



Republic of the Philippines  
**SULTAN KUDARAT STATE UNIVERSITY**  
ACCESS, EJC Montilla, City of Tacurong

**1<sup>st</sup> International Multi-Disciplinary Research and Extension Conference**  
*Theme: Mobilizing ASEAN Researchers through RD&E*  
Sarangani Highlands, General Santos City  
November 8-10, 2018

October 29, 2018

**Notification of Acceptance**

Title of Paper: "OPTIONS AND STRATEGIES FOR DEVELOPMENT OF FARMING IN SUB-OPTIMAL LAND: CASE STUDIES OF THE COASTAL AREA IN YOGYAKARTA, INDONESIA"

**PARTOYO**

Faculty of Agriculture,  
Universitas Pembangunan Nasional Veteran,  
Yogyakarta, Indonesia

Dear Dr. Partoyo:

Thank you for submitting your abstract for **keynote speaker presentation** in the **1<sup>st</sup> International Multi-Disciplinary Research and Extension Conference** with the theme *Mobilizing ASEAN Researchers through RD&E* to be held at Sarangani Highlands, General Santos City on November 8-10, 2018.

We are pleased to inform you that your presentation will be on **the 1<sup>st</sup> keynote session on the day 1** of the conference.

For further information regarding the presentation, please email us at [reextension17@gmail.com](mailto:reextension17@gmail.com) or contact **Ms. Dona Rose F. Genobata** thru mobile number 0977-807-2790.

Thank you and Wassalam!

Very truly yours,

  
**MITOS D. DELCO, PhD**  
Director for Research & Development  
Conference Secretariat

**Options and Strategies for Development of Farming in Sub-optimal Land: Case Studies of the Coastal Area in Yogyakarta, Indonesia**

Partoyo<sup>1\*</sup>

<sup>1</sup>Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Yogyakarta

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**ABSTRACT**

Nowadays, farmland area with a good soil quality is becoming scarce. It is induced either by long-term improper soil nutrient management or by trend of fertile farmland loss due to land conversion to non-agricultural uses. In Yogyakarta, it is recorded around 100 hectares per year of irrigated rice field converted to housings, buildings, and many other needs for urban development. Regulation has been established to manage the trend of land conversion, but still not effective. Alternatively, there are opportunities to develop farming activities in the suboptimal land of Yogyakarta, which are still abundant including the dry land area and the coastal area. Although in nature, there are many constraints in developing farming activities on the suboptimal land. Nevertheless, farmers in Yogyakarta have experienced in developing farming activities in the suboptimal land, particularly in the coastal area. They have succeeded in cultivating some horticultural plant as well as foodstuff commodities, which are having a good quality and high economic value. This paper discusses the options and strategies practiced in the area to deal with the constraint in producing the crops. There are including water management, anticipation for wind-breaking, soil amendment with clayey material and organic matter, crop management and selection, as well as implementing integrated farming concept and challenging to agro-tourism attractions. Besides, the research shows that a long-term utilization of the coastal area for farming activities has improved soil quality as indicated by a higher soil quality index (SQI).

**Keywords:** coastal area, farming, soil quality index, agro-tourism, Yogyakarta



# **1<sup>st</sup> INTERNATIONAL MULTI - DISCIPLINARY RESEARCH AND EXTENSION CONFERENCE**

**Theme:**

***"Mobilizing ASEAN Research through RD&E"***

Sarangani Highlands Garden and Restaurant,  
Purok Wal, Tambler, General Santos City

November 9 - 10, 2018

## MESSAGE

My congratulations to the steering committee of the 1<sup>st</sup> International Multi – Disciplinary Research and Extension Conference for successfully organizing this laudable endeavor.

International research endeavors and extension efforts have always been linked with international linkages. With the advent of ASEAN integration, the need for international partnerships and connectivity is made ever more urgent and significantly more relevant. Alas, the whole idea of ASEAN integration is the establishment of a more inclusive economy and trade. Thus, it is but timely for us to undertake this worthy endeavor. The friendships that we can forge with our foreign counterparts in the coming days would not only be beneficial to our researches, but also to the development of the academe in terms of international representation. This conference likewise provides an avenue for exchange of ideas and best practices upon which we can launch our research endeavors.



The main challenge is to remain competitive and relevant by offering high quality technical academic programmes and research activities, focusing on its niche areas. New knowledge and findings cannot be generated without any research and development (R&D) activities. These efforts will undoubtedly generate lots of interesting results and new knowledge either bring further commercialization activities.

