BUKTI KORESPONDENSI PADA
PROCEDIA ENVIRNONMENTAL SCIENCES

Judul Artikel: Spatial distribution and habitat use of Javan Langur (*Presbytis comata*): case study in District of Kuningan

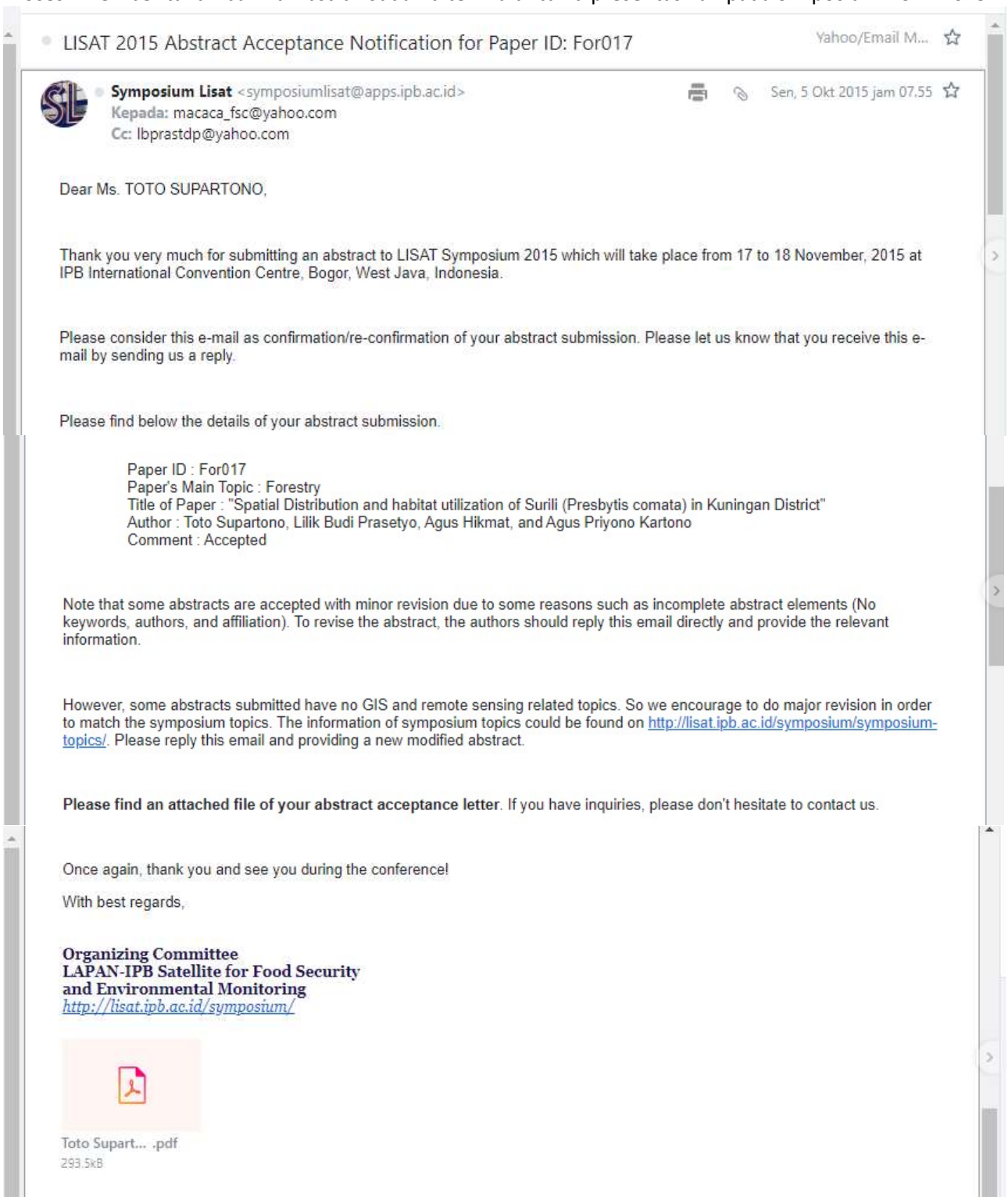
DAFTAR ISI

DAFTAR LAMPIRAN

BUKTI KORESPONDENSI PADA
PROCEDIA ENVIRNONMENTAL SCIENCES

Judul Artikel: Spatial distribution and habitat use of Javan Langur (*Presbytis comata*): case study in District of Kuningan

Proses1. Pemberitahan bahwa Abstrak sudah diterima untuk dipresentasikan pada Simposium LISAT 2015



LISAT 2015 Abstract Acceptance Notification for Paper ID: For017

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kepada: macaca_fsc@yahoo.com
Cc: lbprastdp@yahoo.com

Sen, 5 Okt 2015 jam 07.55

Dear Ms. TOTO SUPARTONO,

Thank you very much for submitting an abstract to LISAT Symposium 2015 which will take place from 17 to 18 November, 2015 at IPB International Convention Centre, Bogor, West Java, Indonesia.

Please consider this e-mail as confirmation/re-confirmation of your abstract submission. Please let us know that you receive this e-mail by sending us a reply.

Please find below the details of your abstract submission.

Paper ID : For017
Paper's Main Topic : Forestry
Title of Paper : "Spatial Distribution and habitat utilization of Surili (Presbytis comata) in Kuningan District"
Author : Toto Supartono, Lilik Budi Prasetyo, Agus Hikmat, and Agus Priyono Kartono
Comment : Accepted

Note that some abstracts are accepted with minor revision due to some reasons such as incomplete abstract elements (No keywords, authors, and affiliation). To revise the abstract, the authors should reply this email directly and provide the relevant information.

However, some abstracts submitted have no GIS and remote sensing related topics. So we encourage to do major revision in order to match the symposium topics. The information of symposium topics could be found on http://lisat.ipb.ac.id/symposium/symposium-topics/. Please reply this email and providing a new modified abstract.

Please find an attached file of your abstract acceptance letter. If you have inquiries, please don't hesitate to contact us.

Once again, thank you and see you during the conference!

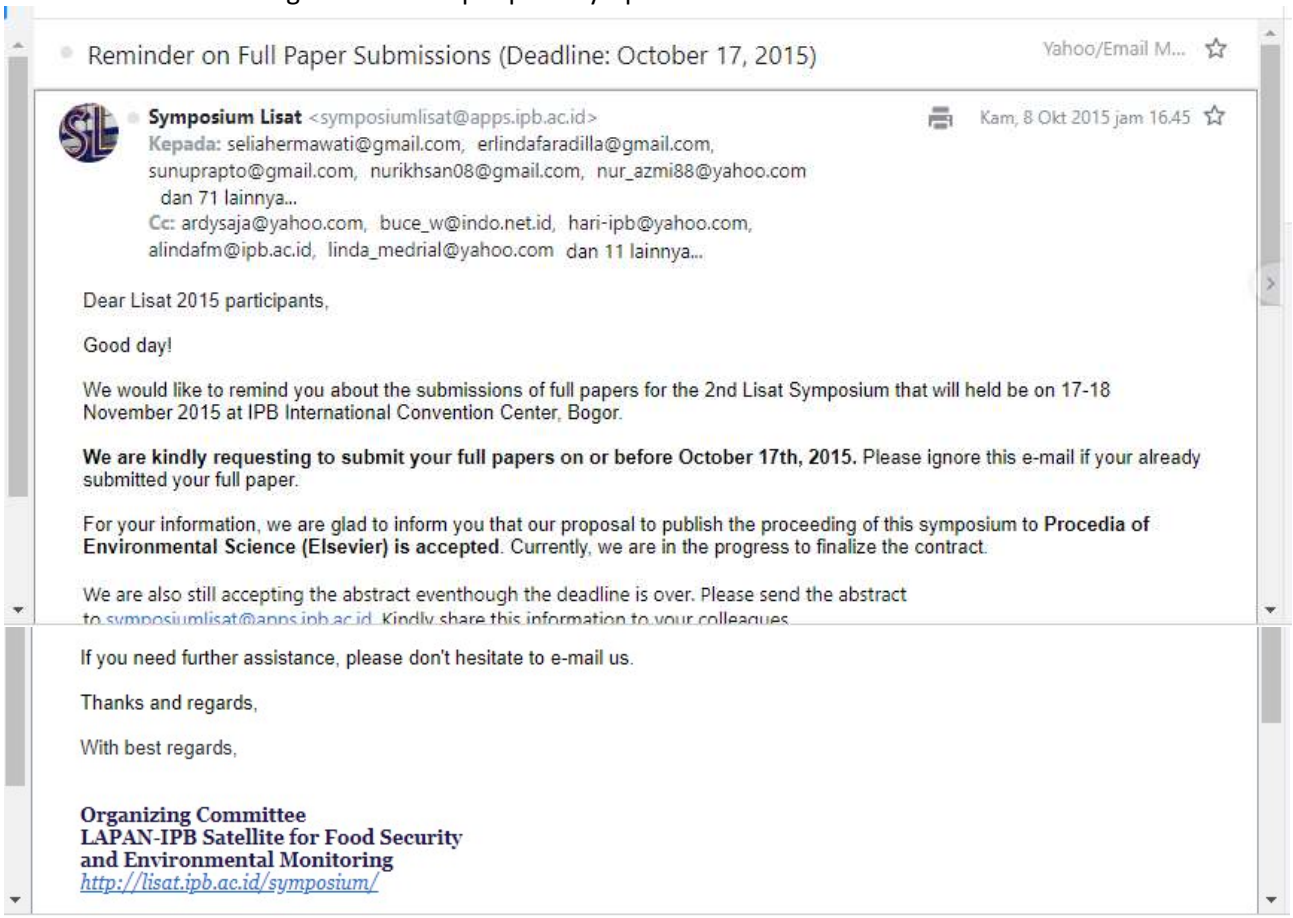
With best regards,

Organizing Committee
LAPAN-IPB Satellite for Food Security
and Environmental Monitoring
http://lisat.ipb.ac.id/symposium/

Toto Supart... .pdf
293.5kB

Bukti surat acceptance abstrak disajikan pada Lampiran 1

Proses 2. Reminder Pengiriman Full Paper pada Symposium lISAT2015



Reminder on Full Paper Submissions (Deadline: October 17, 2015)

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kam, 8 Okt 2015 jam 16.45
Kepada: seliahermawati@gmail.com, erlindafaradilla@gmail.com, sunuprapto@gmail.com, nurikhsan08@gmail.com, nur_azmi88@yahoo.com dan 71 lainnya...
Cc: ardysaja@yahoo.com, buce_w@indo.net.id, hari-ipb@yahoo.com, alindafm@ipb.ac.id, linda_medrial@yahoo.com dan 11 lainnya...

Dear Lisat 2015 participants,

Good day!

We would like to remind you about the submissions of full papers for the 2nd Lisat Symposium that will held be on 17-18 November 2015 at IPB International Convention Center, Bogor.

We are kindly requesting to submit your full papers on or before October 17th, 2015. Please ignore this e-mail if your already submitted your full paper.

For your information, we are glad to inform you that our proposal to publish the proceeding of this symposium to **Procedia of Environmental Science (Elsevier) is accepted**. Currently, we are in the progress to finalize the contract.

We are also still accepting the abstract eventhough the deadline is over. Please send the abstract to symposiumlisat@apps.ipb.ac.id. Kindly share this information to your colleagues.

If you need further assistance, please don't hesitate to e-mail us.

Thanks and regards,

With best regards,

Organizing Committee
LAPAN-IPB Satellite for Food Security and Environmental Monitoring
http://lisat.ipb.ac.id/symposium/

Proses 3. Reminder Pembayaran Registrasi Symposium LISAT2015

Reminder for registration fee of LISAT Symposium 2015

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Sen, 12 Okt 2015 jam 08.17
Kepada: seliahermawati@gmail.com, erlindafaradilla@gmail.com, sunuprapto@gmail.com, nurikhsan08@gmail.com, nur_azmi88@yahoo.com dan 78 lainnya...
Cc: ardysaja@yahoo.com, buce_w@indo.net.id, hari-ipb@yahoo.com, alindafm@ipb.ac.id, linda_medrial@yahoo.com dan 10 lainnya...

Dear Authors and Participants,

Thank you very much for your registration to the **LISat Symposium 2015 for Food Security and Environmental Monitoring** that will be held on 17-18 November, 2015 at IPB Convention Centre, West Java.

This email is to remind you to complete the registration process by making the payment for the registration fee as soon as possible. **We will prioritize those who have completed the registration** in our LISAT program including the publication of the proceeding. However, **the publication fee is not included in the registration fee**.

The registration fee information could be accessed on **http://lisat.ipb.ac.id/symposium/how-to-register/**

Type of Attendee	Oral	Poster
Authors (Non-student)	IDR 750.000	IDR 650.000
Author (student)	IDR 600.000	IDR 450.000
Non-paper participant	IDR 300.000	

Apart from the registration fee, you will be asked to pay additional cost for publication (approx.IDR 1.500.000) for each of the paper. The proceeding of this LISat Symposium 2015 will be published on **Procedia of Environmental Sciences (Administered by Elsevier)** as we are currently dealing with the process. **See our previous publication on** http://www.sciencedirect.com/science/journal/18780296/24/supp/C.

The publication fee information will be available as soon as we have signed the contract with the Elsevier.

Furthermore, You are suggested to make the payment by online transfer to this following detail;

Name: **PUSAT PENELITIAN LINGKUNGAN HIDUP IPB**
Account No: **0003894970**
SWIFT CODE: **BNINIDJABGR** (if transfer process from abroad)
Bank BNI , Jl. Ir. Juanda No. 52 Bogor-Indonesia

After the payment is completed, please send your transfer proof (*.pdf or *.jpeg) by e-mail to: lisatsymposium@apps.ipb.ac.id

All registrations must be completed on or before November 10, 2015. Please ignored this email if you already done so.

If you have inquiries, please don't hesitate to contact us.

Once again, thank you and see you during the conference!

With best regards,

Organizing Committee
LAPAN-IPB Satellite for Food Security
and Environmental Monitoring

Proses 4. Pengiriman Bukti Pembayaran Keikutsertaan Symposium LISAT2015

Transfer proof and registration form 2 Yahoo/Terkirim

toto supartono <macaca_fsc@yahoo.com> Kam, 22 Okt 2015 jam 15.23
Kepada: symposiumlisat@apps.ipb.ac.id

To:
Organising Committee of LISat 2015

Dear Sir,
My name is Toto Supartono, student in Graduate Program of Tropical Biodiversities Conservation, Bogor Agricultural University. I would like to confirm that I had paid registration for The 2nd International Simposium of LISat; transfer proof is attached. I tried several times to online registration, but it failed. Therefore, I also send the registration form.

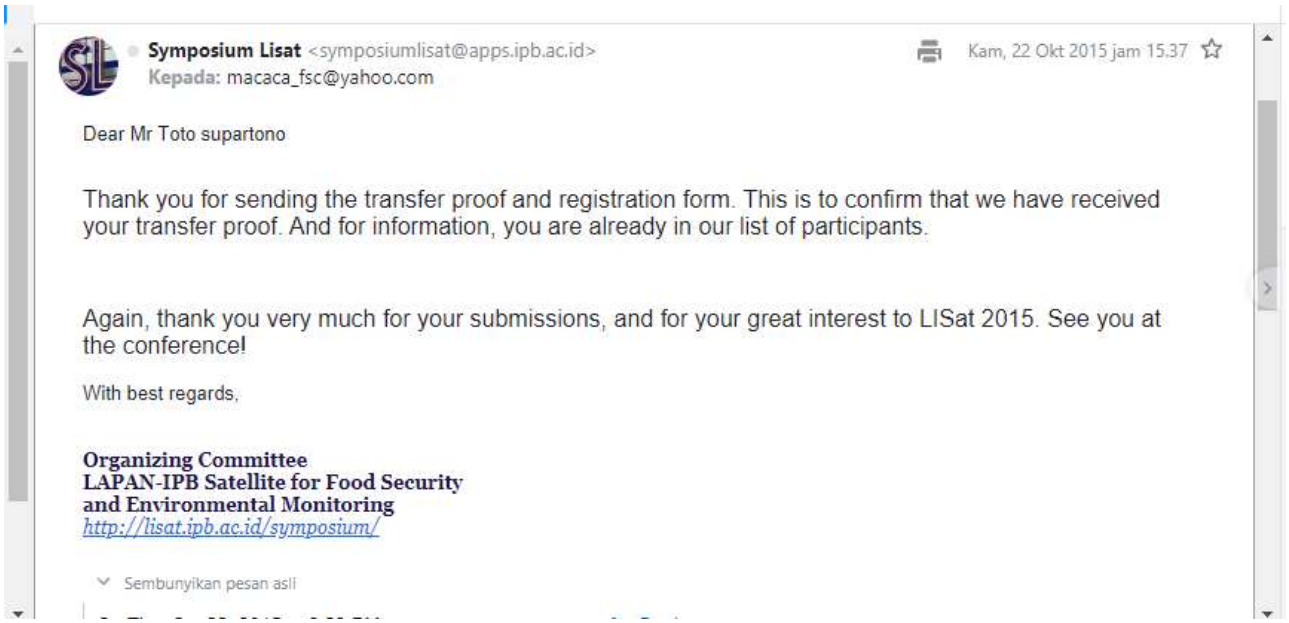
Thank you

Sincerely,

Toto Supartono

Unduh semua lampiran sebagai file zip

Proses 5. Pemberitahuan bahwa Bukti Pembayaran sudah diterima oleh Panitia Penyelenggara Symposium LISAT2015



Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kepada: macaca_fsc@yahoo.com

Kam, 22 Okt 2015 jam 15.37

Dear Mr Toto supartono

Thank you for sending the transfer proof and registration form. This is to confirm that we have received your transfer proof. And for information, you are already in our list of participants.

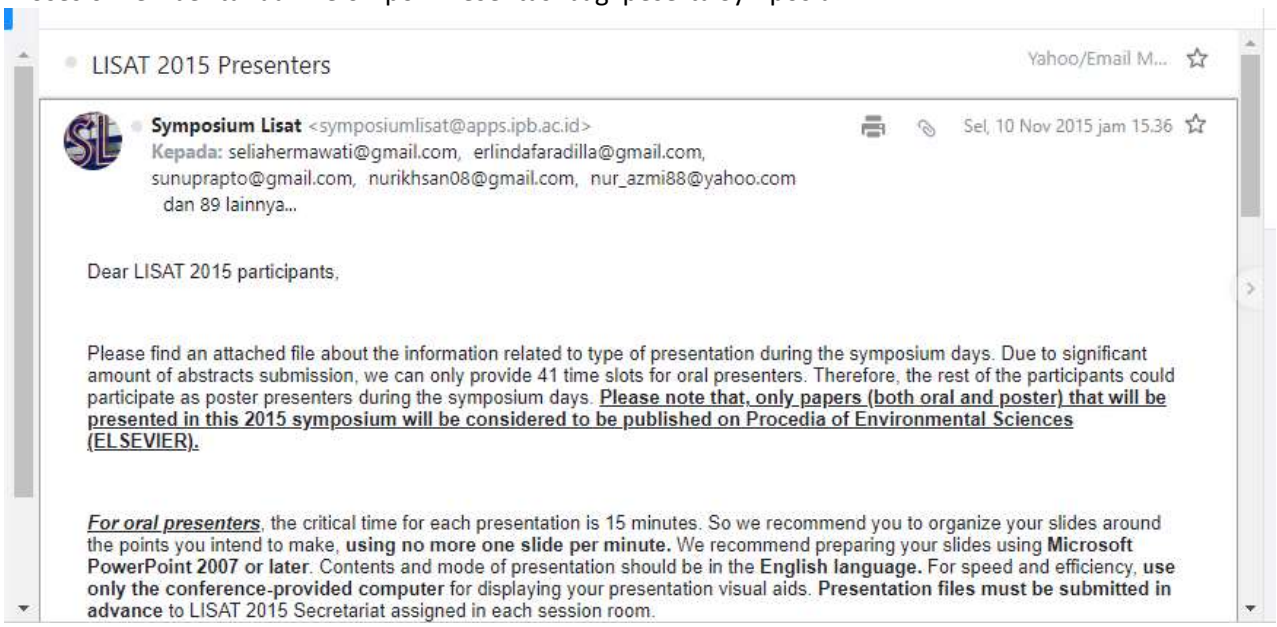
Again, thank you very much for your submissions, and for your great interest to LISat 2015. See you at the conference!

With best regards,

Organizing Committee
LAPAN-IPB Satellite for Food Security and Environmental Monitoring
http://lisat.ipb.ac.id/symposium/

Sembunyikan pesan asli

Proses 6. Pemberitahuan Kelompok Presentasi bagi peserta Symposium



LISAT 2015 Presenters

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kepada: seliahermawati@gmail.com, erlindafaradilla@gmail.com, sunuprapto@gmail.com, nurikhsan08@gmail.com, nur_azmi88@yahoo.com dan 89 lainnya...

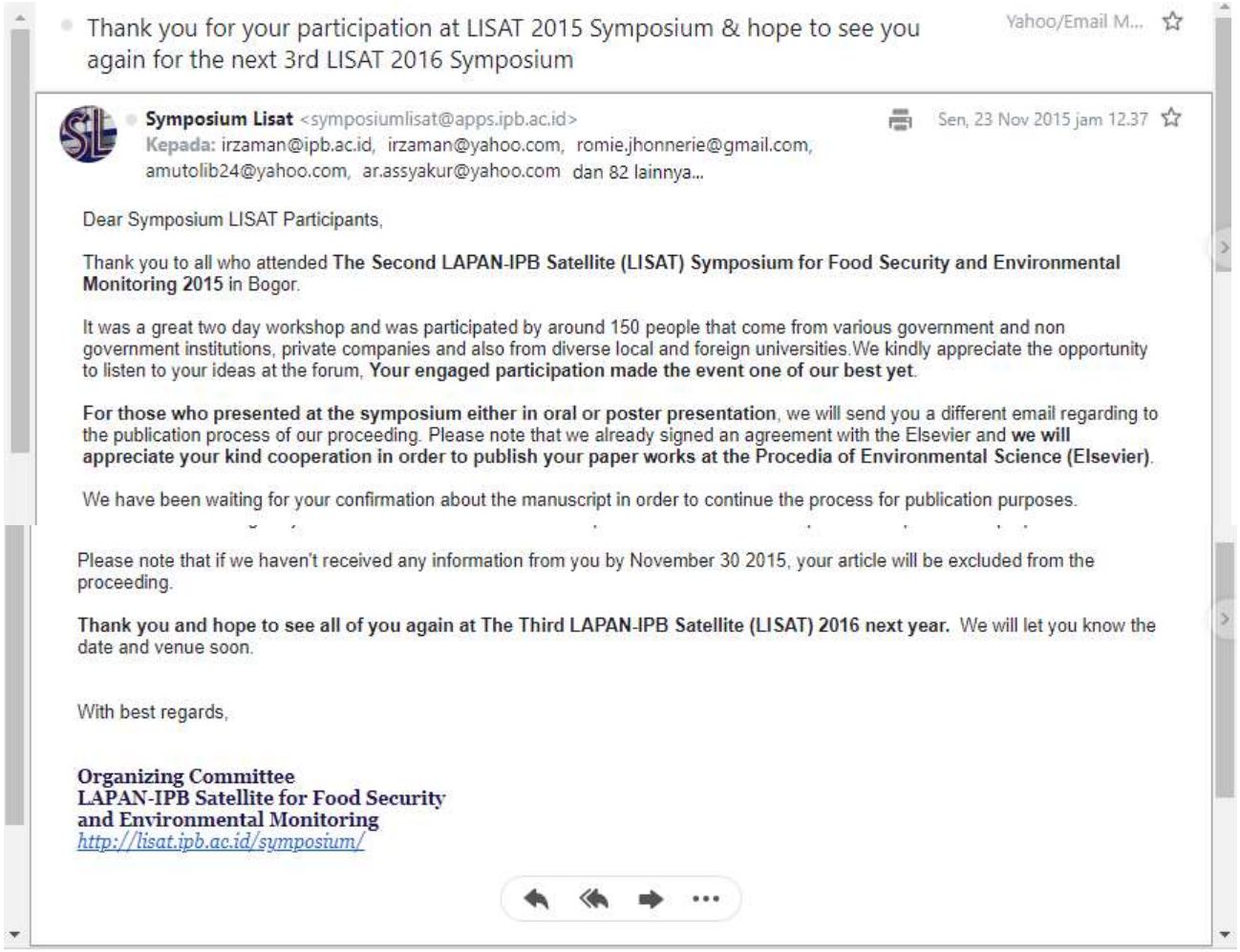
Sel, 10 Nov 2015 jam 15.36

Dear LISAT 2015 participants,

Please find an attached file about the information related to type of presentation during the symposium days. Due to significant amount of abstracts submission, we can only provide 41 time slots for oral presenters. Therefore, the rest of the participants could participate as poster presenters during the symposium days. **Please note that, only papers (both oral and poster) that will be presented in this 2015 symposium will be considered to be published on Procedia of Environmental Sciences (ELSEVIER).**

For oral presenters, the critical time for each presentation is 15 minutes. So we recommend you to organize your slides around the points you intend to make, **using no more one slide per minute.** We recommend preparing your slides using **Microsoft PowerPoint 2007 or later**. Contents and mode of presentation should be in the **English language.** For speed and efficiency, **use only the conference-provided computer** for displaying your presentation visual aids. **Presentation files must be submitted in advance** to LISAT 2015 Secretariat assigned in each session room.

