



# WEBINAR



**Tema: COVID-19: PANGGILAN UNTUK MEMULIHKAN KESEIMBANGAN  
MANUSIA, BIODIVERSITAS DAN LINGKUNGAN**

**7 Agustus 2021**

## **Peran Surveilans Patogen Pada Satwa Liar dalam Deteksi Dini Penyakit Zoonotik atau Yang Berpotensi Pandemi**

**Joko Pamungkas**

Dosen Fakultas Kedokteran Hewan-IPB

Peneliti Pusat Studi Satwa Primata-IPB

### *Disclaimer:*

Presentasi disusun berdasarkan pada aktivitas penulis dan informasi yang dikumpulkan dari jurnal yang diterbitkan, namun, mungkin tidak mencakup semua informasi yang tersedia pada 7 Agustus 2021.

### *Contributors:*



**IPB University**  
— Bogor Indonesia —

Diah Iskandriati,  
Suryo Saputro,  
Uus Saepuloh,  
Rachmitasari Noviana,



**EcoHealth  
Alliance**

Alice Latinne,  
Kevin J. Olival,  
James Desmond,  
William B. Karesh.

Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

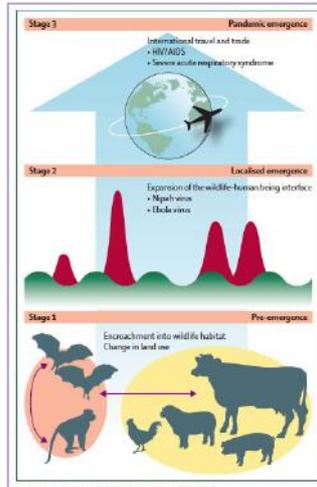
## **Penyakit Infeksius**

- Penyakit infeksius pada manusia
- Penyakit infeksius pada hewan
- Penyakit zoonotik
  - Inang alami vs. inang fatal
- *Emerging Infectious Diseases* (EIDs)
  - ~ 75% bersifat zoonotik
  - > 60% dikaitkan diperankan satwa liar

**Pendekatan *One Health* menjadi sangat penting**

## Beberapa contoh EIDs

- Spanish flu
- Ebola, Marburg virus
- AIDS/ HIV
- Nipah virus
- SARS, MERS
- Influenza (H7N9, H5N1, H5N8)
- White Nose Syndrome
- Chytridiomycosis
- Zika virus
- COVID-19



thorities quarantine area  
**coronavirus**  
 /virus death toll jumps

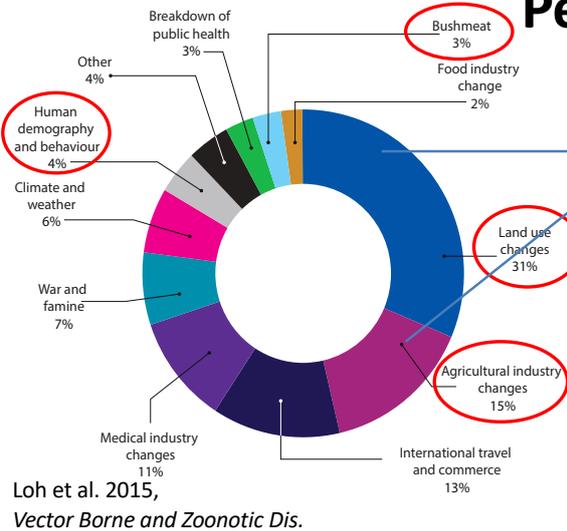


**Deadly white-nose syndrome attacks bats with no end in sight**



Joko Pamungkas jpi-pspp@indo.net.id

## Pemicu kemunculan EIDs



Loh et al. 2015, *Vector Borne and Zoonotic Dis.*

- Deforestasi
- Perubahan industri pertanian
- Degradasi habitat
- Fragmentasi habitat

Murray & Daszak 2013, *Curr. Opinion Virology:*

Perubahan fungsi hutan menggiring kemunculan EIDs:

- 1) Peningkatan interaksi satli-manusia-ternak → *spillover* patogen dari satli (**pathogen pool hypothesis**)
- 2) Perubahan dinamika ekologi inang-patogen → transmisi *cross-species* (**perturbation hypothesis**)



# Deforestasi. . . . .



Pictures from internet sources.

