



World Organisation
for Animal Health



**16th Meeting of the Upper Mekong Working Group on Foot and Mouth
Disease Zoning and Animal Movement Management Back-to-back
Private Sector Consultative Committee meeting**

Animal movement and value chain in Asia: Objective and study designs

**Veerasak Punyapornwithaya Ronello Abila Waraphon Phimpraphai
Terdsak Yano and Wengui Li**

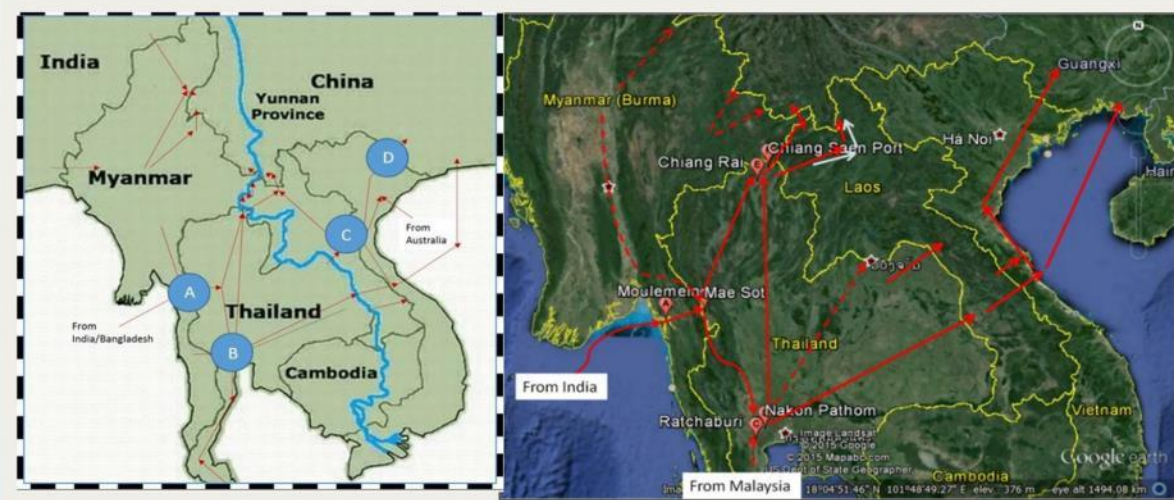
Background

- **Transboundary animal diseases (TADs) are driven by animal movements**
- **Molecular epidemiology shows the same virus caused disease outbreaks in several country in Asia.**



Similar strains of LSD have been distributed across the region.

 **WOAH-2015 STUDY**



There may have been changes in prices, infrastructure, socio-economic drivers, as well as in supply and demand.

Therefore, information on animal movements, including movement pathways, management practices, and relevant regulatory frameworks, should be updated accordingly.

Objectives

- **Objective 1: Review previous studies and relevant literatures, initiatives in the region on the control of animal movement including policy and legislation instruments.**
- **Objective 2: Assess recent changes in animal movement pathways within the region and identify potential FMD/TADs risk pathways.**
- **Objective 3: Identify and evaluate key market and movement value chains for animals in the region by analysing official and unofficial cross-border movements, country livestock movement data, and conducting targeted field studies.**



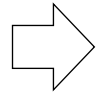
OBJECTIVE 1

Review previous studies and relevant literatures, initiatives in the region on the control of animal movement including policy and legislation instruments.

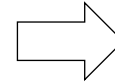
**Desktop review and analysis
of existed data**

Data sources

- Peer-reviewed literature
- WOH and FAO reports
- ASEAN and SEACFMD documents
- Online public data



- **Desktop Review**
- **Analysis of pre-existing data**



**Report : Current
knowledge and gaps**



Supplementary data collection

Formal requests for unpublished data,
official movement statistics, and
current regulatory frameworks

Data Analysis with the current obtained data



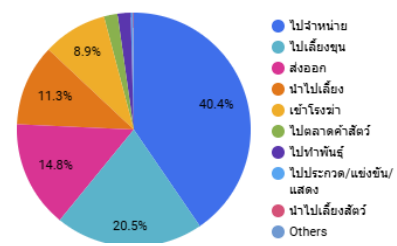
Public online data from the government sector