Proses 7. Pemberitahuan bahwa Pelaksanaan Symposium LISAT2015 sudah selesai dilaksanakan dan Naskah sudah dikirimkan ke Publisher (Elsevier)



Thank you for your participation at LISAT 2015 Symposium & hope to see you again for the next 3rd LISAT 2016 Symposium

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kepada: irzaman@ipb.ac.id, irzaman@yahoo.com, romie.jhonnerie@gmail.com, amutolib24@yahoo.com, ar.assyakur@yahoo.com dan 82 lainnya...

Sen, 23 Nov 2015 jam 12.37

Dear Symposium LISAT Participants,

Thank you to all who attended **The Second LAPAN-IPB Satellite (LISAT) Symposium for Food Security and Environmental Monitoring 2015** in Bogor.

It was a great two day workshop and was participated by around 150 people that come from various government and non government institutions, private companies and also from diverse local and foreign universities.We kindly appreciate the opportunity to listen to your ideas at the forum, **Your engaged participation made the event one of our best yet**.

For those who presented at the symposium either in oral or poster presentation, we will send you a different email regarding to the publication process of our proceeding. Please note that we already signed an agreement with the Elsevier and **we will appreciate your kind cooperation in order to publish your paper works at the Procedia of Environmental Science (Elsevier)**.

We have been waiting for your confirmation about the manuscript in order to continue the process for publication purposes.

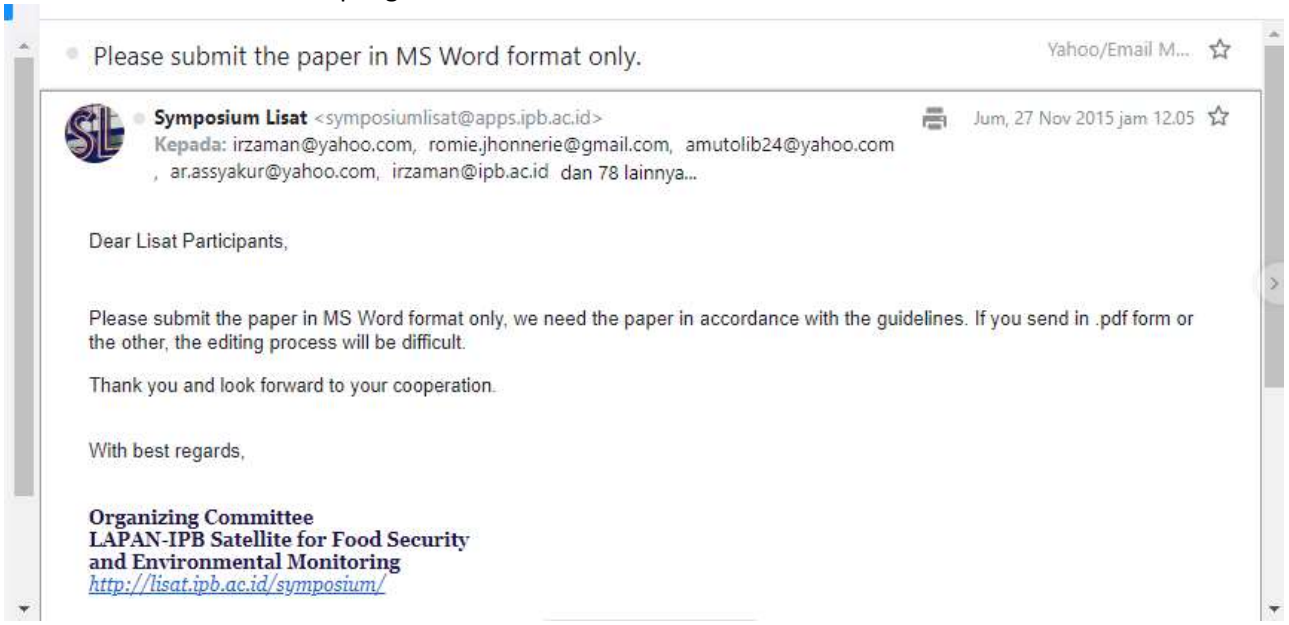
Please note that if we haven't received any information from you by November 30 2015, your article will be excluded from the proceeding.

Thank you and hope to see all of you again at The Third LAPAN-IPB Satellite (LISAT) 2016 next year. We will let you know the date and venue soon.

With best regards,

Organizing Committee
LAPAN-IPB Satellite for Food Security and Environmental Monitoring
http://lisat.ipb.ac.id/symposium/

Proses 8. Permintaan untuk pengiriman kembali naskah



Please submit the paper in MS Word format only.

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kepada: irzaman@yahoo.com, romie.jhonnerie@gmail.com, amutolib24@yahoo.com, ar.assyakur@yahoo.com, irzaman@ipb.ac.id dan 78 lainnya...

Jum, 27 Nov 2015 jam 12.05

Dear Lisat Participants,

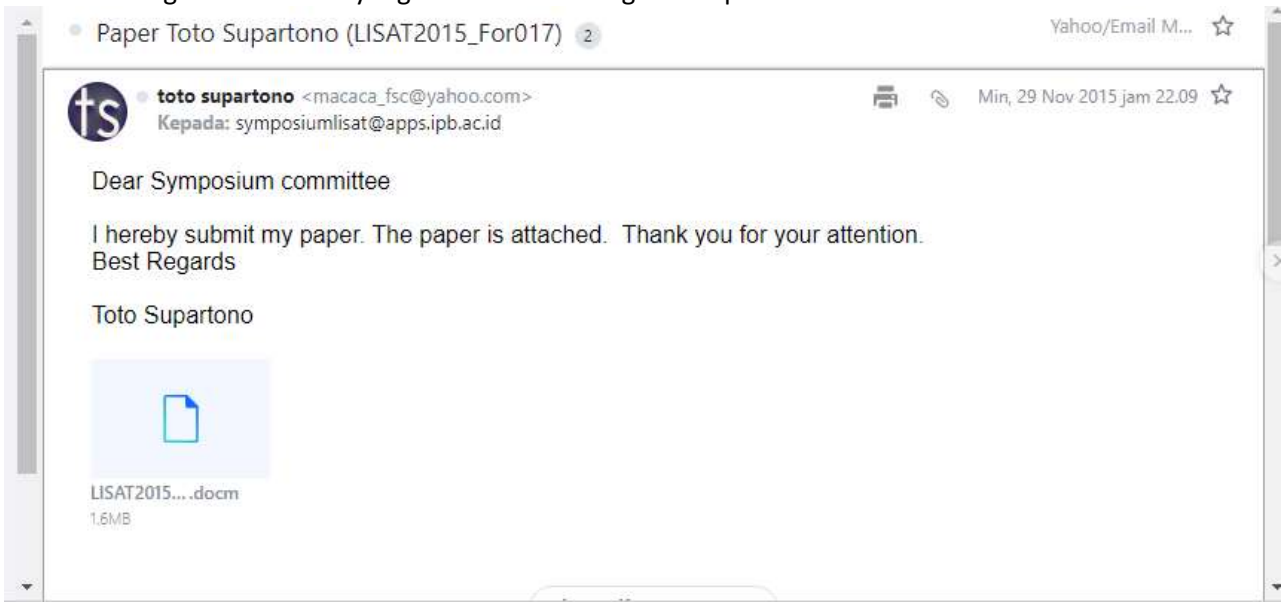
Please submit the paper in MS Word format only, we need the paper in accordance with the guidelines. If you send in .pdf form or the other, the editing process will be difficult.

Thank you and look forward to your cooperation.

With best regards,

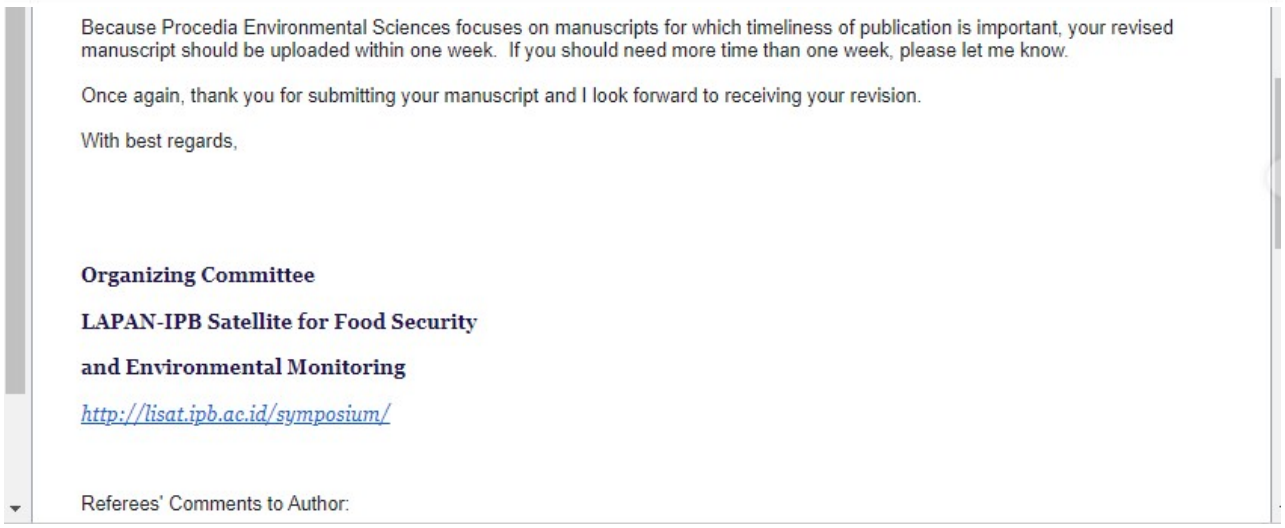
Organizing Committee
LAPAN-IPB Satellite for Food Security and Environmental Monitoring
http://lisat.ipb.ac.id/symposium/

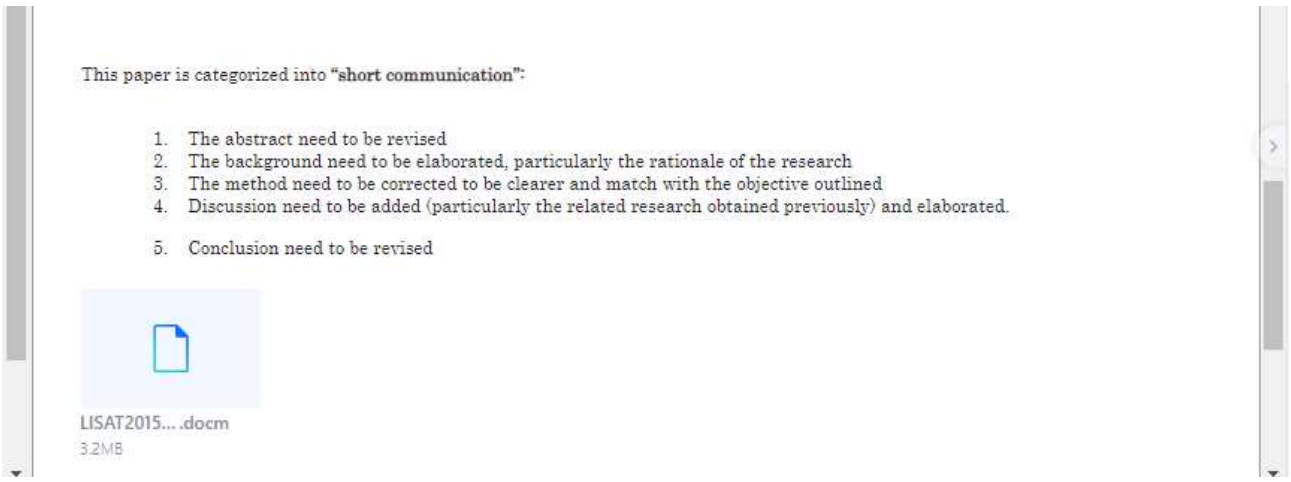
Proses 9. Pengiriman Naskah yang sudah sesuai dengan Template



Naskah yang dikirim kembali ke Panitia disajikan pada Lampiran 2

Proses 10. Pemberitahuan bahwa naskah sudah direview dan terdapat beberapa perbaikan





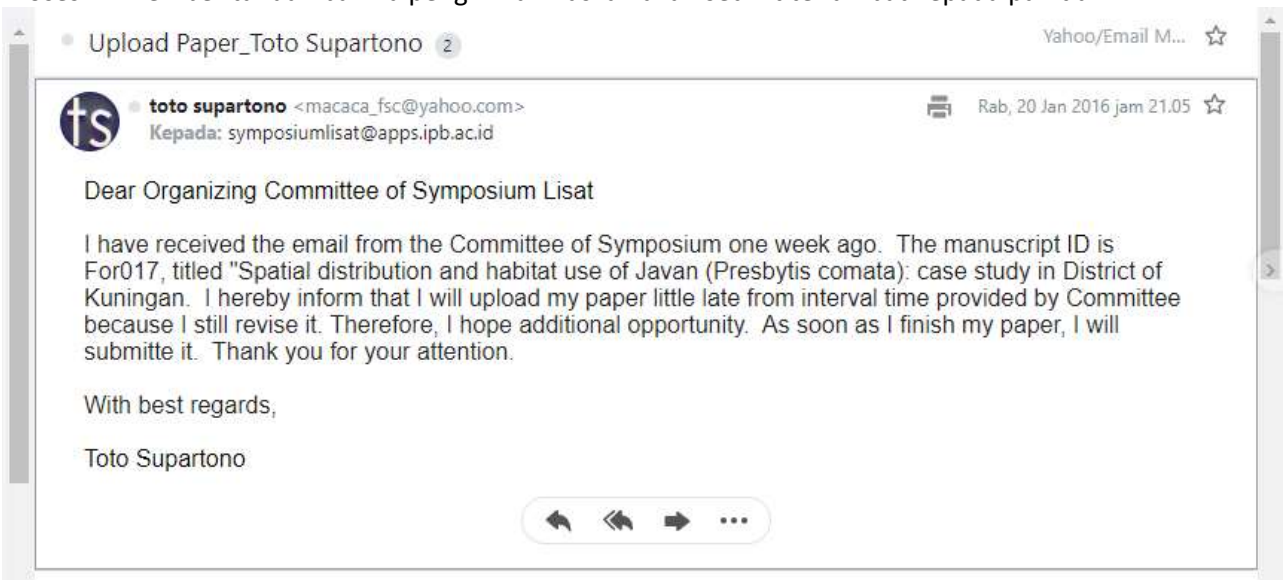
This paper is categorized into "**short communication**":

1. The abstract need to be revised
2. The background need to be elaborated, particularly the rationale of the research
3. The method need to be corrected to be clearer and match with the objective outlined
4. Discussion need to be added (particularly the related research obtained previously) and elaborated.
5. Conclusion need to be revised

LISAT2015... .docm
3.2MB

Artikel yang berisi komentar reviewer disajikan pada Lampiran 3

Proses 11. Pemberitahuan bahwa pengiriman naskah akan sedikit terlambat kepada panitia



Upload Paper_Toto Supartono 2 — Yahoo/Email M...

toto supartono <macaca_fsc@yahoo.com> — Rab, 20 Jan 2016 jam 21.05
Kepada: symposiumlisat@apps.ipb.ac.id

Dear Organizing Committee of Symposium Lisat

I have received the email from the Committee of Symposium one week ago. The manuscript ID is For017, titled "Spatial distribution and habitat use of Javan (Presbytis comata): case study in District of Kuningan. I hereby inform that I will upload my paper little late from interval time provided by Committee because I still revise it. Therefore, I hope additional opportunity. As soon as I finish my paper, I will submitte it. Thank you for your attention.

With best regards,

Toto Supartono

Proses 12. Pengiriman naskah yang sudah diperbaiki

Paper_LISAT2015_For017_Toto Supartono 2 — Yahoo/Email M...

toto supartono <macaca_fsc@yahoo.com> — Jum, 5 Feb 2016 jam 11.00
Kepada: symposiumlisat@apps.ipb.ac.id

Toto Supartono

Dear Organizing Committee of Symposium Lisat

I hereby send my paper. I have revised and responded all comments from referee. Lists of Response to Referee's Comments is attached here. I apologize for delaying my paper because I have to consult with my supervisor. I hope that my paper can be published by committee. I will wait for the next information. Thank you for your attention.

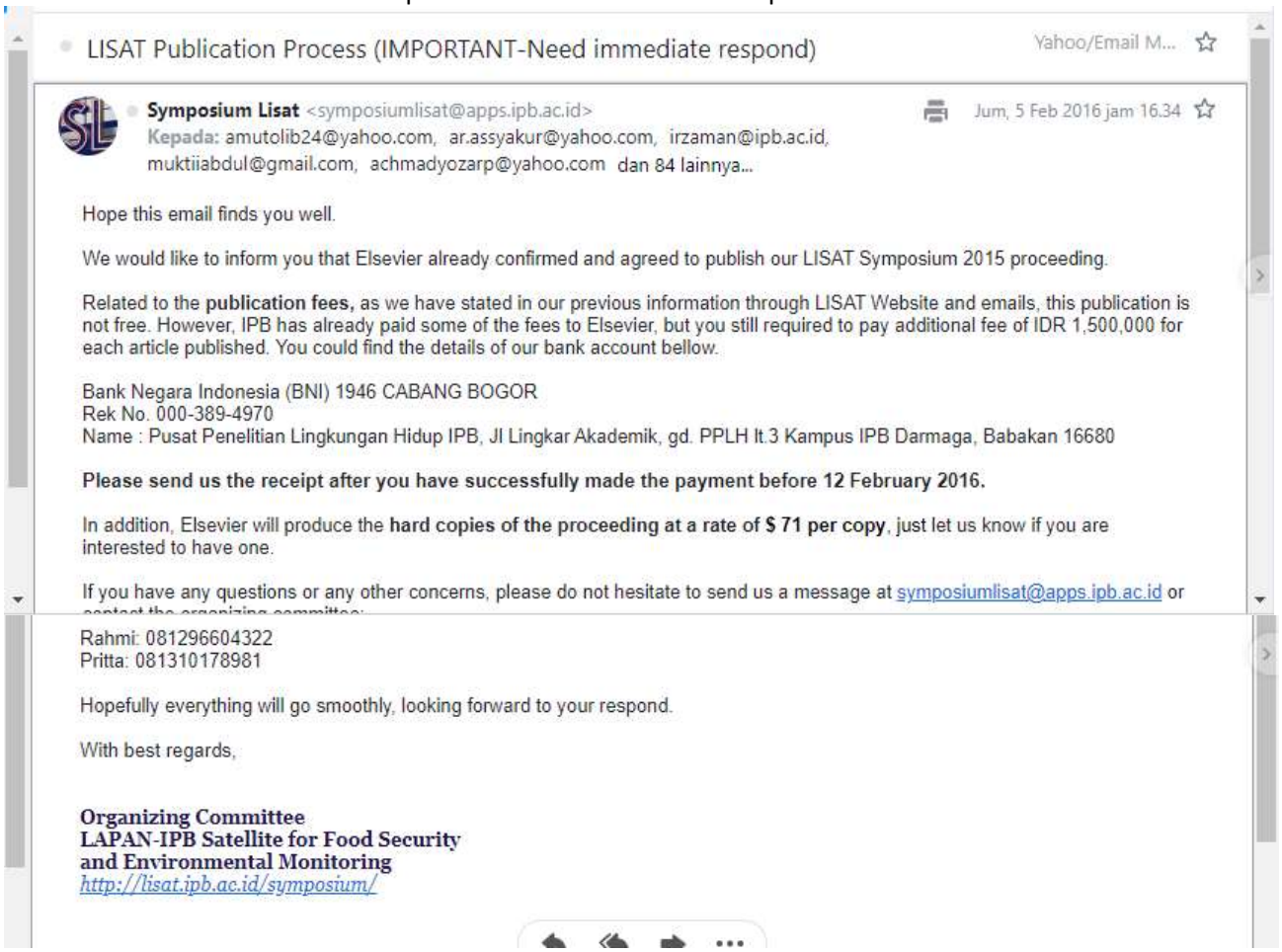
With best regards,

Toto Supartono

Unduh semua lampiran sebagai file zip

Naskah yang sudah diperbaiki disajikan pada **Lampiran 4a** dan Daftar respon atas komentar riviewer disajikan pada **Lampiran 4b**

Proses 13. Pemberitahuan bahwa publisher sudah bersedia mempublikasikan naskah



LISAT Publication Process (IMPORTANT-Need immediate respond)

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kepada: amutolib24@yahoo.com, ar.assyakur@yahoo.com, irzaman@ipb.ac.id, muktiiabdul@gmail.com, achmadyozarp@yahoo.com dan 84 lainnya...

Jum, 5 Feb 2016 jam 16.34

Hope this email finds you well.

We would like to inform you that Elsevier already confirmed and agreed to publish our LISAT Symposium 2015 proceeding.

Related to the **publication fees,** as we have stated in our previous information through LISAT Website and emails, this publication is not free. However, IPB has already paid some of the fees to Elsevier, but you still required to pay additional fee of IDR 1,500,000 for each article published. You could find the details of our bank account bellow.

Bank Negara Indonesia (BNI) 1946 CABANG BOGOR
Rek No. 000-389-4970
Name : Pusat Penelitian Lingkungan Hidup IPB, Jl Lingkar Akademik, gd. PPLH lt.3 Kampus IPB Darmaga, Babakan 16680

Please send us the receipt after you have successfully made the payment before 12 February 2016.

In addition, Elsevier will produce the **hard copies of the proceeding at a rate of $ 71 per copy**, just let us know if you are interested to have one.

If you have any questions or any other concerns, please do not hesitate to send us a message at symposiumlisat@apps.ipb.ac.id or

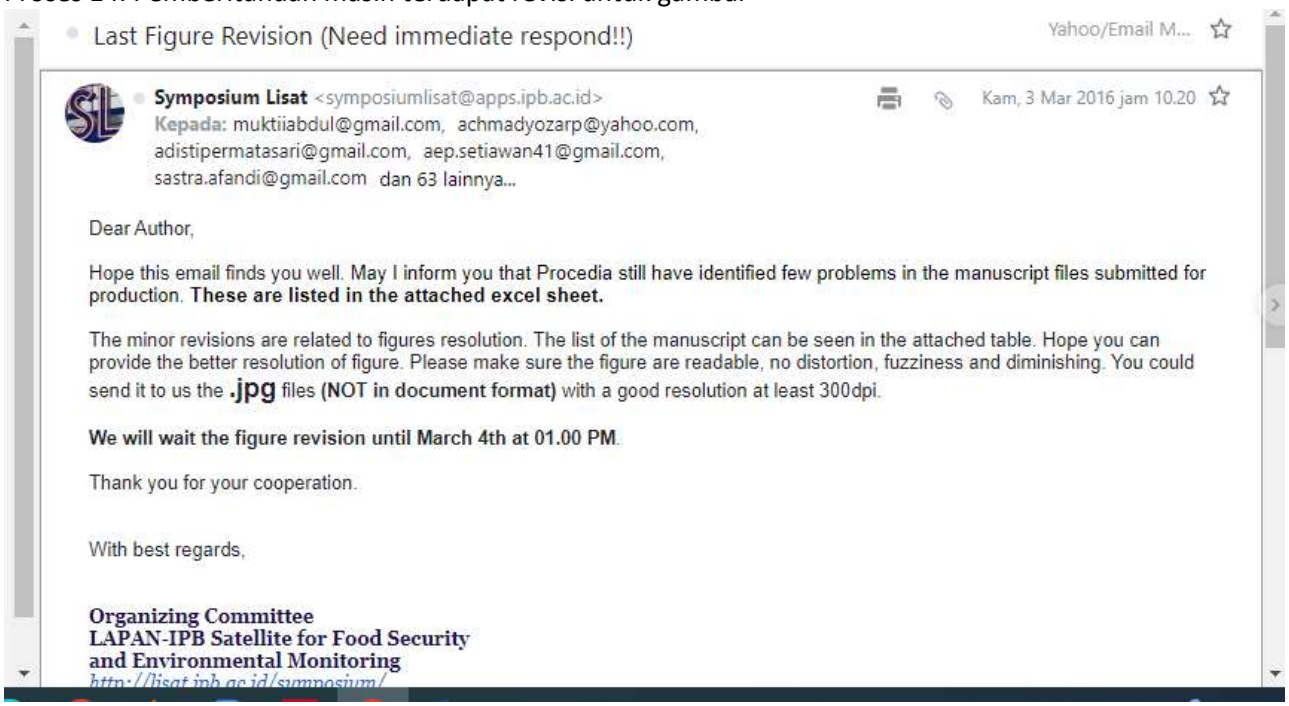
Rahmi: 081296604322
Pritta: 081310178981

Hopefully everything will go smoothly, looking forward to your respond.