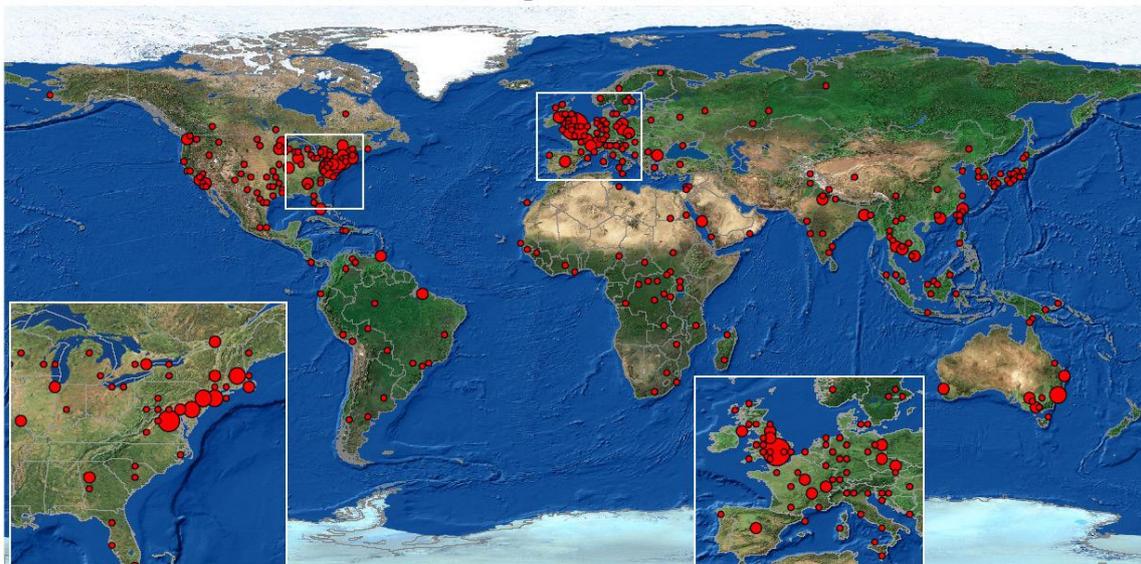


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## EIDs dalam 60 tahun

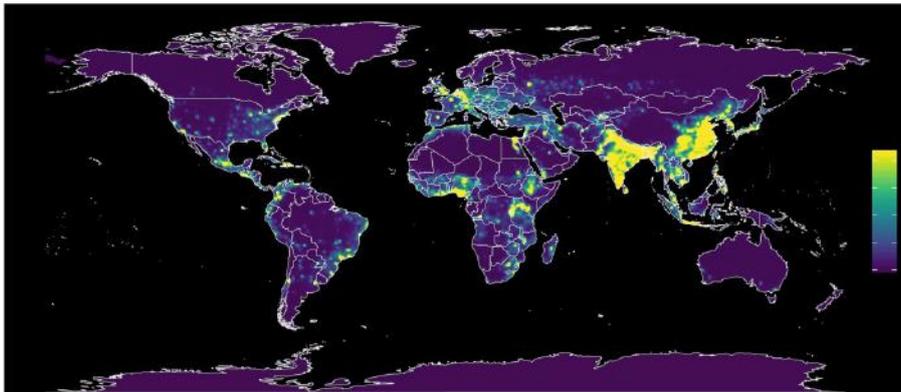
Hotspots 1.0

Total EID events    ● 1   ● 2-3   ● 4-5   ● 6-7   ● 8-11

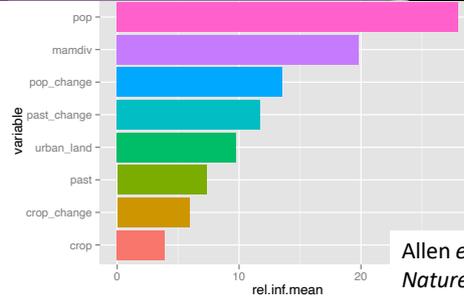


