

26

PROCEEDING

INTERNATIONAL SYMPOSIUM ON SUSTAINABILITY SCIENCE UNDERSTANDING CLIMATE CHANGE PHENOMENA FOR HUMAN WELL BEING

BANDUNG, SEPT 8TH - 10TH '14
CAMPUS OF UNIVERSITAS PADJADJARAN



UNITED NATIONS
UNIVERSITY



MIE
UNIVERSITY



UNIVERSITY of
FLORIDA

UNIVERSITEIT
TWENTE.



LEBIH BAIK



PERTAMAX



INDOCEMENT
HEIDELBERG CEMENT Group

Correct citation:

PSMIL (Postgraduate Programme on Environmental Studies). 2015. Proceeding of the International Symposium on Sustainability Science: Understanding Climate Change Phenomena for Human Well-Being, 8-9 September 2014, Universitas Padjadjaran, West Java, Indonesia.

Website: www.sss2014.unpad.ac.id

E-mail: insys2014@gmail.com

Chair of Organizing Committee:

Prof. Oekan S Abdoellah, MA., Ph.D

Conference Reviewers:

Prof. Johan Iskandar, M.Sc., Ph.D

Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Chay Asdak, M.Sc., Ph.D

Budhi Gunawan, M.Sc., Ph.D

Prof. Dr. Erri Noviar Megantara

Proceeding Editors:

Parikesit, M.Sc., P.hD

Sunardi, M.Si., Ph.D

Dr. Susanti Withaningsih, M.Si

Program Committee and Publications:

Ika Anisya, M.I.L.

Nadia Istiqomah, M.I.L., M.Sc

Linda Yustikasari, M.I.L., M.Sc

Miranti Ariyani, M.I.L.

Gemilang Lara Utama, M.I.L.

Hafsah, M.I.L.

Ghea Sakti Maharani, M.I.L.

Rina Febriani, M.I.L., M.Sc.

M. Ramdhan Firdaus, S.Si.

PROCEEDING INTERNATIONAL SYMPOSIUM ON SUSTAINABILITY SCIENCE

ISBN : 978-602-72141-0-1

Postgraduate Programme on Environmental Studies
Universitas Padjadjaran
2015

PREFACE

In the name of Allah The Most Merciful The Most Compassionate.

We deeply thank to Allah for His help on the successful Symposium, as well as the completion of the proceeding, of Sustainability Science. The symposium and seminar was organized to promote the role of sustainability science under the topic of "*Sustainability Science: Understanding Climate Change Phenomena for Human Well-Being*". It was held in Campus of Universitas Padjadjaran at September 8th - 11th, 2014 to commemorate 57th Dies Natalis of Universitas Padjadjaran. The objectives of the event were to address issues, concepts, approaches, methodologies, and role of sustainability science and researches in bridging the implications of climate change and the human well-being. The organizers of the symposium were Postgraduate Programme on Environmental Studies and Institute of Ecology, Universitas Padjadjaran Indonesia, in collaboration with Universiteit Twente The Netherlands, Mie University Japan, University of Florida, United Nations University Japan, National Council on Climate Change, and National Planning Agency of Republic Indonesia. The participants came from many countries including Indonesia, Malaysia, Laos, The Netherlands, Germany, Japan, and Iraq.

Every submission was assigned to at least two members of the committee for review. This Proceeding consist of 45 papers selected and arranged into four umbrella topics based on the symposium setting. The topics are as follow:

1. Resilience, Adaptation, Mitigation, and Opportunities of Climate Change
2. Planning, governance and management capacities,
3. Indigenous Knowledge, Local Initiatives, and Education related to Climate Change
4. Applicable Innovation Technology to Encounter Climate Change