With best regards,

Organizing Committee
LAPAN-IPB Satellite for Food Security
and Environmental Monitoring
http://lisat.ipb.ac.id/symposium/

Proses 14. Pemberitahuan masih terdapat revisi untuk gambar



Last Figure Revision (Need immediate respond!!)

Yahoo/Email M...

Symposium Lisat <symposiumlisat@apps.ipb.ac.id>
Kepada: muktiiabdul@gmail.com, achmadyozarp@yahoo.com, adistipermatasari@gmail.com, aep.setiawan41@gmail.com, sastra.afandi@gmail.com dan 63 lainnya...

Kam, 3 Mar 2016 jam 10.20

Dear Author,

Hope this email finds you well. May I inform you that Procedia still have identified few problems in the manuscript files submitted for production. **These are listed in the attached excel sheet.**

The minor revisions are related to figures resolution. The list of the manuscript can be seen in the attached table. Hope you can provide the better resolution of figure. Please make sure the figure are readable, no distortion, fuzziness and diminishing. You could send it to us the **.jpg** files **(NOT in document format)** with a good resolution at least 300dpi.

We will wait the figure revision until March 4th at 01.00 PM.

Thank you for your cooperation.

With best regards,

Organizing Committee
LAPAN-IPB Satellite for Food Security
and Environmental Monitoring
http://lisat.ipb.ac.id/symposium/

Proses 15. Pengiriman gambar yang sudah diperbaiki

Figure Revised_For_017_Toto Supartono 2

Yahoo/Email M...

toto supartono <macaca_fsc@yahoo.com>
Kepada: symposiumlisat@apps.ipb.ac.id

Kam, 3 Mar 2016 jam 22.46

Dear OC Lisat

I already revised figures 1, 3, and 4 with resolution at least 300 dpi. Therefore, I hereby submit the figures. Thank you for your attention.

Best regards,

Toto Supartono

Unduh semua lampiran sebagai file zip

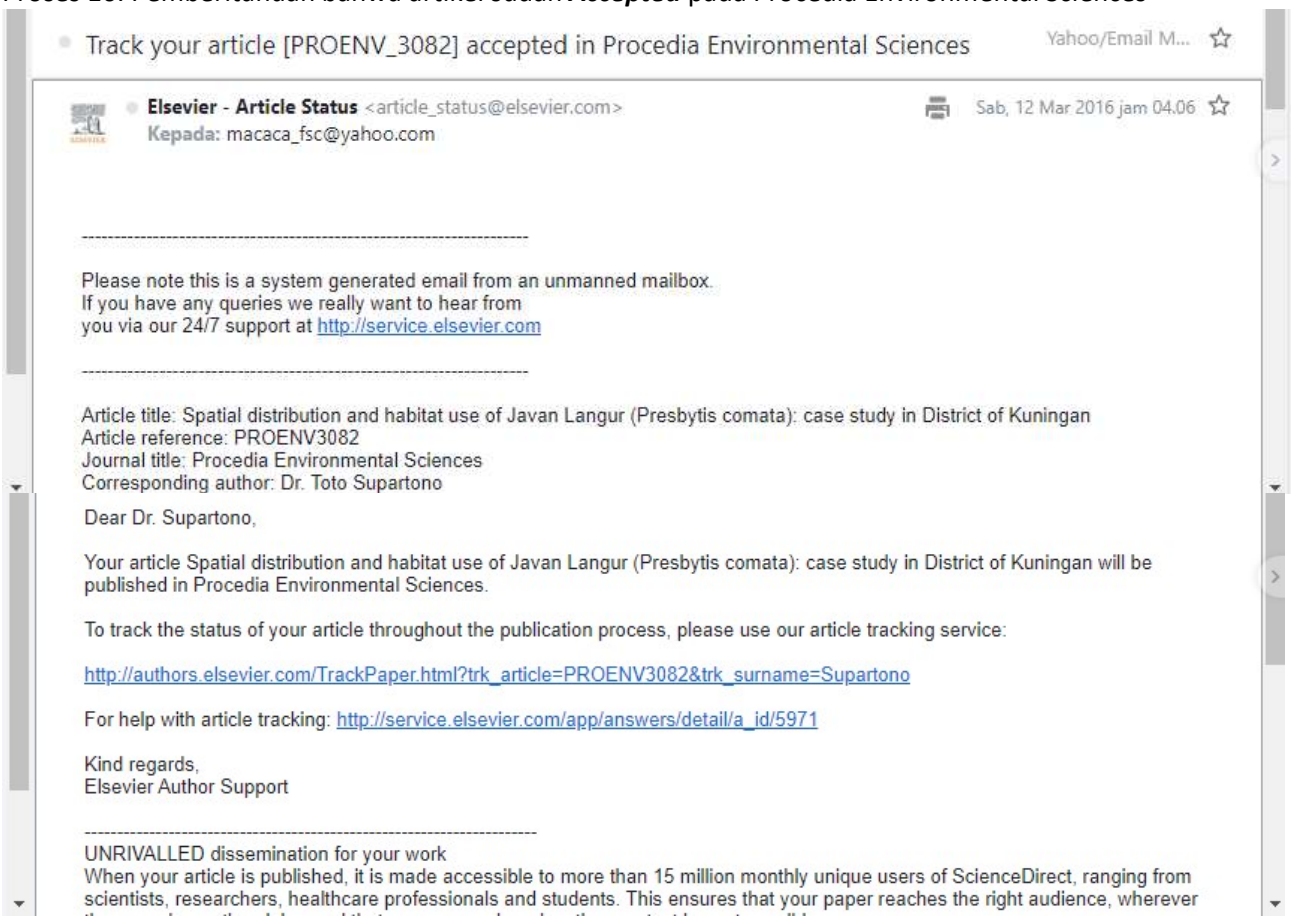
Figure 1_For... .jpg
4.8MB

Figure 3_For... .jpg
335.1kB

Figure 4_For... .jpg
294.8kB

Gambar yang sudah direvisi disajikan pada Lampiran 5a; Lampiran 5b; dan Lampiran 5c

Proses 16. Pemberitahuan bahwa artikel sudah ***Accepted*** pada Procedia Environmental Sciences



Track your article [PROENV_3082] accepted in Procedia Environmental Sciences

Yahoo/Email M...

Elsevier - Article Status <article_status@elsevier.com>
Kepada: macaca_fsc@yahoo.com

Sab, 12 Mar 2016 jam 04.06

Please note this is a system generated email from an unmanned mailbox.
If you have any queries we really want to hear from
you via our 24/7 support at http://service.elsevier.com

Article title: Spatial distribution and habitat use of Javan Langur (Presbytis comata): case study in District of Kuningan
Article reference: PROENV3082
Journal title: Procedia Environmental Sciences
Corresponding author: Dr. Toto Supartono

Dear Dr. Supartono,

Your article Spatial distribution and habitat use of Javan Langur (Presbytis comata): case study in District of Kuningan will be published in Procedia Environmental Sciences.

To track the status of your article throughout the publication process, please use our article tracking service:

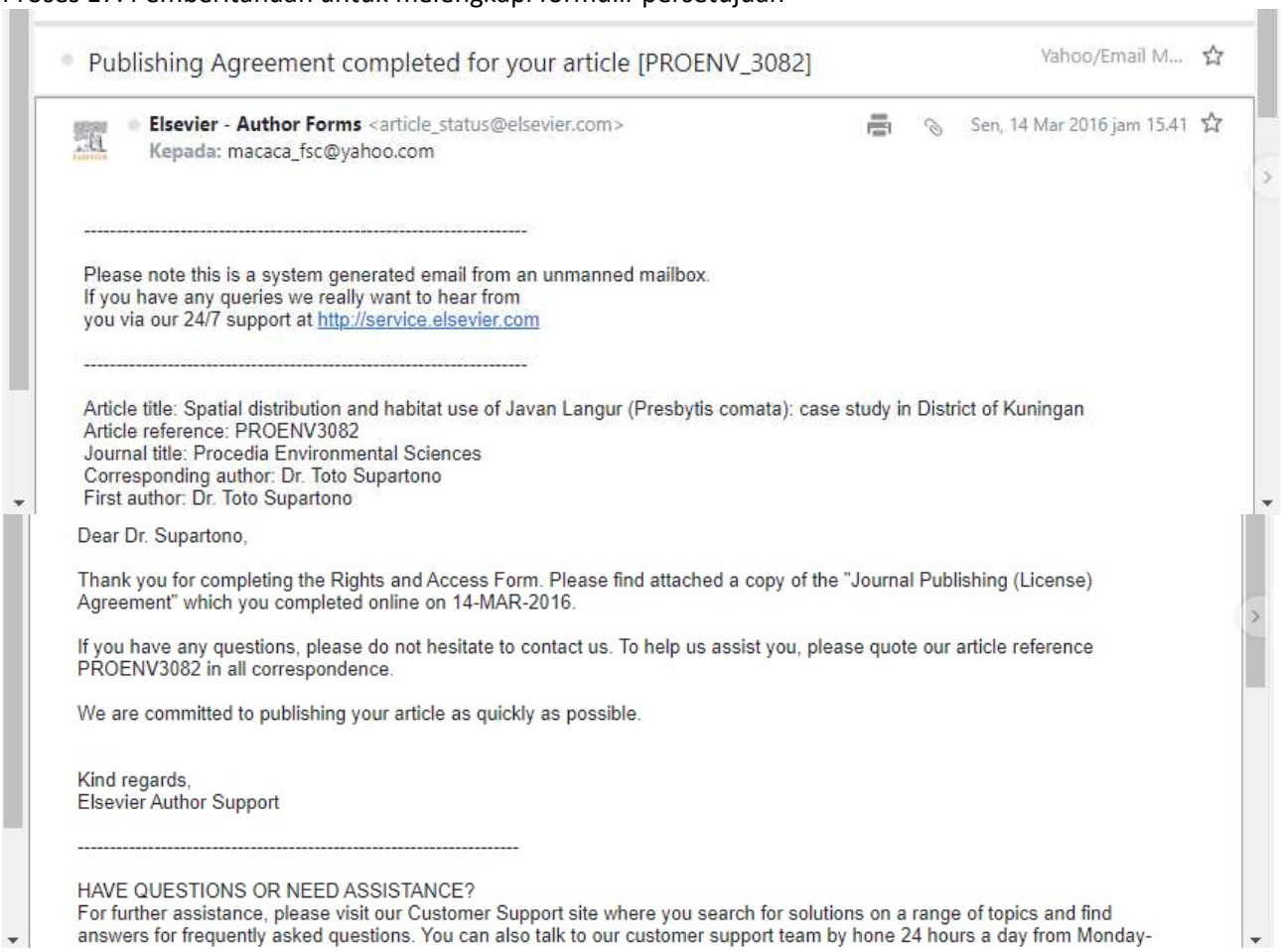
http://authors.elsevier.com/TrackPaper.html?trk_article=PROENV3082&trk_surname=Supartono

For help with article tracking: http://service.elsevier.com/app/answers/detail/a_id/5971

Kind regards,
Elsevier Author Support

UNRIVALLED dissemination for your work
When your article is published, it is made accessible to more than 15 million monthly unique users of ScienceDirect, ranging from scientists, researchers, healthcare professionals and students. This ensures that your paper reaches the right audience, wherever

Proses 17. Pemberitahuan untuk melengkapi formulir persetujuan



Publishing Agreement completed for your article [PROENV_3082]

Yahoo/Email M...

Elsevier - Author Forms <article_status@elsevier.com>
Kepada: macaca_fsc@yahoo.com

Sen, 14 Mar 2016 jam 15.41

Please note this is a system generated email from an unmanned mailbox.
If you have any queries we really want to hear from
you via our 24/7 support at http://service.elsevier.com

Article title: Spatial distribution and habitat use of Javan Langur (Presbytis comata): case study in District of Kuningan
Article reference: PROENV3082
Journal title: Procedia Environmental Sciences
Corresponding author: Dr. Toto Supartono
First author: Dr. Toto Supartono

Dear Dr. Supartono,

Thank you for completing the Rights and Access Form. Please find attached a copy of the "Journal Publishing (License) Agreement" which you completed online on 14-MAR-2016.

If you have any questions, please do not hesitate to contact us. To help us assist you, please quote our article reference PROENV3082 in all correspondence.

We are committed to publishing your article as quickly as possible.

Kind regards,
Elsevier Author Support

HAVE QUESTIONS OR NEED ASSISTANCE?
For further assistance, please visit our Customer Support site where you search for solutions on a range of topics and find answers for frequently asked questions. You can also talk to our customer support team by hone 24 hours a day from Monday-

Proses 18. Pemberitahuan bahwa naskah sudah dipublikasikan pada Procedia Environmental Sciences

Your article has been published!

Yahoo/Email M...

Procedia Environmental Sciences <journals@mail.elsevier.com>
Kepada: macaca_fsc@yahoo.com

Rab, 4 Mei 2016 jam 20.27

Can't see this email properly? **Click here to view an online version**

Congratulations, your article has been published!

Dear Dr. Supartono,

Dear Dr. Supartono,

Your article *Spatial distribution and habitat use of Javan Langur (Presbytis comata): case study in District of Kuningan* is now available on ScienceDirect, where over 15 million scientists around the globe can read it.

Publishing your article with us has many benefits, such as having access to a personal dashboard: citation and usage data on your publications in one place. This free service is available to anyone who has published and whose publication is in Scopus. Join us at Stats.

We are happy to offer you different ways to celebrate its publication. Visit Elsevier's WebShop for:

- Professional reprints of your article
- Poster of your article which includes a personalized reference
- FREE digital certificate of publication of your article.

More benefits of publishing with Elsevier

Thank you for publishing with us. We look forward to receiving future manuscripts from you!

Yours sincerely,

Nicoline van der Linden, M.Sc.
SVP Marketing Communications & Researcher Engagement

THE 2nd INTERNATIONAL SYMPOSIUM OF LAPAN-IPB SATELITTE (LISAT) ON FOOD SECURITY AND ENVIRONMENTAL MONITORING
LISat Secretariat: 4th Floor Building, Centre for Environmental Research (PPLH), Bogor Agricultural University, Jl. Lingkar Akademik, Kampus IPB Darmaga, Bogor 16680, Jawa Barat, Indonesia, website www.pplh.ipb.ac.id

October 5th, 2015

ABSTRACT ACCEPTANCE LETTER

Dear **Mr. Toto Supartono,**

Bogor Agricultural University (IPB) in collaboration with National Institute of Aeronautics and Space of Indonesia (LAPAN) is pleased to inform that your submitted abstract entitled:

"Spatial Distribution and habitat utilization of Surili (*Presbytis comata)* in Kuningan District"

Is **accepted with minor revision** to be presented at **The 2nd International Symposium of LISAT on Food Security and Environmental Monitoring on November 17-18, 2015 in Bogor, West Java-Indonesia**. The venue will be held at IPB International Convention Centre at Botany Square Building 2nd Floor, Jl. Pajajaran, Bogor - West Java 16127 Indonesia (www.ipbicc.com).

You are now invited to submit your paper to symposiumlisat@apps.ipb.ac.id, the e-mail should be clearly titled "**LISAT2015_For017**". The full-paper should be submitted no later than **October 17th, 2015** and the acceptance of full-paper will be notified on **October 30th, 2015**.

Kindly refer to website http://lisat.ipb.ac.id/symposium/full-paper-submission/ for guidelines in preparing and submitting the full paper.

This invitation is issued by LISat 2015's committee to arrange Visa or other institutional purposes.

Sincerely yours,

Organising Committee of LISat 2015
Dr. Yudi Setiawan, SP., M.Sc
NIP. 197807302007101002

Available online at www.sciencedirect.com

ScienceDirect

Procedia Environmental Sciences00 (2015) 000–000

Procedia Environmental Sciences

www.elsevier.com/locate/procedia

The 2nd International Symposium on LAPAN-IPB Satellite for Food Security and Environmental Monitoring

Spatial distribution and habitat use of surili (*Presbytis comata*): case study in District of Kuningan

Toto Supartono[a]*, Lilik Budi Prasetyo[b], Agus Hikmat[b], Agus Priyono Kartono[b]

[a]*Graduate School of Tropical Biodiversity Conservation, Faculty of Forestry, Bogor Agricultural University, Jl. Lingkar Akademik, Kampus IPB Darmaga, Bogor 16680, Indonesia*

[b]*Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University, Jl. Lingkar Akademik, Kampus IPB Darmaga, Bogor 16680, Indonesia*

Abstract

Surili (*Presbytis comata*) is priority species for conservation. Its habitat have been decreasing and isolated due to deforestation and forest degradation. The research is aimed at understanding its distribution patterns with regard to distance from settlement and road network as well as biophysical habitat component (habitat type and altitude) in Kuningan Distric, West Java Provinces. Surili population were distributed in 34 villages in varies type of land cover such as lowland natural forest and mixed plantation forest. The closest distance surili were recorded at 9.32 m from settlement and 3.24 m from the road. Its distribution ranging from 255-1254 m asl.

Selection and peer-review under responsibility of the LISAT-FSEM Symposium Committee.

Keywords: Distribution, Kuningan District, land cover, surili, grizzled leaf monkey, *Presbytis comata*, conservation

1. Introduction

Surili (*Presbytis comata*) is grouped into a very high conservation rating species [1] because the condition is endangered due to the reduction of most (96%) of its natural habitat [2]. In addition, surili also has limited natural distribution [3], and since 1988 it was categorized by the IUCN as an endangered species [4]. The Government of the Republic of Indonesia stated that surili is a protected species [5] and is one of a number of conservation priority

* Corresponding author. Tel.: +62-852-1936-3919
*E-mail address:*macaca_fsc@yahoo.com

Selection and peer-review under responsibility of the LISAT-FSEM Symposium Committee.

species in Indonesia [6]. However, efforts of conservation of surili have some constraints. One of the constraints is that there is still little information about the distribution and population of the species [7].

Nijman [8] had published a map of population distribution of *P. comata* in Java. Nijman's research result showed that the distribution of population of *P. comata* covered the western and central parts of Java Island within the altitude of up to 2500 meters above sea level. Considering that the population that distributed in central and eastern parts of Java has now been known as a distinct species, namely *P. fredericae* [9], then the distribution areas of *P. comata* are mostly limited in the western part of Java.

District of Kuningan is an area of distribution of Surili, but it is not included in the distribution map of Nijman [8], except Mount Ciremai which was since 2004 has been changed into a national park. The distribution locations that have not been listed in the map are located outside the conservation area, and still have not been enough studied, in terms of distribution patterns and habitat. This research aims to study the characteristics of the habitat of *P. comata*. Results of this study are expected to support the Government in conservation efforts of *P. comata*.

2. Method

2.1. Research location

Surili population distribution data in Kuningan District was collected between April 2014 and March 2015. Location of the study did not include conservation areas. The study was conducted in two forest blocks, i.e. Gunung Subang (GS) forest block and Bukit Pembarisan (BP) forest block. The GS forest block is a forest area bordering with Central Java Province. This block is in the form of lowland and hilly forest which is dominated by secondary natural forest cover (Figure 1), at the edge this area is generally surrounded by community mixed-forest. Natural forests in some locations have been replaced by young and old coffee plants. Pine forests, in general, exist between the community mixed-forests and secondary forests. Pine forest and natural forest are managed by Perum Perhutani Forest Management Unit (FMU) of Kuningan. Those forests serve as, respectively, production forest and local protected areas. Based on the government administration, this forest block is included in 11 village administrative areas.

The land cover in the study site of BP forest block is classified by the Ministry of Environment and Forestry as industrial timber plantation and secondary forest (Figure 1). The forest block consists of pine forest, teak forest, mahogany forest, remnants of natural forest and community mixed-forest. The pine forest is a plantation that produces sap. The natural forest is a part of production forest which is designated as local protected area, generally narrow, and scattered among forests of pine and other tree plantations. The natural forest and the pine forest in the forest block are located on state land and are managed by Perum Perhutani Forest Management Unit (FMU) of Kuningan. As it was in the GS forest group, in some areas coffee plantations have replaced the natural forest and pine forest. The community mixed-forests are generally scattered with varied sizes. They are located on privately-owned land and bordered by natural forest or pine forest. Furthermore, on the vicinity of the community mixed-forest in general there is a mixture of rice fields and settlements. The community mixed-forest is also known as a mixed-garden because it is planted with various types of commercial timber trees and fruit-bearing plants [10]. The community mixed-forest that becomes the location of this study henceforth will be referred to as mixed-garden.

2.2. Survey of surili population

The research was conducted in two phases. In the first phase, we visited villages that have forest where there were indications of the presence of Surili population. Then we conducted interviews with local villagers [11] to collect information about the existence of Surili in the forest that belongs to the administrative areas of the villages. Because the villagers already familiar with this species of Surili, during the interview they could provide accurate information and would not confused the Surili in question with other species of monkeys which also existed in the District of Kuningan (long-tailed macaque and langur). At this stage we collected information that Surili existed in 34 villages.

In the second phase, a survey was conducted in villages which were suspected as habitats of the Surili based on results of the first phase. In the villages observation paths were established in forest areas. Total transects in each

village varied from 5 km to 6 km, and the length of each transect varied from 1 km to 3 km, depended on the area of the forest blocks. Transect length was measured by using hipchain. The placement of transects in each village was not done randomly, but by following the distribution of the forest and by considering accessibility. The forest areas where the research was conducted had many ravines with a very steep topography. To get the proportions of land cover types in the path traversed, we recorded the type of land cover every 100 meters along the transect [12] based on the plant species composition. The grouping of types of land cover were in the forms of natural forest, mix of natural forest and crops, mixed-garden, pine forest, mixed pine forest, teak forest, mahogany forest, rosewood forest, coffee plantation, and shrubs. At the time of meeting Surili on the transect, we recorded the coordinates of encounter location by using a GPSmap 62sc receiver, land cover type, and activity. Observations generally began at 07.00 to 11.00 am. However, during rainy morning, the survey was postponed for a while, and then we started when the rain stopped.

Surili distribution information, which is based on the distance from nearest settlements and roads, was obtained by entering the coordinates of each location of encounter with Surili groups on map by Google Earth tool, then measure the distance to the nearest settlements and roads. Data of distribution by altitude was also obtained by observing each point of Surili encounter which had been entered into the Google Earth map, so that the elevation data was obtained.

2.3. Data analysis

The picture of Surili distribution by areas of the village administration was made by mapping the coordinates of locations of Surili encounters into the administrative maps of the villages combined with maps of land cover types. The distribution of groups at various distances from nearest settlements and roads, and various altitudes were analyzed descriptively and some of them were statistically tested.

Chi-square test which was introduced by Neu et al. [13] was conducted to identify whether the numbers of groups that were met in each type of land cover was proportional to the total length of the survey transects which were made on each of the cover types. For this purpose, variable which acted as available resource was the total length of transect on each type of land cover, while variable which acted as the value of the observation result was total of groups encountered. Estimation of the proportion of the range of observation values at a given confidence level was done by using Bonferroni procedure [14]. Furthermore, Neu selection index was used to determine the level of Surili selection on each type of land cover, with the following criteria: if the selection index>1, then it indicates that the habitat is preferred because the proportion of resource used (usage) is bigger than the proportion of available resource (availability) [15].

3. Result

3.1. Spatial distribution

Based on information collected from local residents, as many as 34 villages were suspected to be the location of distribution of Surili, however, based on the line transect the Surili population were found only in 31 villages (Figure 1).