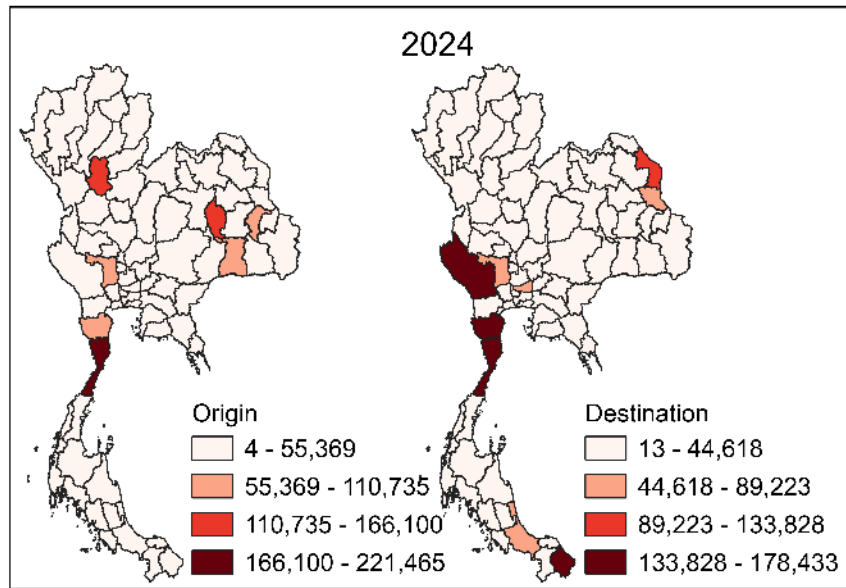
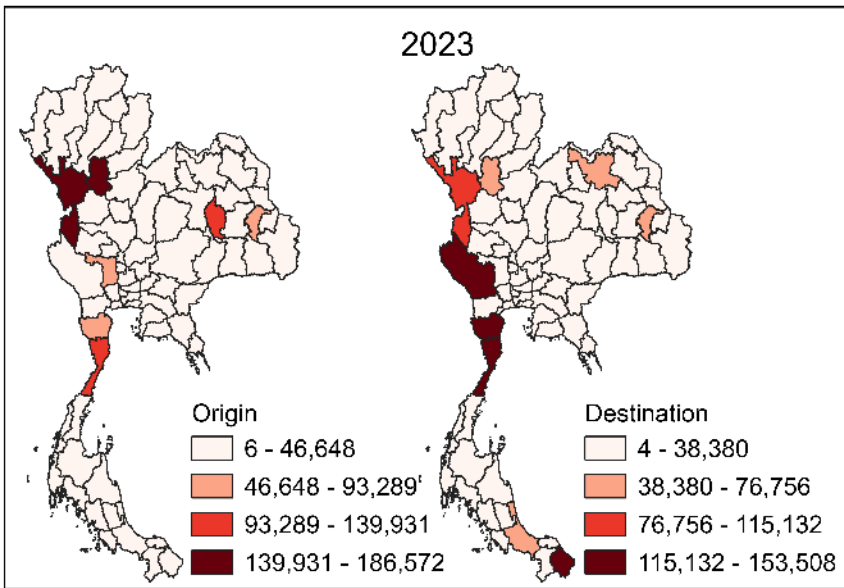
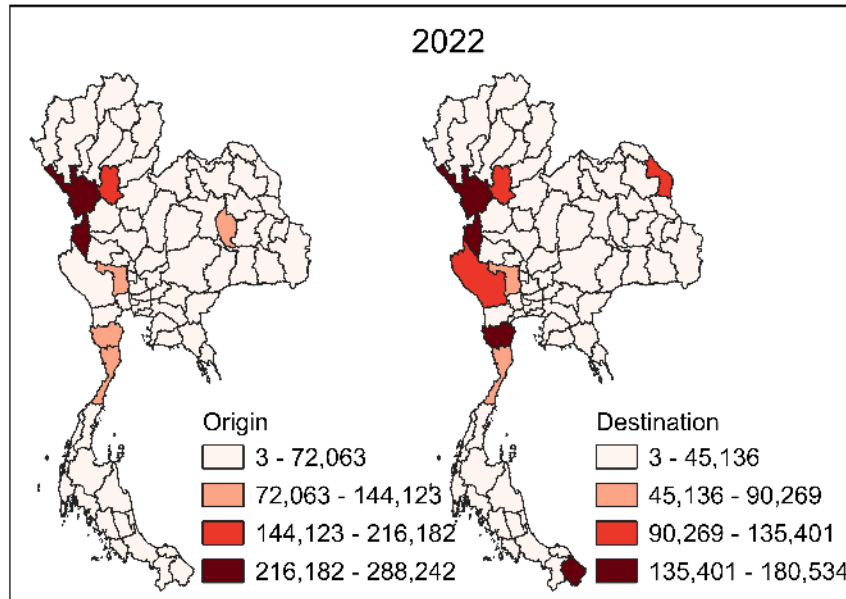
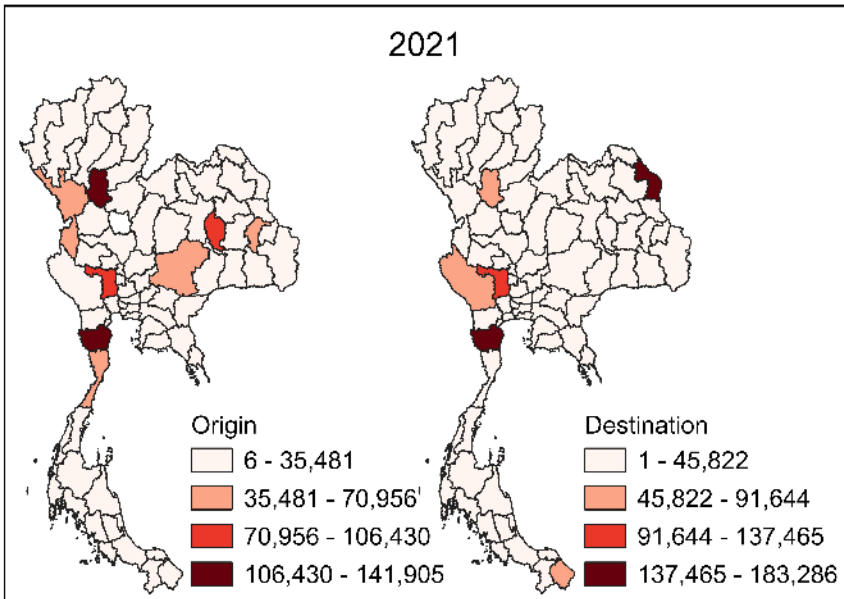
dashboard แสดงเคลื่อนย้ายโคเนื้อ โคนม กระบือ แพะ แกะ ภายในประเทศ ปี 2564-2567

Dashboard interface for animal movement data. It includes filters for 'อำเภอต้นทาง' (Origin District) and 'จังหวัดต้นทาง' (Origin Province), and 'อำเภอปลายทาง' (Destination District) and 'จังหวัดปลายทาง' (Destination Province). Two maps of Thailand show movement density, with a legend indicating a total of 904,964 movements. A summary box shows a total of 7,487,098 movements for the period of January 2024 to November 2026. Below the maps are dropdown menus for 'ปี' (Year) and 'ชนิดสัตว์' (Animal Type). A pie chart titled 'วัตถุประสงค์การเคลื่อนย้าย' (Purpose of Movement) is also present.

