



Spatial Risk Analysis For ASF Spread in NTT Province in Indonesia

Indonesian Team

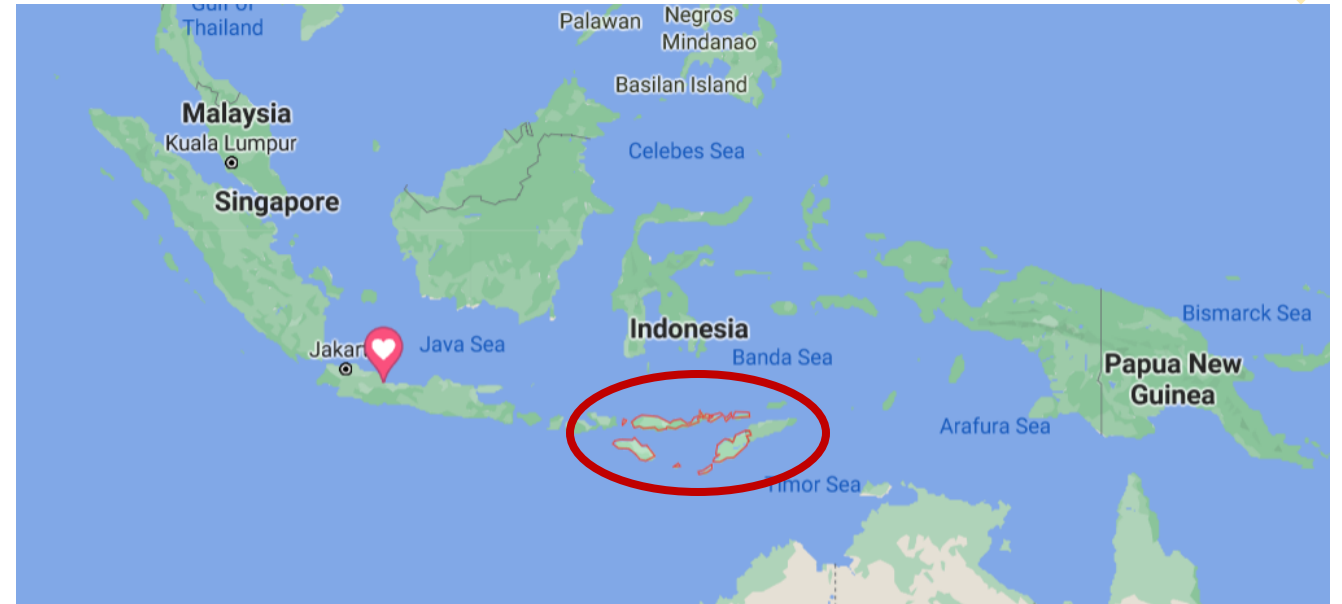