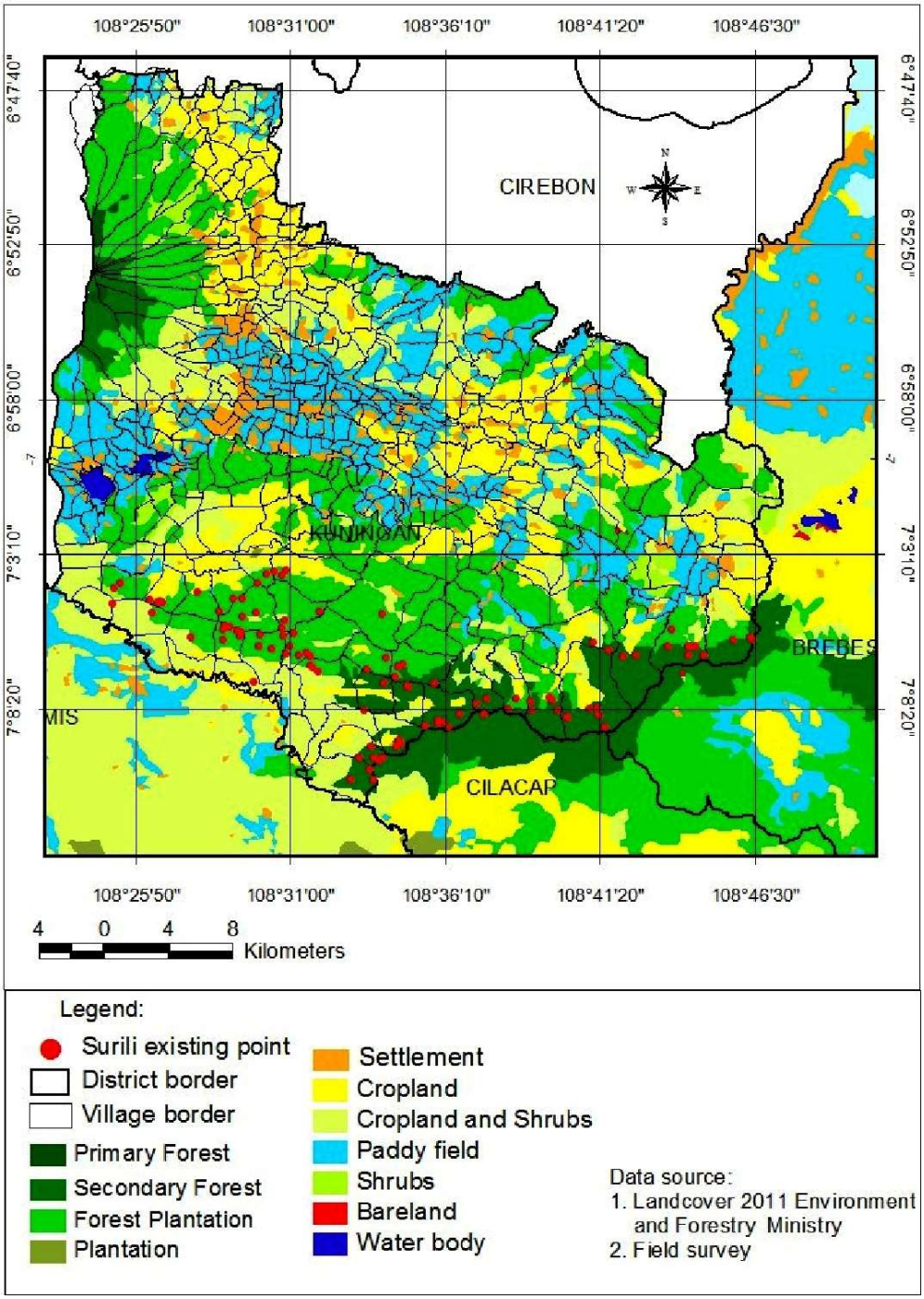


Fig. 1. Distribution of Surili populations outside conservation areas in the District of Kuningan.

3.2. Distance from human activities

The characteristic of habitat of the existence of Surili is specified in more detail by considering: a) location of nearest settlement, and b) nearest road. Results of measurements showed that Surili groups were found within the

distance of 9.32 to 3022.23 meters ($\bar{x}$ = 1002.08; n = 92; SD = 604.56) to the nearest settlement and within the distance of 3.24 to 3104.26 meters ($\bar{x}$ = 984.09; n = 92; SD = 667.02) to the nearest road. There was a significant correlation between the distance from the point of the encounter of Surili group to nearest settlements and to nearest road (r = 0.963; n = 92; p = 0.000). To determine group distribution based on distance from nearest settlement to the meeting point and the nearest road, the distance was divided into six classes (Figure 2). Although the number of Surili groups that were encountered in each distance class was varied, the number of the groups was proportional to the number of transects (the location of Surili-nearest settlement: λ^2 = 6.251; df = 4, p>0.05 and the location of Surili-nearest road: λ^2 = 4.663; df = 4; p> 0.05). In other words, the number of groups that were found was related to the number of transects: the more the transects were made, the more the number of groups that were found (Table 1). Furthermore, by Kruskall Wallis test, the average of transect lengths between each distance class were not significantly different (transect to nearest settlement: λ^2 = 2.584; df = 4; p = 0.630, and transect to nearest road: λ^2 = 2.217; df = 4; p = 0.696).

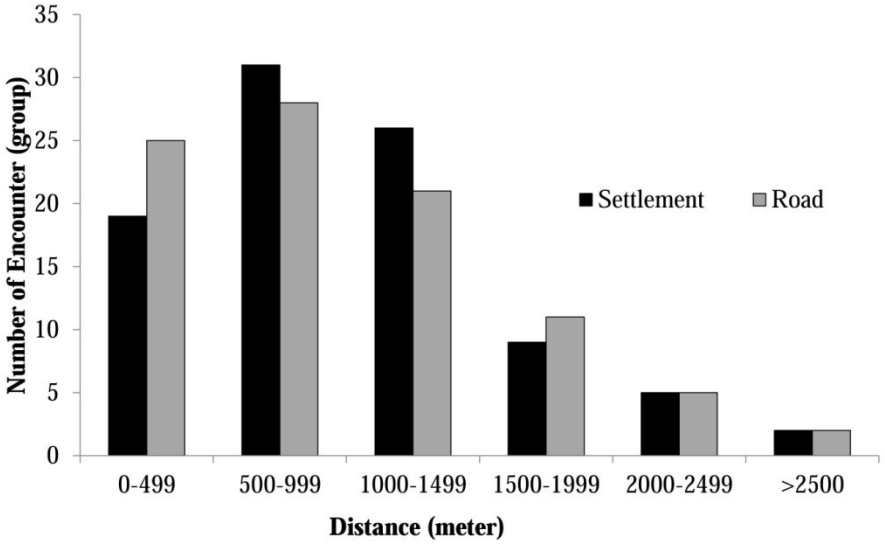


Figure 2. Surili population distribution based on distance from point of group encounter to nearest settlement and nearest road.

Table 1. Number of transects and numbers of Surili groups on each distance class from transect which their starting points were made at certain distance from nearest settlement and nearest road.

Distance (m)	Number of Transect	Prop. (1)	Obs. (2)	Prop. (3)	E (4)	$(O-E)^2/(E)$
Settlement transect						
0 – 499	57	0.475	41	0.446	43.70	0.167
500 – 999	37	0.308	35	0.380	28.37	1.551
1000 – 1499	16	0.133	6	0.065	12.27	3.201
1500 – 1999	7	0.058	8	0.087	5.37	1.292
>2000	3	0.025	2	0.022	2.30	0.039
Total	120	1.000	92	1.000	92.000	6.251
Road transect						
0 – 499	63	0.525	41	0.446	48.30	1.103
500 – 999	27	0.225	28	0.304	20.70	2.574

Distance (m)	Number of Transect	Prop. (1)	Obs. (2)	Prop. (3)	E (4)	$(O-E)^2/(E)$
1000 – 1499	18	0.150	13	0.141	13.80	0.046
1500 – 1999	8	0.067	8	0.087	6.13	0.568
>2000	4	0.033	2	0.022	3.07	0.371
Total	120	1.000	92	1.000	92.000	4.663

Note: (1) Proportion of total of transects; (2) Number of groups encountered; (3) Proportion of number of groups encountered; (4) Expected number of groups encountered

3.3. Land cover

The study also noted the type of land cover at each point of encounter with Surili groups. Results of this study showed that land cover types at locations of Surili encounter were natural forest, mixed garden, timber plantations, area of transition between natural forest with mixed garden, and area of transition between pine forest with natural forest and mixed garden (Table 2). However, this study did not find any Surili groups at coffee plantations and shrubs (Table 2).

Table 2. Length of observation transects, number of groups, and Neu index on each vegetation type.

Vegetation Type	Transect (1)	Prop. (2)	Group (3)	Prop. (4)	E (5)	Interval prop. (6)	Neu
Natural Forest (HA)	60.30	0.333	47	0.511	30.616	$0.368 \leq P \leq 0.654$*	1.535
Mixed Garden (KC)	71.90	0.397	22	0.239	36.506	$0.117 \leq P \leq 0.361$*	0.603
Homogenous timber plantation							
Pine forest	11.30	0.062	1	0.011	5.737	$0 \leq P \leq 0.040$*	0.174
Teak, mahogany and rosewood forests	7.60	0.042	2	0.022	3.859	$0 \leq P \leq 0.063$	0.518
Areas of transition							
HA to KC	14.70	0.081	15	0.163	7.464	$0.058 \leq P \leq 0.269$	2.010
Pine forest to HA&KC	11.80	0.065	5	0.054	5.991	$0 \leq P \leq 0.119$	0.835
Coffee plantation and shrubs	3.60	0.020	0	0	1.828	0	0
Total	181.20	1	92	1	92		5.675

Note: (1) Total length of observation transect (km); (2) Proportion of length of observation transect; (3) Number of groups observed; (4) Proportion of number of groups observed; (5) Expected number of groups observed; (6) Interval of proportion of observed groups at significant level of α = 0,05; and*shows difference at significant level of 0.05

Total of groups of Surili found on all transects were 92 groups. The groups were mostly found in natural forest, followed by mixed garden, area of transition between natural forest and mixed garden, area of transition between pine forest and natural forest and mixed garden, and homogenous timber plantation (Table 2). The distribution of Surili groups on the various types of vegetation was significantly different or was not proportionate to the total length of transect on any type of land cover ($\lambda^2 = 28.94$; p<0:01). Based on Neu Index (Table 2), Surili groups liked natural forest. Although it was not significant, the groups also liked the transition area between forest and mixed garden. Pine forests that mixed with natural forest plant species and mixed garden were preferred over pure stands of pine forest (Table 2).

Based on results of interviews with local people, Surili frequently visited gardens bordering settlements to take food in forms of fruit crops such as banana and papaya. Although annoying, the local villagers did not hunt or kill

these animals, they just repelled them away or protected their crops, such as by wrapping the banana fruits with plastic bags while they were still on the tree.

3.4. Elevation

To determine the distribution of Surili based on altitude, the research has measured altitudes at every point of encounter with Surili groups. The results showed that Surili groups were encountered within the altitudes of 255 to 1254 meters above sea level ($\bar{x}$ = 671.78; n = 92; SD = 187.92), or from the lowland forest ecosystem up to hilly area. Surili groups were often found at an altitude of 400 – 1000 m asl, and were rarely encountered at elevations below 400 m asl or above 1000 m asl (Figure 3).

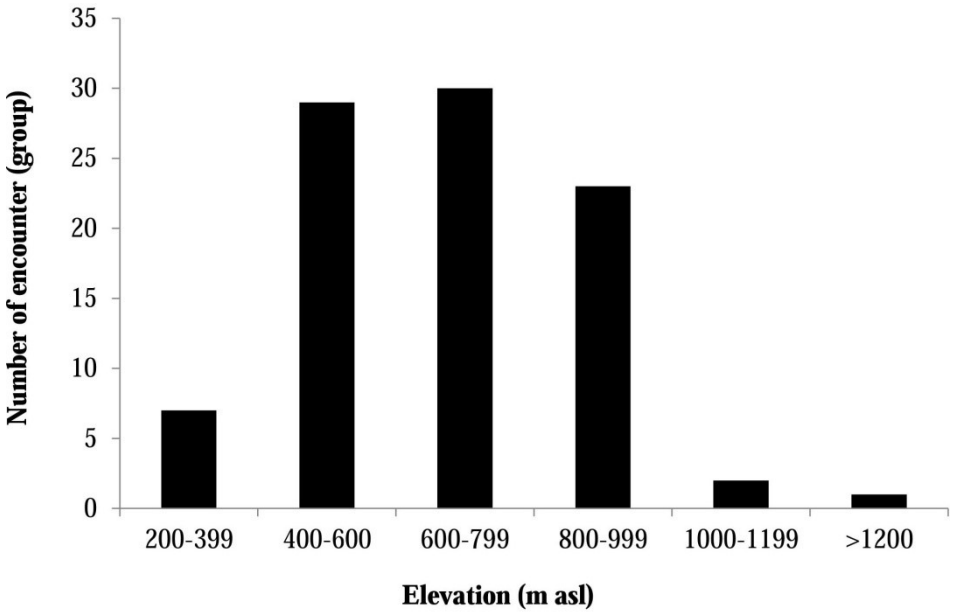


Figure 3. Distribution of Surili based on elevation of location of encounter.

4. Discussion

4.1. Spatial distribution

The study results showed that Surili population, based on information collected from local community, was distributed in 34 forest villages, while based on direct field survey they were distributed in 31 villages. Although there were 3 locations where Surili groups were not encountered during direct field observations, we still assume that the Surili groups were there at those locations. This is because based on interviews with some members of the local community, they have encountered Surili groups at the three locations. Regarding the absence of Surili groups that were not encountered at the three locations at the time of the survey, we argue that it was because the population density was very low, so the probability to be encountered was small. The locations of the Surili distribution were interconnected one to another by forest cover and those were located within two blocks of forest, e.g. the Bukit Pembarisan forest block and the Gunung Subang forest block (Figure 1). The interconnectedness allowed the Surili groups to move from one location to another. Bukit Pembarisan forest block is located in the southern part of Kuningan District, stretching from west to east. Gunung Subang forest block is located in the eastern part of the Kuningan District (extending from the northeast to the southwest), bordering the Central Java Province (Figure 1). Given this part of the Central Java Province is also a forest, and then the Surili distribution also included the western part of the province. The result of this study could also complement the study results of Nijman [8] which only put

Ciremai Mountain National Park as a distribution location of Surili in Kuningan District. By combining the results of both studies, the picture of Surili population distribution in Kuningan District became more complete, specifically that it spreaded in three forest blocks: Ciremai Mountain National Park, Bukit Pembarisan, and Gunung Subang.

4.2. Distance from human activities

The results of the study also indicated that the Surili groups did not only occupy locations far away from settlements and roads, but also those that were close to those features. Whereas the Surili was classified into species that is sensitive and timid to the presence of humans [16]. This study also obtained information that the Surili group often came to the gardens close to houses to"steal" food, especially bananas, but the residents did not bother the surili groups. Although these cases were common in regard to populations of *M. fascicularis* as reported by Munsha and Hanya [17] in Central Catchment Nature Reserves in Singapore and by Marchal and Hill [18] in North Sumatra, there has not been a lot of reports in relation to Surili population. Although some other primates such as *M. fuscata* will also enter the area around the settlement when there is a shortage of feed in their natural habitat [19], the probability of such scarcity of food sources of Surili in its natural habitat is small because Surili is a leaf-eating monkey. Therefore, the Surili group could occupy locations close to settlements and highways allegedly because of several factors such as the availability of preferred feed sources, and area was also safe from disturbance; or even though there was disturbance, it was still below the tolerance limit of the Surili population.

4.3. Land cover types

Based on the types of habitats that were used, we found that the population of Surili in Kuningan District used not only natural forest, but also used mixed-gardens and several places in the form of a pine forest. The natural forests where Surili populations were found in this study were in the form of secondary natural forests (Figure 1). Our study results that showed that surili occupied a secondary natural forest had also been widely reported by previous researchers, such as Nijman [8]. By calculating the Neu Index, it can be known that the Surili group preferred habitats in form of secondary natural forest compared to other forest types. According to Supriatna et al.[7], the availability of preferred food was suspected to be the reason for Surili to prefer forest stands are still young compared to that of older ones. However, undisturbed primary forest is an optimal habitat for a population of Surili [8] because primary forest is a high quality and more secure habitat [20]. Primary forests have trees larger than other habitat types so that primates that use the trees in the primary forest would have a lower risk of predation [20]. Although not a primary forest, habitat quality and security conditions supposed to be some of the factors that cause surili prefers natural forests.

In addition to occupying the interior of the natural forest, Surili also occupied areas of transition between natural forest and mixed-gardens. This finding was in accordance with the publication of Supriatna et al. [7] and the study results of Melisch and Dirgayusa [21] around Nature Reserve of Mount Tukung Gede. Ecotone area can experience a merging of species from two types of adjacent habitats so that it has a higher species diversity [22, 23]. A high plant diversity has a great possibility to increase the diversity of feeds. The condition was thought to be one of the factors that attracted Surili to occupy the area. The result of the study, that informed that the population of Surili could also be found in the mixed-garden ecosystem, was in accordance with the results of research of Melish and Dirgayusa [21] in Gunung Gede Tukung Nature Reserve. According to the two researchers, Surili often entered orchards and degraded forests bordering the Nature Reserve. Previous researchers also found evidence that some other primates, such as *P. fredericae* [24], *P. thomasi* [25], and *Nasalis larvatus* [26], also used the mixed-gardens as part of their habitats. Species of plants that were common in the mixed-gardens were *Paraserianthes falcataria, Swietenia mahagoni, Anthocepalus cadamba, Tectona grandis, Maesopsis eminii, Bambusa* spp*., Mangifera indica, Durio zibethinus, Nephelium lappaceum, Parkia speciosa, Cocos nucifera, Arenga pinnata, Artocarpus heterophyllus* and *Gnetum gnemon* [10]. Some species of plants in the mixed-garden such as *N. lappaceum*, and *P. falcataria* are feed source for Surili [21, 27]. Therefore, the availability of food was thought to be one of the reasons of Surili group presence in mixed-gardens. In addition, the presence of Surili in the mixed-gardens in this study showed that mixed-gardens can be an alternative habitat for a population of Surili.

Although Surili groups could be found in pine forests and other monoculture forests (*T. grandis, S. macrophylla*, and *D. latifolia*), but, the encounter frequency was lower than in other forest types. The condition was supported by results of research of Henzi et al. [28] in Mpumalanga Province, South Africa, which showed that baboons (*Papio hamadryasursinus*) avoided stands of pine and choose small pockets that contained natural stands. Pine forests and other monoculture forests such as Agathis forest have availability of food for primates (such as *P. fredericae*) lower than natural forests [29]. *T. grandis, S. macrophylla,* and *D. latifolia* have never been reported eaten by Surili [16, 27]. Furthermore, Surili occupying plantations and degraded forests cannot survive for a long time [8]. Therefore, the low number of groups of Surili in both forest types was allegedly because of the low availability of feeds sources.

The result of the study that showed that Surili were not found in shrubs were allegedly linked to level of its ability to move and habitat quality. As an arboreal species [8], Surili needs canopies of trees that are closely connected to enable it to move, even though Ruhiyat [16] once found a Surili got down on to the ground. In addition, the shrubs were also a low-quality habitat [20]. The suspected reason that Surili was not found in coffee plantation was also that coffee plantations have low quality as habitat. However, this study is different from results of the research done by Gurmaya [25] on *P. thomasi*. The species used shrubs and cacao garden as part of its home range [25]. But, the difference of the results of the two studies has not been understood yet, whether it was because of the methods used, difference in species, or other factors. This needs to be studied further.

4.4. Elevation

The fact that Surili were found in the lowland forest ecosystems was in accordance with reports of previous researchers that said that the lowland primary forests were the main habitat of Surili [2, 30, 31]. Melisch and Dirgayusa [21] in their study also found Surili population in lowland forest and hills with an altitude below 700 meters above sea level. However, the reduction of habitat due to conversion of natural forest into, for example, agricultural area and timber plantation [21] has resulted in surili nowadays often found in mountain ecosystems [4, 32], such as in the Gunung Halimun National Park [27]. At Mount Slamet, *P. fredericae*, which was known formerly as a subspecies of *P. comata frederiace* [9], was distributed at an altitude of 750 meters to 2500 m asl [29]. Not much different from situation in Dieng Mountains, the species was foundat an altitude of 650-2565 m asl [33, 34]. In Situ Patenggang Nature Reserve and in Kamojang, respectively, Surili found at an altitude of 1600-1775 m asl and 1390-1625 m asl [16]. The study that found evidence of Surili existence at an altitude of 255-1254 m asl showed that Surili in Kuningan District was still survived in forest ecosystem at the lowland and on hills.

4.5. Implications for conservation

The result of the study creates some implications on the conservation of Surili, particularly in the lowland forest ecosystems in the District of Kuningan. This research obtained results that locations of distribution of Surili were interconnected by forest cover, which indicated that the making of corridor that connects other forest locations need to be done to facilitate the distribution and expansion of habitat. The result of the research that showed that the population of Surili could be found in mixed-gardens and pine forests that mixed with other plant species indicated that the conservation of Surili can be done in man-made forest which is a combination of crops plants and other plants either natural or crop plants that can provide resources for Surili population. Our study which obtained results that Surili population can be found in gardens or forests that were close to settlements indicated that Surili conservation can be done near settlements by keeping the security of those forests and gardens.

Although this study could be considered as covering almost all locations (village administrative area) outside conservation area in District of Kuningan, where Surili population was distributed, this study had its limitations. The placement and length of transects were not based on the proportion of the total area of each land cover types. The consideration of determination of transect starting point was based on accessibility, and some transects were made by following existing paths. However, it was made by reasonable consideration of representation of land cover types in these locations, even though they were not in strict proportions.

5. Conclusion

The study concluded that in Kuningan District the habitat where the Surili was distributed were forests that were interconnected. Surili population in District of Kuningan were still distributed in lowland and hilly forest ecosystems. Surili distribution locations were not only in form of natural forests and located far away from settlements and roads, but also in man-made forests which have diverse plant species and forests which were close to settlements.

References

1. Eudey AA. Priorities in Asian primate conservation. *Primate Conservation* 1987; 8:172-174.
2. MacKinnon K. Conservation status of primates in Malesia, with special reference to Indonesia. *Primate Conservation* 1987; 8:175-183.
3. Kool KM. The status of endangered primates in Gunung Halimun Reserve, Indonesia. *Oryx* 1992; 26:29-33.
4. IUCN. IUCN Red List of Threatened Species. Version 2012.2. www.iucnredlist.org. [downloaded at 05 April 2013].
5. Peraturan Pemerintah No. 7 Tahun 1999 tentang Pengawetan Jenis Tumbuhan dan Satwa. Jakarta: Pemerintah Republik Indonesia; 1999.
6. Peraturan Menteri Kehutanan Nomor P.57/Menhut-II/2008 tentang Arahan Strategis Konservasi Spesies Nasional 2008-2018. Jakarta: Kementrian Kehutanan Republik Indonesia; 2008.
7. Supriatna J, Tilson JR, Gurmaya KJ, Manangsang J, Wardojo W, Sriyanto A, Teare A, Castle K, Seal U. *Javan Gibbon and Javan Langur Population and Habitat Viability Analysis*. Bogor: Taman Safari Indonesia; 1994.
8. Nijman V. On the occurrence and distribution of *Presbytis comata* (Desmarest, 1822) (Mammalia: Primates: Cercopithecidae) in Java, Indonesia. *Contributions to Zoology* 1997; 66:247-256.
9. Brandon-Jones D, Eudey AA, Geissmann T, Groves CV, Melnick DJ, Morales JC, Shekelle M, Stewart CB. Asian primate classification. *International Journal of Primatology* 2003; 27:97-164.
10. Prasetyo LB, Damayanti EK, Masuda M. Land cover changes before and after implementation of the PHBM program in Kuningan District, West Java, Indonesia. *Tropics* 2012; 21:47-57.
11. Setchell JM, Curtis DJ. *Field and Laboratory Methods in Primatology: A Practical Guide*. Cambridge: Cambridge University Press; 2003.
12. Morgan D, Sanz C, Onononga JR, Stindberg S. Ape abundance and habitat use in the Goualougo Triangle, Republic of Congo. *International Journal of Primatology* 2006; 27:147-179.
13. Neu CW, Byers CR, Peek JM. A technique for analysis of utilization-availability data. *The Journal of Wildlife Management* 1974; 38:541-545.
14. Byers CR, Steinhorst RK, Krausman PR. Clarification of a technique for analysis of utilization-availability data. *The Journal of Wildlife Management* 1984; 48:1050-1053.
15. Bibby C, Marsden S, Fielding A. Bird-Habitat Studies. In: Colin B, Jones M, Marsden S, editors. *Expedition Field Techniques: Bird survey*. London: Expedition Advisory Centre; 1998. p. 103-117.
16. Ruhiyat Y. Socio-ecological study of *Presbytis aygula* in West Java. *Primates* 1983; 24:344-359.
17. Munsha JCM, Hanya G. Diet, activity, habitat use, and ranging of two neighboring groups of food-enhanced long-tailed macaques (*Macaca fascicularis*). *American Journal of Primatology* 2013; 75:581 – 592.
18. Marchal V, Hill C. Primate crop-raiding: a study of local perception in four villages in North Sumatra, Indonesia. *Primate Conservation* 2009; 24:107-116.
19. Yamada A, Muroyama Y. Effects of vegetation type on habitat use by crop-raiding Japanese macaques during a food-scarce season. *Primates* 2010; 51:159-166.
20. Li Y. The effect of forest clear-cutting on habitat use in Sichuan snub-nosed monkey (*Rhinopithecus roxellana*) in Shennongjia Nature Reserve, China. *Primates* 2004; 45:69-72.
21. Melisch R, Dirgayusa IWA. Notes on the grizzled leaf monkey (*Presbytis comata*) from two nature reserves in the West Java, Indonesia. *Asian Primates* 1996; 6:5-11.
22. Whittaker RJ, Fernandez-Palacios JM. *Island Biogeography: Ecology, evolution, and conservation*. New York: Oxford University Press; 2007.
23. Senft AR. *Species Diversity Patterns At Ecotones*. Chapel Hill: University of North Carolina; 2009.
24. Suryana D. Studi perilaku makan dan palatabilitas rekrekan (*Presbytis fredericae* Sody, 1930) di kawasan hutan dan perkebunan karet Desa Gutomo Kabupaten Pekalongan Provinsi Jawa Tengah. Bogor: Departemen Konservasi Sumberdaya Hutan dan Ekowisata, Fakultas Kehutanan, Institut Pertanian Bogor; 2010.
25. Gurmaya KJ. Ecology and behavior of *Presbytis thomasi* in Northern Sumatra. *Primates* 1986; 27:151-172.
26. Salter RE, Mackenzie NA, Nightingale N, Aken KM, Chai PKP. Habitat use, ranging behaviour, and good habits of the proboscis monkey, *Nasalis larvatus* (van Wurmb), in Sarawak. *Primates* 1985; 26: 436–451.
27. Farida WR, Harun. The diversity of plants as feed resources for the java gibbon (*Hylobates moloch*), grizzled langur (*Presbytis comata*), and silver langur (*Trachypithecus auratus*) in Gunung Halimun National Park. *Jurnal Primatologi Indonesia* 2000; 3:55-61.
28. Henzi SP, Brown LR, Barrett L, Marais AJ. Troop size, habitat use, and diet of chacma baboons (*Papio hamadryasursinus*) in commercial pine plantations: implications for management. *International Journal of Primatology* 2011; 32:1020-1032.

