

1st International Conference on Geography and Education (ICGE 2016)

Advances in Social Science, Education and
Humanities Research Volume 79

Malang, Indonesia
29 October 2016

Editor:

Budi Handoyo

ISBN: 978-1-5108-4024-9

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by Atlantis Press
All rights reserved.
<http://www.atlantis-press.com/php/pub.php?publication=icge-16>

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact the publisher:

Atlantis Press
Amsterdam / Paris

Email: contact@atlantis-press.com

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

DISASTER RISK MANAGEMENT

PHYSICAL ASSESSMENT OF BARANGKA TUGURARA TOWARDS VOLCANIC HAZARDS OF GAMALAMA VOLCANO	1
<i>Estuning Tyas Wulan Mei, Djati Mardianto, Evita Pamudianti, Dwi Yanti Amalia</i>	
DISASTER MANAGEMENT PRACTICE TOWARDS DIVERSE VULNERABLE GROUPS IN YOGYAKARTA	7
<i>Dyah Rahmawati Hizbaron, Maulida Iffani, Helvetia Wijayanti, Ghalih Nur W.</i>	
STRENGTHENING LOCAL CAPACITY IN DISASTER RISK REDUCTION (CASE STUDY: DISASTER RESILIENT VILLAGE IN BATU CITY, EAST JAVA, INDONESIA)	13
<i>Nila Restu Wardani, Dwi Fauzia Putra</i>	
SOCIAL DISASTER RISK VULNERABILITY ANALYSIS AS A RESULT OF RURAL URBAN TRANSFORMATION PROCESS (CASE STUDY AT SAWANGAN DEPOK WEST JAVA PROVINCE INDONESIA)	18
<i>Dewi Susiloningtyas, Rantri Candra Restuti</i>	
LANDSAT 7 IMAGERY INTERPRETATION FOR MAPPING POTENTIAL HAZARD OF LANDSLIDE IN BATU CITY AREA OF EAST JAVA PROVINCE, INDONESIA	24
<i>Rudi Hartono</i>	
PEOPLE PARTICIPATION IN DISASTER RISK REDUCTION FLOOD IN DESA TANJUNG SARI DISTRICT OF NORTH CIKARANG BEKASI	28
<i>Sony Nugratama H.</i>	
ASSESSING THE SOCIAL ECONOMIC AND PHYSICAL VULNERABILITIES TO GAMALAMA VOLCANO	33
<i>Estuning Tyas Wulan Mei, Ifa Meilyana Sari, Alia Fajarwati, Diwya Safitri</i>	
DYNAMIC LAND RESOURCE MANAGEMENT IN MT. KELUD AREA	41
<i>Puspita Indra Wardhani, Junun Sartohadi, Sunarto Sunarto</i>	
TSUNAMI RISK EVALUATION BASED ON LAND SUITABILITY FOR SETTLEMENT IN PACITAN COASTAL AREA, EAST JAVA	48
<i>Djati Mardiatno, Cintya Wahyu Permatasari, Mukhamad Ngainul Malawani, Fitria Nuraini Sekarsih</i>	
IMPACT OF COASTAL EROSION AND TIDAL FLOOD TO LAND LOSS AT SRIWULAN VILLAGE, SAYUNG, DEMAK, CENTRAL JAVA PROVINCE	53
<i>Chatarina Muryani, Setya Nugraha, Singgih Prihadi</i>	
REDUCING RISK FROM LAHAR HAZARD IN VOLCANIC CATCHMENT: RETARDING BASIN SITE ASSESSMENT	57
<i>Alzaena Ulya Rusdimi, Junun Sartohadi, Su Ritohardoyo</i>	
LANDSLIDE HAZARD ANALYSIS BASED ON GEOMORPHOLOGICAL APPROACH IN KARO HIGHLAND, NORTH SUMATRA PROVINCE, INDONESIA	62
<i>Dwi Wahyuni Nurwihastuti, Anik Juli Dwi Astuti, Eni Yuniastuti</i>	
LAHAR SUSCEPTIBILITY OF MAGELANG, CENTRAL JAVA AFTER THE 2010 ERUPTION OF MERAPI VOLCANO	66
<i>Suprpto Dibyosaputro</i>	
SPATIAL AND TEMPORAL PATTERN OF FLOOD AREA IN CISADANE WATERSHED, BANTEN PROVINCE	70
<i>Mangapul P. Tambunan, Tjiong Giok Pin, Bintar Permana, Ahmad Zikrullah, Agus Maulana</i>	