We would like to thank to all who contributed to the success of this symposium, in particular both the members of steering and organizing committee for their wonderful efforts since the preparation until the completion of the symposium. We are very thankful to all keynote speakers: Prof. P.K. Ramachandran Nair; Prof. Hans Bressers, Prof. Takao Yoshimatsu; Dr. Osamu Saito; and Parikesit M.Sc., Ph.D for a great contribution to share their expertise in an very attractive presentation and fruitful discussion. We are also indebted to Pertamina PT. Pertamina, as well as to PT. Indocement for their financial support. We would also like to extend special thank to conference reviewers: Prof. Johan Iskandar, M.Sc., Ph.D; Dr.Tb. Benito A. Kurnani, Ir., Dip., EST; Chay Asdak, M.Sc., Ph.D; Budhi Gunawan, MA., Ph.D; and Prof. Dr. Erri N. Megantara, and also to proceeding reviewers: Parikesit, M.Sc., Ph.D; Sunardi, M.Si., Ph.D; and Dr. Susanti Withaningsih, M.Si for their precious expertise and timely reviews. Our sincere thank also goes to the Rector of Universitas Padjadjaran and the Governor of Wet Java Province for their gracious service during the symposium. Finally, we sincerely hope that all the participants gained tremendous benefit while having joyable experience during the international symposium and seminar at Universitas Padjadjaran, West Java, Indonesia.

THE CHAIR OF SYMPOSIUM MEMORIAL LECTURE ON “INTERNATIONAL SYMPOSIUM OF SUSTAINABILITY SCIENCE”

Ass.Wr.Wb. and Good morning,

First of all, please allow me to take this opportunity to welcome you all to our campus to attend the international “Symposium on Sustainability Science: Understanding Climate Change for Human Well Being”, which is conducted here, to commemorate the 57rd anniversary of Universitas Padjadjaran. The event is also arranged by Universitas Padjadjaran as a part of our pioneering spirit on environment concern.

The objectives of this symposium are to discuss the issues, concepts, methodologies and role of sustainability science and research in bridging the implications of climate change and human well-being.

Distinguished participants,

This international symposium is attended by 6 keynote speakers from United States of America, Japan, Netherlands, and Indonesia. The symposium is also attended by approximately 200 participants consisting of 47 participants for oral presentations, 14 posters and 139 general participants from different backgrounds such as scientists, government, non-governmental organization, students and other interested stakeholders.

This symposium, I hope, will inspire future leaders of sustainability science. It is my great expectation that sustainability science issue will attract more Indonesian scholars, policy makers, practitioners, and business people in the coming years. And through scientific meeting like this symposium, they will share ideas, opinion, and alternative solutions to meet the challenge of our environmental problems as well as to frame the future transdisciplinary sustainability research and science. .

Distinguished participants,

Let me conclude my speech by thanking all the speakers and participants for taking part in this symposium and getting to know more about the city of Bandung, the Sundanese culture, and the hospitality of its people. I also appreciate for all support to make this symposium possible, especially to all parties and to all media participating in this symposium. I also appreciate for all support and thanks to organizing and steering committees for making this important gathering possible. I also apologize for any inconvenience in organizing this activity.

Finally, I request the rector to officially open the symposium. Thank you very much and have a productive discussion.

Wass.Wr. Wb.

Bandung, September 8th 2014

Prof. Oekan S. Abdoellah MA.PhD.