29. Setiawan A, Wibisono Y, Nugroho TS, Agustin IY, Imron MA, Pudyatmoko S, Djuwantoko. Javan surili: a survey population and distribution in Mt. Slamet Central Java, Indonesia. *Jurnal Primatologi Indonesia* 2010; 7:51–54.
30. Hoogerwerf AA. *Udjung Kulon: The land of the last javan rhinoceros*. Netherlands: E.J. Brill; 1970.
31. Napier JR, Napier PH. *The Natural History of Primates*. Cambridge: The MIT Pr.; 1985.
32. Roland, Seitre J. Recent sightings of rare primates on Java. *Primate Conservation* 1990; 11:18.
33. Nijman V, Sozer R. Recent observations of the grizzled leaf monkey (*Presbytis comata*) and an extension of the range of the Javan gibbon (*Hylobates moloch*) in Central Jawa. *Tropical Biodiversity* 1995; 3: 45-48.
34. Nijman V, van Balen SB. A faunal survey of the Dieng Mountains, Central Java, Indonesia: distribution and conservation of endemic primate taxa. *Oryx* 1998; 32:145 – 156.

Available online at www.sciencedirect.com

ScienceDirect

Procedia Environmental Sciences00 (2015) 000–000

Procedia Environmental Sciences

www.elsevier.com/locate/procedia

The 2nd International Symposium on LAPAN-IPB Satellite for Food Security and Environmental Monitoring

Commented [S1]: Elsevier to update with volume and page numbers.

Spatial distribution and habitat use of surili (*Presbytis comata*): case study in District of Kuningan

Toto Supartono[a]*, Lilik Budi Prasetyo[b], Agus Hikmat[b], Agus Priyono Kartono[b]

[a]*Graduate School of Tropical Biodiversity Conservation, Faculty of Forestry, Bogor Agricultural University, Jl. Lingkar Akademik, Kampus IPB Darmaga, Bogor 16680, Indonesia*

[b]*Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University, Jl. Lingkar Akademik, Kampus IPB Darmaga, Bogor 16680, Indonesia*

Abstract

Surili (*Presbytis comata*) is priority species for conservation. Its habitat have been decreasing and isolated due to deforestation and forest degradation. The research is aimed to identify the distribution patterns of Surili with regard to biophysical habitat component (habitat type and altitude) as well as the sosial component in Kuningan Distric, West Java Provinces. The study found that Surili population are distributed in 34 villages in varies type of land cover such as lowland natural forest and mixed plantation forest. The closest distance surili were recorded at 9.32 m from settlement and 3.24 m from the road. Its distribution ranging from 255-1254 m asl.

Commented [LISAT20152]: It is better to use the word "identify" OR "measure" instead of "understanding" in the objective

Please enrich and improve the absract at least 200-250 words

Selection and peer-review under responsibility of the LISAT-FSEM Symposium Committee.

Keywords: Distribution, Kuningan District, land cover, surili, grizzled leaf monkey, *Presbytis comata*, conservation

1. Introduction

Surili (*Presbytis comata*) is grouped into a very high conservation rating species [1] because the condition is endangered due to the reduction of most (96%) of its natural habitat [2]. In addition, surili also has limited natural distribution [3], and since 1988 it was categorized by the IUCN as an endangered species [4]. The Government of the Republic of Indonesia stated that surili is a protected species [5] and is one of a number of conservation priority

* Corresponding author. Tel.: +62-852-1936-3919
E-mail address:macaca_fsc@yahoo.com

1878-0296
Selection and peer-review under responsibility of the LISAT-FSEM Symposium Committee.

species in Indonesia [6]. However, efforts of conservation of surili have some constraints. One of the constraints is that there is still little information about the distribution and population of the species [7].

Nijman [8] had published a map of population distribution of *P. comata* in Java. Nijman's research result showed that the distribution of population of *P. comata* covered the western and central parts of Java Island within the altitude of up to 2500 meters above sea level. Considering that the population that distributed in central and eastern parts of Java has now been known as a distinct species, namely *P. fredericae* [9], then the distribution areas of *P. comata* are mostly limited in the western part of Java.

District of Kuningan is an area of distribution of Surili, but it is not included in the distribution map of Nijman [8], except Mount Ciremai which was since 2004 has been changed into a national park. The distribution locations that have not been listed in the map are located outside the conservation area, and still have not been enough studied, in terms of distribution patterns and habitat. This research aims to study the characteristics of the habitat of *P. comata*. Results of this study are expected to support the Government in conservation efforts of *P. comata*.

Commented [LISAT20153]: This is different from the abstract describe above

2. Method

2.1. Research location

Surili population distribution data in Kuningan District was collected between April 2014 and March 2015. Location of the study did not include conservation areas. The study was conducted in two forest blocks, i.e. Gunung Subang (GS) forest block and Bukit Pembarisan (BP) forest block. The GS forest block is a forest area bordering with Central Java Province. This block is in the form of lowland and hilly forest which is dominated by secondary natural forest cover (Figure 1), at the edge, this area is mainly surrounded by community mixed-forest covers. Natural forests in some locations have been replaced by young and old coffee plants. Pine forests, in general, exist between the community mixed-forests and secondary forests. Pine forest and natural forest are managed by Perum Perhutani Forest Management Unit (FMU) of Kuningan. Those forests serve as, respectively, production forest and local protected areas. Based on the government administration, this forest block is included in 11 village administrative areas.

The land cover in the study site of BP forest block is classified by the Ministry of Environment and Forestry as industrial timber plantation and secondary forest (Figure 1). The forest block consists of pine forest, teak forest, mahogany forest, remnants of natural forest and community mixed-forest. The pine forest is a plantation that produces sap. The natural forest is a part of production forest which is designated as local protected area, generally narrow, and scattered among forests of pine and other tree plantations. The natural forest and the pine forest in the forest block are located on state land and are managed by Perum Perhutani Forest Management Unit (FMU) of Kuningan. As it was in the GS forest group, in some areas coffee plantations have replaced the natural forest and pine forest. The community mixed-forests are generally scattered with varied sizes. They are located on privately-owned land and bordered by natural forest or pine forest. Furthermore, on the vicinity of the community mixed-forest in general there is a mixture of rice fields and settlements. The community mixed-forest is also known as a mixed-garden because it is planted with various types of commercial timber trees and fruit-bearing plants [10]. The community mixed-forest that becomes the location of this study henceforth will be referred to as mixed-garden.

2.2. Survey of surili population

The research was conducted in two phases. In the first phase, we visited villages that have forest where there were indications of the presence of Surili population. Then we conducted interviews with local villagers [11] to collect information about the existence of Surili in the forest that belongs to the administrative areas of the villages. Because the villagers already familiar with this species of Surili, during the interview they could provide accurate information and would not confused the Surili in question with other species of monkeys which also existed in the District of Kuningan (long-tailed macaque and langur). At this stage we collected information that Surili existed in 34 villages.

In the second phase, a survey was conducted in villages which were suspected as habitats of the Surili based on results of the first phase. In the villages observation paths were established in forest areas. Total transects in each village varied from 5 km to 6 km, and the length of each transect varied from 1 km to 3 km, depended on the area of

the forest blocks. Transect length was measured by using hipchain. The placement of transects in each village was not done randomly, but by following the distribution of the forest and by considering accessibility. The forest areas where the research was conducted had many ravines with a very steep topography. To get the proportions of land cover types in the path traversed, we recorded the type of land cover every 100 meters along the transect [12] based on the plant species composition. The grouping of types of land cover were in the forms of natural forest, mix of natural forest and crops, mixed-garden, pine forest, mixed pine forest, teak forest, mahogany forest, rosewood forest, coffee plantation, and shrubs. At the time of meeting Surili on the transect, we recorded the coordinates of encounter location by using a GPSmap 62sc receiver, land cover type, and activity. Observations generally began at 07.00 to 11.00 am. However, during rainy morning, the survey was postponed for a while, and then we started when the rain stopped.

Surili distribution information, which is based on the distance from nearest settlements and roads, was obtained by entering the coordinates of each location of encounter with Surili groups on map by Google Earth tool, then measure the distance to the nearest settlements and roads. Data of distribution by altitude was also obtained by observing each point of Surili encounter which had been entered into the Google Earth map, so that the elevation data was obtained.

2.3. Data analysis

The picture of Surili distribution by areas of the village administration was made by mapping the coordinates of locations of Surili encounters into the administrative maps of the villages combined with maps of land cover types. The distribution of groups at various distances from nearest settlements and roads, and various altitudes were analyzed descriptively and some of them were statistically tested.

Chi-square test which was introduced by Neu et al. [13] was conducted to identify whether the numbers of groups that were met in each type of land cover was proportional to the total length of the survey transects which were made on each of the cover types. For this purpose, variable which acted as available resource was the total length of transect on each type of land cover, while variable which acted as the value of the observation result was total of groups encountered. Estimation of the proportion of the range of observation values at a given confidence level was done by using Bonferroni procedure [14]. Furthermore, Neu selection index was used to determine the level of Surili selection on each type of land cover, with the following criteria: if the selection index>1, then it indicates that the habitat is preferred because the proportion of resource used (usage) is bigger than the proportion of available resource (availability) [15].

3. Result

3.1. Spatial distribution

Based on information collected from local residents, as many as 34 villages were suspected to be the location of distribution of Surili, however, based on the line transect the Surili population were found only in 31 villages (Figure 1).

Commented [LISAT20154]: Did you suppose to say "systematic sampling" on the access road?

Commented [LISAT20155]: Unclear statement

Commented [LISAT20156]: Please describe how the pattern was calculated and analyzed.

Please add how the chi-sq test was performed

The flow chart study it is better to be outlined in the study.

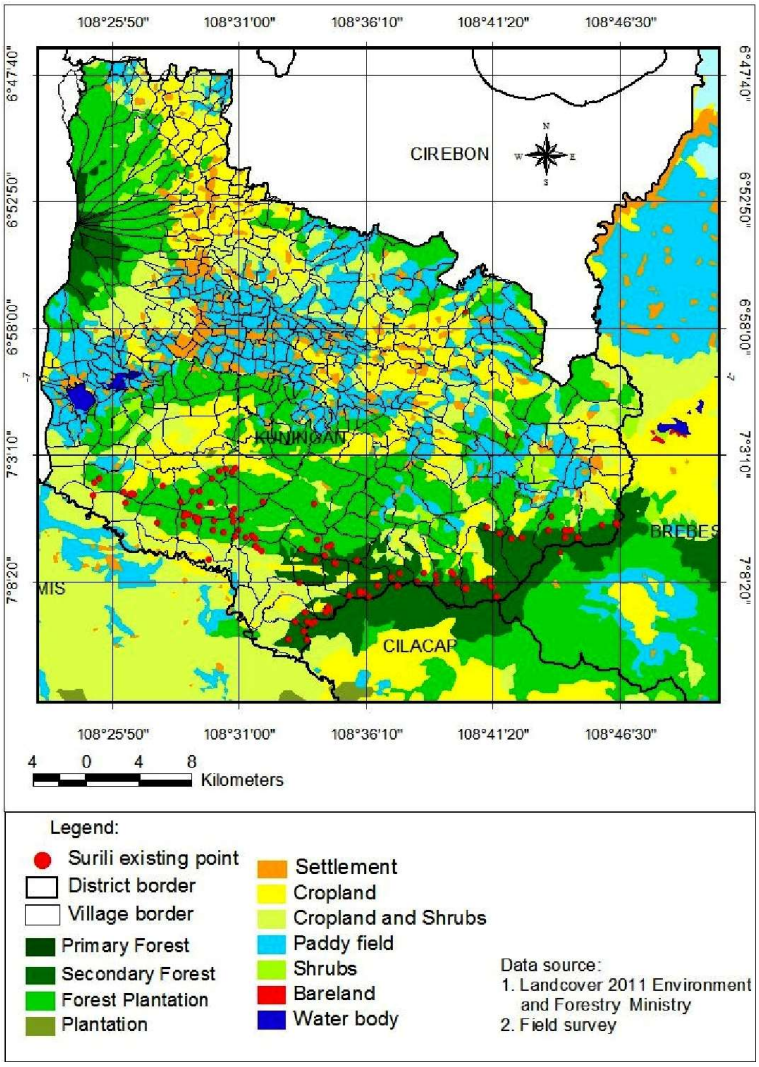


Fig. 1. Distribution of Surili populations outside conservation areas in the District of Kuningan.

3.2. Distance from human activities

The characteristic of habitat of the existence of Surili is specified in more detail by considering: a) location of nearest settlement, and b) nearest road. Results of measurements showed that Surili groups were found within the

distance of 9.32 to 3022.23 meters ($\bar{x}$ = 1002.08; n = 92; SD = 604.56) to the nearest settlement and within the distance of 3.24 to 3104.26 meters ($\bar{x}$ = 984.09; n = 92; SD = 667.02) to the nearest road. There was a significant correlation between the distance from the point of the encounter of Surili group to nearest settlements and to nearest road (r = 0.963; n = 92; p = 0.000). To determine group distribution based on distance from nearest settlement to the meeting point and the nearest road, the distance was divided into six classes (Figure 2). Although the number of Surili groups that were encountered in each distance class was varied, the number of the groups was proportional to the number of transects (the location of Surili-nearest settlement: λ^2 = 6.251; df = 4, p>0.05 and the location of Surili-nearest road: λ^2 = 4.663; df = 4; p> 0.05). In other words, the number of groups that were found was related to the number of transects: the more the transects were made, the more the number of groups that were found (Table 1). Furthermore, by Kruskall Wallis test, the average of transect lengths between each distance class were not significantly different (transect to nearest settlement: λ^2 = 2.584; df = 4; p = 0.630, and transect to nearest road: λ^2 = 2.217; df = 4; p = 0.696).

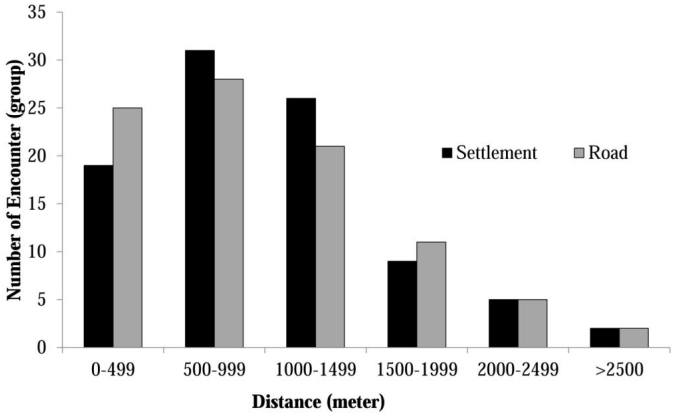


Figure 2. Surili population distribution based on distance from point of group encounter to nearest settlement and nearest road.

Table 1. Number of transects and numbers of Surili groups on each distance class from transect which their starting points were made at certain distance from nearest settlement and nearest road.

Distance (m)	Number of Transect	Prop. (1)	Obs. (2)	Prop. (3)	E (4)	$(O-E)^2/(E)$
Settlement transect						
0 – 499	57	0.475	41	0.446	43.70	0.167
500 – 999	37	0.308	35	0.380	28.37	1.551
1000 – 1499	16	0.133	6	0.065	12.27	3.201
1500 – 1999	7	0.058	8	0.087	5.37	1.292
>2000	3	0.025	2	0.022	2.30	0.039
Total	120	1.000	92	1.000	92.000	6.251
Road transect						
0 – 499	63	0.525	41	0.446	48.30	1.103
500 – 999	27	0.225	28	0.304	20.70	2.574
1000 – 1499	18	0.150	13	0.141	13.80	0.046

Distance (m)	Number of Transect	Prop. (1)	Obs. (2)	Prop. (3)	E (4)	$(O-E)^2/$ (E)
1500 – 1999	8	0.067	8	0.087	6.13	0.568
>2000	4	0.033	2	0.022	3.07	0.371
Total	120	1.000	92	1.000	92.000	4.663

Note: (1) Proportion of total of transects; (2) Number of groups encountered; (3) Proportion of number of groups encountered; (4) Expected number of groups encountered

3.3. Land cover

The study also noted the type of land cover at each point of encounter with Surili groups. Results of this study showed that land cover types at locations of Surili encounter were natural forest, mixed garden, timber plantations, area of transition between natural forest with mixed garden, and area of transition between pine forest with natural forest and mixed garden (Table 2). However, this study did not find any Surili groups at coffee plantations and shrubs (Table 2).

Table 2. Length of observation transects, number of groups, and Neu index on each vegetation type.

Vegetation Type	Transect (1)	Prop. (2)	Group (3)	Prop. (4)	E (5)	Interval prop. (6)	Neu
Natural Forest (HA)	60.30	0.333	47	0.511	30.616	$0.368 \leq P \leq 0.654$*	1.535
Mixed Garden (KC)	71.90	0.397	22	0.239	36.506	$0.117 \leq P \leq 0.361$*	0.603
Homogenous timber plantation							
Pine forest	11.30	0.062	1	0.011	5.737	$0 \leq P \leq 0.040$*	0.174
Teak, mahogany and rosewood forests	7.60	0.042	2	0.022	3.859	$0 \leq P \leq 0.063$	0.518
Areas of transition							
HA to KC	14.70	0.081	15	0.163	7.464	$0.058 \leq P \leq 0.269$	2.010
Pine forest to HA&KC	11.80	0.065	5	0.054	5.991	$0 \leq P \leq 0.119$	0.835
Coffee plantation and shrubs	3.60	0.020	0	0	1.828	0	0
Total	181.20	1	92	1	92		5.675

Note: (1) Total length of observation transect (km); (2) Proportion of length of observation transect; (3) Number of groups observed; (4) Proportion of number of groups observed; (5) Expected number of groups observed; (6) Interval of proportion of observed groups at significant level of $\alpha = 0,05$; and*shows difference at significant level of 0.05

Total of groups of Surili found on all transects were 92 groups. The groups were mostly found in natural forest, followed by mixed garden, area of transition between natural forest and mixed garden, area of transition between pine forest and natural forest and mixed garden, and homogenous timber plantation (Table 2). The distribution of Surili groups on the various types of vegetation was significantly different or was not proportionate to the total length of transect on any type of land cover ($\lambda^2 = 28.94$; p<0:01). Based on Neu Index (Table 2), Surili groups liked natural forest. Although it was not significant, the groups also liked the transition area between forest and mixed garden. Pine forests that mixed with natural forest plant species and mixed garden were preferred over pure stands of pine forest (Table 2).

Based on results of interviews with local people, Surili frequently visited gardens bordering settlements to take food in forms of fruit crops such as banana and papaya. Although annoying, the local villagers did not hunt or kill these animals, they just repelled them away or protected their crops, such as by wrapping the banana fruits with plastic bags while they were still on the tree.

3.4. Elevation

To determine the distribution of Surili based on altitude, the research has measured altitudes at every point of encounter with Surili groups. The results showed that Surili groups were encountered within the altitudes of 255 to 1254 meters above sea level ($\bar{x}$ = 671.78; n = 92; SD = 187.92), or from the lowland forest ecosystem up to hilly area. Surili groups were often found at an altitude of 400 – 1000 m asl, and were rarely encountered at elevations below 400 m asl or above 1000 m asl (Figure 3).

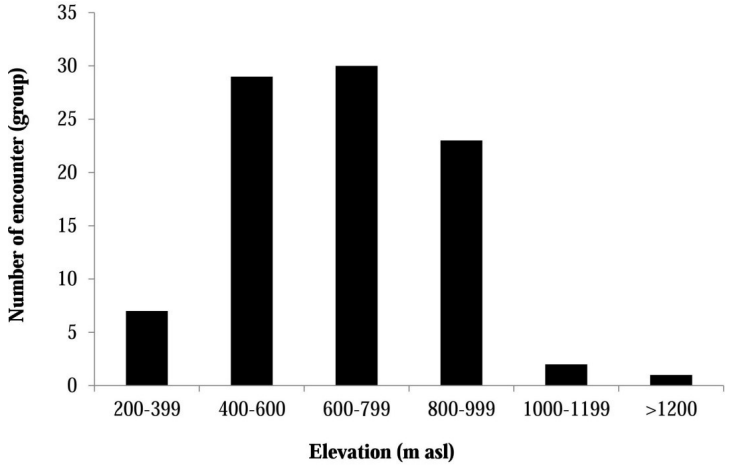


Figure 3. Distribution of Surili based on elevation of location of encounter.

4. Discussion

4.1. Spatial distribution

The study results showed that Surili population, based on information collected from local community, was distributed in 34 forest villages, while based on direct field survey they were distributed in 31 villages. Although there were 3 locations where Surili groups were not encountered during direct field observations, we still assume that the Surili groups were there at those locations. This is because based on interviews with some members of the local community, they have encountered Surili groups at the three locations. Regarding the absence of Surili groups that were not encountered at the three locations at the time of the survey, we argue that it was because the population density was very low, so the probability to be encountered was small. The locations of the Surili distribution were interconnected one to another by forest cover and those were located within two blocks of forest, e.g. the Bukit Pembarisan forest block and the Gunung Subang forest block (Figure 1). The interconnectedness allowed the Surili groups to move from one location to another. Bukit Pembarisan forest block is located in the southern part of Kuningan District, stretching from west to east. Gunung Subang forest block is located in the eastern part of the Kuningan District (extending from the northeast to the southwest), bordering the Central Java Province (Figure 1). Given this part of the Central Java Province is also a forest, and then the Surili distribution also included the western part of the province. The result of this study could also complement the study results of Nijman [8] which only put Ciremai Mountain National Park as a distribution location of Surili in Kuningan District. By combining the results of both studies, the picture of Surili population distribution in Kuningan District became more complete, specifically that it spreaded in three forest blocks: Ciremai Mountain National Park, Bukit Pembarisan, and Gunung Subang.

4.2. Distance from human activities

The results of the study also indicated that the Surili groups did not only occupy locations far away from settlements and roads, but also those that were close to those features. Whereas the Surili was classified into species that is sensitive and timid to the presence of humans [16]. This study also obtained information that the Surili group often came to the gardens close to houses to"steal" food, especially bananas, but the residents did not bother the surili groups. Although these cases were common in regard to populations of *M. fascicularis* as reported by Munsha and Hanya [17] in Central Catchment Nature Reserves in Singapore and by Marchal and Hill [18] in North Sumatra, there has not been a lot of reports in relation to Surili population. Although some other primates such as *M. fuscata* will also enter the area around the settlement when there is a shortage of feed in their natural habitat [19], the probability of such scarcity of food sources of Surili in its natural habitat is small because Surili is a leaf-eating monkey. Therefore, the Surili group could occupy locations close to settlements and highways allegedly because of several factors such as the availability of preferred feed sources, and area was also safe from disturbance; or even though there was disturbance, it was still below the tolerance limit of the Surili population.

4.3. Land cover types

Based on the types of habitats that were used, we found that the population of Surili in Kuningan District used not only natural forest, but also used mixed-gardens and several places in the form of a pine forest. The natural forests where Surili populations were found in this study were in the form of secondary natural forests (Figure 1). Our study results that showed that surili occupied a secondary natural forest had also been widely reported by previous researchers, such as Nijman [8]. By calculating the Neu Index, it can be known that the Surili group preferred habitats in form of secondary natural forest compared to other forest types. According to Supriatna et al.[7], the availability of preferred food was suspected to be the reason for Surili to prefer forest stands are still young compared to that of older ones. However, undisturbed primary forest is an optimal habitat for a population of Surili [8] because primary forest is a high quality and more secure habitat [20]. Primary forests have trees larger than other habitat types so that primates that use the trees in the primary forest would have a lower risk of predation [20]. Although not a primary forest, habitat quality and security conditions supposed to be some of the factors that cause surili prefers natural forests.