PHYSICAL GEOGRAPHY

SEDIMENT CHARACTERISTICS AND BENTHOS COMMUNITY SPREAD IN LAKE BERATAN IN BALI	76
<i>Dewa Made Atmaja, Mth. Sri Budiastuti, Prabang Setyono, Sunarto Sunarto</i>	
IDENTIFICATION OF CONDITION IN COASTAL METINARO MANGROVE FOREST, TIMOR-LESTE	81
<i>Luis Da Costa, Mth. Sri Budiastuti, Sunarto Sunarto, Joko Sutrisno</i>	

WATER INFILTRATION INTO SOIL AND ITS EFFECT TO SURFACE RUNOFF IN SUBDISTRICT OF KASIHAN, BANTUL REGENCY	87
<i>Setyawan Purnama</i>	
POTENTIAL DEVELOPMENT REGION IN PALANGKA RAYA	92
<i>Ratna Saraswati</i>	
WATER ENVIRONMENTAL CARRYING CAPACITY IN URBAN AGGLOMERATION OF YOGYAKARTA CITY	96
<i>E. Yogafanny, S. S. Wardoyo, J. Susanto</i>	
STUDY OF SOIL PROPERTIES AND PHYSICAL LAND CHARACTERISTICS OF CORN FARMLAND IN GORONTALO REGENCY, GORONTALO PROVINCE.....	101
<i>Sri Maryati, Sunarty Eraku</i>	
THE DIVERSITY STUDY OF ASTERACEAE FAMILY AS EFFORT TO DEVELOP ECOTOURISM IN MOUNT LAWU.....	105
<i>Sunarto Sunarto, Titik Warsiti, Sugiyarto Sugiyarto, Widhi Himawan</i>	
IMPROVEMENT OF PEOPLE'S WELFARE THROUGH FULFILLING THE NEEDS OF WATER IN MOROTAI ISLAND AS OUTERMOST ISLAND	111
<i>Lies Wahyuni, Dede Rohmat, Dadang Ruhiat</i>	
THE IMPACT OF LAND USE CHANGE ON THE GROUNDWATER LEVEL IN SUBURBAN AREA.....	117
<i>Suhadi Purwantara, Dyah Respati Suryo Sumunar</i>	

HUMAN GEOGRAPHY

DUGONG IN THE ACCOUNT OF STAMFORD RAFFLES	121
<i>Daya Negri Wijaya, Neni Wahyuningtyas</i>	
ACCESS TO THE INFRASTRUCTURE OF SETTLEMENT FOR SUSTAINABLE DEVELOPMENT GOALS IN RURAL DISTRICT SEMARANG, CENTRAL JAVA, INDONESIA	124
<i>Puji Hardati</i>	
THE SPATIAL VARIATION OF VISITORS OF BEACH RESORTS IN BANYUWANGI REGENCY, EAST JAVA PROVINCE	129
<i>M. H. Dewi Susilowati, Oki Pratama</i>	
RELATIONSHIP AMONG TODDLER TREATMENT, BIOPHYSICAL ENVIRONMENT, AND TODDLER MORBIDITY IN KLAMPAR VILLAGE, PROPO DISTRICT, PAMEKASAN REGENCY	134
<i>Sri Ira Suharwati, Siti Azizah</i>	
POPULATION MOBILITY BASED ON SOCIAL INTEGRITY FACTORS	139
<i>Triwahyudianto, Suwito</i>	
IDENTIFY SUSTAINABLE LIVELIHOOD IN SMALL ISLAND.....	144
<i>Nurul Sri Rahatiningtyas, Elgodwistra Kartikoputro</i>	
TOURISM DEVELOPMENT STRATEGY EX-TIN MINING THE LAKE PONGKAR TANJUNG BALAI KARIMUN, RIAU ISLANDS, INDONESIA	150
<i>T. Putri Tiara, Darsiharjo Darsiharjo</i>	
BUILD CONNECTIVITY SOUTH COASTAL MALANG LUMAJANG 2020.....	156
<i>Agus Purnomo</i>	
INCLUSIVE CITIES: THE NEW ISSUE IN URBAN DEVELOPMENT.....	160
<i>Rini Rachmawati</i>	
THE MEANING OF HOUSEWORK (DOMESTIC SECTOR) FOR THE INDONESIAN LABOR WOMAN'S HUSBAND IN THE VILLAGE OF DUNGMENTEN, REJOTANGAN SUBDISTRICT, TULUNGAGUNG REGENCY.....	166
<i>Singgih Susilo, Wulan Amalia</i>	
STRENGTHENING LOCAL INSTITUTION TO IMPROVE PHYTOREMEDIATION OF MANGROVE FOREST BASED ON CO-MANAGEMENT: CASE STUDY IN WONOREJO, SURABAYA, EAST JAVA, INDONESIA	170
<i>Rudianto Rudianto</i>	
URBAN SPRAWL IMPACT ON THE SOCIAL CHANGE IN WEST SUBURB OF MALANG CITY	177
<i>Satti Wagistina</i>	
FUTURE LIVING ARRANGEMENT OF OLDER PEOPLE: A COMPARISON BETWEEN MALAYSIA AND INDONESIA	182
<i>I Komang Astina, Wan Ibrahim Wan Ahmad</i>	