Considering that among the four – fold functions of the University is research and extension, I believe, we have come a long way in making our University research – centered and equipped with research – driven faculty members and students. This activity is a testament to our research and extension driven purpose.

We are spearheading this effort in the belief that human and knowledge capital is our strongest and most valuable resource, and that its development is key to achieving national development and sustaining inclusive growth. We need to provide the Filipino students with the motivation and the means to contribute in uplifting our people's lives. Encouraging partnerships across disciplines can speed up that process.

Research & Development and creative work are crucial to building the knowledge economy. SKSU, as the only state University Sultan Kudarat, is in a unique position to mobilize experts from various sectors—Science & Technology, Arts & Humanities—to think and to work together toward key regional objectives like better quality employment and poverty reduction. And bring these regional objectives to international focus and knowledge, thus providing a wider venue to brainstorming. In this way, SKSU is serving as an academic hub around which government, industry, and civil society can converge as partners in a common cause.

Bridging gaps between regions, SUCs, and countries is the end game of this activity and one of our aims is to generate new knowledge and collaboration between researchers. It is my ardent hope that by the end of this conference, we all can say we have reached our goal. Throughout this conference I ask you to stay engaged, keep proactive and help shape the future of the advancements in research and extension as well as its countless branches and subfields.

Mabuhay!

A handwritten signature in black ink, appearing to read 'Rolando F. Hechanova'.

**ROLANDO F. HECHANOVA, RPAE, PhD**

President

CONFERENCE PROGRAM

November 9, 2018

DAY 1

7:00 am – 8:00 am	Registration
8:00 am – 10:00 am	Opening Program
➤ Invocation.....	<b>JEANNIE A. ROMANO, PhD</b> <i>Dean, College of Arts and Sciences</i>
➤ National Anthem.....	Overture
➤ ASEAN Hymn.....	Overture
➤ Words of Welcome.....	<b>HON. RONNEL RIVERA</b> <i>Mayor - General Santos City</i>
➤ SKSU ACCESS ENACTUS Presentation....	<b>Philippine Representative to the World Cup National Winner</b>
➤ Message.....	<b>ROLANDO F. HECHANOVA, PhD</b> <i>University President</i>
➤ Introduction of the Plenary Speaker.....	<b>ATTY. MARCO RAY GLEYO</b> <i>SKSU Legal Officer and Director, International Affairs</i>
➤ Plenary Speaker.....	<b>DR. MACHYA ASTUTI DEWI, M.Si.</b> <i>Lecturer at Department of International Relations Universitas Pembangunan Nasional</i>
➤ Introduction of the Plenary Speaker.....	<b>JESUSA D. ORTOUSTE, PhD</b>
➤ Plenary Speaker.....	<b>DR. PARTOYO</b> <i>College of Agriculture Facultas Pertanian – UPN Yogyakarta</i>
➤ Giving of Plaque of Appreciation.....	<b>ROLANDO F. HECHANOVA, PhD.</b> <i>President University</i>
➤ Presentation of Guidelines and House Rules	<b>ELVIE V. DIAZ, PhD.</b> <i>DRRMC, Director</i>
➤ Parallel Sessions.....	<b>Session 1 – Sciences, Education and Information Technology</b> <b>Session 2 – Education, Biological and Agri – Aqua Technology</b>

Emcee: **ADRIAN PROTACIO, MAT**  
*SKSU Faculty*



Republic of the Philippines  
OFFICE OF THE PRESIDENT  
COMMISSION ON HIGHER EDUCATION



**MEMORANDUM FROM THE CHAIRMAN**

**FOR :** ALL CHED CENTRAL AND REGIONAL OFFICE DIRECTORS  
ALL PRESIDENTS / HEADS OF PUBLIC AND PRIVATE HIGHER  
EDUCATION INSTITUTIONS (HEIs)

**SUBJECT :** PARTICIPATION IN THE 1<sup>ST</sup> INTERNATIONAL MULTI-  
DISCIPLINARY RESEARCH AND EXTENSION CONFERENCE  
WITH THE THEME, "MOBILIZING ASEAN RESEARCHERS  
THROUGH RD&E", TO BE HELD ON NOVEMBER 9-10, 2018 IN  
GENERAL SANTOS CITY

**DATE :** October 19, 2018

In accordance with the pertinent provisions of Republic Act (R.A.) 7722, otherwise known as the "Higher Education Act of 1994", this Office hereby endorses the above undertaking organized by the Sultan Kudarat State University – Research Development & Extension Division (SKSU-RD&E) for the support and participation of all concerned.

