

# JDS International Seminar 2016 • Part II, III

*Sustainability Policy & Practice*

Part II : December 12 and 13, 2016

Part III : January 16 and 17, 2017

Room C501, Natural Science Building C

 *University of Tsukuba*

Japanese Grant Aid for Human Resource Development Scholarship (JDS) Program  
Master's Program in Environmental Sciences  
Graduate School of Life and Environmental Sciences  
University of Tsukuba



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## Part II Monday, December 12

# PROGRAM

- 9:30-9:45            **Opening Remark**
- 9:45-11:30         **Special Lecture I**  
Dr. Mario T. Tabucanon  
Visiting Professor & Senior Research Fellow at the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), Tokyo, Japan  
Emeritus Professor at the Asian Institute of Technology (AIT), Thailand.  
“Leadership for Sustainability”
- 11:30-13:00        Lunch Break
- 13:00-14:00       **Presentation by JDS Fellows I**
1. AZM Farhan Daud  
“Impacts of Constructing Roads and Small Bridges on Chittagon Hill Tribes”
2. Aisha Karpaeva  
“The Mining Sector Capacity Improvement in the Kyrgyz Republic through Building Effective Cooperation among Governments, Mining Companies and Local Communities”
3. Shagdarsuren Chantsalnurmaa  
“A Study on Possibilities of Green Purchasing as a Solution to the Environmental Pollutions in Ulaanbaatar City”
4. Tran Thi Loi  
“Resource Perception, Livelihood Choices in the Context of Changes in the Fisheries and the Economy: A Case Study of Xuan Thuy National Park, Vietnam”
- 14:00-14:30        Coffee Break
- 14:30-15:45       **Presentation by JDS Fellows II**
5. Md. Rezaul Karim  
“Municipal Solid Waste Management through Public-Private-Community Participation in Mymensingh Municipality, Bangladesh”
6. Than Naing Win  
“The Analysis of Environmental Impacts of the Current Municipal Solid Waste Management System in Mandalay City, Myanmar”
7. Tin Min Htoo  
“The Life Cycle Assessment of the Municipal Solid Waste Management System in Yangon City, Myanmar”
8. Vu Van Nam  
“Municipal Solid Waste Management in Hanoi: Toward the Application of Life Cycle Assessment”
- 18:00-20:00       Welcome Reception at “The Soup Factory” building 1 A

Tuesday, December 13

# PROGRAM

- 9:00-10:30      **Special Lecture II**  
Dr. Maurits W. Ertzen  
Associate Professor, The Water Resources Management group of Delft University of Technology  
“Material inheritances. The past in the present”
- 10:30-10:45      Coffee Break
- 10:45-11:30      **Presentation by JDS Fellows III**  
9. Begum Swapna  
“Comprehensive Evaluation of the BRT Project from Gazipur to Airport at Dhaka: With Focus on Environmental Impacts”  
10. D.A. Anura Kumara Amaradewa  
“The Sector-specific Estimation of Greenhouse Gas Emission using Environmentally Extended Input-Output Analysis for Sri Lanka”  
11. Gan-Ochir Davaajargal  
“The Evaluation of the Cost and Benefit of Adopted Air pollution Strategies in the Ger Area, Ulaanbaatar City, Mongolia”
- 11:30-13:00      Lunch Break
- 13:00-13:45      **Presentation by JDS Fellows IV**  
12. Siri Karunaratne  
“The Benefit Analysis of Integrated Municipal Solid Waste Management for Land Use Planning in Sri Lanka”  
13. Chu Minh Thu  
“Evaluating Some Drought Indices for Agricultural Drought Monitoring in Gia Lai Province, Vietnam”  
14. Le Viet Minh  
“A Study on Drought Management and Climate Change Adaptation for the Ben Tre Province in the Mekong Delta, Vietnam”
- 13:45-14:00      Lunch Break
- 14:00-15:35      **Presentation by JDS Fellows V**  
15. Jerome Edem Abiemo  
“The Environmental Implications of the Increase Use of Pesticides among Smallholder Rice Farmers: A Case Study of the Aveyime Community, Ghana”  
16. Rakhmat Baibolotov  
“Rural Development Through the Use of Organic Fertilizer in Agricultural Production of the Kyrgyz Republic”  
17. Ernest Ohene Nkansah  
“Comprehensive Evaluation of Biochar Application in Rice Production in Ghana”  
18. Adwoa Oforiwa Antwi  
“Weights and Measures at the Local Market in Ghana”
- 15:35-15:40      **Closing Remarks**