Jones et al. 2008 Nature

### Hotspots 2.0

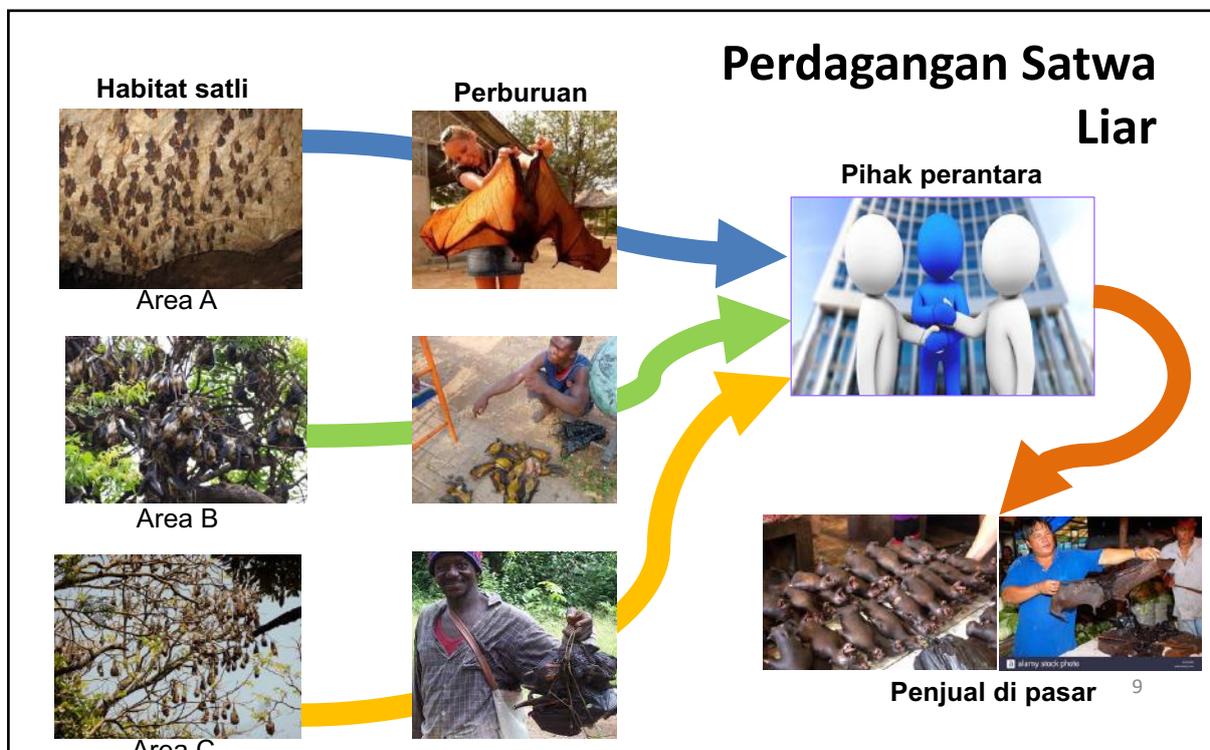


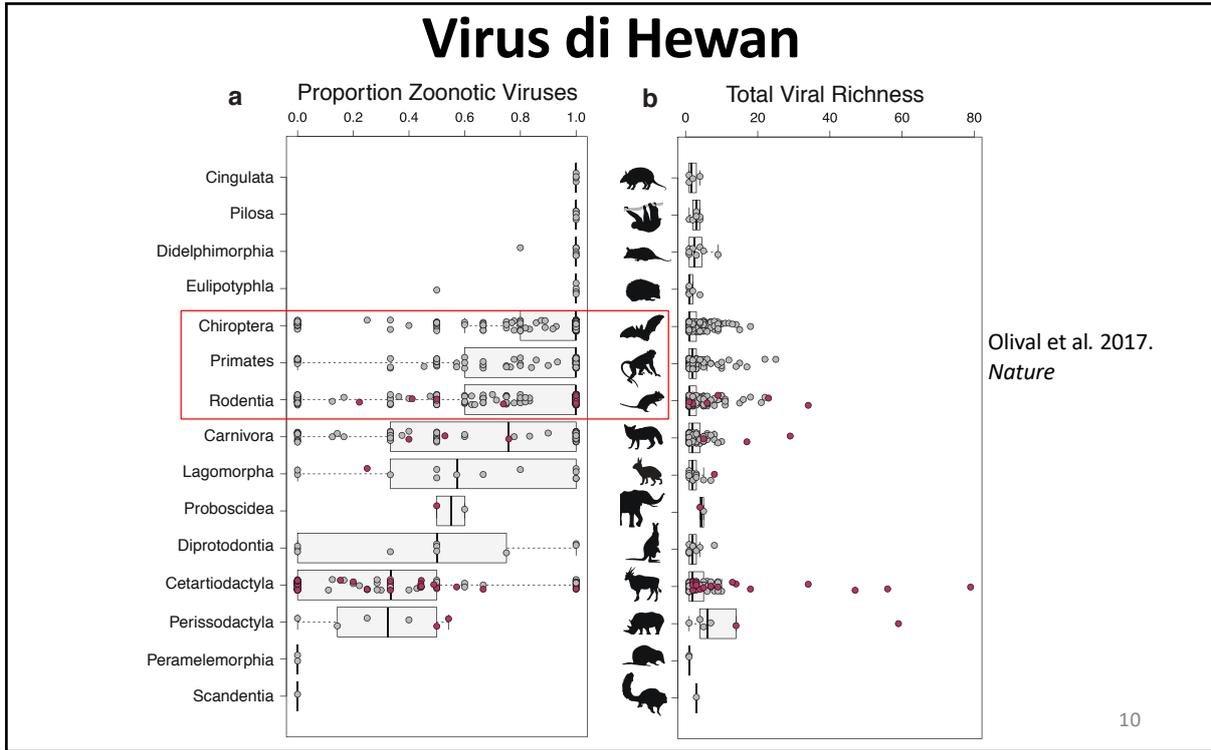
	relative influence (%)	std. dev.
population	27.99	2.99
mammal diversity	19.84	3.30
change: pop	13.54	1.54
change: pasture	11.71	1.30
urban extent	9.77	1.62



