

Data Management Plan rewild4Health

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Table of contents

1	Project Description	1
1.1	Rational	1
1.2	Research Objectives	2
1.3	Summary	2
2	Data Management Plan	3
2.1	Data Collection	3
2.1.1	Types of Data	3
2.1.2	Data sources	5
2.2	Data organization	5
2.2.1	Creators	5
2.2.2	File Naming Conventions	5
2.2.3	Datasets and metadata	6
2.2.4	Folder Structure	8
2.2.5	Data Storage and Backup	9
2.2.6	Data Documentation	9
2.3	Data Sharing and Access	10
2.3.1	Sharing Platforms	10
2.3.2	Licensing	10
2.3.3	Access Restrictions	10
2.4	Ethical and Legal Considerations	11
2.4.1	Informed Consent	11
2.4.2	Animal ethics and compliance	11
2.4.3	Permit and compliance	11
2.5	Project Timeline	12
2.5.1	Milestones	12
2.6	Contact Information	12

3	References	12
4	Appendices	13
4.1	Useful Links	13

1 Project Description

Title: rewild4Health

Full title: Rewilding and reforestation-based solution for reducing zoonotic risk using a One Health approach

Funder: French National Research Agency (ANR)

To: IRL2021 HealthDEEP CNRS

1.1 Rational

Rewilding following reforestation could reduce zoonotic risk. The project rewild4Health takes place in northern Thailand characterized by a community reforestation policy. The project will be realized by the IRL2021 HealthDEEP (Table 1).

Table 1: Summary table of persons involved in the project (members of IRL 2021 HealthDEEP)

Partner	Name	Current position	Role & responsibilities
HealthDEEP CNRS	Serge Morand	DRCE CNRS	Coordinator, WP4 (data), WP5 (national, policy)
HealthDEEP KU	Anamika Kritiyakan	Assistant Professor	WP0 (Animal ethics), WP3 (zoonotic diseases)
HealthDEEP KU	Areeya Kriengudom	Management Assistant TICA	WP0 (Ethics, permits, protocols), WP4 (data), WP5 (local)
HealthDEEP KU	Piyapoom Chongchimpree	Field Assistant	WP2 (rewilding assessment), WP4 (data), WP5 (local)

Partner	Name	Current position	Role & responsibilities
HealthDEEP KU	Inpreeya Choknakhawaro	Field Assistant	WP1 (community engagement, participatory methods)
HealthDEEP KU	Chayanan Arahmkong	Master student	WP3 (zoonotic diseases)
HealthDEEP KU		Master students	WP2 (reforestation assessment)
HealthDEEP MU	Kittipong Chaisiri	Assistant Professor	WP0 (Human ethics), WP4 (data), WP3 (zoonotic diseases)
HealthDEEP MU	Kraichat Tantrakarnapa	Associated Professor	WP5 (national, policy)

1.2 Research Objectives

The two main objectives of rewild4Health are:

- (1) to assess the contribution of community reforestation to biodiversity through rewilding;
- (2) to demonstrate that reforestation and rewilding are effective solutions to reduce the risk of transmission of zoonotic diseases in a One Health approach.

The project rewild4Health is based on our previous research activities in Nan province (Thailand) Thinphovong et al. (2024) Thinphovong et al. (2023) Chaisiri et al. (2023).

1.3 Summary

The three main research hypotheses of rewild4Health are:

- (1) the effectiveness of community reforestation on biodiversity depends on the structure of community forests as well as community governance rules;
- (2) rewilding contributes to the regulation of disease transmission with predators and specialist species capable of regulating synanthropic reservoir species;
- (3) cross-sector collaboration (public health, animal health, conservation) and community engagement are key factors for ecological restoration and disease risk reduction through a One Health approach.

Flowchart of main activities of rewild4Health: land use and participatory mapping (WP1), reforestation assessment (WP2), rewilding assessment with camera traps and sound recorders (WP2), and zoonotic risk assessment (small mammals, dogs, mosquitoes) (WP3) (Figure 1).