## Leadership for Sustainability

### **Dr. Mario T. Tabucanon**

Visiting Professor, Senior Research Fellow  
The United Nations University  
(UNU-IAS), Tokyo, Japan, and Technology (AIT), Thailand



### **Abstract**

Leadership for sustainability is about bringing the present state of development into the desired future state, which is to have a world where needs of the present generation are met without compromising those of future generations. In order to transform this ideal vision into tangible reality, strong leadership is essential to promote and effectuate change and mobilize people towards achieving the shared goal. Whereas sustainability conditions are reflected in international multilateral agreements, intergovernmental platforms and declarations on sustainable development. Leadership for sustainable development is founded in the harmony amongst the human dimensions of sustainability – mind, body, soul. Developing leadership abilities and skills entails sound understanding of the fundamental domains of leadership – personal (ability to make right decisions), relational (ability to relate with multiple stakeholders), and contextual (ability to view things in a holistic systems way) - and their interconnections. It is also important to emphasize the roles of rational decision making and policy making, which are pre-requisites for effective implementation of plans that reflect the values and aspirations of societies in the context of sustainable development. Creation of sustainable societies requires leadership that is conversant in sustainable development topics. Current education systems may not be sufficient in bringing up leaders with competencies to resolve sustainability challenges. Higher education requires transformation in order to effectively integrate the vision of sustainability in education curricula whereby building a culture of change and reform. Networking is a strategic tool to effectuate that transformation. The network of higher education institutions known the Promotion of Sustainability in Postgraduate Education and Research Network (ProSPER. Net) will be highlighted as an instrument for developing a new generation of leaders through transforming higher education.

### **Profile**

At UNU-IAS, he serves as Asia-Pacific Regional Adviser to the Regional Centres of Expertise (RCEs) on Education for Sustainable Development (ESD) and oversees the academic alliance known as the Promotion of Sustainability in Postgraduate Education and Research Network (ProSPER.Net). He leads the annual offering of the ASEAN+3 Leadership Programme on Sustainable Production and Consumption. He is head of the “Persistent Organic Pollutants (POPs) Monitoring and Management in the Asian Region” project at UNU-IAS. At AIT, where he served in the faculty for more than three decades (1978-2010), he assumed senior leadership positions - division chairman (1986-89), dean (1995-99 & 2005), vice president (academic, 1998-99), provost (1999-2005) and president (2005). He is founding president of the International Society of Environmental and Rural Development, and International Adviser to the Executive Board of the Sirindhorn International Environmental Park Foundation under the patronage of HRH Princess Maha Chakri Sirindhorn.

## Material Inheritances: The Past in the Present

### Dr. Maurits W. Ertsen

Associate professor  
Delft University of Technology  
The Netherlands



### Abstract

“When in Rome, act as the Romans do” is a well-known proverb. Less well-known, perhaps, is that we also act like Romans in other locations, and in other times. Rome is still everywhere. Take London, where moving in the city center means moving along Roman roads. In this paper, which builds from one of my current book project, I will explore this issue of continuity in our built environment in more detail to show how our material and cultural environments are closely linked to our past. Furthermore, I argue that although we have enough desires to transform our own environment, we are actually constrained in doing so by the same environment that we want to change. My initial argument will be based on examples from the Netherlands: a zoo, a botanical garden, a museum of ethnology and irrigation systems. All four are both material and cultural environments. What these environments have in common as well is that they are creations from the Dutch empire in the Netherlands East Indies – modern Indonesia.

In the second part of the paper, I argue that many of the material remains in the Dutch coastal landscape – canals, sluices, harbours, etcetera – represent ‘morality’ in two ways. First, when the historical landscapes that included these remains were developed, the artefacts (or technologies) co-shaped the relationship between humans and their world. In these emerging landscapes, artefacts (and the material in general) helped to shape relations between different social groups. The material expressions of moral decisions of access and control continued to be present in the landscape and are appreciated today as heritage, the second way morality relates to coastal landscapes: which landscape elements are considered worth preserving and which are not? Through a reconstruction of selected water management infrastructure in the area of Delfland (one of the oldest water boards in the Netherlands), I will show how development of water infrastructure shaped social relations (who could access certain land or control certain infrastructure) as much as the physical landscape itself.