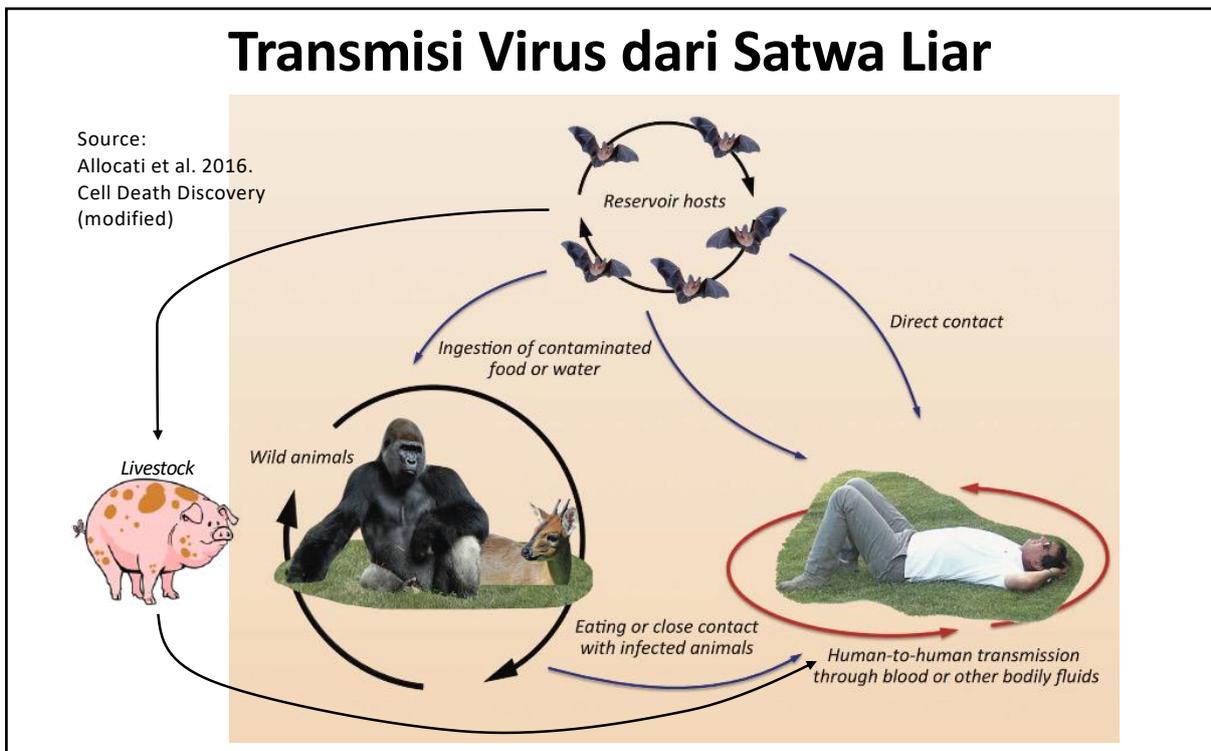
Allen et al. Nature Comm. 2017

Joko Pamungkas jpi-pssp@indo.net.id

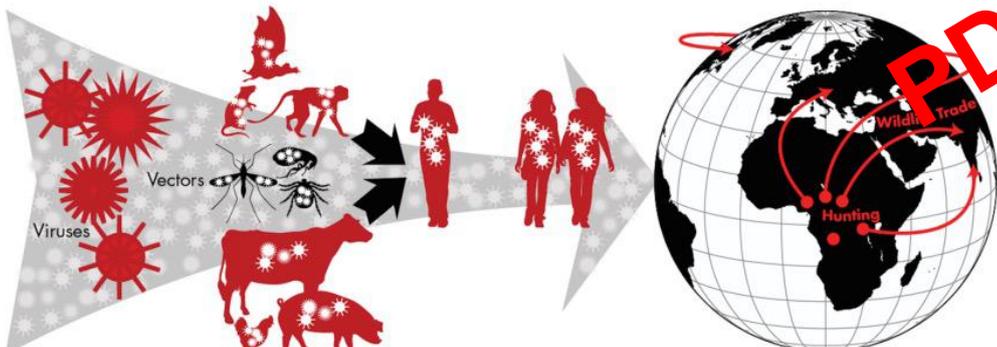




Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)



  
A Project of USAID's Emerging Pandemic Threats Program  
Towards a proactive paradigm for early disease detection and response



**One Health** approach to understanding the dynamics of zoonotic virus evolution, spillover from animals to people, amplification, and spread to inform prevention and control

 **USAID** | Emerging Pandemic Threats Program 2 (EPT-2)

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## PREDICT-Indonesia

EPT-1: 2011-2014 and EPT-2: 2014-2019:

**Implementing partners:**

- Primate Research Center at Bogor Agricultural University:
  - Detection and identification of novel and known wildlife pathogens that pose significant public health threats
- Eijkman Institute for Molecular Biology:
  - Detection and identification of new and known zoonotic pathogens that spill over into humans from wildlife

**Consortium partners (from PREDICT Global):**

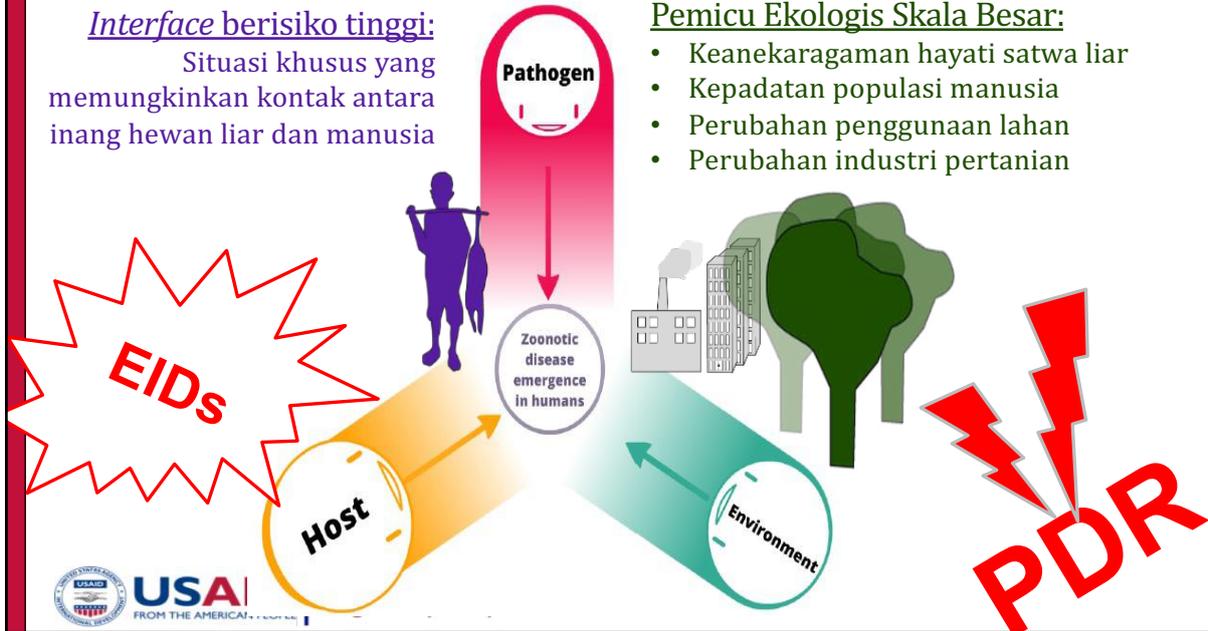
- UC Davis, EcoHealth Alliance, Metabiota, Smithsonian Institution, Wildlife Conservation Society

## Surveilans berdasarkan risiko tertarget

Interface berisiko tinggi:  
Situasi khusus yang memungkinkan kontak antara inang hewan liar dan manusia

Pemicu Ekologis Skala Besar:

- Keanekaragaman hayati satwa liar
- Kepadatan populasi manusia
- Perubahan penggunaan lahan
- Perubahan industri pertanian

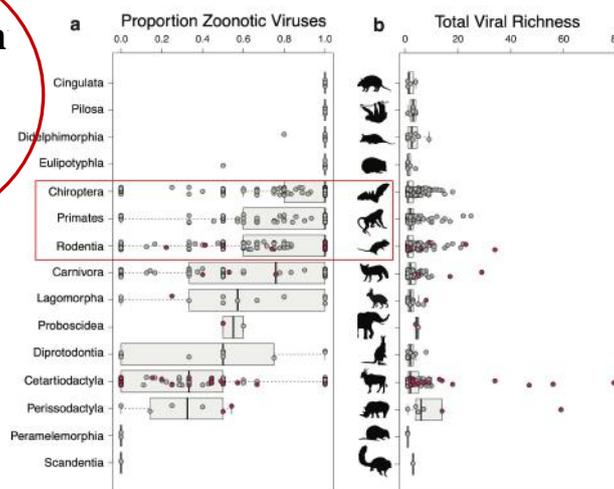


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## Surveilans berdasarkan risiko tertarget