IDENTIFICATION OF MAIN COMMODITIES AS REGIONAL DEVELOPMENT BONDOWOSO REGENCY	185
<i>Nevy Farista Aristin, Ellyn Normelani, Agus Purnomo</i>	
UTILIZATION OF ORTHOPHOTO IMAGERY FOR MAPPING THE CULTURAL HERITAGE AREA (IJO TEMPLE COMPLEX, DISTRICT PRAMBANAN, YOGYAKARTA)	189
<i>Barandi Sapta Widartono, Arnellya Fitri</i>	
THE ROLE OF CILIWUNG CONDET COMMUNITY IN FOSTERING ECOLOGICAL INTELLIGENCE IN URBAN COMMUNITIES	193
<i>Amin Amin</i>	
LONGITUDINAL LIVELIHOOD STUDY: A CASE STUDY OF TRADITIONAL WEAVERS IN GROGOL VILLAGE, WERU SUBDISTRICT, SUKOHARJO REGENCY, CENTRAL JAVA	196
<i>Abdur Rofi</i>	
A STUDY OF LOCAL WISDOM OF BALINESE AGA AND SAMIN PEOPLE TO DEVELOP ENVIRONMENTAL AWARENESS CHARACTERISTICS	201
<i>Sumarmi Sumarmi</i>	
ENVIRONMENT CONDITION OF INDONESIAN MIGRANT WORKER IN THE DESTINATION COUNTRIES AND THE AMOUNT OF REMITTANCE DELIVERY TO ORIGIN REGION	206
<i>Budijanto Budijanto, Wan Ibrahim Wan Ahmad</i>	
 <u>REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS</u>	
LANDSAT IMAGE ANALYSIS FOR OPEN SPACES CHANGE MONITORING TO TEMPERATURE CHANGES IN SEMARANG CITY	212
<i>Satya Budi Nugraha, Wahid Akhsin Budi Nur Sidiq, Fahrudin Hanafi</i>	
MONITORING OF TEMPERATURE DISTRIBUTION AND VEGETATION INDEX ON VOLCANIC HAZARD ERUPTION WITH LANDSAT-8 THERMAL INFRARED SENSOR IMAGERY	218
<i>Hendro Murtianto, Jupri Jupri, Yakub Malik</i>	
ANALYSIS OF EXAMINATION LOCATION WITH SPATIAL APPROACH (STUDY IN UPBJJ-UT LAMPUNG, SURAKARTA, MAKASSAR AND BANJARMASIN IN UNIVERSITAS TERBUKA)	224
<i>Sri Sumiyati</i>	
STUDY OF POPULATION GROWTH AND LAND USE CHANGE IMPACT OF INTRUSION ON PEKALONGAN CITY	232
<i>Erni Suharini, Fahrudin Hanafi, Wahid Akhsin Budi Nur Sidiq</i>	
ANALYSIS OF BUILDING POSITION AND ORIENTATION TO ASSESS THE BUILDING VULNERABILITY TO LANDSLIDE THROUGH THE INTERPRETATION OF 2D SMALL FORMAT AERIAL PHOTO (CASE STUDY IN BOMPON CATCHMENT, MAGELANG REGENCY)	239
<i>Bobby Setyawan, Junun Sartohadi, Danang Sri Hadmoko</i>	
USING OPEN STREET MAP DATA FOR POPULATION DISTRIBUTION MODEL	244
<i>Nurrokhmah Rizqihandari, Satria Indratmoko</i>	
THE APPLICATION OF GEOGRAPHIC INFORMATION SYSTEM FOR MAPPING SUPERIOR FOOD COMMODITIES IN TABANAN REGENCY	248
<i>Ni Kadek Oki Febrianti, I Ketut Sardiana, Tati Budi Kusmiyarti</i>	
APPLICATION OF LANDSAT 8 IMAGERY FOR POTENTIAL OF GROUNDWATER MAPPING IN BOGOWONTO DOWNSTREAM WATERSHED, PURWOREJO REGENCY	254
<i>Sudaryatno Sudaryatno, Rifqi Fathurrahman, Dessy Ayu Wijayanti</i>	
THE SPATIAL ANALYSIS IN TUNA HABITAT RELATED TO THE OCEAN VARIABILITY IN THE INDIAN OCEAN	262
<i>Abu Bakar Sambah, Feni Iranawati, Syarifah H Julindasari, Dian Pranoto, Ledhyane Ika Harlyan, Ahmad Fauzan Ghafiky</i>	
THE GIS APPLICATION OF MARINE PROTECTED AREA SITE SELECTION, IN TRENGGALEK, EAST JAVA PROVINCE	268
<i>Dhira K. Saputra, Sukandar Sukandar, H. Muliawati, Citra Satrya U., Wahyu P. Pratama</i>	
COMPARISON STUDY OF CROWDSOURCE GEOGRAPHIC INFORMATION SERVICES FOR RURAL MAPPING AND TOPONYM INVENTORY (CASE STUDY IN KEBONDALEM LOR, PRAMBANAN, KLATEN, CENTRAL JAVA)	275
<i>Ari Cahyono, Habib Sidiq Anggoro, Ima Rahmawati</i>	

