. In fact, Imperial Chemical industries draw a conclusion that environment burden is related to some potential factors, such as green house gases, N, P, other heavy metals and etc. In terms of LCA will give a reliable quantitative results which is helpful to consummate environmental management system.

It is best demonstrated by the concrete example of the biggest municipal wastewater treatment plant in the west of China which is named the ChongQing JiGuanShi wastewater treatment. This case of wastewater treatment process at the ChongQing JiGuanShi plant is evaluated in this presentation, which indicates that the material depletion, energy consumption and environmental burden is lower than from traditional ways. In the whole life cycle of the wastewater treatment process, water is seen as the material, and the influence on the environment is considered as the final product. This research also shows that JiGuanShi sewage treatment main running of A/O/A process has an advantage over the traditional activated sludge process though LCA.

Therefore, LCA is a significant assessment which is important to technological innovation, policy making, and sustainable development.

Keywords: wastewater treatment, life cycle assessment, environment burden, environmental impact assessment.

Study on the preparation of particle catalyst TiO₂

Chen Jie

Introduction

Dyes are extensively used in the textile industry, photo catalytic industry, coating industry and photochemical application. Treatment of colored wastewater from textile or other industries is a serious problem that has attracted the attention of many researches during the last decades. In recent years, semiconducting materials mediated photocatalytic degradation is considered to be a successful and convenient alternative to the conventional methods for the treatment of wastewater containing organic pollutant including dyes. TiO₂ has attracted much attention as a semiconducting material owing to their photocatalytic, self-cleaning and antibacterial properties. There are two commonly used types for TiO₂ photocatalysts in experimental investigations and practical applications: suspended TiO₂ particles and supported TiO₂. In order to overcome the trouble of the separation for suspended TiO₂ particles after reaction, the main attempts are focused on searching for the suitable substrates to support nano TiO₂ in order to improve the recovery efficiency of TiO₂. Of various substrates, zeolites have been most favorable used in supporting TiO₂ due to their unique structures, uniform pores and channels and excellent absorption ability. In this study, I will combine TiO₂ and zeolite and then test the effects on the treatment of methylene blue.

Initial experiment

Preparation

Materials: TiO₂ + zeolite powder + water

1. Form into a sphere
2. Dry at 105° C for 24 hours
3. Calcine in a muffle furnace, heated up to 600° C, keep it for 2 hours, and then use natural cooling.

Experiment group

Hand-made product

1	Zeolite + TiO ₂ + UV	Photocatalysis + absorption
2	Zeolite + UV	Photolysis + absorption
3	Zeolite + TiO ₂	absorption

Photocatalytic activity
Hand-made product & Commercial product

Result

Absorption can reduce methylene blue to 42%, absorption with UV light can reduce it to 34%, and the combination of absorption and photocatalysis can reduce it to 11%. Thus, the composite of zeolite/TiO₂ exhibited a higher efficiency for methylene blue removal.

Nuclear Compounds Concentration of Subsurface Water in Small Catchments, Covered by Forest, Grassland and Farmland in Kawamata Town, Fukushima Prefecture

Pun Ishwar

Introduction

After the Fukushima nuclear power plant accident triggered by the tsunami and earthquake on March 11th, 2011, a huge amount of radionuclides were released into the atmosphere. These radionuclides became fallout with the rain fall pattern onto the ground. Some were trapped by the canopy and through the process of stem flow and through fall, it reached the ground surface. Through the hydrological phenomena of infiltration and percolation, it moves in soil water, shallow groundwater and then to the river and ocean. Finally, through the food chain process, it can harm to human health and the ecosystem.

Methodology

To study the radionuclide concentrations in soil water, Kawamata town, Yamakiya district, Fukushima were chosen, which is nearly 35 Km North West from the Fukushima nuclear power plant accident. For the monitoring of radionuclides in soil water, three sites were chosen; 1) Grassland 2) farmland 3) Young and old forest and a regular sampling of soil water once a week and during rainfall from the 6th of June, 2011, onwards.