### Profile

Maurits Ertsen is associate professor within the Water Resources Management group of Delft University of Technology, the Netherlands. Maurits is president of the International Water History Association (IWHA) and, alongside Heather Hoag from the University of San Francisco, main editor of Water History, the official journal of the IWHA.

**13:30-14:30**

## **Impacts of Constructing Roads and Small Bridges on Chittagon Hill Tribes**

**AZM Farhan Daud**

### **Abstract**

The purpose of this study is to identify the impacts of developments on the indigenous peoples of the Chittagong Hill Tracts. It also seeks to find out the policies to minimize those impacts. It argues that a new form of encroachment to Indigenous space has marginalized Native political power and traditional cultures. The Chittagong Hill Tracts have been the traditional territories of twelve indigenous tribes since the early seventeenth century. They have maintained their distinctive ethnicity, political practice and culture. In the 1950s, the Bengali people, the majority ethnic group in present-day Bangladesh, migrated into Hill Tribes' territories. This mass migration caused the conflicts over land between Hill Tribes and the Pakistani Government. The conflicts became worse when the government claimed to have acquired indigenous people's ancestral lands for development works such as the construction of dams, roads and bridges. In these processes, it ignored the territorial uses of Native peoples and their spiritual and cultural connections with their lands. The ensuing involuntary resettlement and eviction meant affected the Native peoples who received little compensation for the lands they lost. As a result of developments, land use patterns changed, destroying forest and hill ecosystems, and thus depriving them further of their livelihoods. In the process of constructing highways and bridges, the Bangladesh Roads and Highways Department has also destroyed hills, reclaimed water bodies, cut rare trees, and polluted air and rivers. It has forcibly moved the indigenous people from their homelands.

**Keywords:** Chittagon Hill Tracts, Indigenous peoples

## **The Mining Sector Capacity Improvement in the Kyrgyz Republic through Building Effective Cooperation among Governments, Mining Companies and Local Communities**

**Aisha Karpaeva**

### **Abstract**

The mining industry is the basis of industrial production in the Kyrgyz Republic and it has great importance in the development of the economy. It is become one of the priorities for the Republic. The development of mineral resources occurs mainly in remote mountainous areas. In recent years, the Kyrgyz Republic has faced the big problem of conflicts between mining companies and local communities, which affected not only the local economy but also the socio-economic development of the entire country. Currently there is no effective cooperation mechanism among government agencies, mining companies and local communities. State and local governments do not have clear directives about how to solve these problems. The government has recently failed mediation as it tended to support mining companies. This research aims at identifying the nature of conflicts between local communities and mining companies, by drawing on the positive experience of other countries in solving these problems. It also seeks to find out weaknesses in the legal system of the Kyrgyz Republic in establishing effective cooperation among parties. Also, I try to recommend mechanisms to improve the efficiency of cooperation among government agencies, companies and local communities.

**Keywords:** Mining conflict resolution, environmental conflict, local community

## **A Study on Possibilities of Green Purchasing as a Solution to the Environmental Pollutions in Ulaanbaatar City**

**Shagdarsuren Chantsalnurmaa**

### **Abstract**

Over the years Ulaanbaatar City has experienced significant population increase that has resulted into socio-economic problems and environmental deterioration. The soil in 50% of city's territory is polluted by chemical toxic substances and heavy metals discharged from vehicles, power plants and household coal burning for heating in ger areas. It is also contaminated with untreated industrial and household wastewater. The level of underground water pollution increased by 4 to 10 times since 2000. The level of air pollution has become 35 times higher than the permitted level of air quality standard set by the WHO. Pollution of the urban environment by solid waste has increased. As these problems have become more serious than ever, the Government of Mongolia has adopted green development principles. It also approved strategies for green development, such as "Green Development Policy" in June 2014, and "Green Development Policy Action Plan" in January 2016. Under these policy guidelines, there is need to clarify the possible options for citizens to practice green purchasing and development. This research aims to examine the feasibility and applicability of green purchasing in Ulaanbaatar City.