UTILIZATION OF AERIAL PHOTOGRAPH FOR SPASIAL DATA USING QUADCOPTER (IJO TEMPLE COMPLEX, DISTRICT PRAMBANAN, YOGYAKARTA)	283
<i>Arnellya Fitri, Barandi Sapta Widartono</i>	
SPATIAL ANALYSIS OF DEFORESTATION AND ITS IMPACT ON CARBON EMISSIONS USING FREL	289
<i>Mujiono Mujiono, Tito Latif Indra, Djoko Harmantyo</i>	

GEOGRAPHY EDUCATION

EFFECTS OF SCHOOL ENVIRONMENT TO STUDENT'S SPATIAL INTELLIGENCE IN SENIOR HIGH SCHOOL OF BANDUNG	295
<i>Faiz Urfan, Darsiharjo Darsiharjo, Dede Sugandi</i>	
THE EFFECT OF INTEREST AND MOTIVATION IN LEARNING GEOGRAPHY TOWARDS SPATIAL INTELLIGENCE OF SENIOR HIGH SCHOOL STUDENTS IN KUANTAN SINGINGI REGENCY	300
<i>Henki Warsani, Mamat Ruhimat</i>	
UTILIZATION OF THE MANGROVE FOREST AS A LEARNING SOURCES TO IMPROVE AN UNDERSTANDING OF CONCEPTS AND ENVIRONMENTAL AWARENESS (EXPERIMENTAL QUASY STUDY OF MANGROVE ECOTOURISM KARANGSONG FOR STUDENT PARTICIPANTS AT SMA NEGERI 1 INDRAMAYU)	306
<i>Masruroh Masruroh, Lili Somantri, Dede Rohmat</i>	
THE EFFECT OF LEARNING CYCLE 7E MODEL FOR GEOGRAPHIC ACHIEVEMENT AT MULTIETNICH STUDENTS	310
<i>Iya' Setyasih, Mei Vita Romadhon N., Fatchan Amirudin, Ach. Utaya, Ach. Sugeng</i>	
EFFECT OF PBL LEARNING MODEL ON CRITICAL THINKING SKILLS STUDENTS LEARNING COURSE DESIGN OF GEOGRAPHY	316
<i>Yuli Ifana Sari, Achmad Maulana Malik Jamil, Mustika Arif Jayanti</i>	
THE EVALUATION OF TEACHER CERTIFIED PERFORMANCE IN TULANG BAWANG LAMPUNG	320
<i>Sugeng Widodo</i>	
DEVELOPING INTERACTIVE LEARNING MEDIA FOR LIFE ENVIRONMENT MATERIAL OF THE GEOGRAPHIC	324
<i>Rendra Zainal Maliki</i>	
YOUTH EDUCATION IN SELF- PREPARING AS MARINE ECOTOURISM GUIDE IN KEPULAUAN SERIBU	329
<i>Tuty Handayani, Elgodwistra Kartikoputro, A. Harsono Soepardjo</i>	
MODEL OF MANGROVE ECOSYSTEM UTILIZATION AS MEDIA AND LEARNING RESOURCES OF ENVIRONMENTAL EDUCATION AT SENIOR HIGH SCHOOL	334
<i>Restu Restu, Nurmala Berutu, Muhammad Ridha Syafii Damanik, Meilinda Suriani Harefa</i>	
BRAIN BASED LEARNING: EFFECTS MODEL A-CAR IN CRITICAL THINKING SKILLS	339
<i>Dwiyono Hari Utomo</i>	
MENTAL MAPPING: VIEWING THE SCHOOL ENVIRONMENT OF THE MIND	344
<i>Fatiya Rosyida, Wakhidatus Sholikhah, Ulfi Andrian Sari</i>	
SEKOLAH PASEDULURAN AS A SOCIAL CAPITAL TO INCREASING COMMUNITY PREPAREDNESS TO THE ERUPTION OF MERAPI VOLCANO (CASE STUDY: GLAGAHARJO VILLAGE, CANGKRINGAN SUB-DISTRICT, SLEMAN REGENCY, YOGYAKARTA)	349
<i>Nur'Aini Sabilussalami, Intan Puji Nastiti, Jihaduddin Arif Indrawan, Tiara Handayani, Ahmad Cahyadi, Suprpto Dibyosaputro</i>	
THE IMPLEMENTATION OF OUT DOOR STUDY TO ENCHANCE STUDENTS COMPREHENSION IN GEOMORPHOLOGY SUBJECT	353
<i>Ika Meviana, Dwi Kurniawati</i>	
THE DIFFERENCES IN LEARNING OUTCOMES OF GEOGRAPHY STUDENTS USING ROTATION MODELS	357
<i>Sukma Perdana Prasetya</i>	
GEOGRAPHY LESSON DEVELOPMENT BASED ECOLITERACY	362
<i>Muh. Sholeh</i>	
THE EFFECT GUIDED INQUIRY TO CRITICAL THINKING ABILITY TO BUILD STUDENT CHARACTER IN GEOGRAPHY SUBJECT	367
<i>Desi Nurul H., La Ode Amaluddin, Surdin Surdin</i>	