The soil water was collected using a suction lysimeter (consisting of a ceramic porous cup) in a flask using a hand pump. The soil water is sampled at depths of 10, 30, and 50 cm in the grassland and forest and 10, 20, and 30 cm in the farmland site. The collected water was filtered using 0.45 μm membrane. The Cesium-134 and Cesium-137 concentrations were determined by a gamma ray spectrometry using a germanium semiconductor detector. Each sample was observed for 30,000 seconds at the Meteorological Research Institute in Tsukuba.

Results and discussion

The concentration of ^{134}Cs and ^{137}Cs in soil water differ from 0.1 to 2.5 Bg/kg. The concentration at a depth of 10 cm were higher than at 30cm and 50 cm depths in grassland and farmland. In the case of forest areas, where the highest concentrations were at a 50 cm depth in young forest at were at levels of ^{134}Cs : 1.5 Bg/kg and ^{137}Cs : 1.6 Bg/kg. Comparatively, higher concentrations of cesium were found in young forests than in old forests.

The decaying rate of some radionuclides are short, but some have long, half –lives and are thought to remain in the environment long term. Therefore, we have to monitor carefully and continuously the movement of radionuclides in the soil water, groundwater, and surface water in the Fukushima nuclear power plant accident area.

Conclusions

The concentrations of cesium in the surface soil are not uniform. It is well known that Cs-137 is supplied through deposition like wet or dry fallout and then absorbed into the surface soil (McCallan et al., 1980) and the cesium profile in the surface soil is the highest near the surface and decreases with depth. (Tamura, 1964; Cremers et al., 1988). The value of ^{134}Cs and ^{137}Cs shows the value range from 0.1 Bq/kg to 2.5 Bq/kg in soil water. Further study should be done on the movement of cesium in the soil with respect to water movement.

Keywords: cesium, radionuclides, nuclear power plant, Fukushima

Assessment impacts of climate change on water allocation on Cau river basin-Vietnam

Vu Van Minh

Water is one of the most important inputs for socio-economic development activities such as domestic life, agriculture, industry, hydropower, the environment, and tourism. Climate change is one big challenge that humankind faces in the 21st century. As the *IPCC technical paper VI-Climate change and water (2008)* states: freshwater resources are vulnerable and have the potential to be strongly impacted by climate change, with wide-ranging consequences for human societies and ecosystems.

Vietnam is likely to be one of the most significantly impacted nations in the world from climate change, due to its very long coastline, high dependence on agriculture, and relatively low levels of development in rural areas (*The Social Dimensions of Adaptation to Climate Change in Vietnam (World Bank, 2010)*). Because of understanding the risk of climate change, the government of Vietnam ratified the United Nations Framework Convention on Climate Change, approved the National Target Program to Respond to Climate Change (2008), and announced the Climate Change and Sea Level Rise Scenarios for Viet Nam (2009).

Assessment impacts of climate change on water resources are important steps to implement The National Target Program to Respond to Climate Change. My research focus is on water allocation in Cau river basin, the main stream of the Thai Binh River system in the Northern Part of Vietnam. The Cau river basin includes the territories of 6 provinces and one city of Vietnam (Bac Kan, Thai Nguyen, Bac Giang, Bac Ninh, Vinh Phuc and the capital Ha Noi). In these areas, water from the Cau and its branches have a vital role for the socio-economic development in currently and in the future.

In my research, based on data sources about climate change scenarios from the Ministry of Natural Resources and Environment of Vietnam, and the Vietnam Institute of Meteorology, Hydrology and Environment, mathematical models will be applied to estimate the impacts of climate change on water resources: CROPWAT for calculate crop water demand, NAM for calculate natural flow, and MIKE BASIN for calculate water allocation. The results from the above models will be inputs for my analysis and assessment about the change of water supply for the water use sectors under impacts of climate change.