This activity is open to all interested participants from Higher Education Institutions (HEIs).

Participation of officials, employees and students from private higher education institutions shall be VOLUNTARY. Officials and employees of State and Local Universities and Colleges (SUCs and LUCs) who will participate in this activity should obtain prior approval from the President/Head of their respective institutions and are hereby reminded to observe proper use of government funds in accordance with the Department of Budget and Management (DBM) National Budget Circular No. 563 and Budget Circular No. 2017-5.

For registration and further information, you may coordinate with the organizers via email at [recdev@sksu.edu.ph](mailto:recdev@sksu.edu.ph) or through Dr. Mary Lynn G. Magbanua at (0917) 465-1310 and (0977) 807-2790.

Wide dissemination of this Memorandum is desired.

J. PROSPERO E. DE VERA III, DPA

2018-0926-384\_cmp\_SKSU RD&E 1<sup>st</sup> Int'l R&E Conf

Higher Education Development Center Building, C.P. Garcia Ave., UP Campus, Diliman, Quezon City, Philippines  
Web Site: [www.ched.gov.ph](http://www.ched.gov.ph) Tel. Nos. 441-1177, 385-4391, 441-1169, 441-1149, 441-1170, 441-1216, 392-5296, 441-1220  
441-1226, 988-0002, 441-0750, 441-1254, 441-1235, 441-1255, 411-8910, 441-1171, 352-1871



SULTAN KUDARAT STATE UNIVERSITY  
ACCESS Campus, EJC Montilla, Tacurong City



awards this

# CERTIFICATE OF APPRECIATION

to

**DR. PARTOYO**


for sharing his expertise as Plenary Speaker on the topic "Options and Strategies for Development of Farming in Sub-Optimal Land: Case Studies of the Coastal Area in Yogyakarta, Indonesia" during the 1<sup>st</sup> International Multi-Disciplinary Research and Extension Conference held on November 9 -10, 2018 at Sarangani Highlands, General Santos City.

The 1<sup>st</sup> International Multi-Disciplinary Research and Extension Conference with the theme "Mobilizing ASEAN Research through RD&E" is one of the initiatives undertaken by the administration in its quest to establish international affiliations and partnerships as member of the ASEAN region.

Given this 10<sup>th</sup> day of November 2018 at Sarangani Highlands, General Santos City, Province of Sarangani, Philippines.

**ATTY. MARCO RAY S. GLEYO**  
Director for International Affairs

**MARY LYNN G. MAGBANUA, PhD**  
Vice President, RD&E

  
**ROLANDO F. HECHANOVA, RPAE, PhD**  
University President



1<sup>st</sup> INTERNATIONAL MULTI-DISCIPLINARY RESEARCH AND  
EXTENSION CONFERENCE

Sarangani Highlands, General Santos City, The Philippines

November 9-10, 2018

## Options and Strategies for Development of Farming in Sub-optimal Land



Case Studies of the Coastal Area in  
Yogyakarta, Indonesia

Partoyo

Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Yogyakarta

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FACULTY OF AGRICULTURE  
UPN "VETERAN" YOGYAKARTA

**"Bringing knowledge for a better future"**

Jl. Lingkar Utara Condongcatur Yogyakarta 55283

<http://agriculture.upnyk.ac.id>

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**LOCATION**

# UPN "VETERAN" YOGYAKARTA



**Yogyakarta**



**INDONESIA**




**Java island**


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## Province of Yogyakarta Special Region


**Sultan Palace of Yogyakarta**




**2<sup>nd</sup> tourists destination city after Bali**



**Sultan Hamengkubuwono X  
Governor of Yogyakarta**



**Learning and cultural environment**



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## Partners



Overseas

- Universiti Malaysia Serawak (UNIMAS), Malaysia
- Sultan Kudarat State University (SKSU), The Philippines
- Tokyo University of Agriculture and Technology, Japan
- University of Arkansas, USA
- Muray State University, Kentucky, USA
- University of Western Sydney, Australia
- Singapore Polytechnic, Singapore
- Eszterhazy Karoly University, Hungary
- Maejo University, Thailand