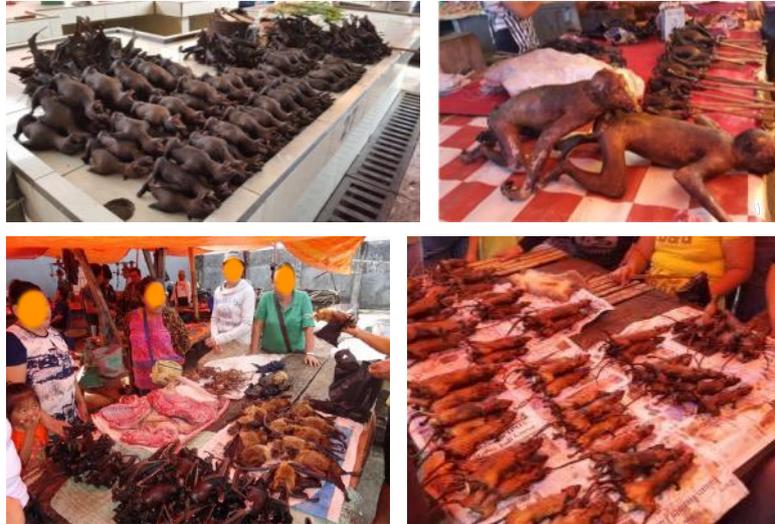
- ✓ **Human**
- ✓ **Nonhuma**
- ✓ **Primates**
- ✓ **Bats**
- ✓ **Rodents**
- Birds
- Suids
- Carnivores
- Ungulates
- Others

### Viruses in Animals



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## Perdagangan Satli di Sulawesi Utara



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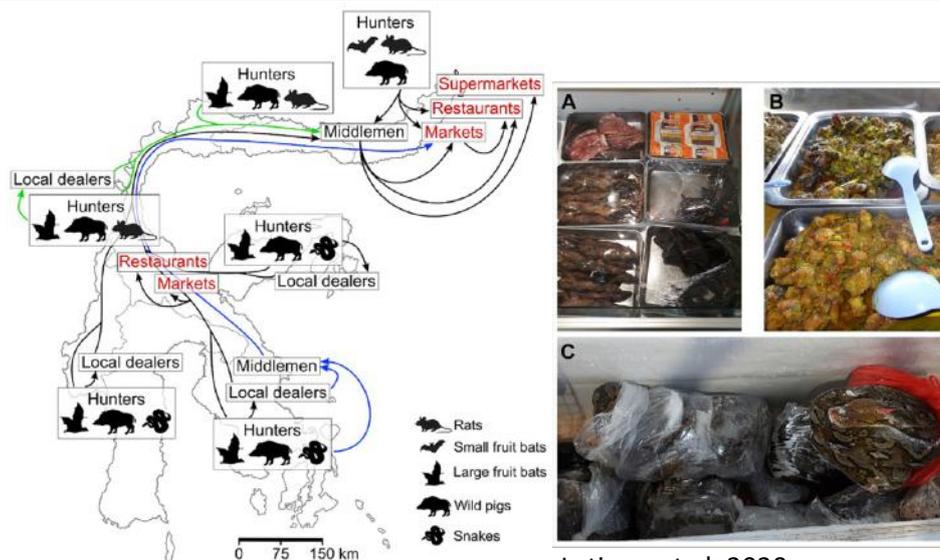
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Program 2 (EPT-2)

Latinne et al. 2020,  
*Global Ecology and Conservation*

20

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## Perdagangan Satli di Sulawesi Utara



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Latinne et al. 2020,  
*Global Ecology and Conservation*

21

# EPT-2

## Let's go to the field...



Joko Pamungkas [jpi-pspp@indo.net.id](mailto:jpi-pspp@indo.net.id)

Appendix 1

ANIMAL CARE AND USE COMMITTEE  
PRIMATE RESEARCH CENTER, BOGOR AGRICULTURAL UNIVERSITY  
KOMISI PENGAWASAN KESEHATAN & PENGGUNAAN HEWAN PENELITIAN  
PRIMATE STUDI SATEWA PRIMATA  
Lembaga Penelitian dan Pengabdian kepada Masyarakat - Institut Pertanian Bogor  
Jalan Lodaya II No. 5, Bogor 16151, Telp. 0251-8320417, 0136073, Fax. 0251-8360732

**APPLICATION FORM  
FOR THE USE AND CARE OF ANIMAL/ANIMAL TISSUE  
IN RESEARCH/TEACHING/TESTING**

**Section I: Principal Investigator Statement**

1. General Information

If the Principal Investigator is from an overseas institution:

a. Has protocol been approved home institution? \_\_\_\_\_

b. Is approval of protocol by home institution required by Funding Source Institution? \_\_\_\_\_

2. Principal Investigator signature and statement

a. I/We understand policies in using animals for research/teaching/testing in PRC-IPB.

b. I/We responsible for all procedures done by him/ her or their laboratory personnel/ all personnel involved in this project; responsible for adequate qualification and experience of all personnel in the project; providing adequate training to perform the procedures described in this project, including the species used.

c. All procedures in this project will be conducted as described in the approved protocol. An addendum will be sent/ communicated to PRC-IPB ACUC for any change. No new procedures will be conducted prior to approval of the addendum.