**Keywords:** Green purchasing, green development, Ulaanbaatar City

## **Resource Perception, Livelihood Choices in the Context of Changes in the Fisheries and the Economy: A Case Study of Xuan Thuy National Park, Vietnam**

**Tran Thi Loi**

### **Abstract**

The wetland in Xuan Thuy National Park was designated in 1989 as the 50th Ramsar site in the world and the first Ramsar site in Southeast Asia. Vietnam has rich biodiversity with 150 vascular plant species, 111 aquatic plant species, 219 bird species, and more than 500 species of benthos and zooplankton (e.g., shrimp, fish, crab, oysters). Aquatic biodiversity directly or indirectly provides food for more than 46,000 local people living in the buffer zone. About 50% of them depend on wetland resources. However, their income from these resources has decreased because of degradation of aquatic resources. Xuan Thuy National Park now exemplifies negative changes such as the degradation of natural resources, unsustainable livelihood practices among local communities, and the limited capacity of human resources. My study examines how environmental and economic changes affect local livelihoods in Xuan Thuy National Park. The research is based on the survey of 50 households in one buffer zone village conducted from February to March 2016. It also attempted to understand local people's perceptions about wetland resources.

**Keywords:** Xuan Thuy National Park, wetland, Ramsar Convention

**14:45-16:00****Municipal Solid Waste Management through Public-Private-Community Participation in Mymensingh Municipality, Bangladesh****Md. Rezaul Karim****Abstract**

In Bangladesh, the informal sector collects, recycles, and disposes waste in traditional ways. Some final waste disposal sites are in open space without processing and precautionary measures to protect the environment. More than 522 towns and cities in the country generate thousands of tons of waste from domestic, industrial, commercial, health care facilities, and farms. People believe that waste management is a responsibility of local government bodies. Over the past few years, Bangladesh has experimented with new technical options and administrative processes to improve the effectiveness of waste management. This paper explores the role of the municipality in solid waste collection, recycling and disposal. It also attempts to find the potential economic benefits, especially job creation, from waste management. It focuses on the public-private partnership for sustainable waste management. Primary and secondary data will be collected to find appropriate strategies for enhancing awareness among communities on waste management. It will also contribute to the modification of existing policies on waste management and employment generation in Mymensingh Municipality.

**Keywords:** Public-Private Partnership, employment, solid waste management**The Analysis of Environmental Impacts of the Current Municipal Solid Waste Management System in Mandalay City, Myanmar****Than Naing Win****Abstract**

Along with its economic growth, rapid urbanization, and population growth in the last several years, Mandalay City has experienced a rapid increase in municipal solid waste (MSW). However, it does not yet have adequate waste collection, treatment and disposal systems. This situation has caused serious environmental and health problems. The latest data suggests that the City generates 339,450 tons of solid waste, of which 80% is collected by the Mandalay City Development Committee (MCDC), and 5% by the informal sector. All the waste collected by MCDC is taken to the final disposal landfill sites, which are very basic without gas collection and liners for leachate collection. In this study, the five potential environmental impact scenarios are analyzed by using life cycle assessment (ISO-14040). The scenario design is based on suitable alternative waste management options considering recycling, biological treatment, thermal treatment and the sanitary landfill gas collection system. The study also includes cost analysis and suitability analysis for the selection of optimum treatment location by using ArcGIS software. The preliminary results show that the current situation generates 473,767 tons of CO<sub>2</sub> eq. and the implementation of the proposed scenarios will significantly reduce this and other emissions.

**Keywords:** Municipal solid waste management, life cycle assessment, alternative waste management options, suitability analysis

## **The Life Cycle Assessment of the Municipal Solid Waste Management System in Yangon City, Myanmar**

**Tin Min Htoo**

### **Abstract**

Yangon City is the largest economic center of Myanmar with about 6 million people in 2016. Current municipal solid waste management in the City mostly relies on open dumping with many negative environmental impacts. The City needs to address the new effective municipal solid waste management system. A scenario analysis by life cycle assessment is used to find the environmental performance of different possible systems focusing on the waste-to-energy policy. The current management system is the baseline scenario and system boundary is collection, recycling, biological treatment, incineration plant and landfill. After analyzing the environmental impacts of the scenarios, the waste-to-energy policy is reviewed by cost-benefit analysis.

