



ICMSE 2015

INTERNATIONAL CONFERENCE ON MATHEMATICS,
SCIENCE, AND EDUCATION



Proceeding of

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SCIENCE, AND EDUCATION 2015**

*Applied Research of Mathematics and Natural Sciences
to Improve Its Usefulness for Knowledge and Society*

**Aston Hotel, Semarang
5 – 6 September 2015**

Organized by
Faculty of Mathematics and Natural Sciences,
Semarang State University - Indonesia



**PROCEEDING
INTERNATIONAL CONFERENCE ON MATHEMATICS,
SCIENCE, AND EDUCATION**

**"Applied Research of Mathematics and Natural Sciences to
Improve Its Usefulness for Knowledge and Society"**

Reviewers:

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Prof. Ir. Ibnu Maryanto, M.Si., Ph.D.
Prof. MD Rahim Sahar
Prof. Dr. Supama, M.Si.
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Prof. M.Supar Rohani
Prof. Dr. Poonsuk Prasertsan
Prof. Dr. Wiyanto, M.Si.
Prof. Dr. Edy Cahyono, M.Si.
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Dr. Masturi, M.Si
Aji Purwinarko, M.Cs

**FACULTY OF MATHEMATICS AND NATURAL SCIENCES
SEMARANG STATE UNIVERSITY
2015**

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PREFACE

Thanks to God Almighty this International Conference Proceeding could be completed. All articles in this proceeding are presented in International Conference On Mathematics, Science, and Education – Applied Research of Mathematics and Natural Sciences to Improve Its Usefulness for Knowledge and Society on September 5-6, 2015 at Aston Hotel Semarang. This Conference is organized by Faculty of Mathematics and Natural Science. This proceeding has been reviewed of Mathematics and Science experts before it is published.

This conference is designed to improve the discussion and research scope in mathematics, science, and education area in the international level. Sub topics in this proceeding cover mathematics, applied mathematics, and mathematics education in accelerating character building. Enhancing biology and biology education research for a better life. Green chemistry in research and education. Physics and physics education for trending research. Hopefully this publication of proceeding will be profitable for all of us.

Semarang, 3 December 2015

Regards
Committee of ICMSE 2015

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MESSAGE FROM THE DEAN OF FMIPA UNNES

Dear Participants of ICMSE 2015,

It is a pleasure to welcome all of you in the first International Conference on Mathematics and Science Educations (ICMSE 2015) held by Faculty of Mathematics and Natural Sciences, Semarang State University.

Faculty of Mathematics and Natural Science Semarang State University or more popularly known as FMIPA Unnes has 6 departments and 11 study programs of Mathematics and Natural Sciences education backgrounds and non education backgrounds. FMIPA Unnes has the mission of being an excellent and meaningful faculty by improving human resources through scientific activity.

One of efforts to result excellent and meaningful human resources through scientific activity is by performing discussion and knowledge sharing. To widen discussion of science and research development in mathematics and science educations scopes in national and international level, ICMSE 2015 was initiated as the medium of that discussion. I believe that ICMSE 2015 as the first international conference held by FMIPA Unnes can facilitate the knowledge sharing in mathematics and science educations area in order to establish a global cooperation among experts and researchers.

With the hope that this conference will be the medium to optimize the role of Mathematics, Science and Education in global cooperation, I am proud to welcome all of you and I wish you a pleasant sharing and discussion in this conference and enjoyable stay in Semarang, Indonesia.

Prof. Dr. Wiyanto, M.Si.

Dean of Faculty of Mathematics and Natural Sciences
Semarang State University

MESSAGE FROM CONFERENCE CHAIRMAN

My pleasure, welcome to you today on the occasion of this International Conference on Mathematics, Science, and Education (ICMSE 2015). I would like to extend my warmest welcome to all of the distinguished participants, especially those who have travelled long distances to be present here. This conference has already established itself as a key event to offer various thoughts and knowledge in enhancing our understanding in fundamental sciences and education.

This conference focus on “Applied Research of Mathematics and Natural Sciences to Improve Its Usefulness for Knowledge and Society”, offers all of us the opportunity to explore exciting information. The aim of the conference is to provide an interdisciplinary forum for scientist engaged in the full spectrum of research and development activities. The meeting intends to bring together researchers, scientists, and scholars to exchange and share their experiences, new ideas, and research result in related fields and discuss the practical challenges encountered and the solutions adopted. I invite all of you to approach this year's events to take advantage of the many ways in which you too might explore the unfamiliar - and discover a great deal in the process.

First, the various sessions that have been organized for the next day promise exciting revelation for all who attend them. Each speakers who are experts in their respective fields, will address a major topic or issue related to Fundamental Sciences,. You might learn more about a topic with which you were already familiar; or you might also find yourself discovering a whole new world of ideas and information you didn't know existed. Either way, you'll have many opportunities to explore fascinating new terrain with these reputable speakers.