Keywords: Climate change, water allocation, Cau river, mathematical model

The Empowerment of Rural Women in Bangladesh for Environmental Conservation: Integrating Traditional Knowledge and Environmental Education

Khanam Syeda Masuma

In Bangladesh, rural women have intimate relationships with the environment. They use, manage, and protect natural resources for food, fuel, fodder, water, medicine and other income generating activities. They are fully aware that their livelihood and family welfare depend on sustainable resource use; and therefore, the environment is to be conserved for their long-term needs.³ In Bangladesh, environmental degradation is a hot issue now. More than men, rural women have to bear the adverse consequences of environmental degradation, especially the ones caused by climate change. However, rural women do not need to be the powerless victims if they are sufficiently empowered to conserve the environment. In the past, the rural women of Bangladesh proved their capacity to manage household food security while coping with natural disasters. Their participation in the Grameen Bank (2006 Nobel Prize laureate) has successfully improved their financial conditions since the 1980s. Based on this understanding, my hypothesis is that the marriage of rural women's traditional knowledge with contemporary environmental education will empower them to cope with environmental degradation and environmental conservation management. For a long time, male-centered social, cultural, political and religious norms have marginalized rural women's knowledge regarding environmental conservation-related tasks such as kitchen gardening, agriculture and animal husbandry. Though rural women have conserved natural resources, some new causes of environmental degradation such as synthetic chemical contaminations by agribusiness, over-population, increased and mismanaged wastes, and climate change cannot always be dealt with through their traditional conservation methods. To cope with these new challenges, rural women need to also be adequately informed through their participation in environmental education projects.

Keywords: Empowerment, rural women, environmental degradation, traditional knowledge, environmental education, environmental conservation, Bangladesh.

³ Khan,Salma (1995). "The Impact of Environment on Women's health Status" in Jahan.et.al.,(eds.), (1995), *Environment and Development: Gender Perspectives*, Dhaka : Women for Women.

Soil Erosion Risk Modeling and Sediment Yield Prediction at Small Watershed Scale in Central Vietnam

Nguyen Thi My Quynh

Soil erosion by water is one of the most critical problems due to its negative impacts on the environment and resulting in high economic costs by its effect on agricultural production, infrastructure, and water quality (Lal 1998; Pimental et al. 1995). An efficient approach to assess soil erosion risk is a method which integrates remotely sensed data and the Revised Universal Soil Loss Equation (RUSLE) within the Geographical Information System (GIS). The RUSLE, a well tested model for erosion prediction, is often used to model the risks of water erosion within GIS platform. Remote sensing data is a very useful tool to obtain information about vegetation which is considered as a protective layer from soil erosion by water (Pham 2008). Although this approach has many advantages in assessing the water erosion risk, it is applied on a large region scale mostly. This study aims to apply this method to model the soil erosion rate and predict the sediment yields in Thua Thien Hue province, where there is a high risk of soil erosion by water because of the most severe climatic conditions and a steeply sloped topography. The watershed of Binh Dien's reservoir was selected as the study site in order to check the potential of this approach when applied at a small catchment scale. Moreover, the role of the vegetation types on reducing the soil erosion risk by water can be used as an empirical reference in forming a detailed implementation plan of the national policy called "Payments for Environmental Services" at the provincial level.

Keywords: soil erosion by water, sediment yield, GIS, remotely sensed data, RUSLE

Estimating the opportunity costs of forest conservation and management policies related to REDD+ mechanism in Bac Kan, Vietnam

Nguyen Tu Anh

It is stated that greenhouse gases play a major role in climate change. According to the Intergovernmental Panel on Climate Change (IPCC), CO₂ from deforestation is the second largest contributor to global greenhouse gas emissions. Moreover, forestry accounts for 17.4 percent of total emissions. Therefore, the Reducing Emissions from Deforestation and Forest degradation plus Forest Conservation in Developing Countries (REDD+) mechanism is considered to be a good option to use in responding to climate change. In the meantime, forest and biodiversity conservation and national and local economic development should be promoted.

Vietnam is identified as one of the countries most vulnerable to climate change. Thus, the Government of Vietnam has struggled with international community to respond to climate change and committed to REDD+. Currently, Vietnam is preparing for the implementation of the REDD+ and Bac Kan is one of the study sites. Located in the North East region of Vietnam, Bac Kan province has a total area of about 485,700 ha with a total population of about 300,000 dominated by 7 ethnic minority groups. The forest coverage of Bac Kan accounts for approximately 55.1% of total province's area with rich forest resources and biodiversity.