ANALYSIS OF THE PESANGGEM COGNITIVE ASPECTS OF THE RESOURCES MANAGEMENT PROGRAM COMMUNITY BASED IN MURIA FORES.....	372
<i>Eva Banowati</i>	
ANALYSING THE GEOGRAPHICAL SKILLS ACROSS THE WORLD SECONDARY SCHOOLS CURRICULUM BASED ON THE SCIENTIFIC APPROACH	376
<i>Budi Handoyo, Ach. Amirudin, Hadi Soekanto</i>	
REVITALIZATION OF LOCAL WISDOM IN ENVIRONMENTAL EDUCATION	383
<i>Iman Hilman, Nedi Sunaedi</i>	
Author Index	

Study of Soil Properties and Physical Land Characteristics of Corn Farmland in Gorontalo Regency, Gorontalo Province

Sri Maryati

Department of Earth Science and Engineering
Faculty of Mathematics and Natural Sciences
Universitas Negeri Gorontalo
Gorontalo, Indonesia
Corresponding email: sri.maryati@ung.ac.id

Sunarty Eraku

Department of Earth Science and Engineering
Faculty of Mathematics and Natural Sciences
Universitas Negeri Gorontalo
Gorontalo, Indonesia

Abstract—Corn is the main commodity in the category of food crops other than cassava, sweet potatoes, peanuts and soybeans in the Gorontalo Regency. Based on The Gorontalo Province in Figures 2016, corn production of Gorontalo Regency 2015 was 142863 ton and total harvested area was 26817 hectare. Corn productivity in Gorontalo Regency 2015 was 53.27 kw/ha, the productivity of corn exceeded productivity targets 2016 set by the Ministry of Agriculture 52.62 kw/ha. The purpose of this study is to examine the soil physical properties, soil chemical properties, soil biological properties, and physical land characteristics of corn farmland in the Gorontalo Regency. Data in this study were collected by observation and measurement of the physical land characteristics on the field, soil sampling, and laboratory analysis. Selection of samples was based on the land unit principle. The analysis method used is the quantitative analysis and descriptive analysis. The results showed that the topography, soil conditions, and land conservation system of corn farmland vary widely in the Gorontalo Regency. It determines the corn productivity in the Gorontalo Regency.

Keywords—Soil properties, physical land characteristics, corn farmland

I. INTRODUCTION

Agriculture is a major sector in the Gorontalo Regency. In line with the government program of Gorontalo Province, namely corn based agropolitan program, Gorontalo Regency also put corn as a major commodity. It is also supported by Gorontalo people's habits that make corn as basic food besides rice. Based on The Gorontalo Province in Figures 2016, corn production of Gorontalo Regency 2015 was 142863 ton and total harvested area was 26817 hectare. Corn productivity in Gorontalo Regency 2015 was 53.27 kw/ha, the productivity of corn exceeded productivity targets 2016 set by the Ministry of Agriculture 52.62 kw/ha. The corn crop is spread over 19

districts in Gorontalo. Based on The Gorontalo Regency in Figures 2016, the largest corn producer includes Tibawa Sub District with corn production was 25,234.30 ton; Bongomeme Sub District with corn production was 24,787.80 ton; and Mootilango Sub District with corn production was 19,091.40 ton (BPS – Statistics of Gorontalo Regency, 2016).