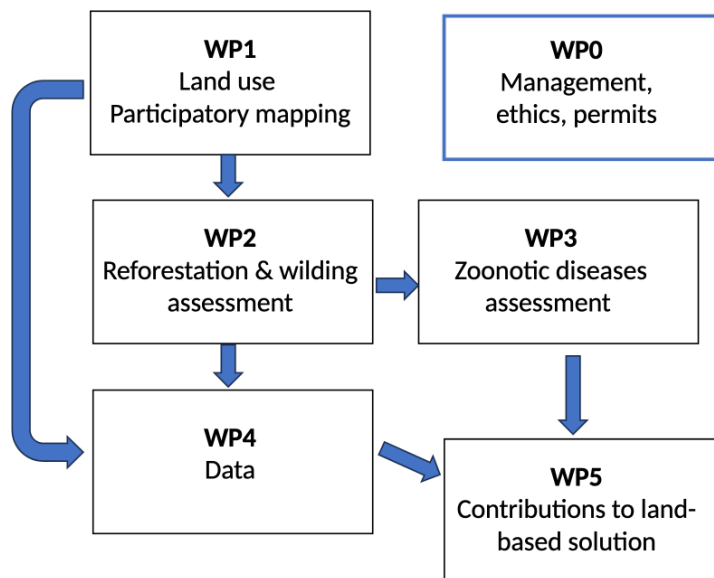


Figure 1: Workpackages of rewild4Health

2 Data Management Plan

2.1 Data Collection

The framework of rewild4Health (Figure 2) illustrates the data that are collected remotely, on the ground using different types of sensors, in the laboratory for the biological samples, and by participatory methods and interviews.

2.1.1 Types of Data

A wide diversity of data are collected by rewild4Health (Table 2).

Table 2: Summary table of the types of data collected by the project rewild4health)

Type of data	Collection method	File format
Land use	remote sensing	TIFF, shp
Livestock	existing data	TIFF

Type of data	Collection method	File format
Conservation area	Dpt Royal Forestry, DNP	shp
LiDAR	drone	LAS (LASer)
Participatory mapping	focus group	shapefile
Interviews and surveys	interviews, questionnaires	text, spreadsheet, csv, RData
Camera traps	camera trap	image (jpg,heic), video (mov)
Sound	sound recorder	wav, mp3
Wildlife	living cage trap, harp trap	spreadsheet, csv, RData
Biodiversity	IUCN, gbif, iNaturalist	shp, csv
Birds	listening stations	wav, spreadsheet, csv, RData
Dogs	gps collar	spreadsheet, csv, RData
Mosquitoes	light trap	spreadsheet, csv, RData
Forest assessment	transect	spreadsheet, csv, RData
Soil assessment	soilBON initiative	spreadsheet, csv, RData
Diseases	passive surveillance DDC MoPH	spreadsheet, csv, RData
Pathogens and parasites	molecular and serology screening	spreadsheet, csv, RData

2.1.2 Data sources

The sources of open databases are given in Table 3.

Table 3: Data collected from open databases

Type of data	Source	Registration / API
Biodiversity	GBIF	yes
	iNaturalist	yes
	IUCN	yes
	CERoPath	no
Land use	DataSud	no
Livestock	FAO	no

2.2 Data organization

2.2.1 Creators

- Identification of creators

(i) *Data of sensors (traps)*

Table 5: Codebook for small mammal trapping: 1 - sensors (traps)

Variable	Description	dataType
trapID	identification code of the sensor (trap)	character
installDate	date of the installation of the trap in the location	character
type	type of traps: cage, shermann, etc.	character
id_site	identification code of the location of the trapping (in reference to location file)	character
lat	latitude in decimals	numeric
long	longitude in decimals	numeric

(ii) *Data trapping location*

Table 6: Codebook for small mammal trapping: 2 - location

Variable	Description	dataType
id_site	identification code of the location of the trapping site	character
location	place name: village name, national park name, forest name	character
subdistrict	name of the subdistrict of the place name	character
district	name of the district of the place name	character
province	name of the province of the place name	character

(iii) *Data small mammal individuals*

Table 7: Codebook for small mammal trapping: 3 - individuals

Variable	Description	dataType
id_indiv	identification code of the individual	character
id_tag	identification code of the tag (microchip)	character
taxonomyID	scientific name of the species	character
commonName	common name of the species (English)	character
animalGroup	scientific name of the animal order (Rodentia, Scandatia, etc)	character
sex	female / male	character
maturity	juvenile / adult	character
session	identification code of the session, if the location is investigated at different periods	character
trappingDate	date of the trapping of the individual (year-month-day)	date
trappingLandscape	description of the habitat at low resolution (settlement, forest, plantation, agriculture on flat land, agriculture on slope)	character