**Keywords:** Municipal solid waste management, waste-to-energy policy, scenario analysis, life cycle assessment, cost-benefit analysis

## **Municipal Solid Waste Management in Hanoi: Toward the Application of Life Cycle Assessment**

**Vu Van Nam**

### **Abstract**

Hanoi, the capital city of Vietnam, is the largest city in the country. It is the home of 7.1 million residents. The urbanization in Hanoi has been accompanied by economic and population growth, which have in turn put pressure on the municipal solid waste (MSW) management system. In 2011, Hanoi generated 2,800,310 tons of MSW annually, and collected about 2,016,223 tons, accounting for about 72% of the total waste generation. About 8% of the waste is collected by the informal sector. Waste composting and combusting account for 2% and 5.4% respectively. The rest of waste (84%) is dumped at the simple disposal sites in the City and its neighboring places without leachate and gas collection. In order to optimize benefits and minimize the environmental impacts of MSW, this paper focuses on recycling, composting, incineration and sanitary landfills. The study provides some recommendations for an integrated MSW management system in Hanoi. In doing so, the paper examines viable scenarios. By using the concept of life cycle assessment, the paper analyzes the potential environmental and social economic benefits of the system. By using ArcGIS, it attempts to find out the suitable location for waste treatment and final disposal sites.

**Keywords:** Municipal solid waste, composting, sanitary landfill, life cycle assessment, ArcGIS

**10:45-11:30**

## **Comprehensive Evaluation of the BRT Project from Gazipur to Airport at Dhaka: With Focus on Environmental Impacts**

**Begum Swapna**

### **Abstract**

Dhaka, the capital city of Bangladesh, is one of congested cities in the world. The rapidly rising population and motor vehicle ownership along with increasingly complex land use patterns have worsened traffic congestion. The transport sector in Dhaka is comprised of many different modes of travel, both motorized and non-motorized, often using the same road space. This has resulted in a high level of operational disorder, significantly limiting the efficiency and effectiveness of the existing transport system. Moreover, this situation has increased cost, air pollution and psychological strain, posing a serious risk to the City's sustainability of its environment. The projected trip generation per day for the next 20 year period is 159.63 million, which is about eight times higher than the current trip generation per day [STP]. Therefore, my research aims to introduce a well-organized, properly scheduled mass transit system (BRT) minimizing the existing problems.

**Keywords:** Traffic congestion, BRT, STP

## **The Sector-specific Estimation of Greenhouse Gas Emission using Environmentally Extended Input-Output Analysis for Sri Lanka**

**D.A. Anura Kumara Amaradewa**

### **Abstract**

The ultimate goal of the Kyoto Protocol on Climate Change was the development of a low green house emission strategy to cope with impacts of global warming. To develop such a strategy, it is imperative to identify and analyze the structural relationship between industrial energy usage and sectorial green house gas emission such as CO<sub>2</sub>. This study attempts to construct the Environmentally Extended Input-Output (I-O) table for Sri Lanka by using Input-Output tables from 2000 to 2005. It further estimates the induced emission of carbon untill 2015, based on the simulation of energy consumption in the domestic sector in Sri Lanka. Additionally, it attempts to analyze three pollutants generated by the consumption of fossil fuels: CO<sub>2</sub>, SO<sub>x</sub>, and NO<sub>x</sub>. Furthermore, this study intends to analyze social and environmental benefits of newly launched the "Soorya Bala Sangramaya" project, which is intended to mount solar power panels on rooftops for one million families in Sri Lanka.