Corn was selected as key of agricultural commodities for agropolitan program to sustain the economy of the community in Gorontalo Province based on several things including the corn has a short life 115 days so that the harvest can be obtained quickly, historically corn is the basic food of the Gorontalo society, the public got used to cultivate corn, as well as there is market demand for corn. The results research by Jocom et al (2009) showed that the agropolitan program increase farmers' income through various interventions from the government.

Corn demand in Indonesia is predicted to continue to increase and the corn has a strategic role for both national food security and other industries as well as its role in economic growth so that production must be increased. The occurrence of corn evenly throughout the 19 sub-districts indicates that the corn is easily to be cultivated in the district of Gorontalo. The cultivation of the corn could increase rural society incomes in the Gorontalo Regency, which is largely dependent on the agricultural sector. Hence, Gorontalo Regency should be able to maintain and to increase the production of corn, harvested area, as well as the productivity per year. But the increase in corn production should be respectful to environmental sustainability.

The land preservation for corn cultivation should be taken seriously by the government as stakeholders and farmers as land users. All activities in development must pay attention to the environment, including the cultivation of agricultural crops.

In the context of corn cultivation in the Gorontalo Regency, the implementation should take into account the soil properties and physical land characteristics so that land degradation can be avoided. Land degradation that may arise is the erosion which will cause soil fertility reduction, and may even lead to critical lands.

It is crucial to have serious attention because most of the Gorontalo Regency area has a moderate steep slope (15-25%), steep (25-40%) and very steep (>40%). Besides, land clearing and conversion of land for the cultivation of the corn tend to increase in the Gorontalo Regency. The productivity of the corn crop could be optimal if the plants get the optimal conditions for growth. Optimal plant growth is determined by the land capability, land suitability, land improvement techniques, as well as the appropriate land conservation techniques.

The purpose of this study is to examine the soil physical properties, soil chemical properties, soil biological properties, and physical land characteristics of corn farmland in the Gorontalo Regency. The results of this study are very useful for decision-making for land improvement techniques, appropriate conservation techniques, as well as the determination of interventions to improve the productivity of corn in Gorontalo Regency. Data in this study were collected by observation and measurement of the physical land characteristics on the field, soil sampling, and laboratory analysis. Selection of samples was based on the land units' principle. The analysis method used is the quantitative analysis and descriptive analysis.

II. METHOD

A. Study Area

This study was conducted in Gorontalo Regency, Province of Gorontalo, Indonesia. In term of geographic location, Gorontalo Regency is located between $00^{\circ} 30' - 00^{\circ} 54'$ North Latitude and between $122^{\circ} 07' - 123^{\circ} 44'$ East Longitude. Gorontalo Regency is bordered to the east with Bone Bolango Regency and Gorontalo City, bordered to the west with Boalemo Regency, bordered to the north with North Gorontalo Regency, and bordered to the south with Tomini Bay. The area of Gorontalo Regency is 2.125,47 km². Gorontalo Regency area is 17 percent of the total land area of the Gorontalo Province. Gorontalo Regency consists of 19 sub districts. Map of study area is showed in Fig. 1.

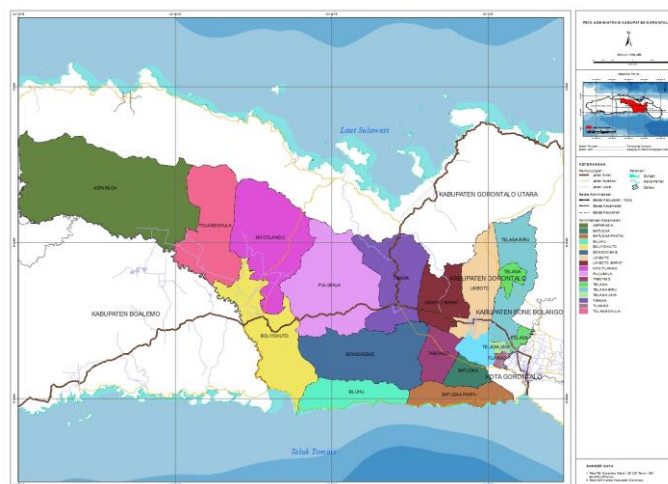


Fig. 1. Map of Study Area

B. Data Collection

The observed parameters in this study include soil properties and physical land characteristics. Indicators were observed for soil properties namely soil texture, organic contents, cation exchanges capacity, and essential nutrients. Indicator were assessed for the physical land characteristics include topography, slope, flood risk, soil erosion risk, coarse material, land cover, and soil tillage.