Yuni Yupiana

M.M Andi Hidayat

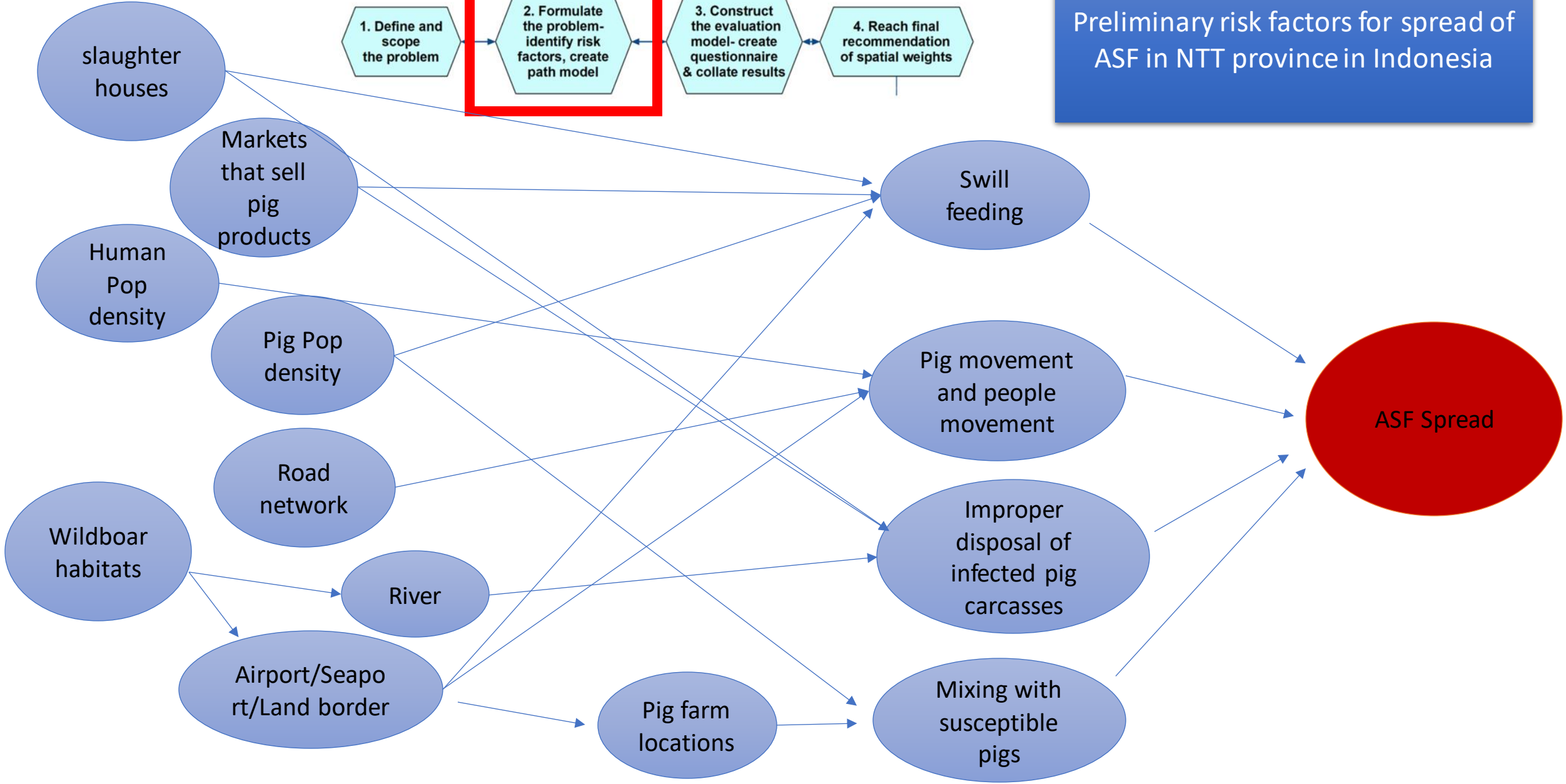
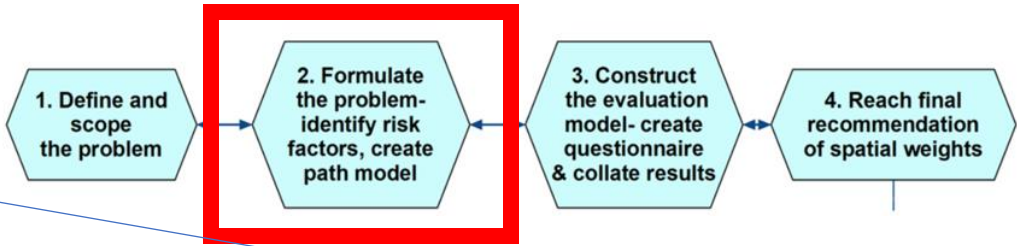
Siti Yulianti