Several REDD+ and forest conservation and management related legislation, policies and programmes that were/are being formulated and implemented. However, it is evident that the total forest coverage and the quality of forest in this area is still decreasing. One of the main causes of this situation is the inadequate forest management and conservation policies and legislation.

Recognizing that the economic approach is an appropriate tool to assess policy effectiveness, this study aims to identify a sufficient economic framework and models to evaluate the tangible and intangible values of forest conservation and management based on current national legislation. Recommendations for more appropriate forest conservation and management legislation will be established, especially for the purpose of implementing REDD+. It will consider both aspects of natural resources and environmental protection and local and national economic development.

Keywords: Forest conservation and management, REDD+ implementation, forest legislations, forest policy, opportunity costs of forest conservation, Bac Kan.

Obstacles of Using Economic Instruments In Industrial Wastewater Management in Bac Ninh province, Vietnam

Dao Minh Khue

Industrial wastewater charge is one of the basic economic instruments (EIs) increasingly used in the implementation of environmental policies in many countries, based on the Polluter Pays Principle (PPP). It is expected not only to reduce pollution and the damage it causes, but also to provide needed revenues to reinvest back into wastewater management (WWM) activities and to finance for environmental protection policies.

WW charge has been applied in developed countries for a long time with many remarkable results in pollution control caused by WW. Recently, it has been used in developing countries such as Vietnam. Yet, Vietnam is far behind in using it effectively. In fact, even WW charge for industrial companies is applied but high pollution levels from industrial WW, under-estimated revenue from WW charge, no cooperation from industrial enterprises, etc still take place. This study is carried out to find out the obstacles of applying WW charge in industrial WWM in Bac Ninh province, Vietnam at two levels: (i) at the management level, to determine the constraints encountered in obtaining the funds given for the construction of WW treatment systems and in implementing the WW charge system for industrial enterprises and (ii) at the enterprise level, to determine their attitude towards related charges.

Data used in this study are mainly collected from reports/ research/ questionnaires related to the situation of collecting industrial WW charge in Bac Ninh province. The applied methods include: (i) desk study to review of national legislations relevant to the study and any other published materials (ii) interviews (iii) field visits (iv) questionnaires (v) expert experiences (vi) analysis and synthesis.

Expected results of this study will identify the problems of using WW charge in the industrial field in Bac Ninh province and any necessary recommended solutions for improving water quality and creating a stable regular revenue for the local government for environmental protection activities.

Keywords: Industrial Wastewater Charge, Water Pollution, Economic Instruments, Bac Ninh

**Economic Valuation of Marine Protected Area (MPA) to suggest
a Sustainable Financing Mechanism**
A case study in Nha Trang Bay MPA, Vietnam

Dang Nguyet Anh

Marine protected areas (MPAs) have been recognized as a management tool for conserving fisheries resources, protecting marine ecology and developing livelihoods for communities in and around MPAs. Therefore, the Vietnam government has made great efforts to establish and enhance the management of MPAs throughout the country. However, the use of the national budget for MPA management, which is the current major funding source, is not the long-term strategy of the Vietnam government. Additionally, almost MPAs which are much dependent on foreign financial support through projects cannot continue conservation activities when the projects end. This study begins by raising the questions relating to Marine Protected Area (MPA) financial sustainability. What is needed to help MPAs in Vietnam to reach an autonomous and sustainable financing mechanism? My study is based primarily on empirical data collected through questionnaire surveys with different stakeholders who possibly enjoy the values brought by the Nha Trang Bay MPA including use values, non-use values and option values. The data can also be used to analyze the stakeholders' demands for the MPA. The Contingent Valuation Method (CVM) and the travel cost method are utilized to quantify economic benefits of the Nha Trang Bay MPA, which then act as a ground for prove economic benefits to involving stakeholders. Based on the analysis of the revenue generation channels for the world MPAs, the most appropriate revenue generation scheme for the Nha Trang Bay MPA could be suggested for a sustainable financing mechanism in the area.