Second, the key note speakers will provide, for all of us, an important window into the world of the future. We are privileged to have them as our key note speakers Prof. Barke, Munster University Germany, Prof. Martin Stein, Munster University Germany, Prof. Simone Krees, Munster University Germany, Prof. Matthias Ludwig, University Frankfurt Germany, Prof. Van Horsen, Delf Univesity Netherland, Prof. Rahim Sahar, UTM Malaysia and Dr. Margareta Rahayuningsih, M.Si experience has taken them through the whole cycle of Life and General science.

Finally, as you attend these various events, keep in mind that other people can also serve as doorways to new worlds. Hearing of someone else's background and experiences can often make for fascinating discoveries that can educate and profoundly affect us. So take advantage of this rare gathering of hundreds of people working in various fields to meet one another, talk with one another, and learn from one another.

In conclusion, I hope that you will find your time with us exciting. We have a great agenda for you with esteemed speakers and presenters from our profession. I do hope you will enjoy the next couple of days. I would like to once again extend my gratitude to all the participants, generous sponsor and I look forward to a most successful and fruitful conference.

Professor Dr. Supriyadi, M.Si
Chairman of ICMSE 2015

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SIMULATION OF RADIO TELEMTRY FOR HOME RANGE PREDICTING OF WREATHED HORNBILL (*RHYTICEROS UDULATUS*) ON MOUNT UNGARAN

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ABSTRACT

Dynamics data of home range and utilization of the Wreathed Hornbill (*Rhyticeros undulatus*) habitat in Mount Ungaran be required. The objective of the study was to determine the models of transmitter and receiver to be used in determining the home range area of Wreathed Hornbill in Mount Ungaran Central Java. Time simulation implemented starting in April-August 2015. Simulations step include the identification of specifications and models of radio transmitter, antennas and receivers type are used, matching the wave, manufacture coat (jacket) for telemetry and try the ability, endurance telemetry which is attachment on the specimen in the Mangkang zoo. The result of identification of specifications and models of radio telemetry used the product Holohil System Ltd RI-2C transmitter, the active battery 3 (three) years with the 150000-151999 MHz frequency range. Yagi antenna (Yagi Antenna VHF Perdix 151 MHz) used type whip the product of Perdix Wildlife supplies, while the receiver used Yaetsu FT 1802 M E.

Keyword : Wreathed Hornbill (*Rhyticeros undulatus*), Radio telemetry, simulation, home range

INTRODUCTION

Habitat structure and resource availability are important factors that influence bird communities in both naturally occurring and man-made environments (Chiang et al 2012). The conversion of natural habitats to agriculture, plantation, industry, grazing, illegal logging and urbanization has been cited as causes of declines in bird species.

Wreathed hornbills (*Rycticeros undulatus*) is the bird species of Bucerotidae family that we can found in Mount Ungaran and using of natural forest for their habitat. The conservation status of Wreathed Hornbill has been category in the Least Concern (LC) (IUCN 2014) and based on CITES (Convention on International Trade of Endangered Species of Wild Fauna and Flora), the status belongs to the second appendix (Soehartono and Mardiasuti 2003). Hornbills species including Wreathed hornbill have a very important role in the Mount Ungaran forest as seed dispersers. Population of Wreathed Hornbill on Mount Ungaran is tendency threatened by habitat loss because of illegal logging, fragmentation, local hunting pressure, and also trading of bird. Previous study showed that the natural forest of Mount Ungaran a suitable habitat for Wreathed hornbill (Rahayuningsih and Nugroho 2013, Rahayuningsih and Nugroho 2015). Existence of Wreathed Hornbill in the habitat will support the balance of forest ecosystems and must be

support by conservation of forest environment. One of the efforts to provide a foundation of conservation strategy is through the study of ecology and their habitat. However, no empirical studies of Wreathed Hornbills home ranges and habitat use in Mount Ungaran exist. To estimate the home range and habitat use of Wreathed hornbills, we using radio telemetry method. Radio telemetry is a technique as the transmission of information from a transmitter on a free-ranging wild animal to a receiver. Radio telemetry it possible for determining bird movements over home range in size, breeding area, territories of resident bird species, habitat use, also to the movement patterns of international migratory species. Despite its popularity, radio-telemetry is inappropriate under many circumstances. It is an expensive and time-consuming technique which has proven to be unsuitable for use in some species (Andrusiak et al 1998). In Indonesia Radio telemetry methods have been used on Javan Hawk Eagle, (Afianto et al 1999, Gjersha et al 2004), We have planning Radio telemetry study for three years (2015-2017) with Wreathed Hornbills as a target species. Before the study begin in Mount Ungaran on October-2015, we need simulation the method to ensure which the type of Radio telemetry that we can use. The objective of the study was to determine and simulation the type of transmitter and receiver to be used in the home range area of Wreathed Hornbill in Mount Ungaran Central Java.

METHOD

The early study for simulation start on April-August 2015. The location for simulation at Semarang state University (SSU), Mangkang Zoo, and Mount Ungaran. First step, we have been done to apply letter permission to arrest Wreathed Hornbills to BKSDA (Balai Konservasi Sumberdaya Alam) Central Java, cooperation with LIPI (Lembaga Ilmu Pengetahuan Indonesia) and IBBS (Indonesia Bird Banding Scheme). The data that we need are : identifying specifications and types radiotelemetry, antenna and receiver is used, matching the wave, manufacture coat (jacket) for telemetry, and try ability, endurance telemetry which is mounted on the specimen at the zoo Mangkang and Mount Ungaran..