Signature: *Joko Pamungkas* Date: 25 Februari 2016

Dr. Dth. Joko Pamungkas, MSc  
Principal Investigator  
Country coordinator/ PREDICT Indonesia

PI Contact Numbers/ Address:  
Institution : Pusat Studi Satewa Primate, LPPM - IPB  
Address : Jalan Lodaya II no.5, Bogor 16151  
Phone no. : 0251 - 8320417  
Cell phone no. : 08128432208  
Fax no. : 0251 - 8360732  
Email address : [jpi-pspp@indo.net.id](mailto:jpi-pspp@indo.net.id)

Revisi August 2012

NOV 18/2016 (2)

File No. 02/0797632 18 Feb. 2016 01:50:41 P1

**LEMBAGA ILMU PENGETAHUAN INDONESIA  
(INDONESIAN INSTITUTE OF SCIENCES)  
PUSAT PENELITIAN BIOLOGI  
(RESEARCH CENTER FOR BIOLOGY)**  
Cibinong Science Center, Jl. Raya Cibinong - Bogor KM. 40 Cibinong 16911  
Telp. 0421-7570030 - 7570031, Fax. 0421-7570023  
Website: [www.lipi.go.id](http://www.lipi.go.id)

No. : S75 /PPH/UKB/02/04/02016  
Lamp. :-  
Perihal: Rekomendasi pengalihan sampel  
Bahan Legitimasi sampel virus pada satwa liar

Di,  
Kepala Pusat Studi Satewa Primate (PSSP)  
Lembaga Penelitian dan Pengabdian kepada Masyarakat (LPPM)  
Institut Pertanian Bogor (IPB)

Manajemen satewa Satewa No. 03/0173.1.1/18/2016 tanggal 28 Januari 2016, perihal permohonan rekomendasi ini mengahsilkan dan memohon kepada Kepala Pusat Studi Satewa Primate (PSSP) untuk melakukan pemeriksaan terhadap sampel virus pada satwa liar yang akan digunakan untuk penelitian di Pusat Penelitian Biologi (PBI) Lembaga Ilmu Pengetahuan Indonesia (LIPI) melalui salah satu kegiatan program USAID yaitu PREDICT, dengan ini kami sampaikan hal-hal sebagai berikut:

- Kami mengundang kegiatan penelitian yang dilakukan oleh (in PSSP, LPPM) Satewa Primate Bogor bekerjasama dengan Komite Etik Animal Care untuk melakukan survei virus satewa liar seperti yang ditunjukkan dalam lampiran surat ini.
- Kami dapat memandatkan/izin untuk melakukan penelitian ini berdasarkan dan mengizinkan sampel satewa liar di Satewa Primate Pusat Studi Satewa Primate (PSSP) dengan ketentuan tidak ada sampel satewa liar yang akan dikalikan ke luar negeri.
- Pemeriksaan sampel spesies satewa liar penelitian yang akan dilakukan oleh Komite Etik Lingkungan Hidup dan Kesehatan, ini semua akan terdapat dari aspek satewa liar penelitian satewa liar.
- Kami tidak melihat adanya masalah DNA virus. Kami ingin mengungkapkan bahwa informasi analisis DNA virus satewa liar yang sedang dilakukan penelitian pengalihan sampel satewa liar ke PBI juga termasuk property right-nya menjadi milik Indonesia.

Dokumen informasi ini kami sampaikan. Untuk informasi, berkecukupan mengenai ini masalah di Direktorat Inspeksi Kesehatan Hewan (DIKSH) Kementerian Lingkungan Hidup dan Kehutanan RI untuk prosedur CITES. Apabila/Manajemen satewa di Indonesia akan melakukan dan berkoordinasi, kami ucapkan terima kasih.

Dr. Dth. Joko Pamungkas, MSc  
Country coordinator/ PREDICT Indonesia

PI Contact Numbers/ Address:  
Institution : Pusat Studi Satewa Primate, LPPM - IPB  
Address : Jalan Lodaya II no.5, Bogor 16151  
Phone no. : 0251 - 8320417  
Cell phone no. : 08128432208  
Fax no. : 0251 - 8360732  
Email address : [jpi-pspp@indo.net.id](mailto:jpi-pspp@indo.net.id)

Revisi August 2012



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## Soppeng - S. Sulawesi



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## Logistik dan Transportasi Lokal



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## Logistik dan Transportasi Lokal



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Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

## Habitat Kelelawar di Alam



## Hitan Bakau di Sulawesi



Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

## Penangkapan rodensia di Sulawesi Utara



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# Perijinan Sampling & Angkut

KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN  
DINAS COBAT HINDIA, KEMENTERIAN SUMBER DAYA ALAM DAN EKOWISATA  
**BALAI KONSERVASI SUMBER DAYA ALAM SLEMANEY TERANG**  
Jalan Pahlawan, Yogyakarta 55139 Telp. (0271) 491188 Fax. (0271) 494413  
www.kemlitbang.go.id

15 September 2020

Nomor : SUR/7/VIK.2020/18  
Lampiran : 1 (satu) berkas surat perijinan (satu/dua/berkas)  
Perihal : perijinan pengambilan sampel penelitian (satu/dua/berkas)

Kantor PTD : 18400008  
Gedung PTD : 18400008  
Kantor PTD : 18400008  
Kantor PTD : 18400008

Sampel yang akan diambil pada tanggal 15 September 2020 untuk penelitian awal (preliminary survey) dengan tujuan untuk mengetahui status kesehatan lingkungan di lokasi tersebut.

1. Sesuai dengan Surat Keputusan Menteri Kesehatan Nomor HK.010/Men/Kes/1220/2016 tentang pelaksanaan kebijakan penelitian dan pengabdian masyarakat, maka perijinan pengambilan sampel harus disertai dengan surat perijinan dari instansi yang berwenang di lokasi pengambilan sampel. Untuk keperluan ini, maka perijinan pengambilan sampel harus disertai dengan surat perijinan dari instansi yang berwenang di lokasi pengambilan sampel.

2. Sesuai dengan Surat Keputusan Menteri Kesehatan Nomor HK.010/Men/Kes/1220/2016 tentang pelaksanaan kebijakan penelitian dan pengabdian masyarakat, maka perijinan pengambilan sampel harus disertai dengan surat perijinan dari instansi yang berwenang di lokasi pengambilan sampel.