In addition to occupying the interior of the natural forest, Surili also occupied areas of transition between natural forest and mixed-gardens. This finding was in accordance with the publication of Supriatna et al. [7] and the study results of Melisch and Dirgayusa [21] around Nature Reserve of Mount Tukung Gede. Ecotone area can experience a merging of species from two types of adjacent habitats so that it has a higher species diversity [22, 23]. A high plant diversity has a great possibility to increase the diversity of feeds. The condition was thought to be one of the factors that attracted Surili to occupy the area. The result of the study, that informed that the population of Surili could also be found in the mixed-garden ecosystem, was in accordance with the results of research of Melish and Dirgayusa [21] in Gunung Gede Tukung Nature Reserve. According to the two researchers, Surili often entered orchards and degraded forests bordering the Nature Reserve. Previous researchers also found evidence that some other primates, such as *P. fredericae* [24], *P. thomasi* [25], and *Nasalis larvatus* [26], also used the mixed-gardens as part of their habitats. Species of plants that were common in the mixed-gardens were *Paraserianthes falcataria, Swietenia mahagoni, Anthocepalus cadamba, Tectona grandis, Maesopsis eminii, Bambusa* spp*., Mangifera indica, Durio zibethinus, Nephelium lappaceum, Parkia speciosa, Cocos nucifera, Arenga pinnata, Artocarpus heterophyllus* and *Gnetum gnemon* [10]. Some species of plants in the mixed-garden such as *N. lappaceum*, and *P. falcataria* are feed source for Surili [21, 27]. Therefore, the availability of food was thought to be one of the reasons of Surili group presence in mixed-gardens. In addition, the presence of Surili in the mixed-gardens in this study showed that mixed-gardens can be an alternative habitat for a population of Surili.

Although Surili groups could be found in pine forests and other monoculture forests (*T. grandis, S. macrophylla*, and *D. latifolia*), but, the encounter frequency was lower than in other forest types. The condition was supported by results of research of Henzi et al. [28] in Mpumalanga Province, South Africa, which showed that baboons (*Papio hamadryasursinus*) avoided stands of pine and choose small pockets that contained natural stands. Pine forests and other monoculture forests such as Agathis forest have availability of food for primates (such as *P. fredericae*) lower

than natural forests [29]. *T. grandis, S. macrophylla,* and *D. latifolia* have never been reported eaten by Surili [16, 27]. Furthermore, Surili occupying plantations and degraded forests cannot survive for a long time [8]. Therefore, the low number of groups of Surili in both forest types was allegedly because of the low availability of feeds sources.

The result of the study that showed that Surili were not found in shrubs were allegedly linked to level of its ability to move and habitat quality. As an arboreal species [8], Surili needs canopies of trees that are closely connected to enable it to move, even though Ruhiyat [16] once found a Surili got down on to the ground. In addition, the shrubs were also a low-quality habitat [20]. The suspected reason that Surili was not found in coffee plantation was also that coffee plantations have low quality as habitat. However, this study is different from results of the research done by Gurmaya [25] on *P. thomasi*. The species used shrubs and cacao garden as part of its home range [25]. But, the difference of the results of the two studies has not been understood yet, whether it was because of the methods used, difference in species, or other factors. This needs to be studied further.

4.4. Elevation

The fact that Surili were found in the lowland forest ecosystems was in accordance with reports of previous researchers that said that the lowland primary forests were the main habitat of Surili [2, 30, 31]. Melisch and Dirgayusa [21] in their study also found Surili population in lowland forest and hills with an altitude below 700 meters above sea level. However, the reduction of habitat due to conversion of natural forest into, for example, agricultural area and timber plantation [21] has resulted in surili nowadays often found in mountain ecosystems [4, 32], such as in the Gunung Halimun National Park [27]. At Mount Slamet, *P. fredericae*, which was known formerly as a subspecies of *P. comata frederiace* [9], was distributed at an altitude of 750 meters to 2500 m asl [29]. Not much different from situation in Dieng Mountains, the species was foundat an altitude of 650-2565 m asl [33, 34]. In Situ Patenggang Nature Reserve and in Kamojang, respectively, Surili found at an altitude of 1600-1775 m asl and 1390-1625 m asl [16]. The study that found evidence of Surili existence at an altitude of 255-1254 m asl showed that Surili in Kuningan District was still survived in forest ecosystem at the lowland and on hills.

4.5. Implications for conservation

The result of the study creates some implications on the conservation of Surili, particularly in the lowland forest ecosystems in the District of Kuningan. This research obtained results that locations of distribution of Surili were interconnected by forest cover, which indicated that the making of corridor that connects other forest locations need to be done to facilitate the distribution and expansion of habitat. The result of the research that showed that the population of Surili could be found in mixed-gardens and pine forests that mixed with other plant species indicated that the conservation of Surili can be done in man-made forest which is a combination of crops plants and other plants either natural or crop plants that can provide resources for Surili population. Our study which obtained results that Surili population can be found in gardens or forests that were close to settlements indicated that Surili conservation can be done near settlements by keeping the security of those forests and gardens.

Although this study could be considered as covering almost all locations (village administrative area) outside conservation area in District of Kuningan, where Surili population was distributed, this study had its limitations. The placement and length of transects were not based on the proportion of the total area of each land cover types. The consideration of determination of transect starting point was based on accessibility, and some transects were made by following existing paths. However, it was made by reasonable consideration of representation of land cover types in these locations, even though they were not in strict proportions.

5. Conclusion

The study concluded that in Kuningan District the habitat where the Surili was distributed were forests that were interconnected. Surili population in District of Kuningan were still distributed in lowland and hilly forest ecosystems. Surili distribution locations were not only in form of natural forests and located far away from settlements and roads, but also in man-made forests which have diverse plant species and forests which were close to settlements.

Commented [LISAT20157]: The aims of study described in abstract and background DO NOT MATCH with conclusion

What is the distribution pattern as outlined in the abstract.

References

1. Eudey AA. Priorities in Asian primate conservation. *Primate Conservation* 1987; 8:172-174.
2. MacKinnon K. Conservation status of primates in Malesia, with special reference to Indonesia. *Primate Conservation* 1987; 8:175-183.
3. Kool KM. The status of endangered primates in Gunung Halimun Reserve, Indonesia. *Oryx* 1992; 26:29-33.
4. IUCN. IUCN Red List of Threatened Species. Version 2012.2. www.iucnredlist.org. [downloaded at 05 April 2013].
5. Peraturan Pemerintah No. 7 Tahun 1999 tentang Pengawetan Jenis Tumbuhan dan Satwa. Jakarta: Pemerintah Republik Indonesia; 1999.
6. Peraturan Menteri Kehutanan Nomor P.57/Menhut-II/2008 tentang Arahan Strategis Konservasi Spesies Nasional 2008-2018. Jakarta: Kementrian Kehutanan Republik Indonesia; 2008.
7. Supriatna J, Tilson JR, Gurmaya KJ, Manangsang J, Wardojo W, Sriyanto A, Teare A, Castle K, Seal U. *Javan Gibbon and Javan Langur Population and Habitat Viability Analysis*. Bogor: Taman Safari Indonesia; 1994.
8. Nijman V. On the occurrence and distribution of *Presbytis comata* (Desmarest, 1822) (Mammalia: Primates: Cercopithecidae) in Java, Indonesia. *Contributions to Zoology* 1997; 66:247-256.
9. Brandon-Jones D, Eudey AA, Geissmann T, Groves CV, Melnick DJ, Morales JC, Shekelle M, Stewart CB. Asian primate classification. *International Journal of Primatology* 2003; 27:97-164.
10. Prasetyo LB, Damayanti EK, Masuda M. Land cover changes before and after implementation of the PHBM program in Kuningan District, West Java, Indonesia. *Tropics* 2012; 21:47-57.
11. Setchell JM, Curtis DJ. *Field and Laboratory Methods in Primatology: A Practical Guide*. Cambridge: Cambridge University Press; 2003.
12. Morgan D, Sanz C, Onononga JR, Stindberg S. Ape abundance and habitat use in the Goualougo Triangle, Republic of Congo. *International Journal of Primatology* 2006; 27:147-179.
13. Neu CW, Byers CR, Peek JM. A technique for analysis of utilization-availability data. *The Journal of Wildlife Management* 1974; 38:541-545.
14. Byers CR, Steinhorst RK, Krausman PR. Clarification of a technique for analysis of utilization-availability data. *The Journal of Wildlife Management* 1984; 48:1050-1053.
15. Bibby C, Marsden S, Fielding A. Bird-Habitat Studies. In: Colin B, Jones M, Marsden S, editors. *Expedition Field Techniques: Bird survey*. London: Expedition Advisory Centre; 1998. p. 103-117.
16. Ruhiyat Y. Socio-ecological study of *Presbytis aygula* in West Java. *Primates* 1983; 24:344-359.
17. Munsha JCM, Hanya G. Diet, activity, habitat use, and ranging of two neighboring groups of food-enhanced long-tailed macaques (*Macaca fascicularis*). *American Journal of Primatology* 2013; 75:581 – 592.
18. Marchal V, Hill C. Primate crop-raiding: a study of local perception in four villages in North Sumatra, Indonesia. *Primate Conservation* 2009; 24:107-116.
19. Yamada A, Muroyama Y. Effects of vegetation type on habitat use by crop-raiding Japanese macaques during a food-scarce season. *Primates* 2010; 51:159-166.
20. Li Y. The effect of forest clear-cutting on habitat use in Sichuan snub-nosed monkey (*Rhinopithecus roxellana*) in Shennongjia Nature Reserve, China. *Primates* 2004; 45:69-72.
21. Melisch R, Dirgayusa IWA. Notes on the grizzled leaf monkey (*Presbytis comata*) from two nature reserves in the West Java, Indonesia. *Asian Primates* 1996; 6:5-11.
22. Whittaker RJ, Fernandez-Palacios JM. *Island Biogeography: Ecology, evolution, and conservation*. New York: Oxford University Press; 2007.
23. Senft AR. *Species Diversity Patterns At Ecotones*. Chapel Hill: University of North Carolina; 2009.
24. Suryana D. Studi perilaku makan dan palatabilitas rekrekan (*Presbytis fredericae* Sody, 1930) di kawasan hutan dan perkebunan karet Desa Gutomo Kabupaten Pekalongan Provinsi Jawa Tengah. Bogor: Departemen Konservasi Sumberdaya Hutan dan Ekowisata, Fakultas Kehutanan, Institut Pertanian Bogor; 2010.
25. Gurmaya KJ. Ecology and behavior of *Presbytis thomasi* in Northern Sumatra. *Primates* 1986; 27:151-172.
26. Salter RE, Mackenzie NA, Nightingale N, Aken KM, Chai PKP. Habitat use, ranging behaviour, and good habits of the proboscis monkey, *Nasalis larvatus* (van Wurmb), in Sarawak. *Primates* 1985; 26: 436–451.
27. Farida WR, Harun. The diversity of plants as feed resources for the java gibbon (*Hylobates moloch*), grizzled langur (*Presbytis comata*), and silver langur (*Trachypithecus auratus*) in Gunung Halimun National Park. *Jurnal Primatologi Indonesia* 2000; 3:55-61.
28. Henzi SP, Brown LR, Barrett L, Marais AJ. Troop size, habitat use, and diet of chacma baboons (*Papio hamadryasursinus*) in commercial pine plantations: implications for management. *International Journal of Primatology* 2011; 32:1020-1032.
29. Setiawan A, Wibisono Y, Nugroho TS, Agustin IY, Imron MA, Pudyatmoko S, Djuwantoko. Javan surili: a survey population and distribution in Mt. Slamet Central Java, Indonesia. *Jurnal Primatologi Indonesia* 2010; 7:51–54.
30. Hoogerwerf AA. *Udjung Kulon: The land of the last javan rhinoceros*. Netherlands: E.J. Brill; 1970.
31. Napier JR, Napier PH. *The Natural History of Primates*. Cambridge: The MIT Pr.; 1985.
32. Roland, Seitre J. Recent sightings of rare primates on Java. *Primate Conservation* 1990; 11:18.
33. Nijman V, Sozer R. Recent observations of the grizzled leaf monkey (*Presbytis comata*) and an extension of the range of the Javan gibbon (*Hylobates moloch*) in Central Jawa. *Tropical Biodiversity* 1995; 3: 45-48.
34. Nijman V, van Balen SB. A faunal survey of the Dieng Mountains, Central Java, Indonesia: distribution and conservation of endemic primate taxa. *Oryx* 1998; 32:145 – 156.

Available online at www.sciencedirect.com

ScienceDirect

Procedia Environmental Sciences00 (2015) 000–000

Procedia Environmental Sciences

www.elsevier.com/locate/procedia

The 2nd International Symposium on LAPAN-IPB Satellite for Food Security and Environmental Monitoring

Commented [S1]: Elsevier to update with volume and page numbers.

Spatial distribution and habitat use of Javan langur (*Presbytis comata*): case study in District of Kuningan

Toto Supartono[a]*, Lilik Budi Prasetyo[b], Agus Hikmat[b], Agus Priyono Kartono[b]

[a]*Graduate School of Tropical Biodiversity Conservation, Faculty of Forestry, Bogor Agricultural University, Jl. Lingkar Akademik, Kampus IPB Darmaga, Bogor 16680, Indonesia*

[b]*Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural University, Jl. Lingkar Akademik, Kampus IPB Darmaga, Bogor 16680, Indonesia*

Abstract

Javan langur (*Presbytis comata*) is grouped into one of priority species for conservation. However, little is known about the distribution of the population that can support conservation effort. The research is aimed to identify the distribution of Javan langur based on village administrative area, distance of group encounter to nearest settlement and roadway, and altitude, as well as habitat types used in Kuningan District, West Java Provinces. We interviewed residents of forest villages to gather information on population occurrence, followed by making line transects in each village based on the result of the interviews, then noted habitat type every 100 m along the transect and encountering point of group of Javan langur as well as the coordinates of encountering. The data obtained were analyzed descriptively and by using both chi-square test and Bonferroni's procedure to determine the preferences of habitat types used. The study found that Javan langur populations are distributed in 34 forest villages. The closest distance Javan langur were recorded at 9.32 meters from the settlement and 3.24 meters from the road. Its distribution ranging from 255-1254 meters asl. Land cover types used were natural forest, mixed-garden, homogenous timber plantation (pine, teak, mahagoni and rosewood forest), and transition areas (natural forest to mixed garden and pine forest to natural forest or mixed garden), but natural forest was preferred. This study suggests that the population of Javan langur still survive in various types of forests outside of conservation areas. We conclude that Javan langur population can still be found in several locations in lowland, hills, natural forest and plantation forest that have diverse vegetation, including those adjacent to settlement.

Commented [LISAT20152]: It is better to use the word "identify" OR "measure" instead of "understanding" in the objective

Please enrich and improve the absract at least 200-250 words

Selection and peer-review under responsibility of the LISAT-FSEM Symposium Committee.

* Corresponding author. Tel.: +62-852-1936-3919

E-mail address:macaca_fsc@yahoo.com

1878-0296

Selection and peer-review under responsibility of the LISAT-FSEM Symposium Committee.

*Keywords:*Distribution, Kuningan District, land cover, Javan langur, grizzled leaf monkey, *Presbytis comata*, conservation

1. Introduction

Javan langur (*Presbytis comata*) is grouped into a very high conservation rating species [1] because the condition is endangered due to the reduction of most (96%) of its natural habitat [2]. In addition, Javan langur also has limited natural distribution [3], and since 1988 it was categorized by the IUCN as an endangered species [4]. The Government of the Republic of Indonesia stated that Javan langur is a protected species [5] and is one of a number of conservation priority species in Indonesia [6]. However, efforts of conservation of Javan langur have some constraints. One of the constraints is that there is still little information about the distribution of the species [7].

Nijman [8] had studied and published a map of population distribution of *P. comata* in Java. Nijman's research result showed that the population of *P. comata* was distributed in 34 forest areas, which are mostly located in the western part of Java Island (covering West Java Provinces and Banten Provinces) and some locations are in Central Java Provinces within the altitude of up to 2500 meters above sea level. Considering that the population that distributed in central and eastern parts of Java has now been known as a distinct species, namely *P. fredericae* [9], then the distribution areas of *P. comata* are mostly limited in the western part of Java. The results of previous studies could also complete information of the distribution of the Javan langur population in West Java [e.g., 10, 11, 12, 13]. However, the results of these studies only provided information about the distribution of the population in the conservation areas where the level of security and the region existence were more guaranteed. In fact, apart from in the conservation area, Javan langur also are distributed outside conservation areas [2]. MacKinnon also said that most of the population number of Javan langur are outside the conservation areas.

Information availability of Javan langur population distribution more detailed that includes conservation areas and non conservation areas in each region is necessary for the conservation of the population [6]. In addition, the conservation of populations also need information of habitat preferences [8], but the information is little known [7]. District of Kuningan is an area of distribution of Javan langur, but it is not included in the distribution map of Nijman [8], except Mount Ciremai which was since 2004 has been changed into a national park. The distribution locations that have not been listed in the map are located outside the conservation area, and still have not been enough studied, in terms of distribution patterns and habitat. The research is aimed to identify the distribution of Javan langur based on village administrative area, distance of group encountering to nearest settlement and roadway, and altitude, as well as habitat types used in Kuningan District, West Java Provinces. Results of this study are expected to support the Government in conservation efforts of *P. comata*.

2. Method

2.1. Research location

The research location is forest areas in Kuningan District, West Java Province, Indonesia. The Kuningan District is located at 108º23'-108º47'E and 6º47'-7º12'S and has area 1,195.71 km^2. Total forest area is 583.31 km^2: production forest is 256.44 km^2, conservation forest is 86.99 km^2, and community forest (mixed-garden) is 239.79 km^2 [14]. Javan langur population distribution data was collected between April 2014 and March 2015. Location of the study did not include conservation areas. The study was conducted in two forest blocks, i.e. Gunung Subang (GS) forest block and Bukit Pembarisan (BP) forest block. The GS forest block is a forest area bordering with Central Java Province. This block is in the form of lowland and hilly forest which is dominated by secondary natural forest cover (Figure 1), at the edge, this area is mainly surrounded by community mixed-forest covers. Natural forests in some locations have been replaced by young and old coffee plants. Pine forests, in general, exist between the community mixed-forests and secondary forests. Pine forest and natural forest are managed by Perum Perhutani Forest Management Unit (FMU) of Kuningan. Those forests serve as, respectively, production forest and local protected areas. Based on the government administration, this forest block is included in 11 village administrative areas.

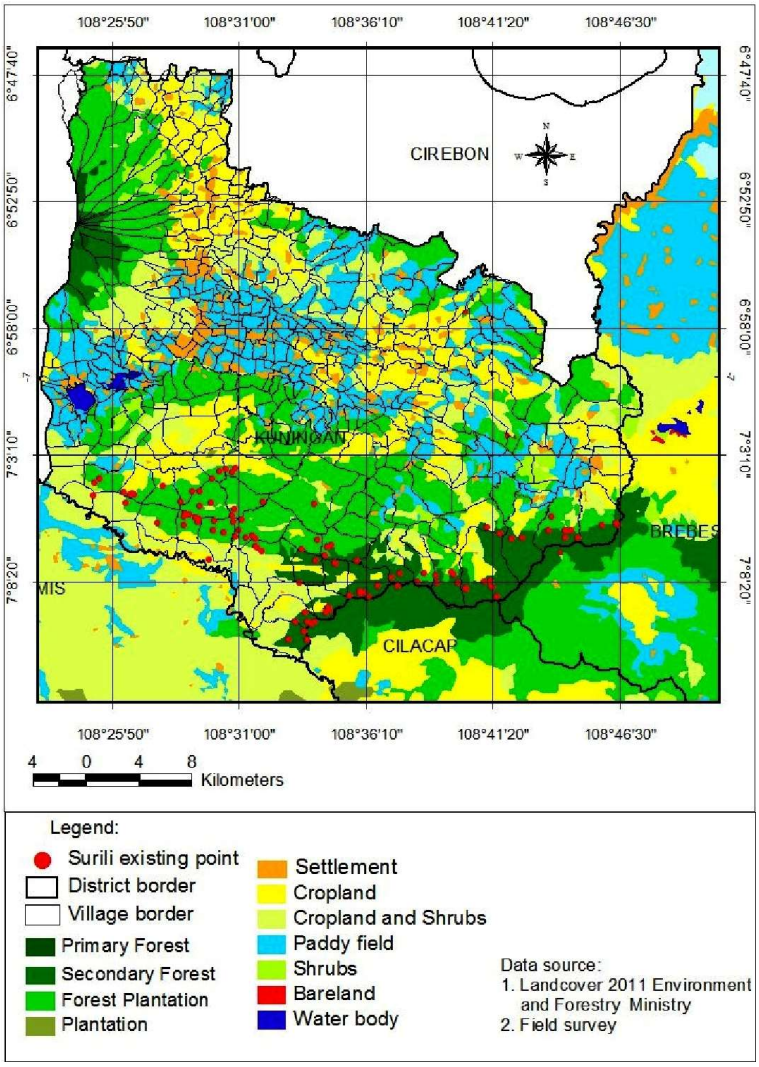


Figure 1. Land cover type and distribution of Javan langur populations outside conservation areas in the District of Kuningan

The land cover in the study site of BP forest block is classified by the Ministry of Environment and Forestry as industrial timber plantation and secondary forest (Figure 1). The forest block consists of pine forest, teak forest, mahogany forest, remnants of natural forest and community mixed-forest. The pine forest is a plantation that produces sap. The natural forest is a part of production forest which is designated as local protected area, generally

narrow, and scattered among forests of pine and other tree plantations. The natural forest and the pine forest in the forest block are located on state land and are managed by Perum Perhutani Forest Management Unit (FMU) of Kuningan. As it was in the GS forest group, in some areas coffee plantations have replaced the natural forest and pine forest. The community mixed-forests are generally scattered with varied sizes. They are located on privately-owned land and bordered by natural forest or pine forest. Furthermore, on the vicinity of the community mixed-forest in general there is a mixture of rice fields and settlements. The community mixed-forest is also known as amixed-garden because it is planted with various types of commercial timber trees and fruit-bearing plants [15]. The community mixed-forest that becomes the location of this study henceforth will be referred to as mixed-garden.

2.2. Survey of Javan langur population

The research was conducted in two phases. In the first phase, we visited villages that have forest where there were indications of the presence of Javan langur population. Then we conducted interviews with local villagers [16] to collect information about the existence of Javan langur in the forest that belongs to the administrative areas of the villages. Because the villagers already familiar with this species of Javan langur, during the interview they could provide accurate information and would not confused the Javan langur in question with other species of monkeys which also existed in the District of Kuningan (long-tailed macaque and langur). At this stage we collected information that Javan langur existed in 34 villages.

In the second phase, a survey was conducted in villages which were suspected as habitats of the Javan langur based on results of the first phase. In the villages observation paths were established in forest areas. Total transects in each village varied from 5 km to 6 km, and the length of each transect varied from 1 km to 3 km, depended on the area of the forest blocks. Transect length was measured by using hipchain. Transects in several places used footpath and other situation used new trail [17]. The forest areas where the research was conducted have many ravines with a very steep topography. Therefore, the transect was turned if there was a cliff as a result the shape of the transects in several places was not a straight lined. The existing of the cliff was one of the reason why the transects used the footpath. To get the proportions of land cover types in the path traversed, we recorded the type of land cover every 100 meters along the transect [18] based on the plant species composition. The grouping of types of land cover were in the forms of natural forest, mix of natural forest and crops, mixed-garden, pine forest, mixed pine forest, teak forest, mahogany forest, rosewood forest, coffee plantation, and shrubs. At the time of meeting Javan langur on the transect, we recorded the coordinates of encounter location by using a GPSmap 62sc receiver and landcover type to know the habitat types used. Observations generally began at 07.00 to 11.00 am. However, during rainy morning, the survey was postponed for a while, and then we started when the rain stopped.

Javan langur distribution information, which is based on the distance from nearest settlements and roads, was obtained by entering the coordinates of each location of encounter with Javan langur groups on map by Google Earth tool, then measure the distance to the nearest settlements and roads. Data of distribution by altitude was also obtained by observing each point of Javan langur encounter which had been entered into the Google Earth map, so that the elevation data was obtained.

2.3. Data analysis

The picture of Javan langur distribution by areas of the village administration was made by mapping the coordinates of locations of Javan langur encounters into the administrative maps of the villages combined with maps of landcover types. The distribution of groups at various distances from nearest settlements and roads, and various altitudes were analyzed descriptively (mean, standart deviation). Pearson's correlation coefficient test was used to measure relationship between distance from a group meeting point to the nearest village and that to the nearest road. Furthermore, the chi-square goodness-of-fit test was used to determine whether the number of group observed are distributed proportionately to the number of the transect of distance categories [19]. The formula used in chi-square test is:

$$\lambda^2 = \Sigma(O_i - E_i)^2/E_i$$

Commented [LISAT20153]: Unclear statement

Commented [LISAT20154]: Please describe how the pattern was calculated and analyzed.

Please add how the chi-sq test was performed

The flow chart study it is better to be outlined in the study.