Keywords: Marine Protected Area, Nha Trang bay, economic valuation, revenue generation, sustainable financing mechanism.

Optimize Shrimp Harvesting and Water Quality Monitoring for Sustainable Intensive Shrimp Culture. A Case Study in Thua Thien Hue, Vietnam

Ha Nam Thang

Intensive shrimp culture has played a highly important role, not only for the local farmers, but also to our country. However, multi-stage production as well as optimizing that harvesting have been problems in the production system in Vietnam. Due to insufficient research on these issues, the farmers still can't optimize the harvesting schedule and maximize the benefits in the cycle of production.

This research exerts the knowledge of management science, growth equation and cost-benefit analysis to model the partial harvesting in the intensive shrimp culture system. The modeling will be coded by Visual basic language and executed in Excel. On the other hand, we intend to apply the Von Bertalanffy equation to predict the growth of the black tiger shrimp (*Penaeus monodon*, Fabricius 1798) during the production period (approximately six months). Finally, the BOMBER tool (Bio-optical model based tool for estimating water quality and bottom property from Remote sensing images) and ALOS AVNIR images will be incorporated to monitor the water quality in the coastal area. This will aim to study the impact of intensive aquaculture on the external water environment. Sustainable production is the most important issue we hope our farmers can establish.

Keywords: multi-stage, partial harvesting, modeling, Von Bertalanffy, BOMBER

WETLAND MANAGEMENT AND WATERBIRD CONSERVATION IN “MONGOL DAGUUR” STRICTLY PROTECTED AREA

Badamsed Delgermaa

Introduction

Wetlands are one of the most important resources and habitats for flora and fauna diversity. My study focused on the “Mongol Daguur” Strictly Protected Area (SPA) which is located in Northeastern Mongolia. This area is a generally a flat plain with rolling hills holding in swampy wetland areas. This unique ecosystem supports diverse fauna and flora species. It provides an important stopover point for water and shore birds and important breeding ground for rare and endangered species.

It is considered an important global site for biodiversity conservation. In 1997, the broader Daurian International Protected Area was established with the cooperation of Mongolia, Russia, and China of which the Mongol Daguur SPA is a part. The Mongol Daguur was included in the North East Asian International Crane Conservation Network and the Ramsar Wetland International Convention, and is listed as a Man and Biosphere Reserve by UNESCO.

Recently, the effects of global warming, fire, mining, pollution, and overgrazing by domestic animals have negatively impacted the region, especially for rare and endangered species of birds. However, the main problems are the lack of finances and properly trained human resources which prevent the proper protection of the wetland ecosystem in Eastern Mongolia.

These environmental problems have affected the wetland habitat and distribution, population sizes, breeding activities, and the migratory success of waterbirds.

Objectives

I will examine the challenges of wetland management which Northeastern Mongolia faces in conserving waterbird habitats. By identifying these problems I will seek some solution, especially how local people and their knowledge can help to conserve the wetlands in the Strictly Protected Area.

Keywords: wetland management, waterbird conservation, biodiversity, “Mongol Daguur” Strictly protected area, local people

The policies for wetland preservation in Mongolia

Yadmaa Tseveenkhanda

Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. Wetlands can be found where the water table is at or near the surface of the land, or where the land is covered by water. Nowadays, over fifty definitions for wetlands are in use. According to the Ramsar convention, “wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or lowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters.” While institutional understanding of the value of wetlands and associated investment in wetland conservation has perhaps grown most rapidly in the United States, similar changes in peoples’ perception of wetlands have given rise to a range of conservation initiatives worldwide.

Mongolia has 11 sites designated as Wetlands of International Importance, with a surface area of 1,439,530 hectares. The Ramsar Convention on Wetlands came into force in Mongolia on April 8th, 1998. At present, land and rivers have been negatively affected by climate changes and human damage. According to a survey, humans have caused the desertification more often by natural causes. In addition, the frequency of natural disasters are increasing. Wetlands are one of the important methods to support of natural conditions. Therefore, from facts and reasoning, we must improve the policies for a wetlands. Also, the protection of the wetlands is very weak due to a lack of policy, specialized staff, and budgets.