TABLE OF CONTENTS

PREFACE		i
THE CHAIR OF SYMPOSIUM MEMORIAL LECTURE		ii
TABLE OF CONTENTS		iii - vi
<hr/>		
KEYNOTE'S ABSTRACT		1
Prof. Dr. P. K. Ramachandran Nair	Sustainability Science : A New Emerging Field Beyond Environmental Sciences	1
Prof. Hans Bressers	Sustainability Governance In A Glocalized World : Governance Qualities To Meet The Challenges	2
Prof. Takao Yoshimatsu	Climate Change and Its Impact on Aquaculture	3
Dr. Osamu Saito	Sustainability Science in the Context of Biodiversity and Ecosystem Services : Integrated Ecosystem Assessment In Socio-Ecological Production Landscapes	4
Parikesit, Ph.D	Towards a New Generation of Sustainability : The Needs for Trans-disciplinary Learning Process in Higher Education	5
Plenary session discussion note		6 - 9
<hr/>		
JOURNAL		
<hr/>		
Scope 1 : Resilience, Adaptation, Mitigation, and Opportunities of Climate Change		10
Efraim S, Saut S and Elizabeth R	Promoting Sister City Concept for Sustainable and Resilient Cities: Indonesian Cities in the Face of Climate Change	11 - 18
Joy Clancy	Living with A Changing Climate: Vulnerability and Resilience Viewed Through A Gender Lens	19 - 26
Sabrina H A, Nur K A M, and Husniyah Y.	Education for Sustainable Consumption: An Analysis of the Malaysian Secondary School Curriculum	27 - 31
Asni I dan Agung H L	Carbon Stock in Tree Biomass in Forest-Agricultural Land Use in West Java (Case Study: Cijendil Village, Cianjur)	32 - 37
Dodon Y, Saut S, Fernando S and Wahyu L	Household Vulnerability to Environmental Change : Examining Adaptive Capacity of Households of Flood Risks in Palembang	38 - 44
Praditya A, Saut S, Aplian A P, and Efraim S	Green Infrastructure Implementation in Flood Mitigation Context (Case Study : Flood Canals in Semarang)	45 - 50
Engkus Kusnadi	Towards Green Economy : The Development of Sustainable Agricultural and Rural Development Planning, The Case on Upper Citarum River Basin West Java Province Indonesia	51 - 59
Junia A P and Tri D K P	Seagrass Community Structure in Tunda Island Gulf of Banten	60 - 64
Merry A, Yuyun Y and Tualar S	Effect of Water Level Management on Yield of Lowland Rice in Sobari System	65 - 69
A B Susanto, Galih S A and Nur I F	Synthesis of Seaweed nanoparticles : Potential and Application	70 - 73
Kusdianti, Iriawati, Diky S D, Gagas P I, Bhargavi P, M	Transcriptom Profiling Of In Vitro Culture Of Banana (<i>Musa acuminata</i>) Tolerant To Salt Stress	74 - 76

Genaleen D, Nocolé Z, John E C, and Sri N B W		
Lida A, Sri N B, Widiyanto and Taufikurahman	The Growth and Chromium Content of Banana Plant (<i>Musa acuminata</i>) cv. Ambon Lumut in Chromium Stress Condition	77 - 80
Nono C, Quddus AQM, Rangga JW, Anas, Diani D, M Herman, Ryo Ohsawa, Ayako S, and Hiroshi E	Evaluation on Invasiveness and Agronomic Traits of Transgenic Tomato with Miraculin Gene	81 - 86
Fitra Y, Sri B K P and Eten M N	Heat Tolerance Identification on Adult Madura Breeds Cow According to Rhoad and Benezra Coefficient	87 - 90
Scope 1 Seminar session discussion note		91 - 93
Scope 2 : Planning, governance and management capacities		94
Wahyu W, Fabrice R and Karen S	Mainstreaming of Eco-DRR to Implement Integrated Water Resources Management in Indonesia	95 - 100
Kamia Handayani	Opportunities for Climate Change Mitigation in The Indonesia's Power Sector	101 - 107
Juli Nurdiana, Suwardhika D, Iqbal M and Natawijaya R	An Analysis From Vlieland Consumer's Perspective: A Step Forward to be Zero Waste Island	108 - 118
NiLuh Widyarningsih, Priyono Tjiptoherijanto Sulistyoweni Widanarko, Francisia SS Ery Seda	Household Solid Waste Management System Through Sustainable Consumption	119 - 122
Fernando S, Saut S, Dodon Y, and Ayumas W	Spatial model of Wetland Use Change and Flood Occurrence in Residential Areas	123 - 130
Akhmad F H, Benny J, and Engkus K W	The Region Development Planning Of Sustainable Agropolitan (Case Study : Poncokusumo Sub District, Malang, East Java)	131 - 136
Linda Y and Luloffs K R D	Water Resource Management under Climate Change: Implications for Sustainable Use on Karst Terrain	137 - 143
Annisa J A and Jon C L	Globalization and Domestic Policy Change: The Case of Mandatory Palm Oil Certification Policy In Indonesia	144 - 151
Joko T H	Development Special Allocation Fund for Energy Efficiency in Indonesia	152 - 155
Atikah N, Isní N, and Ine M	Resource Management analysis Of Aquaculture Sustainability (Case Study: Floating Net Cages Reservoir in Cirata)	156 - 160
Hertien Koosbandiah S and Syamsul B	Thematic Map of Cikapundung Catchment Based on Bioindicator Benthos	161 - 164
Yonik M Y and Leony L	Modelling Design and Parameters of Water Quality of Cikapundung River, Bandung	165 - 167
Scope 2 Seminar session discussion note		168 - 170