3. Sesuai dengan Surat Keputusan Menteri Kesehatan Nomor HK.010/Men/Kes/1220/2016 tentang pelaksanaan kebijakan penelitian dan pengabdian masyarakat, maka perijinan pengambilan sampel harus disertai dengan surat perijinan dari instansi yang berwenang di lokasi pengambilan sampel.

Ditulis dan disahkan, atas perintah Kepala Balai Konservasi Sumber Daya Alam Slemaney Terang.

Dr. Heryanto, S.P.  
Kepala Balai Konservasi Sumber Daya Alam Slemaney Terang

Teknologi: Heryanto, S.P.  
1. Kepala Balai Konservasi Sumber Daya Alam Slemaney Terang  
2. Kepala Balai Konservasi Sumber Daya Alam Slemaney Terang

KEMENTERIAN KEHUTANAN  
DIREKTORAT JENDRAL PERLINDUNGAN  
HUTAN DAN KONSERVASI ALAM

BUPAT ANGGUT TUMBUKAN DAN BAHAN LAIN DALAM KELOMPOK  
Nomor : 49/1000/2020/18400008/PTD/2020  
Tanggal : 29 Agustus 2020  
Batas Waktu : 29 Agustus 2020 s.d. 30 Agustus 2020

Subjek: Izin Pengambilan Sampel Penelitian

Di: Balai Konservasi Sumber Daya Alam Slemaney Terang

Di: Balai Konservasi Sumber Daya Alam Slemaney Terang

No	Intensitas	Luas	Jumlah Sampel/Tipe	Keterangan
1	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
2	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
3	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
4	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
5	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
6	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
7	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
8	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
9	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon
10	Ekstrem	1000 m <sup>2</sup>	10 Sampel	Dung. Dendro, satelit, terestris, vektora, partikel dan Karbon

PLN: 18400008  
Nama Pemohon: Heryanto, S.P.  
Alamat: Yogyakarta, Sleman, Indonesia  
No. Telp: 0271-491188  
No. Fax: 0271-494413  
No. Email: heryanto@kemlitbang.go.id

PLN: 18400008  
Nama Pemohon: Heryanto, S.P.  
Alamat: Yogyakarta, Sleman, Indonesia  
No. Telp: 0271-491188  
No. Fax: 0271-494413  
No. Email: heryanto@kemlitbang.go.id

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No. Email: heryanto@kemlitbang.go.id



Joko Pamungkas jpi-pspp@indo.net.id

# Laboratorium Lapangan



## Pengambilan Spesimen Satli



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Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

## Pengambilan Spesimen Satli



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## Pengambilan Spesimen Satli

### Bat specimens collection:

- non-lethal sampling,
- release back to nature
- specimen types priority: 1) oral, 2) fecal, 3) urine, 4) whole blood, 5) tissue



Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

## Pengambilan Spesimen Satli

### Rodents specimens collection:

- non-lethal sampling,
- release back to nature
- specimen types priority: 1) oral, 2) fecal, 3) urine, 4) whole blood, 5) tissue



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## Penjaminan *Cold chain*



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Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

## Penjaminan *Cold chain*



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## Penjaminan *Cold chain*



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## Pendekatan *Discovery*

Detection/ Discovery  
~~Diagnostic Approach~~

PCR: primers = key

Specific vs Consensus Primers



Traditional PCR  
  
Exclusive  
amplification and  
detection of one  
specific pathogen



Consensus = Degenerate  
  
Broad amplification of multiple,  
genetically related including  
previously unidentified  
pathogens



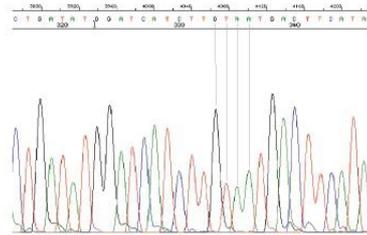
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**PREDICT**

# Consensus PCR

## PCR: Consensus primer design

THE LIZARD LIKES TO LIVE IN THE DESERT  
THE WIZARD MIKE SAID TO LIVE IN THE DESERT  
THE MONKEY LIKED TWO OLIVES IN THE DESSERT  
THE MONKEY BIKES FOR MILES IN THE DESERT



Sequence amplicon for specific identification



Joko Pamungkas jpi-pspp@indo.net.id

	Human	Wildlife
No. of specimens	800 undiagnosed cryopreserved specimens from Acute Febrile Illness patients	1991 specimens from >400 animals from three taxa (nonhuman primates, rodents, bats)
Activity Sites	West Java, South Kalimantan, East Nusa Tenggara, North Sulawesi, Papua	West Java, North Sulawesi, Gorontalo, Bali
Lab Findings*	Herpesviruses (9), Rhinoviruses (4), Adenoviruses (4), Enteroviruses (2), Paramyxovirus (1), and Bocavirus (1)	Paramyxoviruses (7), Coronaviruses (9), Astroviruses (13), Rhabdoviruses (2), and Herpesviruses (2)

\* Sudah dilaporkan dan disetujui otoritas nasional



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## Uji Virus berdasarkan Inang