RESULT AND DISCUSSION

To find the transmitter most suitable for Wreathed Hornbill we are looking for some products through internet sites, one of which was issued by HSL (Holohill Systems Ltd) “Transmitter”. The first step to find the appropriate transmitter is the body size and weight of the bird. Because the body size and weight of Wreathed hornbill estimated to be the type of raptor, then we search the type of transmitter on raptor group. Conventional transmitters consist of an antenna, a power source and a transmitter unit. The transmitter model for raptor group on HSI are BD2, PD2, R1-2B, R2-2C, R12A, S1-2B, and A1-2B (Table 1 Figure 1). Then we look for the type of transmitter that is more specific and tailored to the purpose of research.

Table 1. Transmitter model for Raptor group (HSL)

Model	Attachment method	Weight (gram)	Life (weeks)	Antenna type
BD2	Backpack/tailmount	0.62-1.95	1-20	Whip
PD2	Backpack/tailmount	2.0-4.0	14-26	Whip
R1-2B	Backpack	5-14	26-100	Whip
R1-2C	Backpack/tailmount	5-21	25-250	Whip
R1-2A	Backpack	10-20	40-100	Whip
S1-2B	Backpack	12-16	26-100	Whip
A1-2B	Backpack	19-13	50-250	Whip



Frequency range : 138 to 235 MHz
 Transmitter : Crystal controlle two stage design, pulse by CMOS multivibrator
 pulse widyh & Rate: 20 to 24 ms, nominal 0.6 p/s (36 p/m)

Figure 1. R1-2C transmitter model

The result of identification specifications and radio telemetri model from raptor goup used is the product Holohil System Ltd Ri2C transmitter models, with about 10 grams and the active period of the battery 3 (three) years grams. We used 6 R1-C2 with the different number (Table 2, Figure 2). This transmitter was designed for tail mount attachment on raptors and other birds with robust tails. It can also be configured for backpack attachment to birds, herptiles and small mammals (HTL).

Table 2. R1-2C Transmitter model for Wreathed Hornbill

Model	Serial number	Freq. (MHz)	Pulse	Attachment Methode	Antena type
RI-2C	201043	150.019	0.63	Backpack,	Whip
RI-2C	201044	150.239	0.63	Backpack	Whip
RI-2C	201045	150.319	0.67	Backpack,	Whip
RI-2C	201046	150.470	0.65	Backpack,	Whip
RI-2C	201047	150.661	0.63	Backpack,	Whip
RI-2C	201048	150.880	0.62	Backpack,	Whip

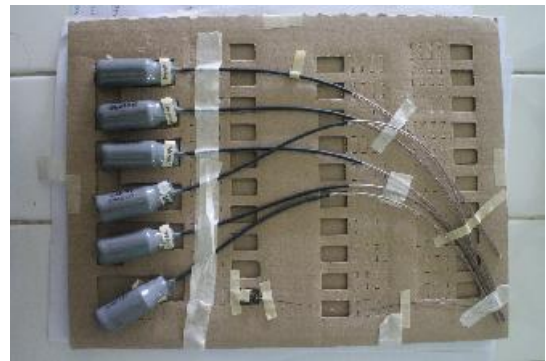


Figure 2 R1-2C transmitter models by HSL with the different number

The antennas type that we used also Whip type, while receivers are used Yaetsu mklk the FT 690 mhz frequency 150000-151999 (Figure 3 and 4).



Figure 3 Antenna Yagi 151 MHz



Figure 4 Radio receiver Yaesu FT-1802 M/E

The next step was to coordinate the member of team researchers, also with LIPI and RCS (Raptor Conservation Society) to conduct stabilization team through theoretical training and simulation in the Semarang state University area (Figure 5), mangkang Zoo, and then directly in the field study.



Figure 5 Simulation radio transmitter in SSU

The training have been done primarily to familiarize team members for distinguish types captured signal receiver, the other team members are required to recognize individuals who have been given a trial installation of radio transmitter.

Trial installation of the transmitter have been done on Wreathed Hornbill specimens in Mangkang Zoo. The transmitter placed in the backpack of the bird for one week (Figure 6 and 7).



Figure 5 To setting radio transmitter on backpack



Figure 6 Radio telemetri backpack attachment method

The test results showed that a transmitter attachment on the backpack has a strong resistance. So that even the birds had several times tried to pull, strong enough transmitter attached and not damaged. After one week simulation, originally a bird disturbed so that it always seeks probe backs and wings to try to take it off, but the next day had not demonstrated such behavior.

The results of trials conducted in the wave reception Mount Ungaran also showed good results, the transmitter can be detected and monitored through a radio receiver that has been configured radio waves.

CONCLUSION

The model and specification radio telemetry are RI-2C transmitters, receivers Yaetsu FT 690 mkl with 150000-151999 mhz frequency and Whip antenna type can be mounted and used on Wreathed Hornbill Mount Ungaran.

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