In the case of Mongolia, priorities for action are to improve the quality and quantity of information on the national wetland ecosystems, develop national policies which support wetland conservation, promote appropriate legislation, widen the acceptance of the principles and concepts of wetland conservation by decision makers in government, and to educate the public about conservation and related issues. The aim of this study is to promote national conservation policies, that support wetland conservation and implement legislation.

Keywords: wetland, national conservation policy, value, legislation

Towards sustainable Municipal Solid Waste Management (MSWM) in Jordan

A life cycle assessment study

Mahdi Ikhlayel

The purpose and scope of the study: This study will be involved in an assessment of the solid waste management system in Jordan from the cradle to grave and based on life cycle assessment (LCA) techniques. The purpose is to achieve a sustainable waste management system that is environmentally effective, socially acceptable and economically affordable. The study will mainly focus on three goals (1) To reduce the local environmental burdens (emissions to water, air and land) and to minimize the global warming potential (GWP) (2) To reduce the increasing risk of ground water pollution from the leachate and heavy materials generated in landfill sites (3) To minimize the risk to human health. In this study, emissions of CO₂, CH₄, SO_x, NO_x, BOD, COD, the final amount of land filled waste, recycling and energy recovery ratios will be used as an environmental evaluation index.

Because waste management issues are not only related to the technical aspects, but are also correlated with policies (legislations), human health, and the active participation of society and public awareness, thus, the study will cover such aspects in order to achieve the promotion of environmentally sound waste collection, recycling and disposal.

Methodology: Various waste management scenarios will be proposed and modeled based on specific waste treatment methods while the cost is reduced as much as possible. Through Life Cycle Assessment, the overall environmental burden and the economic cost associated with each scenario will be predicted, comprehensively evaluated and compared to the existing waste management system (the baseline scenario). For example gases like CO₂, CH₄ and NO_x produced by each scenario will be calculated and evaluated, and then the best scenario will be identified. The study will also end up with recommendations after each scenario is carefully analyzed with the corresponding evaluation index.

Keywords: Waste Management, Life Cycle Assessment (LCA), environmental impacts, Global Warming Potential (GWP), GHG emissions, economic cost.

Study on Enhanced Biological Nitrogen Removal by a Sequencing Batch Reactor with Intermittent Aeration

Wansheng Shi

Huge quantities of municipal wastewater that were discharged into water bodies have caused deterioration of the water quality in many areas of China, and many rivers and lakes can't meet the Environmental Quality Standards. To solve the problem, more wastewater treatment plants need to be built, and the treatment level of some old plants should be elevated to remove more pollutants from wastewater- especially excess nitrogen and phosphorus which could result in eutrophication. Though the technology for the removal of pollutants from municipal sewage had reached a high level, the capital investment and operation costs are still high due to the rate-limiting step of biological nitrogen removal process. To achieve efficient nitrogen removal, the process should include the following characteristics: (1) Reasonable distribution of dissolved oxygen for both aerobic nitrification and anoxic denitrification; (2) Maximize the utilization of carbon sources to reduce the corresponding inhibition; (3) Promoting the relative predominance of nitrifying bacteria to accelerate the bio-nitrifying process.

Based on these problems, we established a new process by using the operation strategy of multipoint feeding modes and intermittent aeration. Though this process, the optimal distribution of DO and the carbon sources could be attained, the microbial community could be improved, and the concentrations of nitrifying bacteria could be increased. Moreover, the reaction time was shortened and the treatment capacity of the facilities were enlarged, which ultimately resulted in lower costs for both construction and operation.

We conducted our experiment in a sequencing batch reactor to treat synthetic domestic sewage, with the feeding mode and aeration time being controlled by using timers. The effect of feeding and aeration mode on nitrogen removal was then investigated.