Scope 3 : Indigenous Knowledge, Local Initiatives, and Education related to Climate Change		171
Elisabeth R	Community Based Wildfire Management in Indonesia	172 - 179
Ardini R and Ahyani R	Clean and Healthy Living Behavior at Household Setting as an Important Determinant Health in Bandung Urban Area	180 - 182
Iendra S, Prayatni S, Tresna D K, Marisa H	Important Factors of Open Defecation Controlling Efforts in Greater Bandung Urban Slum Area	183 - 187
Opan S	Climate Change and Plant Times (Studies in Rice Cultivation Strategy Farmers, Case Study: Leuwihideung Village Darmaraja Subdistrict, Sumedang)	188 - 195
Napsiah	Action of Local People to The Environment of Slope Merapi Yogyakarta	196 - 199
Dede Tresna W	Role of Women in Sustainable Agroforestry	200 - 204
Oot H, Paulus W, Hadi S A, and Setyo M	Environmental Awareness, Interests, and Motives of Bogor Botanic Gardens Visitors : Implications for Interpretive Practices	205 - 207
Scope 3 Seminar session discussion note		208 - 210
Scope 4 : Applicable Innovation Technology to Encounter Climate Change		211
Safrinal S, P Purwanto and B Riyanto	Potential For CO2 Emmision In Transpostation Sector and Reduction Strategies Analysis Related to Greenhouse Gas in Semarang	212 - 214
Nurrohman Wijaya	Current Practice and Performance of Climate Change Adaptation Measures in the Coastal City of Semarang, Indonesia	215 - 221
Annisa J A, Chay A, Oekan S A, Jon C. L	The Development Of Local Ecological Criteria For Sustainable Oil Palm Plantation in Belitung Island	222 - 229
Miranti A, Chay A, and Totok H	Grey Water Footprint Analysis of Rice-Straw Pulp : Toward an Adaptive Strategy to Climate Change	230 - 233
Saptarining W, Haryoto K, Jatna S, H.M.H. Bintoro D	Assessment Of Agriculture Commodities: Sago Palm, Oil Palm, and Paddy on Peatland in Effort to Mitigation of Climate Change	234 - 239
Bob A, Titin S, Nia R and Kartini K	Arbuscular Mycorrhizae Fungi and Sustainability of Artisanal Gold Mining Waste Disposal Site Revegetation	240 - 244
Hafsah, Chay A, and Parikesit	Comparasion Of Consumptive Water On Conventional and Semi Organic Method Potato Cultivation	245 - 247
Mochamad R F, Iin S N, and Sunardi	Productivity of <i>Spirulina fusiformis</i> , (Vorinichin) in Plastic Photobioreactor with Sunlight Filtering	248 - 252
Dewi S, Sandra A A, Sudarsono, Atra R, Aline S H, and Erick R	Breeding, Clonal Propagation and Application of Molecular Marker Analysis of <i>Phalaenopsis</i>	253 - 259
Sandra A A, Dewi S, Tubagus K K A, Eka M D R	Indonesian <i>Phalaenopsis amabilis</i> Poliploidization using Colchicine	260 - 262
Yayan S and Suhara	Diversity and Abundance of Collembola in UPI Botanical Garden	263 - 266
Devianti, Nurpilihan Bafdal, Chay Asdak, Edy Suryadi	Pattern of Land Cover Change Towards Total Erosion in Cimanuk Upstream Sub Watershed	267 - 273