	Viral Test Type				
	Coronaviruses	Filoviruses	Flaviviruses	Influenzas	Paramyxoviruses
Acorodon (bats)	1.6% (1388)	0% (605)	0% (1002)	1.3% (1388)	0.2% (1388)
Cynopterus (bats)	4.2% (120)	0% (60)	0% (82)	0.8% (120)	0% (120)
Dobsonia (bats)	0% (56)	0% (28)	0% (30)	0% (56)	0% (56)
Hipposideros (bats)	0% (4)	0% (2)	0% (2)	0% (4)	0% (4)
Neopteryx (bats)	0% (4)	0% (2)	0% (2)	0% (4)	0% (4)
Nyctimene (bats)	0% (60)	0% (30)	0% (31)	0% (60)	0% (60)
Pteropus (bats)	2.3% (3981)	0% (1992)	0% (2662)	0.6% (3984)	0.3% (3984)
Rhinolophus (bats)	0% (24)	0% (12)	0% (12)	0% (24)	0% (24)
Rousettus (bats)	0.6% (800)	0% (400)	0% (448)	0.1% (800)	0.1% (800)
Stylectenium (bats)	0% (36)	0% (18)	0% (18)	0% (36)	0% (36)
Thoopterus (bats)	0.3% (760)	0% (380)	0% (388)	0.1% (760)	0.1% (760)
Bunomys (rodents/shrews)	3.8% (26)	0% (13)	0% (13)	0% (26)	0% (26)
Echiothrix (rodents/shrews)	0% (42)	0% (21)	0% (21)	0% (42)	0% (42)
Lanomys (rodents/shrews)	0% (24)	0% (12)	0% (12)	0% (24)	0% (24)
Maxomys (rodents/shrews)	0% (72)	0% (36)	0% (46)	0% (72)	0% (72)
Panurromys (rodents/shrews)	1.5% (134)	0% (67)	0% (67)	0% (134)	0% (134)
Rattus (rodents/shrews)	3.6% (2480)	0% (1240)	0% (1417)	0.1% (2480)	0.1% (2480)
Suncus (rodents/shrews)	0% (4)	0% (2)	0% (2)	0% (4)	0% (4)
Taeromys (rodents/shrews)	0% (20)	0% (10)	0% (13)	0% (20)	0% (20)
Unknown (rodents/shrews)	0% (4)	0% (2)	0% (2)	0% (4)	0% (4)




Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)



**USAID**  
FROM THE AMERICAN PEOPLE

Emerging Pandemic  
Threats Program 2 (EPT-2)

## Uji Virus berdasarkan interface

	Coronaviruses	Filoviruses	Flaviviruses	Influenzas	Paramyxoviruses
animal production; crop production; market and value chain	2.1% (910)	0% (455)	0% (455)	0% (910)	0.2% (910)
market and value chain	2.4% (7357)	0% (3681)	0% (4726)	0.6% (7360)	0.2% (7360)
market and value chain; natural areas	1.2% (1720)	0% (860)	0% (1037)	0.1% (1720)	0% (1720)
natural areas	0% (52)	0% (26)	0% (52)	0% (52)	0% (52)







Joko Pamungkas jpi-pspp@indo.net.id



**USAID** Emerging Pandemic Threats Program 2 (EPT-2) **Kampanye ke Masyarakat**

**Living Safely with Bats**

**Hidup Aman Berdampingan dengan Kelelawar**

EcoHealth Alliance IPB University Bogor Indonesia

48

Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

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Karesh et al. Ecology of Zoonoses: Natural and Unnatural Histories. *Lancet*. 2012 Dec 1;380(9857):1936-45

**A**

Wild animal cases  
Domestic animal cases  
Human cases

Vectors  
Spillover  
Domestic animal amplification  
Spillover  
Human amplification

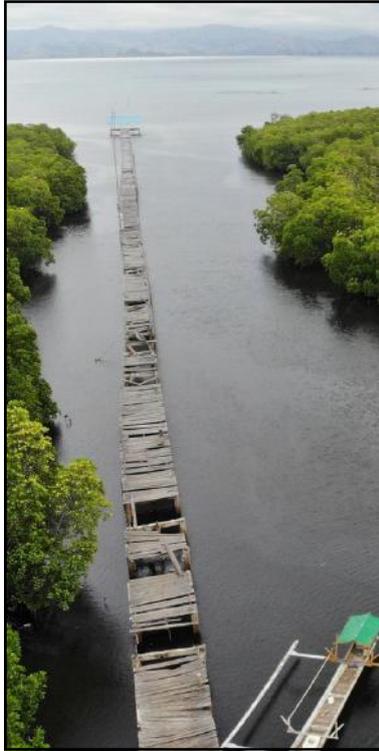
Number of cases  
Time (days)

**B**

Wild animal cases  
Domestic animal cases  
Human cases

Forecasting readiness  
Early detection  
Control operations  
Rapid response  
Control benefits to animals  
Control benefits to people

Number of cases  
Time (days)



## Rekomendasi

- Pendekatan *One Health*:
  - Lintas disiplin dan profesi, lintas sektor, lintas wilayah
- Pendekatan pencegahan:
  - Surveilans virus rutin pada satwa liar tertentu
  - Surveilans virus segitiga (satwa liar-ternak-manusia)
- Kampanye untuk BERHENTI mengganggu satwa liar:
  - STOP mengganggu populasi satwa liar
  - STOP untuk konversi habitat satwa liar dan lahan untuk sumber pakan ternak
  - HENTIKAN konsumsi satwa liar Jarak perilaku

Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)



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Threats Program 2 (EPT-2)

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**Primate Research Center at Bogor Agricultural University  
(PSSP-IPB), Bogor, Indonesia:**

Diah Iskandriati, Suryo Saputro, Rachmitasari Noviana, Uus Saepuloh, Reza Kristiyana,  
Ellis Dwi Ayuningsih, Mad Ramdan, Joko Pamungkas

**Eijkman Institute for Molecular Biology  
(EIMB), Jakarta, Indonesia:**

Dodi Safari, Ageng Wiyatno, Ungke Antonjaya, Chairin Nisa Ma'roef, Tina  
Kusumaningrum, Aghni Dewantari, Herawati Sudoyo

**Community-based Study:**

Jusuf Kalengkongan, Novi Kasenda, Reagen Mandeas





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Joko Pamungkas [jpi-pssp@indo.net.id](mailto:jpi-pssp@indo.net.id)