FAKULTAS PERTANIAN



**1<sup>st</sup> INTERNATIONAL MULTI-DISCIPLINARY RESEARCH AND  
EXTENSION CONFERENCE**  
Sarangani Highlands, General Santos City, The Philippines  
November 9-10, 2018

## Options and Strategies for Development of Farming in Sub-optimal Land



### Case Studies of the Coastal Area in Yogyakarta, Indonesia

**Partoyo**  
Faculty of Agriculture, Universitas Pembangunan Nasional “Veteran” Yogyakarta  
Jl. Lingkar Utara Condongcatur Yogyakarta 55283, INDONESIA  
<http://agriculture.upnyk.ac.id>



## Background

- ❑ Nowadays, farmland area with a good soil quality is becoming scarce.
- ❑ It is induced either by long-term improper soil nutrient management or by increasing trend of land conversion of fertile farmland to non-agricultural uses.
- ❑ In Yogyakarta, it is reported as much 100 hectares per year of irrigated rice field converted to housings, buildings, and many other needs for urban development.
- ❑ Regulation has been established to manage the trend of land conversion, but still not effective.

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## Background

- ❑ Alternatively, there are opportunities to develop farming activities in the suboptimal land of Yogyakarta, which are still abundant including the dry land area and the coastal area.
- ❑ Although in nature, there are many constraints in developing farming activities on the suboptimal land. Nevertheless, farmers in Yogyakarta have experienced in developing farming activities in the suboptimal land, particularly in the coastal area.
- ❑ They have succeeded in cultivating some horticultural plant as well as foodstuff commodities, which are having a good quality and high economic value.

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## Objectives

- ❑ This paper discusses the options and strategies practiced in the area to deal with the constraint in producing the crops.
- ❑ There are including water management, anticipation for wind-breaking, soil amendment with clayey material and organic matter, crop management and selection, as well as implementing integrated farming concept and challenging to agro-tourism attractions.
- ❑ Besides, the research shows that a long-term utilization of the coastal area for farming activities has improved soil quality as indicated by a higher soil quality index (SQI).

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## Coastal area of Yogyakarta



- ❑ **South bay of Yogyakarta**
- ❑ **Hindia ocean**



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## Sand dune area



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## Sand dune area



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## Wind barrier : multi layers



Combination of forage grass and coconut leaves

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**Combination of moringa, coconut trees, and coconut leaves**

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**Model of wind-breaker to manipulate the microclimate for *Capsicum* cultivation at sand dune agricultural land in Bugel bay, Kulonprogo, YOGYAKARTA**



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## Land preparation



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## Manure

**Amendments for  
improving soil fertility**

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# Clay

**Amendments for improving soil physical and chemical properties**

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# Seed bad preparation

**After mixing the soil with manure and clayey material**

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## Soil Quality

- ❑ To calculate soil quality index for different age of land use, so that it could be recognized relationship between period of land utilization and soil quality improvement.
- ❑ The result showed that according to soil quality index, the applied treatment could improve soil quality.
- ❑ The better soil quality, the higher soil quality index.
- ❑ Land utilized for 19 and 11 years had better soil quality than virgin sand dune land, while land utilized for 3 years had no significant different compared to the virgin land.
- ❑ Soil quality index for the three locations were 0.35; 0.32; 0.28 and 0.17 for land utilized for 19, 11, 3 and virgin land respectively.  
(Partoyo, 2015)

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## Soil physical properties

Soil physical properties of different sand dune agricultural plot

Periode of use	Moiture content (%)	Sand (%)	Silt (%)	Clay (%)	Particle density (g/cm <sup>3</sup> )	Bulk density (g/cm <sup>3</sup> )
<b>I (3 years)</b>	0,58	97,07a	0,69b	2,34a	2,26b	<b>1,58b</b>
<b>II (9 years)</b>	0,52	95,96ab	1,04b	2,21a	2,22b	<b>1,64b</b>
<b>III (11 years)</b>	0,56	91,42b	4,07a	1,40a	2,40b	<b>1,57b</b>
<b>IV-origin</b>	<b>0,32</b>	<b>93,37ab</b>	<b>0,54b</b>	<b>0,70a</b>	<b>2,97a</b>	<b>1,93a</b>

Note: Number in column followed by the same letter indicating a not- significant different according to DMRT 5%;

(Partoyo, 2015)