Those indicators were collected by observation and measurement in the field, soil sampling, soil laboratory analysis, quantitative and descriptive analysis. Determination of sample points was performed using land units approach which was conducted by overlay multiple maps includes landform, slope and soil using ArcGIS 10 software.

III. FINDING AND DISCUSSION

This research was conducted by observation, measurement and data collection in the field. The numbers of sample points in this study are 10 sample points which were determined using land unit approach. The sample points represent the entire landform, topography, and soil types of corn farmland in Gorontalo Regency. The research results are presented in the following sections:

A. Soil Texture

Soil texture determines porosity, infiltration, permeability, consistency, drainage, water and air movement, and erodibility. Hence it will influences type of land tillage, soil erosion control technique and soil conservation method. Soil texture in the study area varies according to the size and percent of soil fraction. The soil textures in the study area are clay, clay loam, loam, sandy loam, sandy clay, and sandy clay loam. Clay was dominated study area and was characterized by very small particle size (<0.02 mm) and low infiltration capacity that causes high surface run off which is flowing over the soil and carrying soil particles.

B. Organic Matter

Percent of soil organic matter is very important in agricultural industry. It affects soil fertility which is influencing plant growth. The soil organic matters analyzed in this study consist of percent of carbon and percent of nitrogen to calculate C/N Ratio. Table 1 shows the percent of soil organic matter and the C/N Ratio in the study area. Based on Table 1, Percent of C-organic in the study area range from 0.78 to 3.18 and Percent of N range from 0.09 to 0.11.

TABLE 1. SOIL ORGANIC MATTER AND THE C/N RATIO

Location	% of C	% of N	C/N Ratio
1	1.56	0.09	17 : 1
2	2.16	0.09	24: 1
3	3.14	0.1	31: 1
4	2.91	0.1	29: 1
5	2.14	0.11	19: 1
6	1.79	0.1	18: 1
7	2.23	0.11	20: 1
8	1.79	0.1	18: 1
9	0.78	0.1	8: 1
10	1.91	0.1	19 : 1

Source: field survey and laboratory analysis, 2016

C. Soil pH, Cation Exchange Capacity, and Base Saturation

Soil pH is a degree of acidity or alkalinity of soil. Soil is indicated as an acid soil if the pH below than 7.0 and indicated as an alkaline soil if the pH is greater than 7.0. The soil pH of the study area ranges from 5.97 to 7.27. Soil pH influences availability of nutrients, availability of microorganism, and soil toxicity. Cation exchange capacity (CEC) associated with percent of organic matter and indicates soil fertility. The cation exchange capacity (CEC) of the study area ranges from 4.96 to 65.29 cmol. Base saturation in the study area ranges from 72 to 100%. Table 2 shows soil pH, cation exchange capacity, and base saturation in the study area.

TABLE 2. SOIL pH, CATION EXCHANGE CAPACITY, AND BASE SATURATION

Location	Soil pH	Cation Exchange Capacity	Base Saturation
1	7.05	14.37	100
2	6.89	31.34	85
3	6.69	42.74	80
4	7.22	65.29	72
5	7.27	23.75	92
6	6.65	20.14	100
7	6.35	13.5	74
8	6.22	11.89	80
9	6.01	4.96	67
10	6.36	16.44	67

Source: field survey and laboratory analysis, 2016

D. Essential Nutrients

Soil essential nutrients that were observed in this study include K, Ca, Na and Mg that are very important to maintain soil fertility. Result of laboratory analysis for essential nutrient in the study area was shown in Table 2. Based on Table 3, Ca in the study area varies from 2.64 to 44.49; Mg ranges from 0.63 to 4.83; K varies from 0.01 to 0.17 and Na varies from 0.01 – 0.03. The result of Ca, Mg, K and Na contents could be used for making decisions about the type of fertilizer should be supplied to the plant or the need for special treatment for soil and plants.