Origin	Destination	# animals
Tak	Mukdahan	92,000

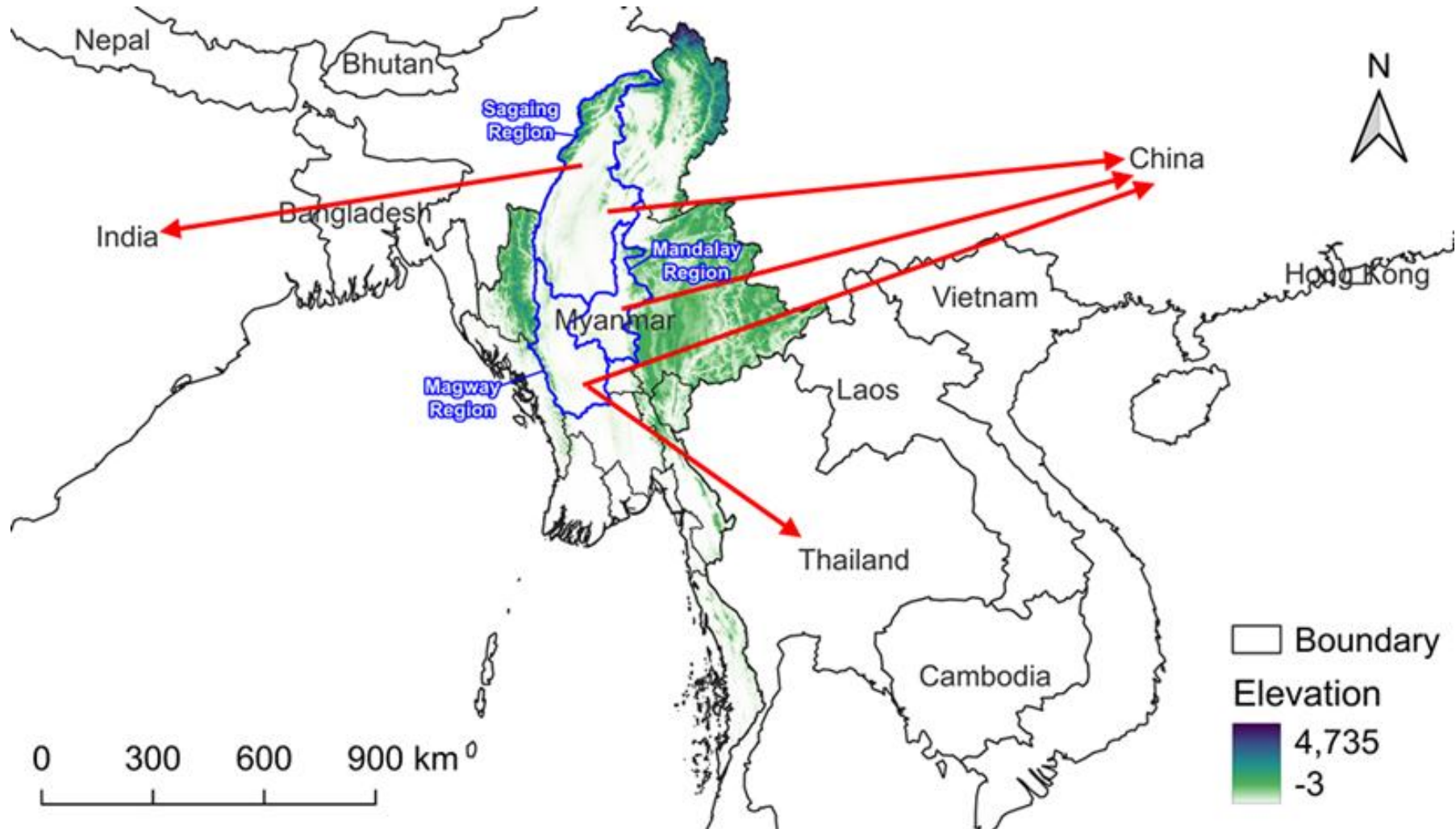
อำเภอต้นทาง	จังหวัดต้นทาง	รวม	อำเภอปลายทาง	จังหวัดปลายทาง	รวม
1. แม่สอด	ตาก	904,964	1. เมืองมุกดาหาร	มุกดาหาร	930,925
2. ปราณบุรี	ประจวบคีรีขันธ์	555,919	2. สุโขทัย	สุโขทัย	598,505
3. ศรีสำโรง	สุโขทัย	400,465	3. เมืองนครพนม	นครพนม	550,404
4. เมืองยโสธร	ยโสธร	302,425	4. เลาชวีญ	กาญจนบุรี	348,576
5. สามร้อยยอด	ประจวบคีรีขันธ์	282,585	5. แม่สอด	ตาก	343,873
6. เมืองมหาสารคาม	มหาสารคาม	219,268	6. สุโขทัย	สุโขทัย	323,282
7. นาเชือก	มหาสารคาม	217,977	7. ดากไพบ	นราธิวาส	231,859