Background

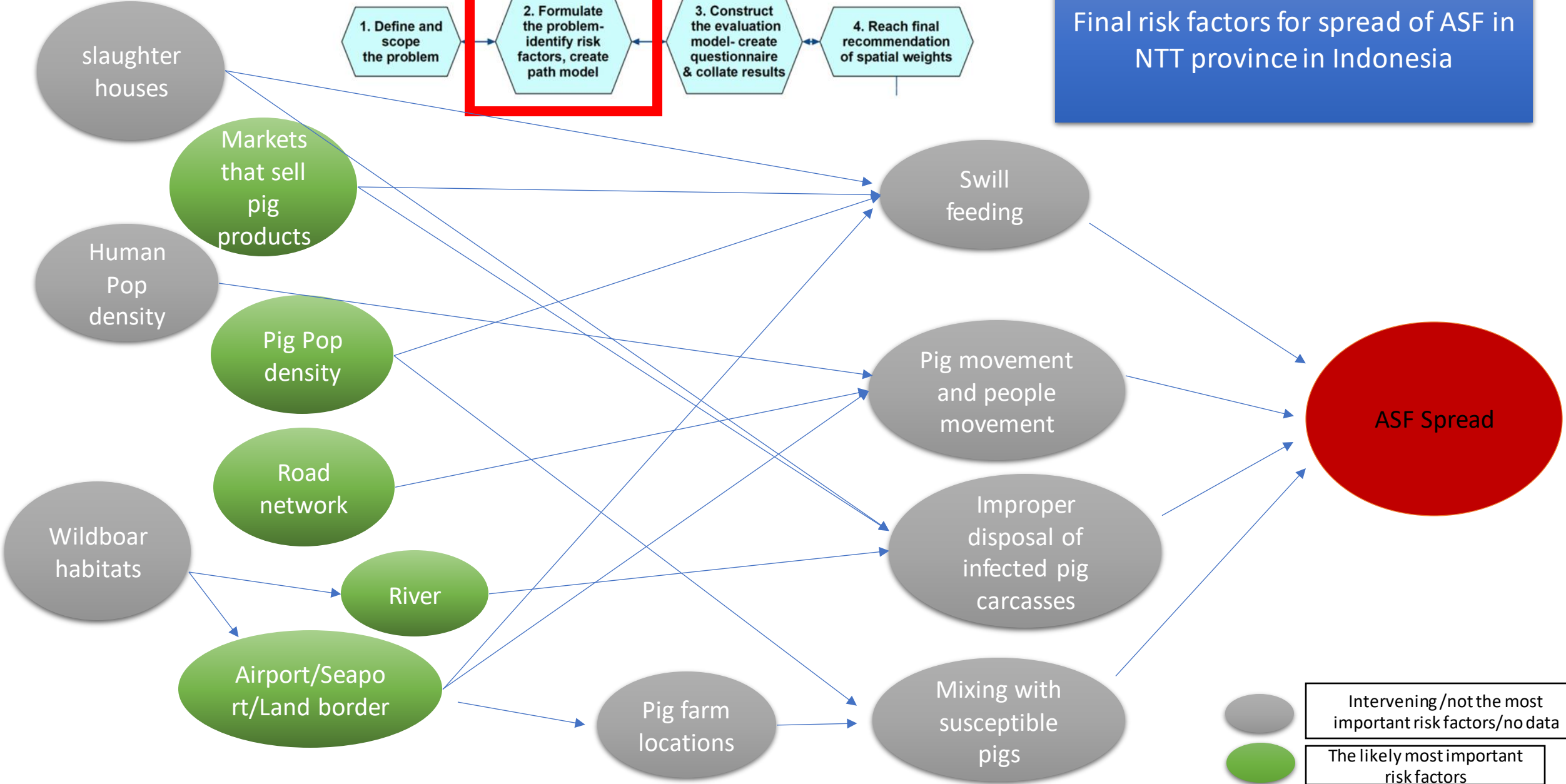
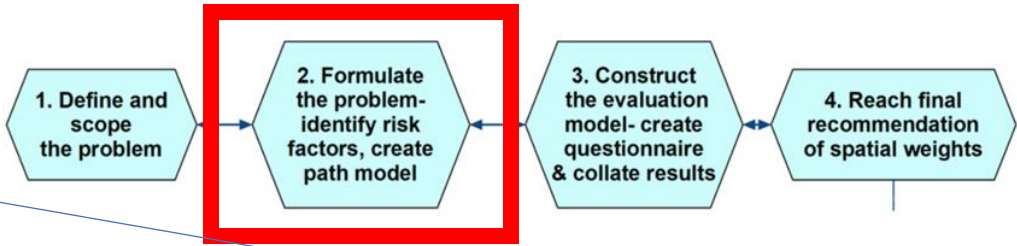
- ASF has been detected for the first time in North Sumatra in December 2019
- ASF has spread to 17 provinces in Indonesia
- NTT is one of the most affected provinces with more complete data compared to other provinces



Preliminary risk factors for spread of ASF in NTT province in Indonesia



Final risk factors for spread of ASF in NTT province in Indonesia



● Intervening/not the most important risk factors/no data
● The likely most important risk factors

Risk factor data sources

Risk factors for ASF occurrences	Spatial feature	Data source
Pig movement (legal and illegal)	Major and minor roads	OSM National roading network map
Susceptible population density	Pig population density	Livestock data from the local government
Swill feeding	Market, pig population density	Local government
Animal mixing and spreading locations	Farm close to the land borders, airports and seaports	Local government
Contaminated environment caused by improper disposal of carcasses to the river	River	OSM National roading network map

Expert group meeting

- Directorate of animal health (DAH) = 6 persons
- Disease investigation center from 4 regionals (DIC) = 5 persons
- Local Livestock office of NTT province (LLO) = 2 persons