**Keywords:** Environmentally Extended Input-Output, green house emission

## **The Evaluation of the Cost and Benefit of Adopted Air pollution Strategies in the Ger Area, Ulaanbaatar City, Mongolia**

**Gan-Ochir Davaajargal**

### **Abstract**

Ulaanbaatar is the coldest capital city in the world. In winter, most residents use raw coal for heating and cooking, leading to the emissions of huge amounts of air pollutants into the atmosphere. As a result, Ulaanbaatar City's air quality is 2-3 times higher than national and World Health Organization's standard values. Recently, the central and City governments have implementing different types of projects in partnership with donor organizations to reducing the level of air pollution, but results are not promising. My study focuses on the cost-benefit analysis and socio-economic analysis of air pollution abatement options in Ulaanbaatar City's "ger" area. It will also estimate and compare the cost-benefit ratios of current projects, to identify the most cost effective project. Both primary and secondary data will be sourced. The results from the study will contribute to policies and decision-making, concerning future air pollution reduction strategies. It will also help increase public awareness on air pollution in Ulaanbaatar City.

**Keywords:** Air pollution, cost benefit analysis, ger area

**13:00-13:45**

## **The Benefit Analysis of Integrated Municipal Solid Waste Management for Land Use Planning in Sri Lanka**

**Siri Karunaratne**

### **Abstract**

The rapid increase in solid waste generation has posed a formidable challenge in developing countries. Sri Lanka has taken many steps to overcome this challenge by assigning the responsibility of solid waste management to local bodies in 1987, and the national policy on solid waste management in 2007. However, the implementation of these initiatives has been inadequate and the health and environmental problems associated with improper waste management have become critical. By 2015, the total generation of municipal solid waste had reached 2,400 tons per day in the country. This study addresses this problem by analyzing the current situation and introducing alternative viable scenarios based on the integrated solid waste management. A case study area, Kandy City, was selected based on its rapidly increasing population, waste generation and its location on the central highlands. Kandy is the third highest solid waste generator in Sri Lanka. The total amount of solid waste reached 177 tons per day in 2015, of which 66% was derived from commercial activities and 34% from household activities. About 78.3% of the total waste is organic. The study examines the potential environmental and socio-economic benefits of viable alternative scenarios by emphasizing on organic waste recovery through composting and biogasification. The study also identifies optimal location for both waste treatment and final disposal sites on the basis of GIS data.

**Keywords:** waste generation, solid waste management, composting, biogasification, optimal location

## **Evaluating Some Drought Indices for Agricultural Drought Monitoring in Gia Lai Province, Vietnam**

**Chu Minh Thu**

### **Abstract**

Drought is a natural disaster that frequently attacks Vietnam. The moisture deficiencies in drought years often cause damage to agricultural production. Thus, drought monitoring plays an important role in mitigating the agricultural damage. However, very few studies on droughts have been conducted for Vietnam. Gia Lai Province is located in the Central Highland of Vietnam. This drought-afflicted area is important for coffee production. This study examines drought in this area by using some drought indices. It also investigates the relationship between some drought indices and crop yield residuals of Gia Lai Province for the period between 2000 and 2010. This investigation can help determine the appropriate index for monitoring agricultural drought. Three drought indices were selected: the Standardized Precipitation Index (SPI), the Byram-Keetch Drought Index (BKDI), and the Crop Drought Index (CDI). SPI is a precipitation-based index. BKDI is a temperature-precipitation based index. CDI is an index based on evapotranspiration and soil moisture. These indices were computed monthly and every 10 days during the growing season by using meteorological data collected in three stations in the study area. Crop yield residuals are calculated by departures of crop yield from trend of crop yield. Spring paddy and coffee were considered to examine the drought indices. The results show that CDI matched the drought events better than SPI and KBDI. In term of the correlation between crop yield residual and these indices, CDI also performed the better value than SPI and KBDI. The results also prove that CDI in the development stage can be used to detect agricultural drought in the study area due to the highest relationship with crop yield residual.

**Keywords:** Agricultural drought, drought monitoring, drought index, crop yield

## **A Study on Drought Management and Climate Change Adaptation for the Ben Tre Province in the Mekong Delta, Vietnam**

**Le Viet Minh**

### **Abstract**

The Mekong Delta is known as a rice basket of Vietnam. It plays a vital role in food security of the country. The Delta has faced climate change impacts such as sea level rise. It has also been affected by upstream development activities such as hydropower development and water diversion. Consequently, the drought has happened more frequently and severely in the dry season since 1998, specifically in 2004, 2010, 2013 and 2016. Moreover, its combination with saline water intrusion has posed the largest challenge for the Mekong Delta. So, the objective of this study is to seek for the holistic and appropriate drought management by using the meteo-hydrological and socio-economic data. The approach methods applied are the deviation and composite (multiple regression analysis) for the relevant drought indices such as the Standardize Precipitation Index (SPI), Streamflow Drought Index (SDI), Water Level Index (WLI), and Standardized Precipitation Evapotranspiration Index (SPEI). The expected result identifies the suitable drought index and multi-indicators for the drought monitoring in the Mekong Delta.