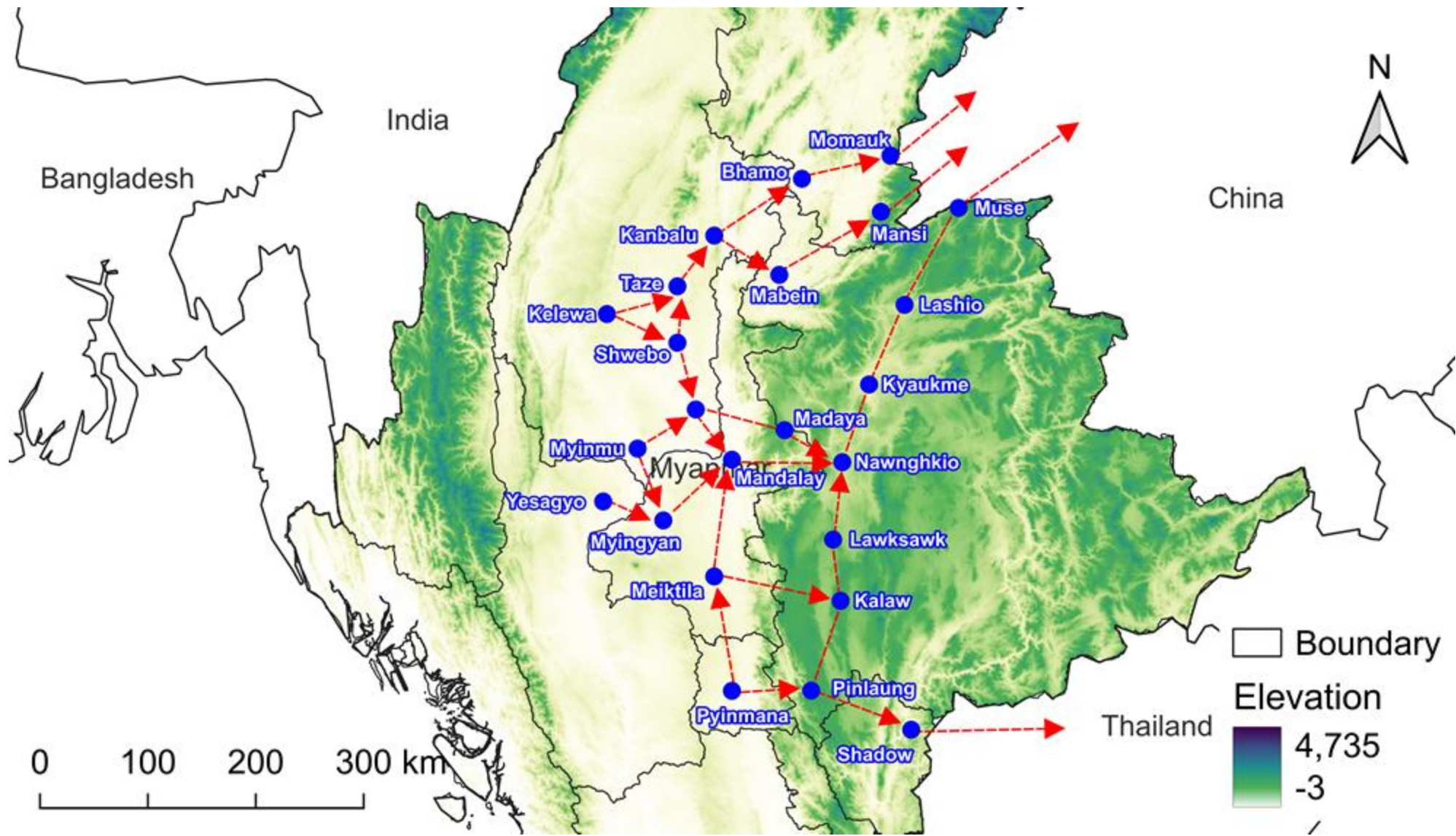




- top provinces of origin and destination for cattle movements

Map creating from pre-existing data from WOAAH meeting





Desktop review

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Animal movement regulation and legislation	11
China	11
Indonesia	12
Malaysia	12
Thailand	13
Lao PDR	13
Myanmar	14
Viet Nam	14

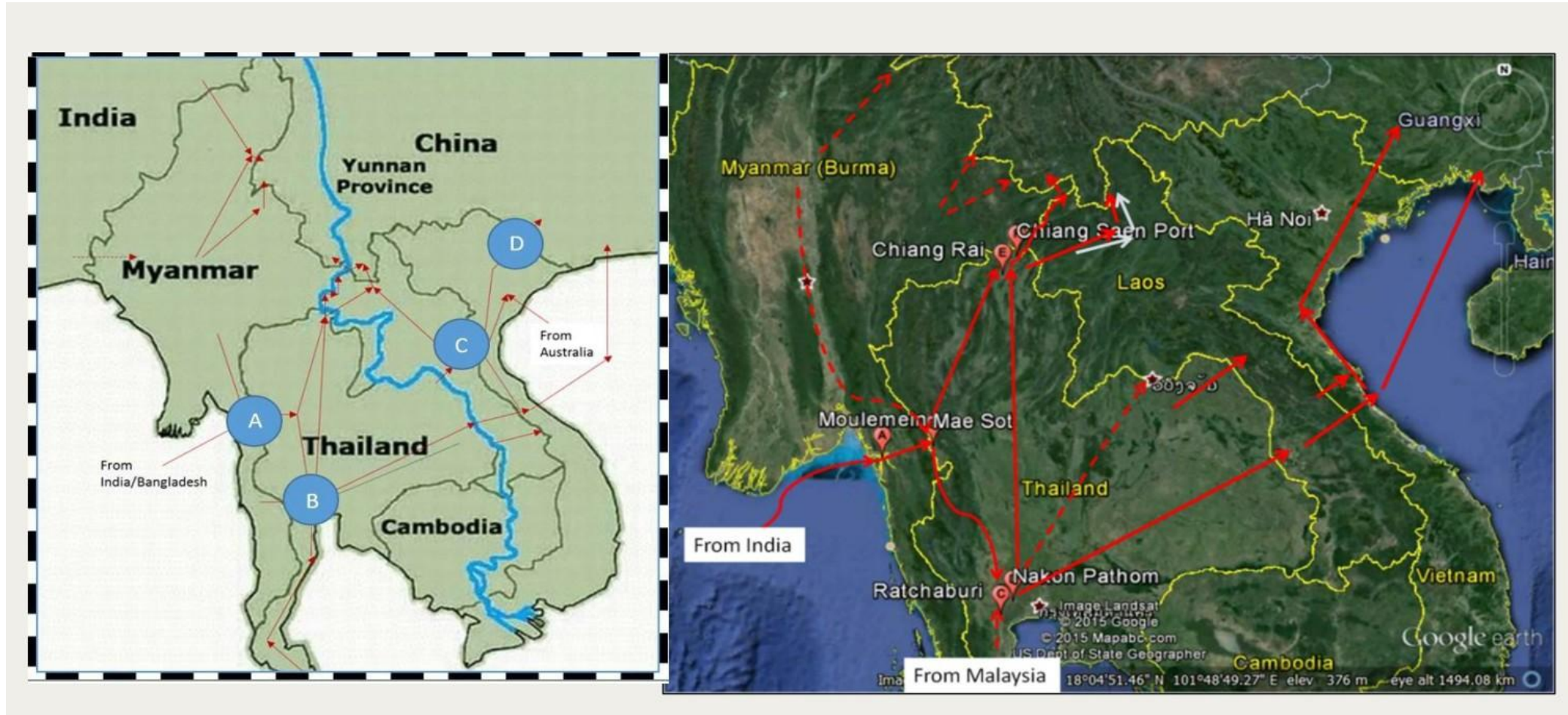


OBJECTIVE 2

Assess recent changes in animal movement pathways within the region and identify potential FMD/TADs risk pathways.