Table 7: Codebook for small mammal trapping: 3 - individuals

Variable	Description	dataType
trappingLocation	description of the habitat at high resolution (village, isolated house, evergreen forest, paddy rice field, rubber plantation, teck plantation, etc)	character
id_site	identification code for the location of the trapping site (in reference to location file)	character
trappingMethod	trapped (by us) / collected (from villagers)	character
trapID	identification code of the sensor (trap) (in reference to traps file)	character
pictureID	name of the picture (jpeg) labelled using “id_indiv” and “trappingDate”	character
bodyWeight	weight of the animal (in grams)	numeric
headBodyMeasurement	length of the animal from snout to end of tail (in millimeters)	numeric
tailMeasurement	length of the animal tail (in millimeters)	numeric
hindfootMeasurement	length of the animal hindfoot (in millimeters)	numeric
earMeasurement	length of the animal ear (in millimeters)	numeric
headMeasurement	length of the animal head (in millimeters)	numeric
vagina	close / open	character
teats	barely visible / visible	character
teatFormula	formula of the teats (e.g. 2+2+2)	character
testes	inside / outside	character
dead	no / yes (the individual died in the trap or during the manipulation)	logical
dissectionDate	date of dissection of the dead animal	date
oralSwabRNAlater	oral swab taken: yes / no	logical
rectalSwabRNAlater	rectal swab taken: yes / no	logical
fecesEthanol	feces recolted in ethanol: yes / no	logical
fecesRNAlater	feces recolted in RNA later: yes / no	logical
ectoparasiteEthanol	ectoparasites recolted in ethanol: yes / no	logical
bloodCell	blood cells recolted: yes / no	logical
serum	serum recolted: yes / no	logical
dryBloodSpot	paper blood recolted: yes / no	logical
capillaryBlood	capillary blood recoled: yes / no	logical
earEthanol	chigger mites from ear recolted: yes / no	logical
isofluraneAmount	amount of isoflurane used for anesthesia (in milliliters)	numeric
anesthesiaInductionTime	time for the individual to fall asleep	numeric
operationalTime	total time to process the individual	numeric
remark1	some commentary regarding the individual or the process	character

2.2.4 Folder Structure

folder hierarchy with organizing data using dataspice Below is the contents of directories in a tree-like format

```
./dataspice_rewild4Health/  
+-- data  
|   +-- individuals.csv  
|   +-- location.csv  
|   +-- metadata  
|       +-- access.csv  
|       +-- attributes.csv  
|       +-- biblio.csv  
|       +-- creators.csv  
|       \-- dataspice.json  
|   +-- recapture.csv  
|   \-- traps.csv  
+-- data 20241231  
|   \-- Rodent_rewild4H_database_20241231.xlsx  
+-- dataspice_rewild4Health.R  
\-- docs  
    \-- index.html
```

```
./dataspice_rewild4Health/data  
./dataspice_rewild4Health/data/individuals.csv  
./dataspice_rewild4Health/data/location.csv  
./dataspice_rewild4Health/data/metadata  
./dataspice_rewild4Health/data/metadata/access.csv  
./dataspice_rewild4Health/data/metadata/attributes.csv  
./dataspice_rewild4Health/data/metadata/biblio.csv  
./dataspice_rewild4Health/data/metadata/creators.csv  
./dataspice_rewild4Health/data/metadata/dataspice.json  
./dataspice_rewild4Health/data/recapture.csv  
./dataspice_rewild4Health/data/traps.csv  
./dataspice_rewild4Health/data 20241231  
./dataspice_rewild4Health/data 20241231/Rodent_rewild4H_database_20241231.xlsx  
./dataspice_rewild4Health/dataspice_rewild4Health.R  
./dataspice_rewild4Health/docs  
./dataspice_rewild4Health/docs/index.html
```

2.2.5 Data Storage and Backup

Storage Locations

External hard drive dropbox mycore CNRS

Backup Strategy

Following any modification of a datafile:

1. modify date in the name (e.g. data_name_yearmonthday)
2. save the file in the dedicated hard drive and on mycore CNRS

2.2.6 Data Documentation

[Dataspice R package](#) is used to create basic, lightweight, and concise metadata files. The basic files created include a README webpage.

The dataspice metadata fields are based on [Schema.org](#) and other, richer metadata standards such as [Ecological Metadata Language](#).