The experimental results showed that 87.2% of TN was removed when adopted the 5-5min (Agitation- aeration) mode, and the efficiency of nitrogen removal could also be improved with the intermittent aeration rate increased under the continuous feeding intermittent aeration mode. Meanwhile, the intermittent aeration rate was not so high or so low for enhancing the TN removal, and 76.5% of TN was removed when adopting the 10-10min (Agitation - aeration) mode under the instantaneous feeding one. The continuous feeding intermittent aeration SBR was better than the instantaneous feeding one in regards to TN removal. Therefore, the application of the newly established process for nitrogen removal was feasible.

Keywords: continuous feeding mode, instantaneous feeding mode, intermittent aeration, biological nitrogen removal

Effect of C/N Ratio on Nitrogen Removal in a Sequencing Batch Biofilm Reactor

Dahu Ding

A novel laboratory-scale sequencing batch biofilm reactor (SBBR) based on an intelligent controlling system (ICS) was subjected to synthetic wastewater with different C/N (COD/TN) ratios (3.8, 6.8, 12.5, 22.0 respectively) to investigate the effects of the C/N ratio on nitrogen removal and furthermore the simultaneous nitrification and denitrification (SND) in the reactor. The experimental results indicated that a C/N ratio of 12.5 was optimal to the simultaneous removal of nitrogen and COD in the SBBR, and the removal efficiencies of ammonia nitrogen ($\text{NH}_4^+\text{-N}$), total nitrogen (TN) and COD were 90.1%, 87.4% and 94.8%, respectively. In addition, the microorganisms grown in the biofilm also had a large capacity of storing the carbon source which resulted in a sharp decrease in COD at the beginning of the operation, so the carbon source could be subsequently provided for denitrification. When the C/N ratio was 12.5, no accumulation of $\text{NO}_3\text{-N}$ or $\text{NO}_2\text{-N}$ was detected, and the removal efficiency of TN was 87.4%, while 80.3%, 79.1% and 37.5% at a C/N ratio of 3.8, 6.8 and 22.0, respectively, demonstrating that the reactor had an efficient SND and the efficiency reached 97.9%.

Keywords: SBBR ; C/N ratio ; efficiency of SND ; intelligent controlling system

Reutilization of soybean residue for production of polysaccharides by edible mushroom under solid state fermentation

Shuhong Li

Soy milk and tofu have been a very popular for thousands of years in Asia, and large quantities of their by-products are generated during the manufacturing process. Producing tofu and soy milk generates considerable soybean residue waste and soy water. The waste disposal leads to potentially serious environmental problems. The composition of the residue is rich in protein, sugars, starch, fat and minerals, which are due to their organic nature are easily assimilated for microorganisms. This makes them very suitable as a high quality medium for the production of secondary metabolites of industrial significance by microorganisms.

Edible mushrooms have been popular oriental medicines used to treat various human diseases. Polysaccharides from edible fungi are one of the main points in research, because they have many active functions. Bioactive polysaccharides in mushrooms can often be extracted from the mycelia of the species without waiting for a full fruiting body to develop. Therefore, mycelia cultivation has received great interest as an efficient method for the industrial production of valuable metabolites, and various agro-industrial by-products have been tried as inexpensive growth substrates.

The aim of the present study is to investigate the feasibility of soybean residue as a substrate for polysaccharides production by different edible mushrooms under solid-state conditions, including *Poria cocos*, *Grifola frondosa* and *Morchella esculenta*. Different experiments, such as pretreatment and fermentation will be conducted in order to select the variables that allow us to obtain high levels of polysaccharides activity. This research will study the changes of sugar, starch, protein, fat and other main compositions during the solid state fermentation process. Polysaccharide extracting techniques will be investigated from the substrate and the mycelium. The extractive will serve to assess the bioactivity of the polysaccharides by in vitro and in vivo experiments. Promising results will open the way for value-added utilization of other similar food processing wastes.

Keywords: soybean residue, edible mushroom, polysaccharides, solid-state fermentation



Opening Remarks



Oral Presentation



Associate Prof. Endo



Faculty and Students



Poster Presentation



Prof. Des Jardins



Group Picture in the Reception Party