WOAH-2015 study

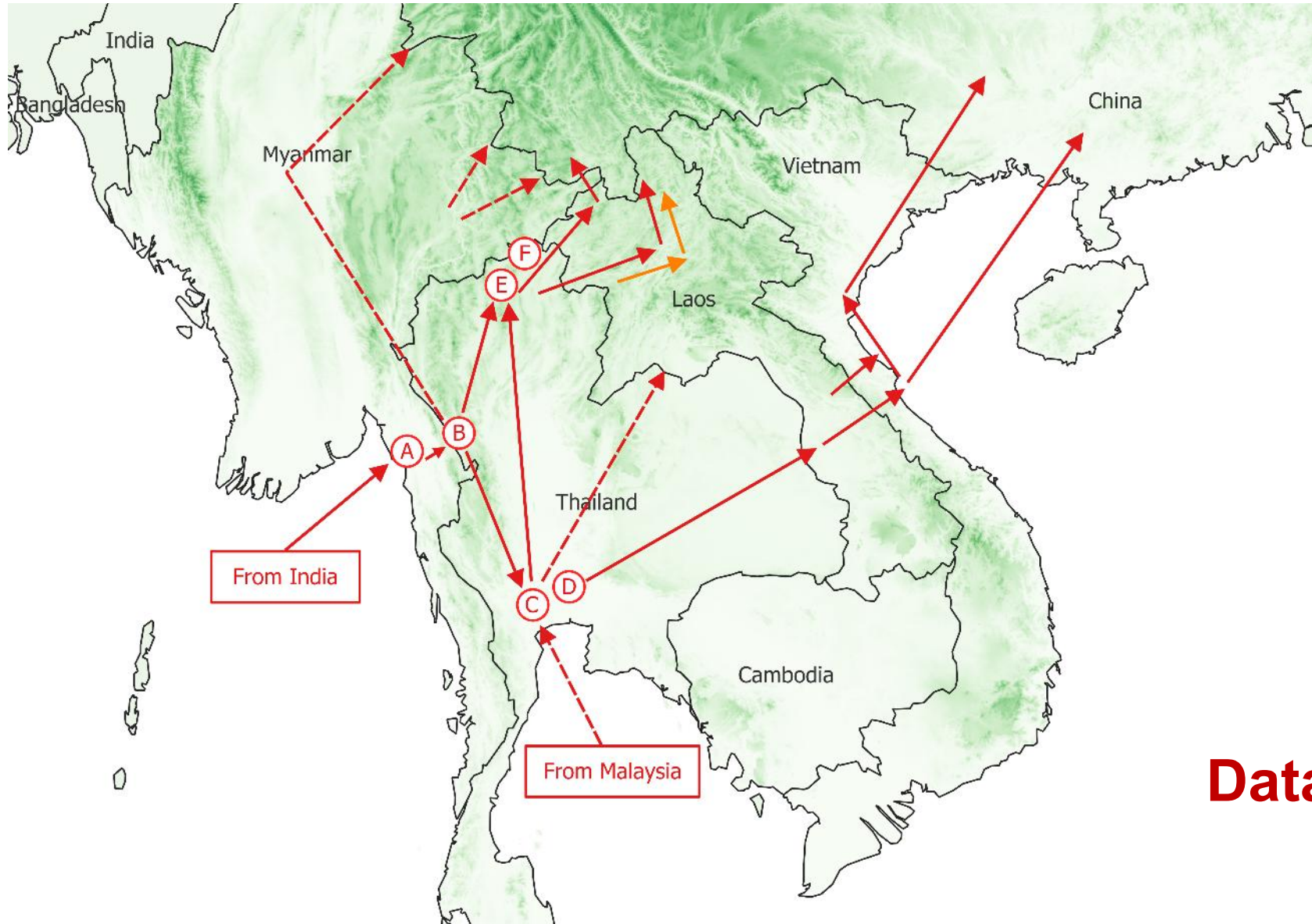


-
- 1. Overall pathway (country level)**
 - 2. Specific locations
(border, quarantine point, market ..etc.)**

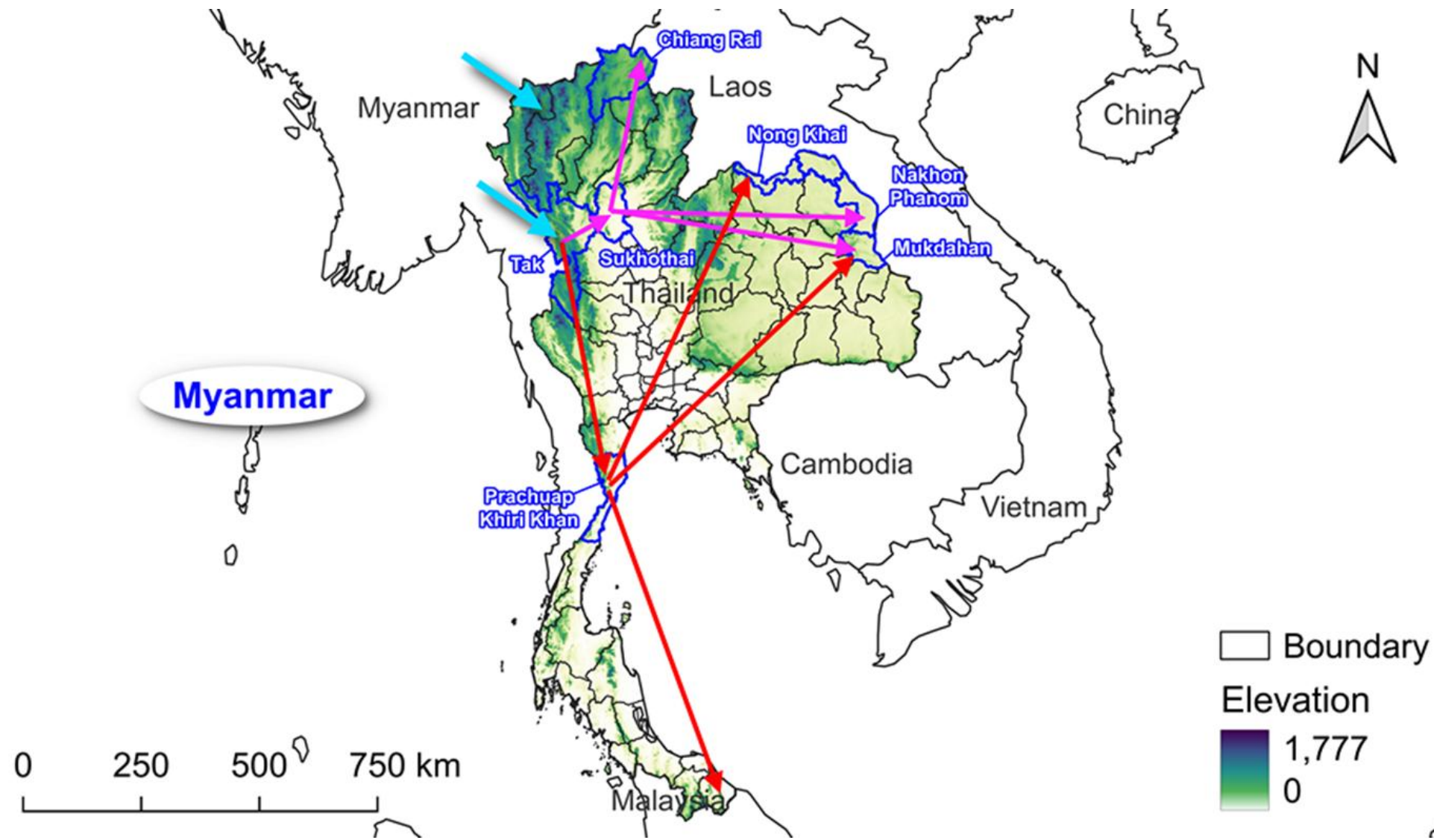
1. Overall pathway

- **Regional**
- **In-country**

- Workshop
- Data shared by country
- Interview with stakeholders



Data before 2023



2. Specific locations (On-site survey)

- **Border area : cross border pathway, management and control at the border**
- **Live animal markets**
- **Fattening and holding areas**