README metadata file obtained using dataspice

[see the README metadata file](#)

2.3 Data Sharing and Access

2.3.1 Sharing Platforms

Resource	Data type	Links
DataSud (IRD)	land Use (with DOI)	Exemple of DataSud
RPubs	R codes	HealthDEEP RPub
GitHub	data and R codes (DOI can be obtained by transfer to Zenodo)	HealthDEEP GitHub
Shinyapps.io	data representation and data sharing	CERoPath at shinyapps.io
Zenodo	data and R codes (with DOI)	HealthDEEP at zenodo

Resource	Data type	Links
genbank	genetic sequences	genbank
wildlifeinsights	camera traps	HealthDEEP at wildlifeinsights

2.3.2 Licensing

- licensing terms for the data: BY 4.0

2.3.3 Access Restrictions

- camera traps: pictures and accurate location accessible only on request from researchers (wildlifeinsights)
- interviews: audio records confidential and deleted after transcription and anonymisation
- human health: only aggregated data accessible

2.4 Ethical and Legal Considerations

The principles of ethics and responsibility require local community and stakeholder engagement, such as in the Primary Health Care Unit, the District Public Health Office, and Nanthaburi National Park. Several meetings with all stakeholders helped to co-construct the project which made it possible to meet the objectives of human health, animal health, and biodiversity conservation.

2.4.1 Informed Consent

Procedures for human health investigation, laboratory investigation, interviews, and questionnaires will be sent for approval by the ethical committee of the Nan Provincial Public Health Office, Ministry of Public Health, Thailand. All participants who agree to join the study will be asked to read the Participant Information Form, which explains the objectives, procedures, possible risks, and benefits of the research project.

All data will be anonymized to protect participant privacy

2.4.2 Animal ethics and compliance

Procedures for collection of samples from domestic animals and wildlife, laboratory investigation, safety procedures, interviews and questionnaires of domestic animals owners will be sent for approval by the Institutional Animal Care and Use Committee, Kasetsart University. Rodent and other wildlife species that will be investigated by rewild4Health will be neither on the CITES list nor on the Red List (IUCN). Animals will be treated in accordance with the guidelines of the American Society of Mammalogists, and within the European Union legislation guidelines (Directive 86/609/EEC). Any trapped rodent species listed on CITES will be released without being manipulated. All animals will be released after sampling.

Approval notices for trapping and investigation of bats and rodents will be sent for approval by the Institutional Animal Care and Use Committee, Kasetsart University.

2.4.3 Permit and compliance

Permit has to be approved by the Department of National Parks, Wildlife and Plant Conservation (DNP) and the Royal Forest Department, Ministry of Natural Resources and Environment, Thailand. In addition, foreign researchers participating in the research project have also to be approved by the National Research Council of Thailand (NRCT) with the consent of the DNP.

2.5 Project Timeline

2.5.1 Milestones

Milestone	Expected Date	Description
Starting date	2024-10-01	Starting date of the project
DMP	2025-07-01	Data management plan written
Protocols	2025-08-01	Protocols written and published
Data Collection	2026-12-31	Complete data collection phase
Data Cleaning	2026-12-31	Finalize data pre-processing
Reporting	2027-04-31	Prepare final report
End date	2027-04-30	Official end date of the project

2.6 Contact Information

contact details for project-related inquiries: `serge.morand[at]cnrs.fr`

3 References

- Chaisiri, Kittipong, Anamika Kittiyakan, Rawadee Kumlert, Claire Lajaunie, Purin Makaew, Serge Morand, Yossapong Paladsing, Malee Tanita, and Chuanphot Thinphovong. 2023. “A Social-Ecological and One Health Observatory: Ten Years of Collaborative Studies in Saen Thong (Nan, Thailand).” *One Health Cases*, no. 2023: ohcs20230008.
- Thinphovong, Chuanphot, Anamika Kritiyakan, Ronnakrit Chakngan, Yossapong Paladsing, Phurin Makaew, Morgane Labadie, Christophe Mahuzier, Waraphon Phimpraphai, Serge Morand, and Kittipong Chaisiri. 2023. “From Protected Habitat to Agricultural Land: Dogs and Small Mammals Link Habitats in Northern Thailand.” *Ecologies* 4 (4): 671–85.
- Thinphovong, Chuanphot, Ewan Nordstrom-Schuler, Pipat Soisook, Anamika Kritiyakan, Ronnakrit Chakngan, Sakarin Prapruti, Malee Tanita, et al. 2024. “A Protocol and a Data-Based Prediction to Investigate Virus Spillover at the Wildlife Interface in Human-Dominated and Protected Habitats in Thailand: The Spillover Interface Project.” *Plos One* 19 (1): e0294397.

4 Appendices

4.1 Useful Links

FAIR principles