TABLE 3. SOIL ESSENTIAL NUTRIENTS

Location	Ca	Mg	K	Na
1	14.99	1.18	0.01	0.03
2	21.72	4.83	0.02	0.03
3	31.38	2.74	0.17	0.02
4	44.49	2.31	0.2	0.02
5	18.85	2.9	0.13	0.02
6	17.11	3.97	0.04	0.03
7	8.61	1.27	0.12	0.02
8	7.86	1.66	0.02	0.02
9	2.64	0.63	0.04	0.02
10	9.8	1.18	0.04	0.01

Source: field survey and laboratory analysis, 2016

E. Topography

Topographical condition is one of the main factors to be considered in various types of land use, including the cultivation of agricultural crops. The topography of the land determines soil development process, infiltration, soil erodibility level, land capability and land suitability. Topography observed in this study includes surface relief and slope. In the context of corn cultivation, topography will affect

planting techniques, soil management techniques, and soil conservation techniques should be applied to the corn farmland.

Based on observations in the field, it was found that corn crop at Gorontalo Regency planted in almost all classes of slope including 0-3%, 3-8%, 8-15%, 30-40% and > 40%. Photos showing the corn planting in various classes of slope are shown in Fig 2 and Fig 3.



Fig. 2. Corn planting in slope >45%



Fig. 3. Corn planting in slope 8-15%

F. Rock and Outcrop

This study also observed the occurrence and percentage of rock and outcrop in the soil surface. This is considering both of these indicators will determine the land suitability for corn cultivation. Based on the criteria of land suitability for corn crops, the land would be very suitable if the rock and outcrop is <5%, and would be suitable if rock and outcrop is 5-15%. Field observations in the study area indicate that the rock and outcrop are <5% and 5-15%, based on these parameters the study area is in a class very suitable and suitable for corn cultivation.

IV. CONCLUSION AND SUGGESTIONS

After the data from field observation and soil laboratory result were analyzed, this research makes the following conclusions:

- The soil textures in the study area are clay, clay loam, loam, sandy loam, sandy clay, and sandy clay loam.
- Percent of C-organic in the study area range from 0.78 to 3.18 and Percent of N range from 0.09 to 0.11.
- The soil pH of the study area ranges from 5.97 to 7.27, the cation exchange capacity (CEC) ranges from 4.96 to 65.29 cmol and base saturation ranges from 72 to 100%.
- In the context of soil essential nutrients, Ca in the study area varies from 2.64 to 44.49; Mg ranges from 0.63 to 4.83; K varies from 0.01 to 0.17 and Na varies from 0.01 – 0.03.
- Based on observations in the field, it was found that corn crop at Gorontalo Regency planted in almost all classes of slope including 0-3%, 3-8%, 8-15%, 30-40% and > 40%.
- Field observations in the study area indicate that the rock and outcrop are <5% and 5-15%, based on these parameters the study area is in a class very suitable and suitable for corn cultivation.

ACKNOWLEDGMENT

The authors' wish to express their deepest gratitude to Directorate General Higher Education, Ministry of Research, Technology and Higher Education Indonesia for research funding. The authors also acknowledge Rector of Universitas Negeri Gorontalo, Head of Institute for Research and Community Services Universitas Negeri Gorontalo, and Dean of Faculty of Mathematics and Sciences for permit and support to attend the 19th Annual Scientific Meeting of Indonesian Geographers Association (IGI).

REFERENCES

- [1] BPS – Statistics of Gorontalo Province, "Gorontalo Province in Figures 2016," BPS – Statistics of Gorontalo Province : Gorontalo, 2016.
- [2] BPS – Statistics of Gorontalo Regency, "Gorontalo Regency in Figures 2016," BPS – Statistics of Gorontalo Regency: Gorontalo, 2016.
- [3] S. Anugrah, "Pembangunan Perekonomian Perdesaan Berbasis Agribisnis Jagung di Provinsi Gorontalo," Analisis Kebijakan Pertanian Volume 8 No 4, Desember 2010, pp.363-382.
- [4] S. G. Jocom, E. I. K. Putri, and H. Hariyoga, "Dampak Pengembangan Agropolitan Basis Jagung dan Partisipasi Masyarakat di Provinsi Gorontalo: Kasus Kabupaten Pohuwato," Forum Pascasarjana Vol. 32 No. 2 April 2009:103-116.
- [5] Kementerian Pertanian, "Petunjuk Teknis Gerakan Pengembangan Jagung Hibrida 2016," Direktorat Jenderal Tanaman Pangan Kementerian Pertanian: Jakarta, 2015.
- [6] Balai Besar Litbang Sumberdaya Lahan Pertanian, "Jagung (Zea mays)," Retrieved from <http://bbsdlp.litbang.pertanian.go.id/kriteria/jagung>, 2016.