DATA COLLECTION-1



Places
(quarantine station,
cattle markets,
fattening farms,
meat market)



XY-coordinates



Others:
frequency of
movement



https://rr-asia.woah.org/app/uploads/2024/04/3.2-Laos_country-report_Laphinh.pdf

DATA COLLECTION-2

Field study: Control measures and practices at the border and quarantine stations



https://rr-asia.woah.org/app/uploads/2024/04/4.4-Case-study_Thailand_Animal-Movement.pdf

DATA COLLECTION-3

Regulation and registration for animal movements

Port of exit : Nakhonpanom animal quarantine station

Document checking in compliance with the health requirement



https://rr-asia.woah.org/app/uploads/2024/04/4.4-Case-study_Thailand_Animal-Movement.pdf

Port of exit : Nakhonpanom animal quarantine station

Issued health certificate as agreed with the country of destination (Vietnam)



No.	Age/sex	Breed	Tag No.	Species	Number of Animals	Sex	Remarks

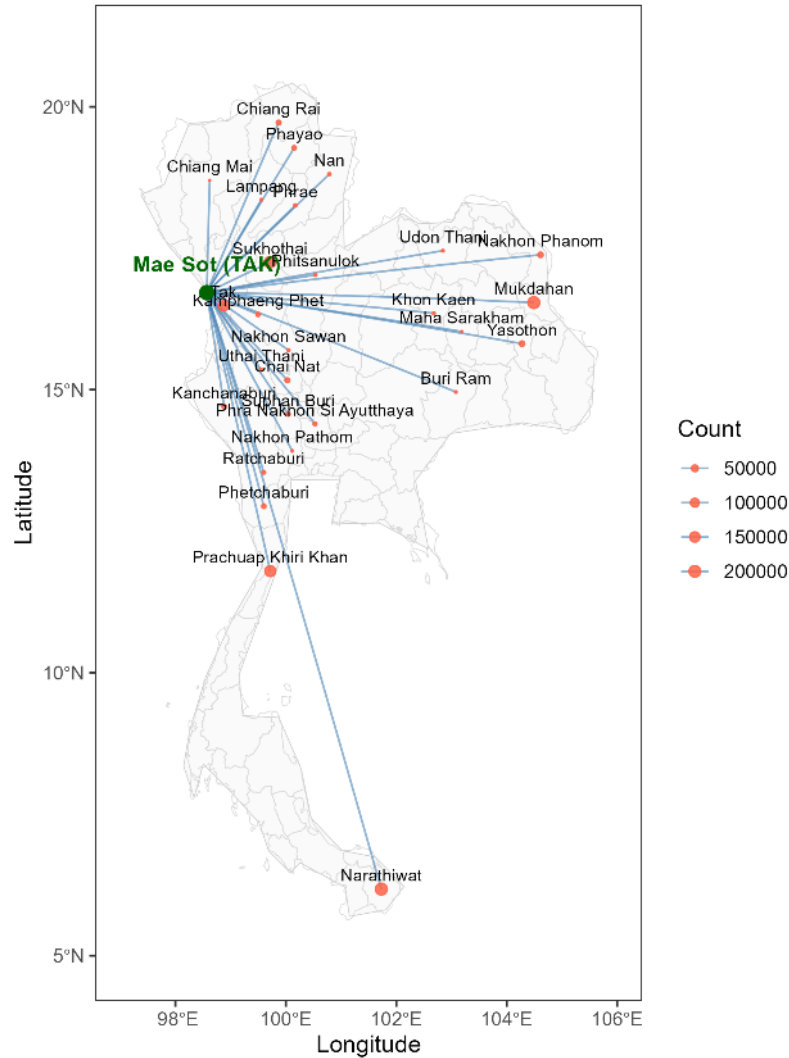
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Data analysis

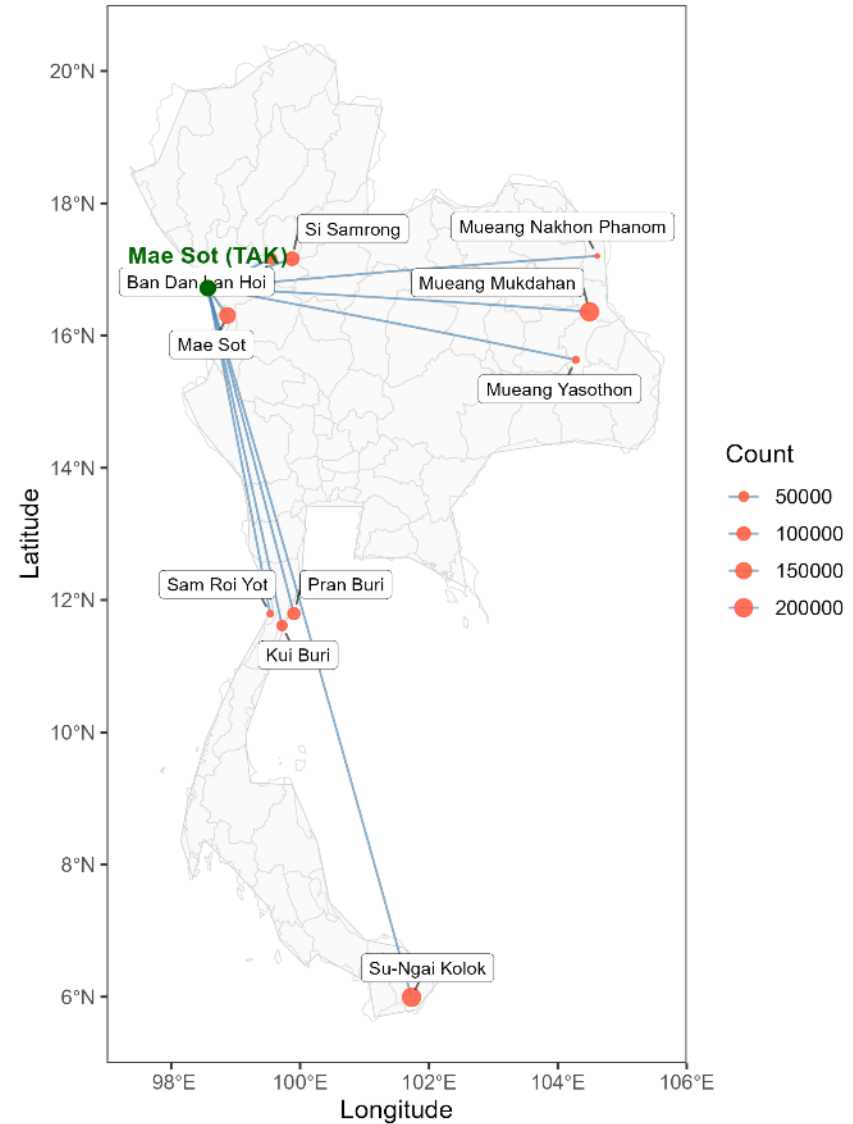
- 1. GIS mapping: Animal movement pathway**
- 2. Animal movement network analysis**
- 3. FMD risk mapping**