Where O_i is the number of group observed in the ith distance category and E_i is the number of group expected in the ith distance category. The expected number of group in each distance (E_i) is obtained by multiplying the total number of group observed from all transect with the proportion of the number of the transects of each categories.

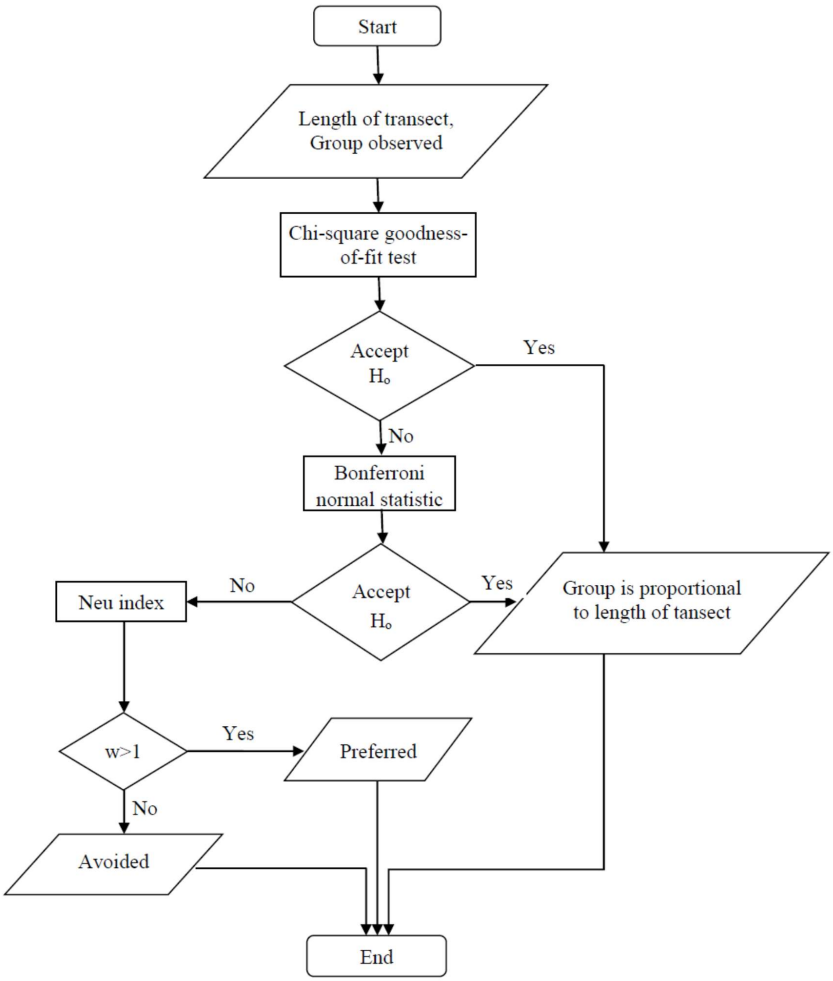


Figure 2. Steps of determination of land cover type preferred by *Presbytis comata*

To know the types of land cover preferred by Javan langur population, we also done steps used by Neu et al.[19] (Figure 2). First was identifying whether the number of group observed are distributed proportionately to the total length of transect of land cover types. The formula used was the same as the formula above, but the value of O_i

and E_i is different. The value of O_i is the number of group observed in the *i*th land cover type and E_i is the number of group expected in the *i*th land cover type. The expected value (E_i) is obtained by multiplying the total number group observed from all land cover types with the proportion of transect length of the *i*th land cover type. In this study, there are seven land cover types where transects were placed. The number of group observed is proportional to the number transect if value $\lambda^2 > \lambda^2_{tabel}$ with level of significance *(α) 0.05,* but if value $\lambda^2 < \lambda^2_{tabel}$, then the number of group observed is not proportional. Next step was using the Bonferroni procedure [20]. This prosedure was conducted if based on the result of the chi-square test, the number of group was not proportional to the total transect length of land cover types and aimed to determine the interval of probability of land cover types. The estimating of the interval of probability used the following formula [19, 20]:

$$\bar{p}_i - Z_{\alpha/2k}\sqrt{\bar{p}_i(1-\bar{p}_i)/n} \leq p_i \leq \bar{p}_i + Z_{\alpha/2k}\sqrt{\bar{p}_i(1-\bar{p}_i)/n}$$

where $\bar{p}_i$ is the proportion of transect length in the *i*th land cover type, *k* is the number of land cover type tested, and *n* is the total number of group observed. The level of significance used was 0.05. The third step was counting the Neu index. To get this index, the group proportion found in each land cover type was divided with the transect lenght proprotion from the same each land cover type [21]. The final step was identifying the land cover type preferred by Javan langur groups. A land cover types is preferred by groups if the Neu Index of the land cover type is more than 1 [21] and between the proportion of transect length and the proportion of group observed is diferent.

3. Result

3.1. Spatial distribution

Based on information collected from local residents, as many as 34 villages were suspected to be the location of distribution of Javan langur, however, based on the line transect the Javan langur population were found only in 31 villages (Figure 1). Figure 1 also shows that the locations of distribution of Javan langur is connected with one to another and the forest areas that was not used by Javan langur is the fragmented areas.

3.2. Distance from human activities

The characteristic of habitat of the existence of Javan langur is specified in more detail by considering: a) location of nearest settlement, and b) nearest road. Results of measurements showed that Javan langur groups were found within the distance of 9.32 to 3022.23 meters ($\bar{x}$ = 1002.08; *n* = 92; *SD* = 604.56) to the nearest settlement and within the distance of 3.24 to 3104.26 meters ($\bar{x}$ = 984.09; *n* = 92; *SD* = 667.02) to the nearest road. There was a significant correlation between the distance from the point of the encounter of Javan langur group to nearest settlements and to nearest road (*r* = 0.963; *n* = 92; *p* = 0.000). To determine group distribution based on distance from nearest settlement to the meeting point and the nearest road, the distance was divided into six classes (Figure 3). Although the number of Javan langur groups that were encountered in each distance class was varied, the number of the groups was proportional to the number of transects (the location of Javan langur – nearest settlement: λ^2 = 6.251; *df* = 4, *p* > 0.05 and the location of Javan langur – nearest road: λ^2 = 4.663; *df* = 4; *p* > 0.05). In other words, the number of groups that were found was related to the number of transects: the more the transects were made, the more the number of groups that were found (Table 1). Furthermore, by Kruskall Wallis test, the average of transect lengths between each distance class were not significantly different (transect to nearest settlement: λ^2 = 2.584; *df* = 4;*p* = 0.630, and transect to nearest road: λ^2 = 2.217; *df* = 4; *p* = 0.696).

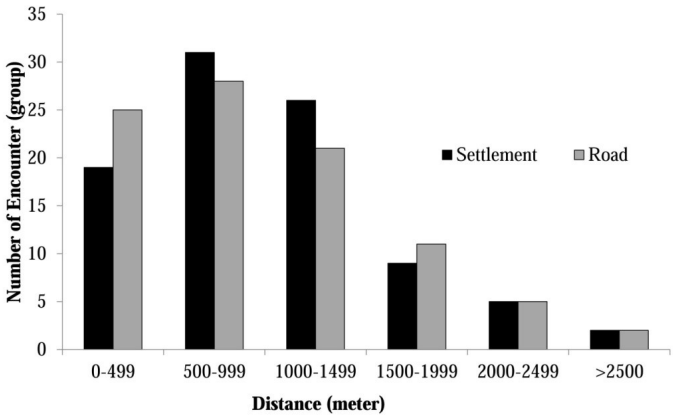


Figure 3. Javan langur population distribution based on distance from point of group encounter to nearest settlement and nearest road.

Table 1. Number of transects and numbers of Javan langur groups on each distance class from transect which their starting points were made at certain distance from nearest settlement and nearest road.

Distance (m)	Number of Transect	Prop. (1)	Obs. (2)	Prop. (3)	E (4)	$(O-E)^2/E$
Starting point to settlement						
0 – 499	57	0.475	41	0.446	43.70	0.167
500 – 999	37	0.308	35	0.380	28.37	1.551
1000 – 1499	16	0.133	6	0.065	12.27	3.201
1500 – 1999	7	0.058	8	0.087	5.37	1.292
>2000	3	0.025	2	0.022	2.30	0.039
Total	120	1.000	92	1.000	92.00	6.251
Starting point to road						
0 – 499	63	0.525	41	0.446	48.30	1.103
500 – 999	27	0.225	28	0.304	20.70	2.574
1000 – 1499	18	0.150	13	0.141	13.80	0.046
1500 – 1999	8	0.067	8	0.087	6.13	0.568
>2000	4	0.033	2	0.022	3.07	0.371
Total	120	1.000	92	1.000	92.00	4.663

Note: (1) Proportion of total of transects; (2) Number of groups encountered; (3) Proportion of number of groups encountered; (4) Expected number of groups encountered

3.3. Land cover

The study also noted the type of land cover at each point of encounter with Javan langur groups. Results of this study showed that land cover types at locations of Javan langur encounter were natural forest, mixed garden, timber plantations, area of transition between natural forest with mixed garden, and area of transition between pine forest

with natural forest and mixed garden (Table 2). However, this study did not find Javan langur groups at coffee plantations and shrubs (Table 2).

Table 2. Length of observation transects, number of groups, and Neu index on each vegetation type.

Vegetation Type	Transect (1)	Prop. (2)	Group (3)	Prop. (4)	E (5)	Interval prop. (6)	Neu
Natural Forest (HA)	60.30	0.333	47	0.511	30.616	$0.371 \leq P \leq 0.651$*	1.535
Mixed Garden (KC)	71.90	0.397	22	0.239	36.506	$0.120 \leq P \leq 0.359$*	0.603
Homogenous timber plantation							
Pine forest	11.30	0.062	1	0.011	5.737	$0 \leq P \leq 0.040$*	0.174
Teak, mahogany and rosewood forests	7.60	0.042	2	0.022	3.859	$0 \leq P \leq 0.063$	0.518
Areas of transition							
HA to KC	14.70	0.081	15	0.163	7.464	$0.059 \leq P \leq 0.267$	2.010
Pine forest to HA&KC	11.80	0.065	5	0.054	5.991	$0 \leq P \leq 0.118$	0.835
Coffee plantation and shrubs	3.60	0.020	0	0	1.828	0	0
Total	181.20	1	92	1	92		5.675

Note: (1) Total length of observation transect (km); (2) Proportion of length of observation transect; (3) Number of groups observed; (4) Proportion of number of groups observed; (5) Expected number of groups; (6) Interval of proportion of observed groups at significant level of α = 0,05; and*shows difference at significant level of 0.05

Total of groups of Javan langur found on all transects were 92 groups. The groups were mostly found in natural forest, followed by mixed garden, area of transition between natural forest and mixed garden, area of transition between pine forest and natural forest and mixed garden, and homogenous timber plantation (Table 2). The distribution of Javan langur groups on the various types of vegetation was significantly different or was not proportionate to the total length of transect on any type of land cover (λ^2= 28.94; $p < 0.01$). Based on Neu Index (Table 2), Javan langur groups liked natural forest. Although it was not significant, the groups also liked the transition area between forest and mixed garden. Pine forests that mixed with natural forest plant species and mixed garden were preferred over pure stands of pine forest (Table 2).

Based on results of interviews with local people, Javan langur frequently visited gardens bordering settlements to take food in forms of fruit crops such as banana and papaya. Although annoying, the local villagers did not hunt or kill these animals, they just repelled them away or protected their crops, such as by wrapping the banana fruits with plastic bags while they were still on the tree.

3.4. Elevation

To determine the distribution of Javan langur based on altitude, the research has measured altitudes at every point of encounter with Javan langur groups. The results showed that Javan langur groups were encountered within the altitudes of 255 to 1254 meters above sea level ($\bar{x}$=671.78; n=92; SD=187.92), or from the lowland forest ecosystem up to hilly area. Javan langur groups were often found at an altitude of 400 – 1000m asl, and were rarely encountered at elevations below 400 m asl or above 1000 m asl (Figure 4).

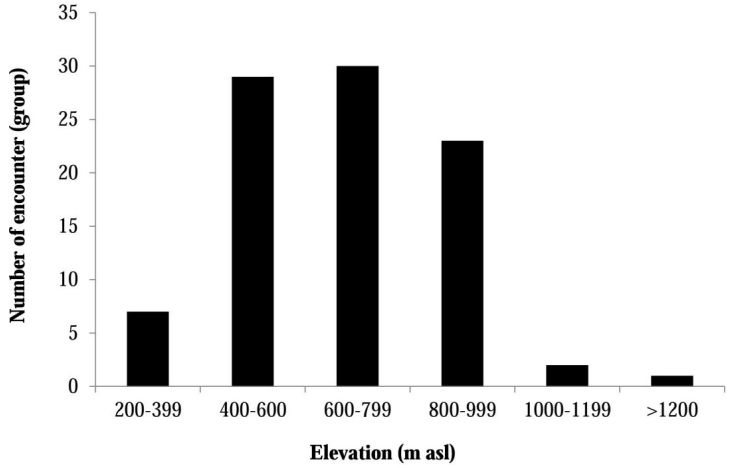


Figure 4. Distribution of Javan langur based onelevation of location of encounter.

4. Discussion

4.1. Spatial distribution

To know the distribution of Javan langur population outside the conservation areas in Kuningan District, we collected information from villages that have forest areas, then proved the information on field. The study results showed that Javan langur population, based on information collected from local community, was distributed in 34 forest villages, while based on direct field survey they were distributed in 31 villages. The study suggested that the Javan langur population in Kuningan District still survived outside the conservation areas. Although there were 3 locations where Javan langur groups were not encountered during direct field observations, we still assume that the Javan langur groups were there at those locations. This is because based on re-interviews with some members of the local community, they have encountered Javan langur groups at the three locations. Regarding the absence of Javan langur groups that were not encountered at the three locations at the time of the survey, we assumed that the population density in those areas was very low, so the probability to be encountered was small.

The locations of the Javan langur distribution were interconnected one to another by forest cover and those were located within two blocks of forest, i.e. the Bukit Pembarisan forest block and the Gunung Subang forest block (Figure 1). On the contrary, the forest areas that is not used by Javan langur population is isolated from those forest blocks. This result indicate that the connection among habitat is needed by the population. The interconnectedness allowed the Javan langur groups to move from one location to another. Bukit Pembarisan forest block is located in the southern part of Kuningan District, stretching from west to east. Gunung Subang forest block is located in the eastern part of the Kuningan District (extending from the northeast to the southwest), bordering the Central Java Province (Figure 1). Given this part of the Central Java Province is also a forest, and then the Javan langur distribution also included the western part of the province. Therefore, both forest blocks are the important areas for the Javan langur population outside the conservation areas.

The map of Javan langur population distribution in Kuningan District from Nijman [8] only covered Gunung Ciremai National Park. Because the study of Javan langur population in the outside conservation areas have not been done, the result of this study could also complement the study results of Nijman [8] in Kuningan District. The

study locations and Gunung Ciremai National Park are fragmented by settlements, paddy fields and croplands (Figure 1). By combining the results of both studies, the picture of Javan langur population distribution in Kuningan District became more complete, specifically that it spreaded in three forest blocks: Ciremai Mountain National Park, Bukit Pembarisan, and Gunung Subang.

4.2. Distance from human activities

Javan langur was classified into species that is sensitive and timid to the presence of humans [13]. Furthermore, the occupancy of primates in an area was affected by settlement existing; primate occupied forest areas far away from settlements [22]. Therefore, we assumed that the locations of Javan langur population distribution would be far away from settlements and places where people do many activities such as road. However, the results of the study indicated that the Javan langur groups did not only occupy locations far away from settlements and roads, but also those that were close to those features. This study also obtained information that the Javan langur group often came to the gardens close to houses to"steal" food, especially bananas, but the residents did not bother the Javan langur groups. These cases were common in regard to populations of *M. fascicularis* as reported by Munsha and Hanya [23] in Central Catchment Nature Reserves in Singapore and by Marchal and Hill [24] in North Sumatra, Indonesia. Marchal and Hill also reported crop-riding by monkeys from the subfamilly of colobine (e.g., *Presbytis thomasi* and *Trachypithecus villosus villosus*). The crop-riding by others primates have also been reported by previous researchers [such as 25, 26, 27]. However, the crop-riding by Javan langur was little studied and published, except the study of Melisch and Dirgayusa [28].

Some other primates such as *M. fuscata* will also enter the area around the settlement when there is a shortage of feed in their natural habitat [27]. However, the probability of such scarcity of food sources of Javan langur in its natural habitat is small because Javan langur is a leaf-eating monkey [13] and leaves are the abundance resources of food. Therefore, we assumed that the Javan langur groups that could occupy locations close to settlements and highways were not related to the scarcity of food resources in their natural habitat. According to Saj et al. [29], generally, the food plants cultivated by farmers have higer quality and energy per unit than the food plants in the wild. Therefore, the Javan langur group frequent entered mixed-gardens near settlements because of several factors such as the availability of preferred feed sources [29, 30] and area was also safe from disturbance; or even though there was disturbance, it was still below the tolerance limit of the Javan langur population.

4.3. Land cover types

Based on the types of habitats that were used, we found that the population of Javan langur in Kuningan District used not only natural forest, but also used mixed-gardens and several places in the form of a pine forest. The natural forests where Javan langur populations were found in this study were in the form of secondary natural forests (Figure 1). Our study results that showed that Javan langur occupied a secondary natural forest had also been widely reported by previous researchers, such as, MacKinnon [2], Nijman [8], Hidayat [12]. By calculating the Neu Index, it can be known that the Javan langur group preferred habitats in form of secondary natural forest compared to other forest types. This result supports the assuming of Supriatna et al. [7] that Javan langur species preferred younger forest stands rather than mature ones. The availability of preferred food was suspected to be the reason why Javan langur chose the forest stands [7]. However, undisturbed primary forest is an optimal habitat for a population of Javan langur [8] because primary forest is a high quality and more secure habitat [31]. Primary forests have trees larger than other habitat types so that primates that use the trees in the primary forest would have a lower risk of predation [31]. Although habitat preferred by Javan langur in this study was not a primary forest, but secondary forest (Figure 1), habitat quality and security conditions supposed to be some of the factors that cause Javan langur prefers natural forests.

In addition to occupying the interior of the natural forest, Javan langur also occupied areas of transition between natural forest and mixed-gardens. This finding was in accordance with the publication of Supriatna et al.[7] and the study results of Melisch and Dirgayusa [28] around Nature Reserve of Mount Tukung Gede. Ecotone area can experience a merging of species from two types of adjacent habitats so that it has a higher species diversity [32, 33].

A high plant diversity has a great possibility to increase the diversity of feeds. The condition was thought to be one of the factors that attracted Javan langur to occupy the area. The result of the study, that informed that the population of Javan langur could also be found in the mixed-garden ecosystem, was in accordance with the results of research of Melish and Dirgayusa [28] in Gunung Gede Tukung Nature Reserve. According to the two researchers, Javan langur often entered orchards and degraded forests bordering the Nature Reserve. Previous researchers also found evidence that some other primates, such as *P. fredericae* [34], *P. thomasi* [35], and *Nasalis larvatus* [36], also used the mixed-gardens as part of their habitats. The study result of Fashing et al. [37] in the africa monkey in mixed plantation forest area, Kenya, also supported this study. The primata group entered the mixed gardens and farm areas aimed to use cultivation plants as food sources [24, 25, 29, 38]. Species of plants that were common in the mixed-gardens of study locations were *Paraserianthes falcataria, Swietenia mahagoni, Anthocepalus cadamba, Tectona grandis, Maesopsis eminii, Bambusa* spp*., Mangifera indica, Durio zibethinus, Nephelium lappaceum, Parkia speciosa, Cocos nucifera, Arenga pinnata, Artocarpus heterophyllus* and *Gnetum gnemon* [15]. Some species of plants in the mixed-garden such as *N. lappaceum*, and *P. falcataria* are feed source for Javan langur [10, 28]. Therefore, the availability of food was thought to be one of the reasons of Javan langur group presence in mixed-gardens. In addition, the presence of Javan langur in the mixed-gardens in this study showed that mixed-gardens can be an alternative habitat for a population of Javan langur.

The study showing that Javan langur population was found in pine forest was consistent with the study result of Agostini et al. [39] in *Alouatta caraya* and *A. guariba clamitans* at Atlantic Forest of Misiones in Northeastern Argentina. Although Javan langur groups could be found in pine forests and other monoculture forests (*T. grandis, S. macrophylla*, and *D. latifolia*), but, the encounter frequency was lower than in other forest types. The condition was supported by results of research of Henzi et al. [40] in Mpumalanga Province, South Africa, which showed that baboons (*Papio hamadryas ursinus*) avoided stands of pine and choose small pockets that contained natural stands. Pine forests and other monoculture forests such as Agathis forest have availability of food for primates (such as *P. fredericae*) lower than natural forests [41]. *T. grandis, S. macrophylla,* and *D. latifolia* have never been reported eaten by Javan langur [10, 13]. Furthermore, Javan langur occupying plantations and degraded forests cannot survive for a long time [8]. Therefore, the low number of groups of Javan langur in both forest types was allegedly because of the low availability of feeds sources.

The result of the study that showed that Javan langur were not found in shrubs were allegedly linked to level of its ability to move and habitat quality. As an arboreal species [8], Javan langur needs canopies of trees that are closely connected to enable it to move, even though Ruhiyat [13] once found a Javan langur got down on to the ground. In addition, the shrubs were also a low-quality habitat [31]. The suspected reason that Javan langur was not found in coffee plantation was also that coffee plantations have low quality as habitat. However, this study is different from results of the research done by Gurmaya [35] on *P.thomasi*. The species used shrubs and cacao garden as part of its home range [35]. But, the difference of the results of the two studies has not been understood yet, whether it was because of the methods used, difference in species, or other factors. This needs to be studied further.

4.4. Elevation

The fact that Javan langur were found in the lowland forest ecosystems was in accordance with reports of previous researchers that said that the lowland primary forests were the main habitat of Javan langur [2, 42, 43]. Melisch and Dirgayusa [21] in their study also found Javan langur population in lowland forest and hills with an altitude below 700 meters above sea level. However, the reduction of habitat due to conversion of natural forest into, for example, agricultural area and timber plantation [28] has resulted in Javan langur nowadays often found in mountain ecosystems [4, 40], such as in the Gunung Halimun National Park [10]. At Mount Slamet, *P. fredericae*, which was known formerly as a subspecies of *P.comata frederiace* [9], was distributed at an altitude of 750 meters to 2500 m asl [41]. Not much different from situation in Dieng Mountains, the species was found at an altitude of 650-2565 m asl [45, 46]. In Situ Patenggang Nature Reserve and in Kamojang, respectively, Javan langur found at an altitude of 1600-1775 m asl and 1390-1625 m asl [13]. The study that found evidence of Javan langur existence at an altitude of 255-1254 m asl showed that Javan langur in several places in Kuningan District was still survived in forest ecosystem at the lowland and on hills.

4.5. Implications for conservation

The result of the study creates some implications on the conservation of Javan langur, particularly in the lowland forest ecosystems in the District of Kuningan. This research obtained results that locations of distribution of Javan langur were 34 forest areas and interconnected by forest cover, which indicated that the making of corridor that connects other forest locations need to be done to facilitate the distribution and expansion of habitat. The result of the research that showed that the population of Javan langur could be found in mixed-gardens and pine forests that mixed with other plant species indicated that the conservation of Javan langur can be done in man-made forest which is a combination of crops plants and other plants either natural or crop plants that can provide resources for Javan langur population. Our study which obtained results that Javan langur population can be found in gardens or forests that were close to settlements indicated that Javan langur conservation can be done near settlements by keeping the security of those forests and gardens.

4.6. Limitation of study

Although this study could be considered as covering almost all locations (village administrative area) outside conservation area in District of Kuningan, where Javan langur population was distributed, this study had its limitations. The placement and length of transects were not based on the proportion of the total area of each land cover types. The consideration of determination of transect starting point was based on accessibility. Eventhough it was not proportional, the transect was placed in several land cover types where the Javan langur population was indicated inhabit the types. Therefore, the future work needed is reseach with the length of transect which is proportional to the total area of various of land cover types so that the result will be more representative.

5. Conclusion

The study concluded that Javan langur population in District of Kuningan were still distributed in 34 forest areas, from lowland to hilly forest ecosystems. Javan langur distribution locations were not only in form of natural forests and located far away from settlements and roads, but also in man-made forests which have diverse plant species and forests which were close to settlements. Secondary natural forest is the ecosystem preferred by Javan langur population. Overall, this result has the value for Javan langur population conservation outside the conservation areas dominated by production activity. The conservation of Javan langur population can be done in production forests that have many tree species that can provide food sources for the Javan langur population. Even though the transect have covered all village forests inhabited by the Javan langur population, the lenght of transect made in this study was not proportional to forest types in the research location. Therefore, the length of transect which is proportional to the area of each forest type is needed for future research.