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## Soil chemical properties

Soil chemical properties of different sand dune agricultural plot

Periode of use	C-Organic (%)	N-total (%)	P-available (ppm)	K-exch (ppm)	pH H <sub>2</sub> O	N-available (%)
<b>I (3 years)</b>	0,82a	0,059a	26,81a	14,76ab	7,08a	0,049ab
<b>II (9 years)</b>	0,78a	0,059a	15,61a	28,05a	7,31a	0,054a
<b>III (11 years)</b>	0,82a	0,051ab	6,40a	16,23ab	6,58a	0,048ab
<b>IV-origin</b>	0,29b	0,043b	4,84a	2,23b	7,01a	0,020b

Note: Number in column followed by the same letter indicating a not- significant different according to DMRT 5%;

(Partoyo, 2015)

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## Soil quality index

Soil quality index of different sand dune agricultural plot

Periode of use	Soil Quality Index (SQI)
<b>I (3 years)</b>	0,3533 a
<b>II (9 years)</b>	0,3234 a
<b>III (11 years)</b>	0,2868 ab
<b>IV-origin</b>	0,1750 b

Note: Number in column followed by the same letter indicating a not- significant different according to DMRT 5%;

(Partoyo, 2015)

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**Utilization of fresh water from groundwater pumping unit, distributed with *sumur renteng* (widely connected reservoir)**



**Water reservoir for irrigation**











**Permanent water reservoir**  
**Collect irrigation water from river**

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The image shows a concrete dam or weir structure built across a river. The water is held back behind the structure, creating a reservoir. The surrounding area is lush with green vegetation, including several tall palm trees. The sky is overcast. A small yellow and red logo is visible in the top right corner of the image frame.



**Onion cultivation at sand dune coastal area of Yogyakarta**

The image shows a long, straight row of young onion plants growing in a field. The plants are green and appear to be in the early stages of growth. The field is situated on a sandy area, likely a coastal sand dune. In the background, there are some trees and a white container. The text is overlaid at the bottom of the image in yellow.



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**Tiron, a superior onion variety developed at sand dune coastal area of Bantul Regency, Yogyakarta**

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**Tiron, a superior onion variety developed in coastal area microclimate**





## Onion yield data

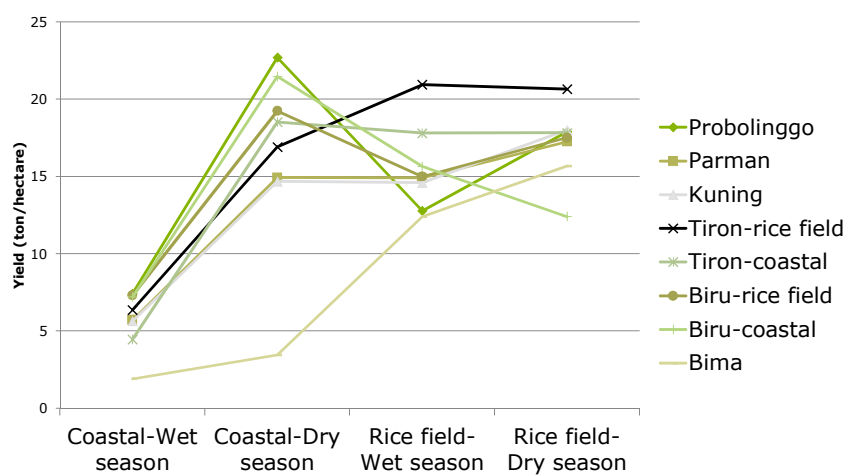
Varieties	Yield (ton.ha-1)
Probolinggo	15,2
Parman	13,2
Kuning	13,24
Tiron-paddy field	16,23
Tiron-coastal land	14,66
Biru-paddy field	14,77
Biru-coastal land	14,19
Bima	8,36
Grand mean	13,73

(Ambarwati & Yudono, 2012)

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## Tiron variety is the superior onion



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Watermelon, a very potential commodity cultivated in the area, harvested up to 3 kg for each



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**Strip cropping** of maize, bean, and onion at coastal farm area of Bugel subdistrict, Kulon Progo Regency, Yogyakarta.







# Corn wind breaker

**Corn strip among the chili crops**

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# Ornamental plant

**Sun flower and zinnia as refugia plants for attracting predators and trapping pests of chili crops**

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## Refugia plant

**Sun flower and zinnia as refugia plants for attracting predators and trapping pests of chili crops**

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## Tourist attraction

**Newly emerging sites for making photo selfies amongst the colourful flower garden**

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