Animal movement pathways

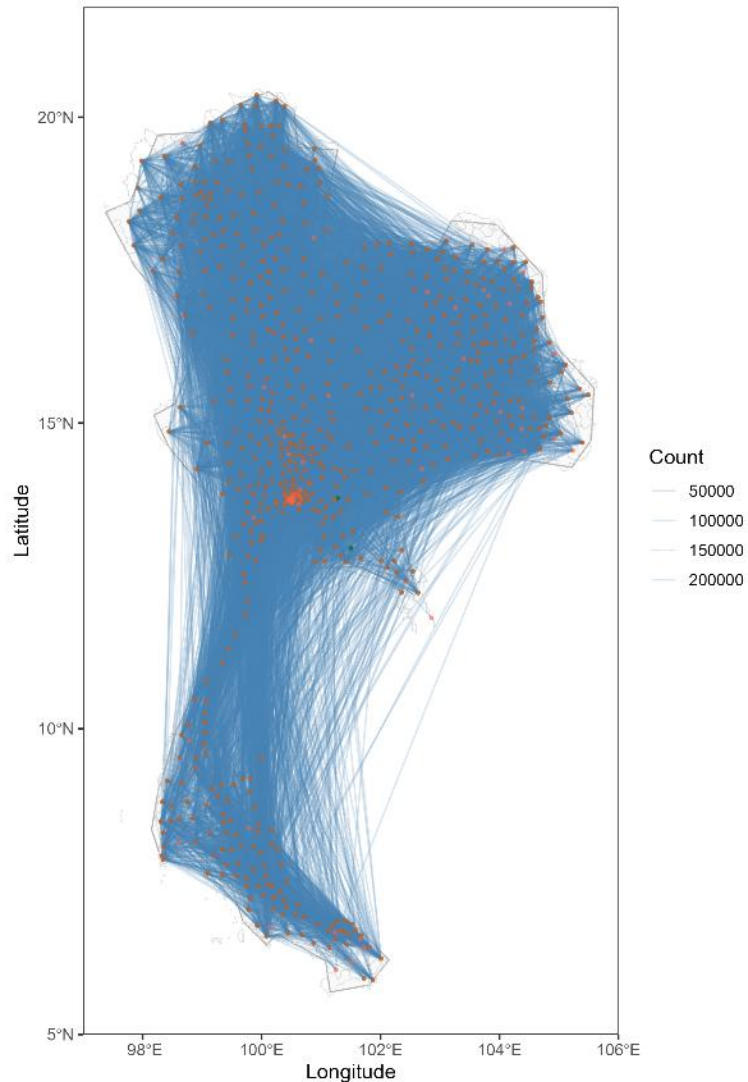
Animal Movement from Mae Sot
Destination Provinces (Top 30)



Animal Movement from Mae Sot
Destination Districts (Top 10)