EFFECT OF WATER LEVEL MANAGEMENT ON YIELD OF LOWLAND RICE IN SOBARI SYSTEM

Merry Antralina¹, YuyunYuwariah² and Tualar Simarmata²

¹ Faculty of Agriculture, Bale Bandung University

² Faculty of Agriculture, Padjadjaran University
mantralina@yahoo.com

Abstract – Research aimed to study effect of water level management on yield of lowland rice in System of Organic - Based on Controlled Aerobic Rice Intensification (SOBARI) had been conducted in lowland Group Farmers Sadang Mukti, Sadang Sari Baleendah, Bandung West Java with altitude of 668 m above sea level. The experiment was conducted since April 2013 until July 2013. Research used experimental methods, with Randomized Block design with three replications. The water level management treatment consisting of four water level managements, namely : A = moldy where re-filled when the soil water level had dropped to -15 cm below the soil surface, B = moldy where irrigation re-filled when the soil water level had dropped to -10 cm below the soil surface, C = moldy where irrigation re-filled when the soil water level had dropped to -5 cm below the soil surface, D = flooded water management 3-5 cm above the soil surface (conventional). The results showed that: to mitigate CH₄ from rice field and increase the number of grain per panicle and yield of rice plants, the planting can be done with a water level management moldy, where irrigation re-filled when the soil water level had dropped to -5 cm below the soil surface.

Keywords – SOBARI System, Water level management, yield of rice

I. INTRODUCTION

Naturally rice crops can grow well in a wide range of water levels until saturated conditions. Paddy rice growth best occurs at the level of stagnant water with 2-25 cm height, due to the water continuous conditions, rice plants have two advantages, namely a maximum rice growth and depressed types of grass weeds and *Cyperus rotundus*, although other types of weeds broadleaf not so depressed (Taslim and Fagi, 1988). According to Moody and De Datta (1982) continuous flow in rice field is the most effective way to control weeds. At the level of the water surface about 15 cm rice plants are able to grow better because it has aerenchym vessels that supply O₂ while the weeds do not have the vessels (Kusanagi, 1981). High water levels create anaerobic conditions that interfere with the absorption of nutrients and weed root respiration. Inundation of water causes interfere the process of gas exchange between the air and ground.

Managing proper water level will give a positive impact on the growth and yield of rice plants, because water level management that creates a more aerobic soil conditions can make the plant roots get more oxygen, so that the growth becomes better, and in turn the plants will grow more well and provide optimal results (Berkelaar, 2001). Aerobic conditions also allow soil microbes to get more oxygen thus maintain their survival, and can assist in the process of decomposition of organic materials into materials that can be utilized by the rice plant, so that the growth and yield of rice plants can be increased. There are several techniques that can create water aerobic conditions i.e. saturated water conditions and intermittent techniques.

Regulation of water techniques effects on rice yield and generates a lot of methane gas emissions. Condition of flooded rice is the largest contributor of methane gas into the atmosphere. Globally, it is estimated to be around 18 to 280 Gt of CH₄ per year released into the atmosphere by lowland rice farming. This happens due to the waterlogged conditions are ideal conditions for methanogenic bacteria in the metabolic activity to produce CH₄. (Lindau et al., 1990).

Apart from being a waste, the use of water resources by flooding caused soil pH become neutral, so that the decomposition of organic matter can take place and lead to the formation of CH₄ (Suparyono et al, 1994). Continuous inundation of rice fields, especially in the tropics, will increase the soil temperature and the temperature of the water in paddy fields during the day with a range of 30 °C - 40 °C, most of methanogenic bacteria that play a role in the process of formation of CH₄ is very active at the optimum temperature of 30° C - 40° C (Notohadiprawiro, 1992).

According Setyanto (1997) lowland rice plants play an important role in CH₄ emissions. Allegedly CH₄ released into the atmosphere from paddy fields emitted by the plant, and the rest through stagnant water bubbles.

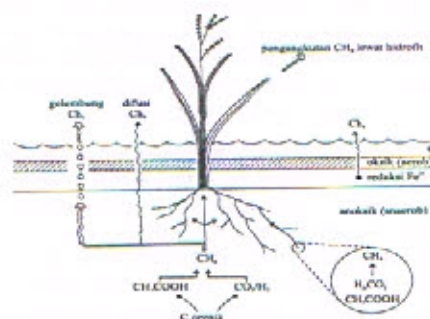


Figure 1. Chart Methane formation in paddy soil and release into the atmosphere according to Takai and Wada (1990) in Notohadiprawiro (1992).

The condition of water resources increasingly limited at this time so that necessary several dealings to overcome them, including water management in paddy rice farming, one of the technologies that can be applied is the approach of in System of Organic - Based on Controlled Aerobic Rice Intensification (SOBARI), this is rice production system integrated with a