Acknowledgements

We thank Dirjen Dikti of Ministry of Research, Technology and Higher Education, Republic of Indonesia for providing the fund of this research, Perum Perhutani Unit III West Java and Banten Province and Agency of Forestry Kuningan District for accessing to the state forest (production forest) and privat forest (mixed-garden). We also thank Rohman, Syahman, Amir, and Didi for helping the data collecting during the research.

References

1. Eudey AA. Priorities in Asian primate conservation. *Primate Conservation* 1987; 8:172-174.
2. MacKinnon K. Conservation status of primates in Malesia, with special reference to Indonesia. *Primate Conservation* 1987; 8:175-183.
3. Kool KM. The status of endangered primates in Gunung Halimun Reserve, Indonesia. *Oryx* 1992; 26:29-33.
4. IUCN. IUCN Red List of Threatened Species. Version 2012.2. www.iucnredlist.org. [downloaded at 05 April 2013].
5. Peraturan Pemerintah No. 7 Tahun 1999 tentang Pengawetan Jenis Tumbuhan dan Satwa. Jakarta: Pemerintah Republik Indonesia; 1999.

6. Peraturan Menteri Kehutanan Nomor P.57/Menhut-II/2008 tentang Arahan Strategis Konservasi Spesies Nasional 2008-2018. Jakarta: Kementrian Kehutanan Republik Indonesia; 2008.
7. Supriatna J, Tilson JR, Gurmaya KJ, Manangsang J, Wardojo W, Sriyanto A, Teare A, Castle K, Seal U. *Javan Gibbon and Javan Langur Population and Habitat Viability Analysis*. Bogor: Taman Safari Indonesia; 1994.
8. Nijman V. On the occurrence and distribution of *Presbytis comata* (Desmarest, 1822) (Mammalia: Primates: Cercopithecidae) in Java, Indonesia. *Contributions to Zoology* 1997; 66:247-256.
9. Brandon-Jones D, Eudey AA, Geissmann T, Groves CV, Melnick DJ, Morales JC, Shekelle M,Stewart CB. Asian primate classification. *International Journal of Primatology* 2003; 27:97-164.
10. Farida WR, Harun. The diversity of plants as feed resources for the java gibbon (*Hylobates moloch*), grizzled langur (*Presbytis comata*), and silver langur (*Trachypithecus auratus*) in Gunung Halimun National Park. *Jurnal Primatologi Indonesia* 2000; 3:55-61.
11. Heriyanto NM, Iskandar S. 2004. The population status and habitat of grizzled-leaf monkey *Presbytis comata* Desmarest in Kalajeten-Karangranjang Forest Complek, Ujung Kulon National Park. *Jurnal Penelitian Hutan dan Konservasi* 1:89-98.
12. Hidayat R. Pendugaan Parameter Demografi dan Pola Pendugaan Ruang Surili (*Presbytis comata*) di Taman Nasional Gunung Ciremai [tesis]. Bogor: Sekolah Pascasarjana Institut Pertanian Bogor; 2013.
13. Ruhiyat Y. Socio-ecological study of *Presbytis aygula* in West Java. *Primates* 1983; 24:344-359.
14. Pemerintah Kabupaten Kuningan. http://www.kuningankab.go.id/sumber-daya-alam/kehutanan. [Downloaded at17 January 2016].
15. Prasetyo LB, Damayanti EK, Masuda M. Land cover changes before and after implementation of the PHBM program in Kuningan District, West Java, Indonesia. *Tropics* 2012; 21:47-57.
16. Setchell JM, Curtis DJ. Field and Laboratory Methods in Primatology: A Practical Guide. Cambridge: Cambridge University Press; 2003.
17. Estrada A, Coates-Estrada R. Tropical rain forest fragmentation and wild populations of primates at Los Tuxtlas, Mexic. *International Journal of Primatology* 1996; 17:759-783.
18. Morgan D, Sanz C, Onononga JR, Stindberg S. Ape abundance and habitat use in the Goualougo Triangle, Republic of Congo. *International Journal of Primatology* 2006; 27:147-179.
19. Neu CW, Byers CR, Peek JM. A technique for analysis of utilization-availability data. *The Journal of Wildlife Management* 1974; 38:541-545.
20. Byers CR, Steinhorst RK, Krausman PR. Clarification of a technique for analysis of utilization-availability data. *The Journal of Wildlife Management* 1984; 48:1050-1053.
21. Bibby C, Marsden S, Fielding A. Bird-Habitat Studies. In: Colin B, Jones M, Marsden S, editors. *Expedition Field Techniques: Bird survey*. London: Expedition Advisory Centre; 1998. p. 103-117.
22. Arroyo-Rodriguez V, Mandujano S, Benitez-Malvido J. Landscape attributes affecting patch occupancy by howler monkey (*Alouatta palliata mexicana*) at Los Tuxtlas, Mexico. *American Journal of Primatology* 2008; 70:69-77.
23. Munsha JCM, Hanya G. Diet, activity, habitat use, and ranging of two neighboring groups of food-enhanced long-tailed macaques (*Macaca fascicularis*). *American Journal of Primatology* 2013; 75:581 – 592.
24. Marchal V, Hill C. Primate crop-raiding: a study of local perception in four villages in North Sumatra, Indonesia. *Primate Conservation* 2009; 24:107-116.
25. Boulton AM, Horrocks JA, Baulu J. The barbados vervet monkey (*Cercopithecus aethiops sabaeus*): change in population size and crop damage, 1980-1994. *International Journal of Primatology* 1996; 17:831-844.
26. Hockings KJ, Anderson JR, Matsuzawa T. Use of wild and cultivated foods by chimpanzees at Bossou, Republic of Guinea: feeding dynamics in a human-influenced environment. *American Journal of Primatology* 2009; 71:636-646.
27. Yamada A, Muroyama Y. Effects of vegetation type on habitat use by crop-raiding Japanese macaques during a food-scarce season. *Primates* 2010; 51:159-166.
28. Melisch R, Dirgayusa IWA. Notes on the grizzled leaf monkey (*Presbytis comata*) from two nature reserves in the West Java, Indonesia. *Asian Primates* 1996; 6:5-11.
29. Saj T, Sicotte P, Paterson JD. Influence of human food consumption on the time budged of vervets. *International Journal of Primatology* 1999; 20: 977-994.
30. Altmann J, Muruthi P. Differences in daily life between semi provisioned and wild-feeding baboons. *American Journal of Primatology* 1988; 15:213-221.
31. Li Y. The effect of forest clear-cutting on habitat use in Sichuan snub-nosed monkey (*Rhinopithecus roxellana*) in Shennongjia Nature Reserve, China. *Primates* 2004; 45:69-72.
32. Whittaker RJ, Fernandez-Palacios JM. *Island Biogeography: Ecology, evolution, and conservation*. New York: Oxford University Press; 2007.
33. Senft AR. *Species Diversity Patterns At Ecotones*. Chapel Hill: University of North Carolina; 2009.
34. Suryana D. Studi perilaku makan dan palatabilitas rekrekan (*Presbytis fredericae* Sody, 1930) di kawasan hutan dan perkebunan karet Desa Gutomo Kabupaten Pekalongan Provinsi Jawa Tengah. Bogor: Departemen Konservasi Sumberdaya Hutan dan Ekowisata, Fakultas Kehutanan, Institut Pertanian Bogor; 2010.
35. Gurmaya KJ. Ecology and behavior of *Presbytis thomasi* in Northern Sumatra. *Primates* 1986; 27:151-172.
36. Salter RE, Mackenzie NA, Nightingale N, Aken KM, Chai PKP. Habitat use, ranging behaviour, and good habits of the proboscis monkey, *Nasalis larvatus* (van Wurmb), in Sarawak. *Primates* 1985; 26: 436–451.
37. Fashing PJ, Nguyen N, Luteshi P, Opondo W, Cash JF, Cords M. Evaluating the suitability of planted forests for african forest monkey: a case study from Kakamega Forest, Kenya. *American Journal of Primatology* 2012; 74:77-90.

38. Naughton-Treves L. Predicting patterns of crop damage by wildlife around Kibale National Park, Uganda. *Conservation Biology* 1998; 12:156-168
39. Agostini I, Holzmann I, Bitetti MSD. Are howler monkey species ecologically equivalent? trophic niche overlap in syntopic *Alouatta guariba clamitans* and *Alouatta caraya*. *American Journal of Primatology* 2010; 72:173–186.
40. Henzi SP, Brown LR, Barrett L, Marais AJ. Troop size, habitat use, and diet of chacma baboons (*Papio hamadryasursinus*) in commercial pine plantations: implications for management. *International Journal of Primatology* 2011; 32:1020-1032.
41. Setiawan A, Wibisono Y, Nugroho TS, Agustin IY, Imron MA, Pudyatmoko S, Djuwantoko. Javan surili: a survey population and distribution in Mt. Slamet Central Java, Indonesia. *Jurnal Primatologi Indonesia* 2010; 7:51–54.
42. Hoogerwerf AA.*Udjung Kulon: The land of the last javan rhinoceros*. Netherlands: E.J. Brill; 1970.
43. Napier JR, Napier PH. *The Natural History of Primates*. Cambridge: The MIT Pr.; 1985.
44. Roland, Seitre J. Recent sightings of rare primates on Java. *Primate Conservation* 1990; 11:18.
45. Nijman V, Sozer R. Recent observations of the grizzled leaf monkey (*Presbytis comata*) and an extension of the range of the Javan gibbon (*Hylobates moloch*) in Central Jawa. *Tropical Biodiversity* 1995; 3: 45-48.
46. Nijman V, van Balen SB. A faunal survey of the Dieng Mountains, Central Java, Indonesia: distribution and conservation of endemic primate taxa. *Oryx* 1998; 32:145 – 156.

Lists of Response to Referee's Comments

Title : Spatial distribution and habitat use of Javan langur (*Presbytis comata*): case study in District of Kuningan
Authors : Toto Supartono, Lilik Budi Prasetyo, Agus Hikmat, Agus Priyono Kartono

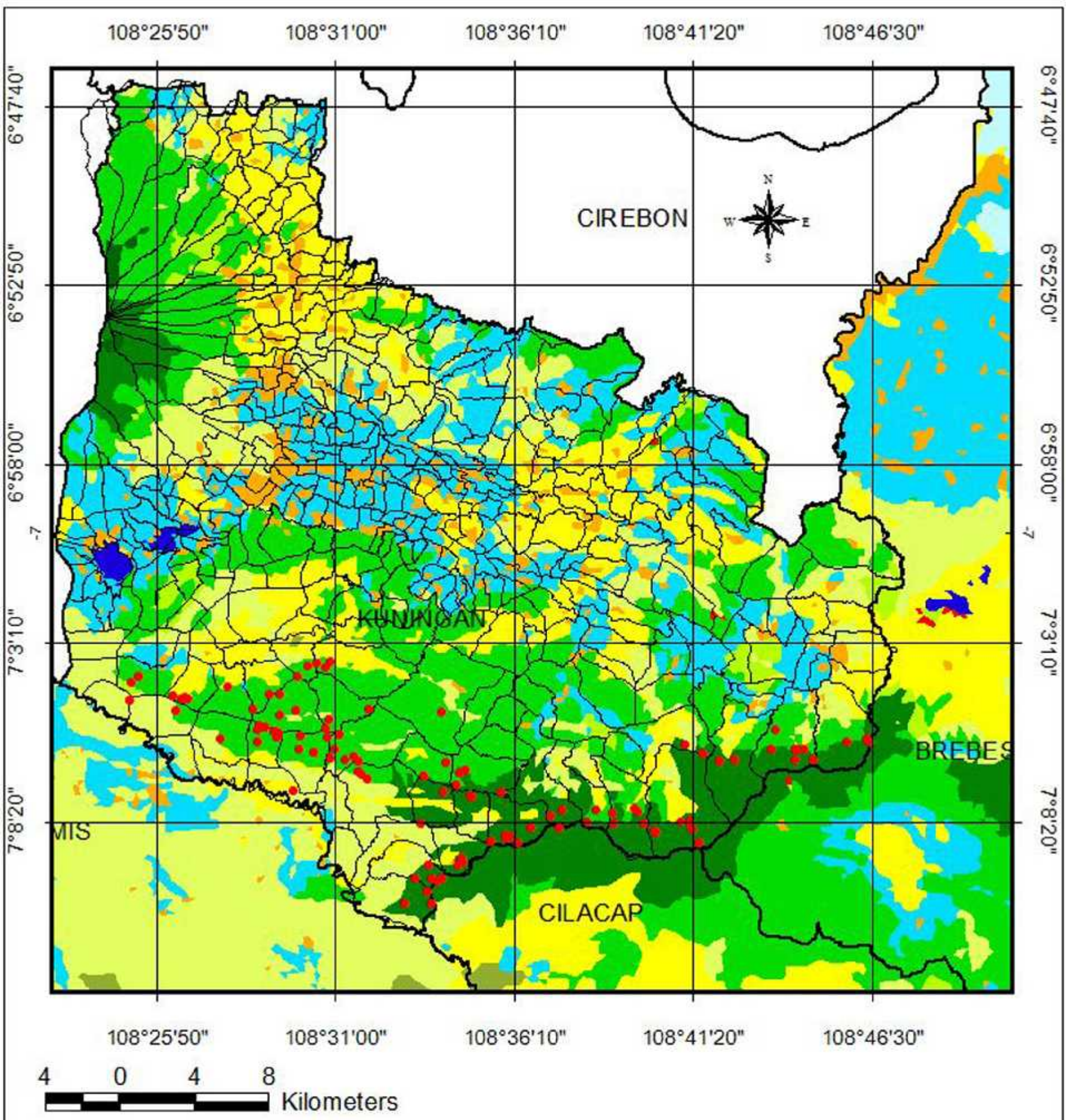
Lists of Response to Referee's Comments

Comment	**Response**	**Section of paper**
[LISAT 20152] It is better to use the word "identify" OR "measure" instead of "understanding" in the objective Please enrich and improve the absract at least 200-250 words	We have revised the aim of study, and used the word "identify" We have enriched and improved the abstract at least 200 words	Sentence 3 of page 1 Section: abstract Page 1 Section: abstract
[LISAT 20153] This is different from the abstract describe above	We have revised the aim of the study	Sentence 5 of Paragraph 3 of page 2 Section: introduction
[LISAT 20154] Did you suppose to say "systematic sampling" on the access road?	We have revised the placement technique of sampling	Sentence 4 to 7 of paragraph 3 of page 4 Section: method
[LISAT 20155] Unclear statement	We have revised the text	Sentence 10 of paragraph 3 of page 4 Section: method
[LISAT 20156] Please describe how the pattern was calculated and analyzed. Please add how the chi-sq test was performed	We have revised and described how to calculate and analyze tha data We have added how the chi-square was performed	Sentence 2 of paragraph 5 of page 4 Section: method From Sentence 3 of paragraph 5 of page 3 to paragraph 1 of page 6

Comment	Response	Section of paper
The flow chart study it is better to be outlined in the study.	We have made the flow chart to outline steps of calculating of habitat preferred by surili	Section: method Fig. 1 of page 5
[LISAT 20157] The aims of study described in abstract and background DO NOT MATCH with conclusion What is the distribution pattern as outlined in the abstract.	We have revised the conclusion	Page 12 Section: conclusion

General Comment	Response	Section of paper
The abstract need to be revised	We have revised the abstract covering: the objective of study, research method and data analyzing, result and discussion, and conclusion	Page 1 Section: abstract
The background need to be elaborated, particularly the rationale of the research	We have added several previous studies that have be done related to the topic of reseach and their gaps We have also explained the reasons of the importance of this research The objective has been revised so that it matched with the one in the abstract	Sentence 2, 4-7 of paragraph 2 of page 2 Sentence 1&2 of paragraph 3 of page 2 Sentence 5 of paragraph 3 of page 2 Section: introduction
The method need to be corrected to be clearer and match with the objective outlined	We have revised this section covering: technique of placement transect, data recording, and data analyzing steps, as well as statistic tests used so that it be clearer The method we explained has matched with the objective outlined	Sentence 5-8, 11 of paragraph 3 of page 4 Sentence 3-5 of paragraph 5 of page 4 Paragraph 2 of page 5 to paragraph 1 of page 6 Section: method

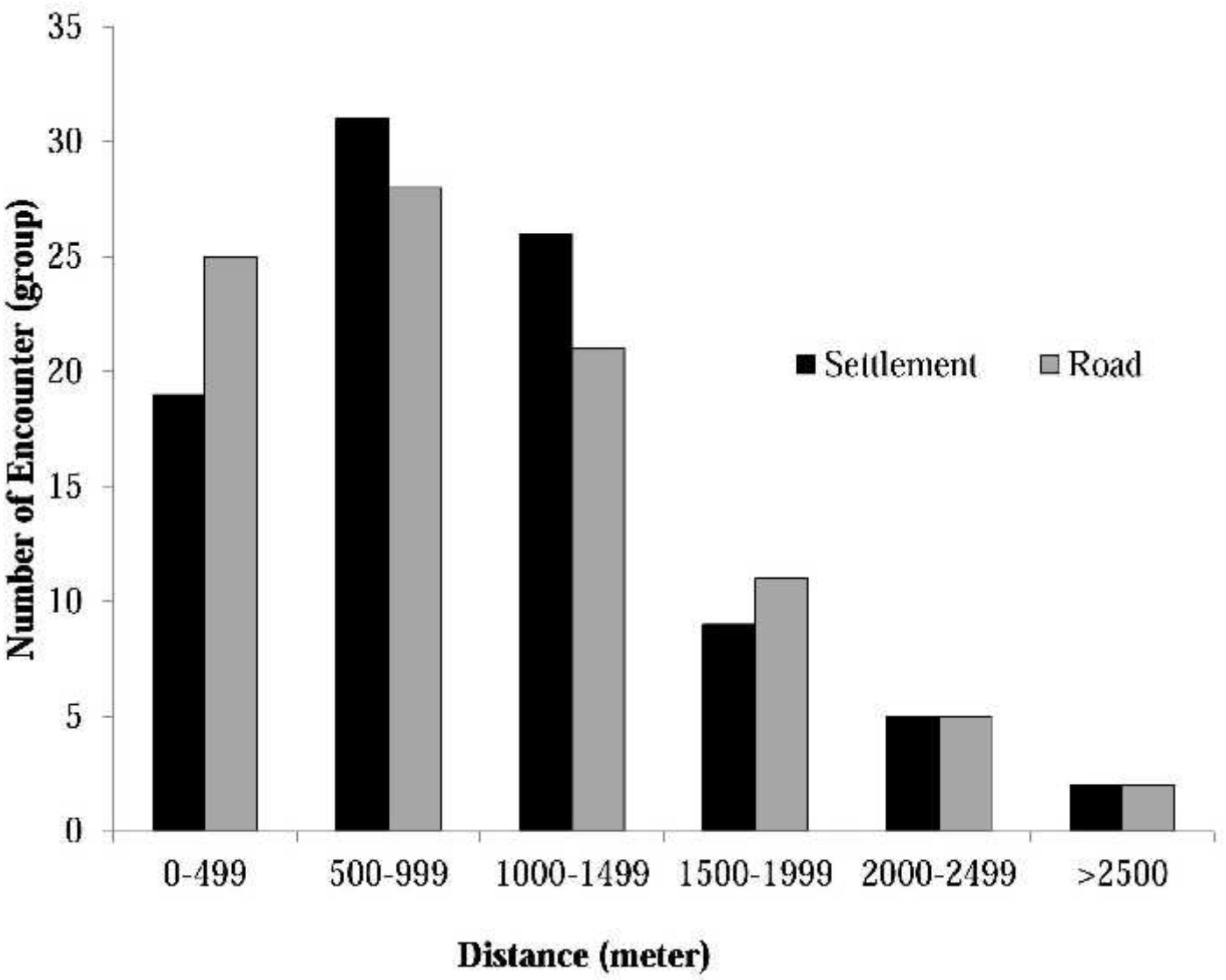
Discussion need to be added (particularly the related research obtained previously) and elaborated	We have added this section covering: Interpretating the results of this study Relating results of this study to those obtained in previous studies Future research needed	Sentence 1, 3 of paragraph 1 of page 9 Sentence 2, 3, 8 of paragraph 2 of page 9 Sentence 1&2 of paragraph 3 of page 9 Sentence 1 of paragraph 1 of page 10 Sentence 2, 3, 7-9 of paragraph 2 of page 10 Sentence 2-5 of paragraph 3 of page 10 Sentence 2, 4, 5, 8 of paragraph 4 of page 10 Sentence 6&7 of paragraph 1 of page11 Sentence 1 of paragraph 2 of page 11 Sentence 2 of paragraph 1 of page 12 Sentence 4&5 of paragraph 2 of page 12 Section: discussion
Conclusion need to be revised	We have revised the conclusion answering the objective of the study	Page 12 Section: conclusion

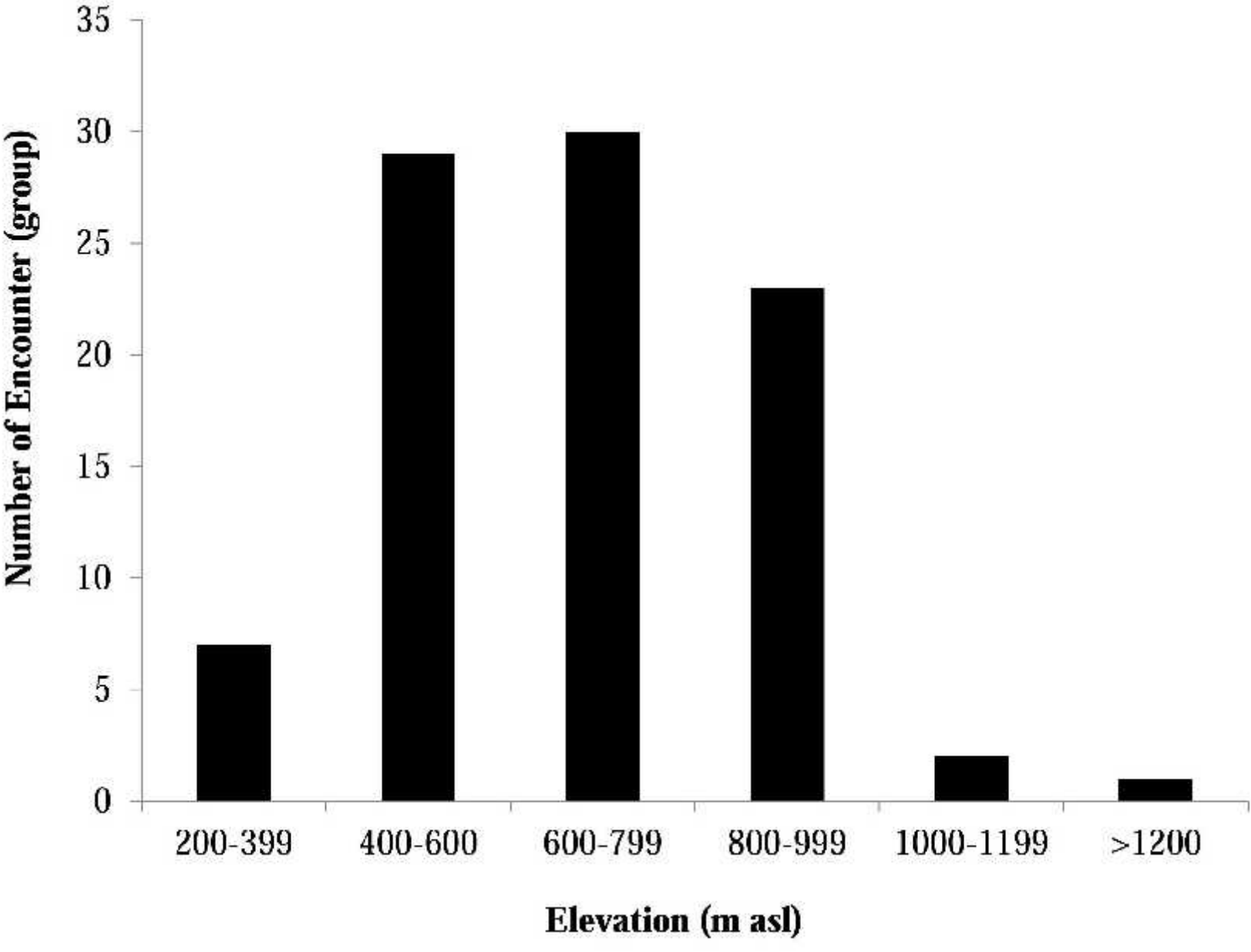


Legend:

- Surili existing point
- District border
- Village border
- Primary Forest
- Secondary Forest
- Forest Plantation
- Plantation
- Settlement
- Cropland
- Cropland and Shrubs
- Paddy field
- Shrubs
- Bareland
- Water body

Data source:
1. Landcover 2011 Environment and Forestry Ministry
2. Field survey


35
30
25
20
15
10
5
0
Number of Encounter (group)
Settlement
Road
0-499
500-999
1000-1499
1500-1999
2000-2499
>2500
Distance (meter)


35
30
25
20
15
10
5
0
Number of Encounter (group)
200-399
400-600
600-799
800-999
1000-1199
>1200
Elevation (m asl)