**Keywords:** Climate change, sea level rise and salinity intrusion, drought monitoring and drought indices

**14:00-15:35****The Environmental Implications of the Increase Use of Pesticides among Smallholder Rice Farmers: A Case Study of the Aveyime Community, Ghana****Jerome Edem Abiemo****Abstract**

In the Aveyime community of southern Ghana, smallholder rice farmers in the past used organic pesticides for controlling pests and diseases, as well as compost and farm yard manure to help replenish the soil's lost nutrients. However, with the advent of chemical pesticides, the majority of farmers have become heavily dependent on them. They focus only on their private costs and benefits without considering the impact of using pesticides. This paper investigates the negative environmental impacts of pesticides on rice production. It also estimates and compares the private and social Benefit-Cost Ratios (BCR) of organic and conventional systems of rice production. This research is based on field survey and secondary data sources. It is expected that the study will identify and quantify environmental and health costs related to pesticides usage. Recommendations from this study will help determine future strategies for pesticide monitoring and policy formulation to promote environmental sustainability in Ghana.

**Keywords:** Benefit-cost ratio, conventional system, externalities, pesticides.

**Rural Development Through the Use of Organic Fertilizer in Agricultural Production of the Kyrgyz Republic****Rakhat Baibolotov****Abstract**

The Kyrgyz Republic is an agricultural country with 66.3% of the population living in rural areas. Of the working population, about 39.9% is engaged in agriculture and animal husbandry. Because of insufficient education about new technologies and methods of cultivation, Kyrgyz farmers have not improved productivity. One of the solutions to this situation is the use of organic fertilizer such as animal manure and green manure. The purpose of this study is to identify the methods of natural farming that Mr. M. Fukuoka wrote about in The One Straw Revolution. Fukuoka did not use animal manure but the clover, which is called "green manure." Thus, I want to focus on green manure. My main aim is to clarify the effects of green manure on soil properties, especially the cycle of N, P, K and develop a low-cost and ecological farming method. For the soil survey and analysis, three soil samples were taken from study farms at the Agricultural Research Center (Tsukuba) in the National Agriculture and Food Research Organization (NARO). Two of these samples used green manures such as oat and vetch. The third sample was taken from the soil without using green manures. Then I analyze the effect of green manures on soil micromorphology, physico-chemical and biological properties.

**Keywords:** Natural farming, green manure

## **Comprehensive Evaluation of Biochar Application in Rice Production in Ghana**

**Ernest Ohene Nkansah**

### **Abstract**

Biochar's high porosity, negative surface charge, nutrient rich and carbon sequestration potential, makes it an option for enhancing agricultural yields and reducing global warming. However, the introduction of biochar to farming faces a lot of challenges and uncertainty. Biochar is defined as a carbonaceous substance created through pyrolysis of biomass which is produced with the intent to apply to soil for agricultural and environmental management. This research seeks to assess the profitability of biochar in rice production by comparing social and private cost against their respective benefits in a cost benefit analysis. The result is expected to confirm the cost effectiveness of the new technology in Ghana.

**Keywords:** Biochar

## **Weights and Measures at the Local Market in Ghana**

**Adwoa Oforiwa Antwi**

### **Abstract**

In many commercial transactions, agricultural commodities are evaluated on the basis of weights and measures. However, these transactions at local markets of Ghana revolve around ad hoc volume measures by the use of merchants' baskets and plastic containers. The importance of a standard weight and measures system is a prerequisite nearly for all aspect of economic growth. Improving weights and measures requires the further understanding of not only government's role but also the roles and perceptions of consumers, retailers and wholesalers. This research employs different scenarios to understand key stakeholders perception and interpretation about weights and measure of three main vegetables and rice in Berekum Municipality, Ghana.

**Keywords:** Agriculture, Ghana, market, weight and measures