Animal movement network analysis



--- Diagnostics ---

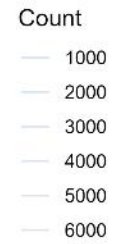
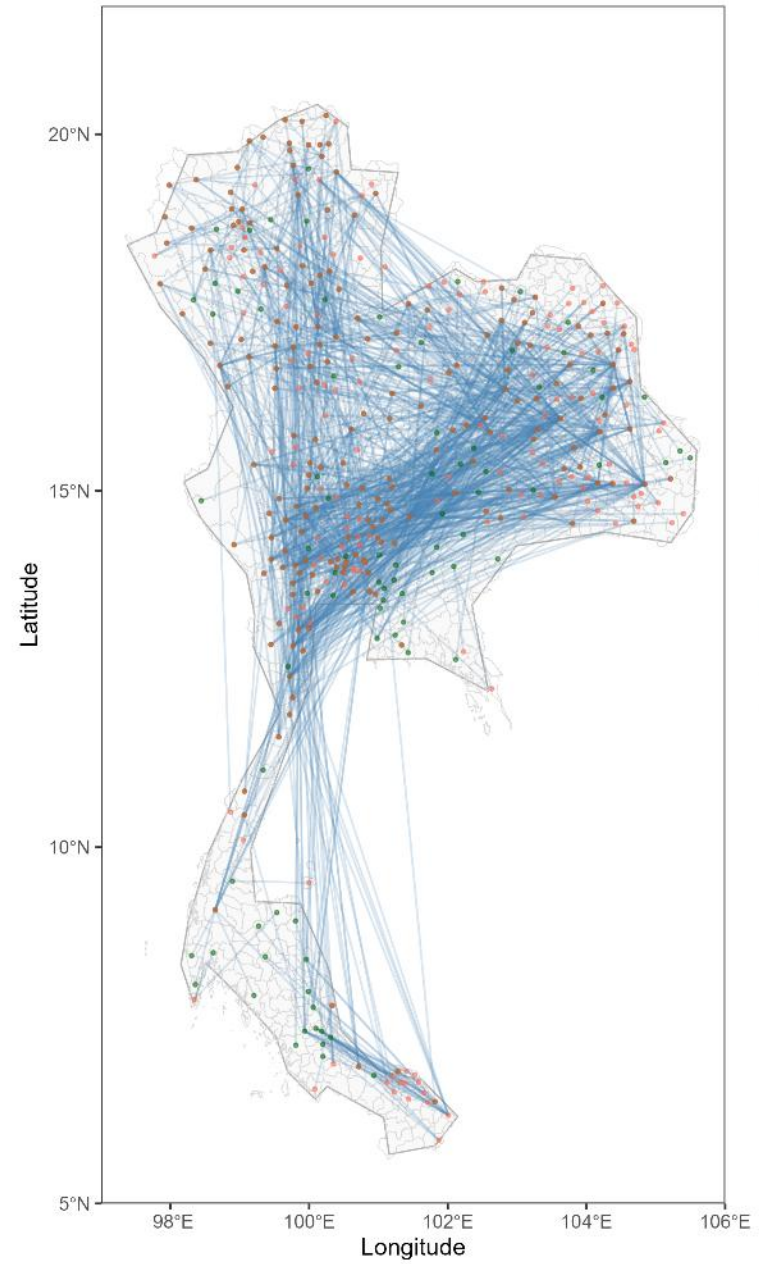
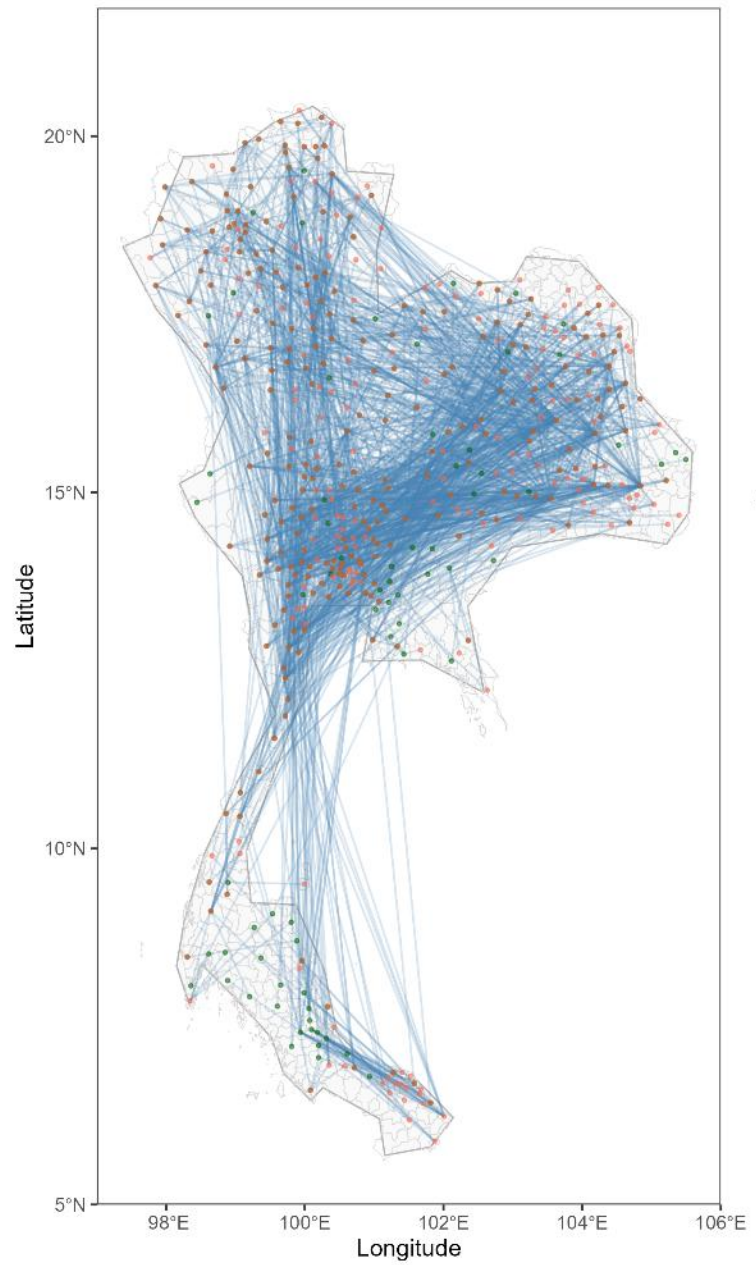
Total OD pairs after aggregation: 42396

Matched OD pairs used for flow map: 24479

Origin points: 619

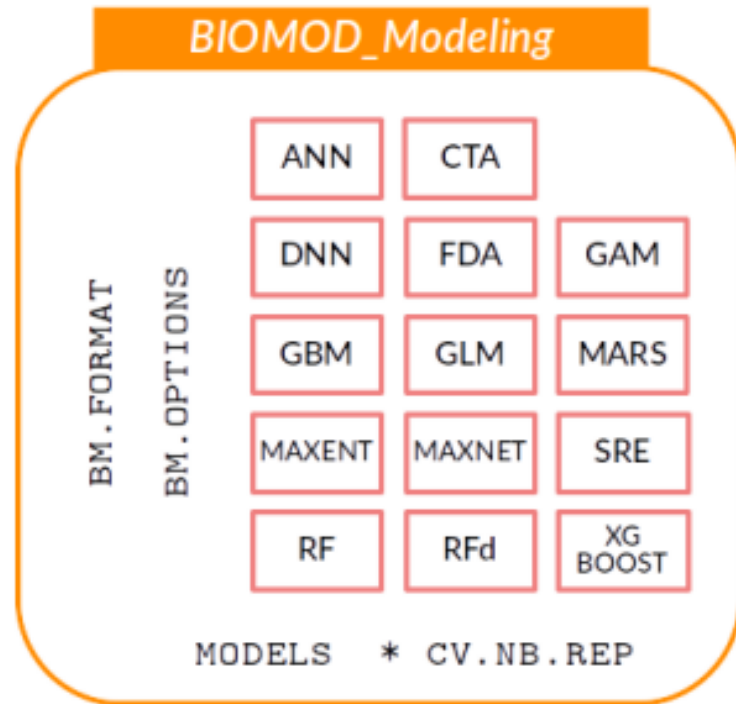
Destination points: 661

Flow lines: 24479



Data analysis

- Risk mapping using machine learning models (e.g., MDCA, MaxEnt, Deep Neural Network, Random Forest)



Article

Spatial Risk Distribution of Lumpy Skin Disease in Thailand Based on Maximum-Entropy Modeling

Kusnul Yuli Maulana ¹, Supitchaya Siriyakhun ², Kannika Na-Lampang ^{1,2}, Kannikar Intawong ³, Kenny Oriel A. Olana ⁴, Wengui Li ⁵, Maytaewee Tamprateep ⁶ and Veerasak Punyapornwithaya ^{1,2,7,*}