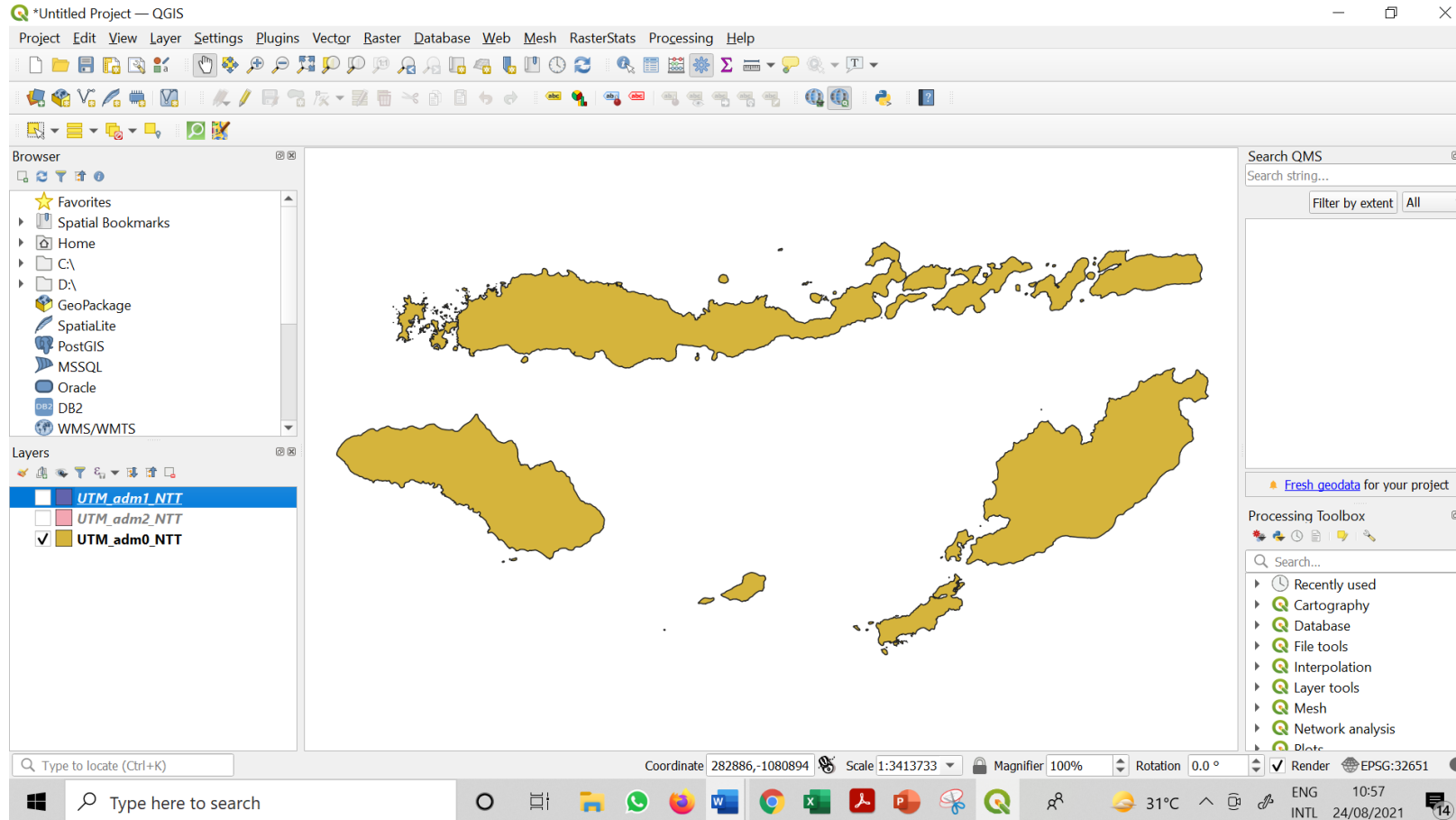


Final weights of the risk factors

1. Pig density: 0.44
2. Markets: 0.18
3. Port: 0.15
4. River: 0.14
5. Roads: 0.09

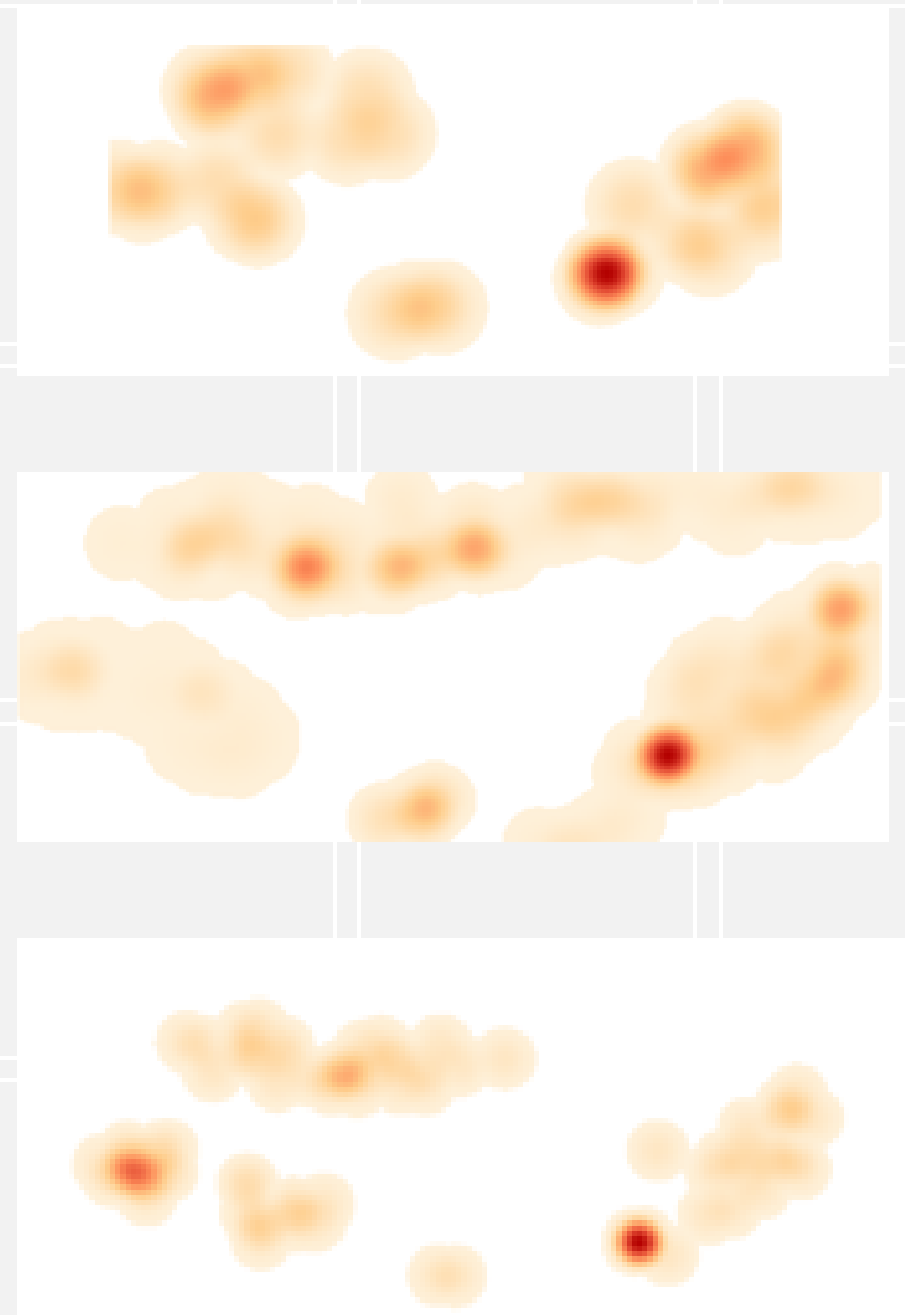
	Transformed score for each risk factor comparison						Geometric row mean	Weight for spatial risk layer
	Risk factor 2							
	Major and minor roads	Pig population density	River	Pig Meat markets	Airport, Seaport, land border			
Major and minor roads	1.00	0.41	0.74	0.74	1.00	0.52	0.09	
Pig population density	2.47	1.00	1.83	1.83	1.35	2.50	0.44	
River	1.35	0.55	1.00	0.74	1.00	0.77	0.14	
Pig Meat markets	1.35	0.55	1.35	1.00	1.00	1.00	0.18	
Airport, Seaport, land border with other countries	1.00	0.74	1.00	1.00	1.00	0.88	0.15	

Acquire spatial risk & study area files and Project country boundary file for study area to the local CRS: NTT Province



Convert Vector to Raster: pig density, market, port

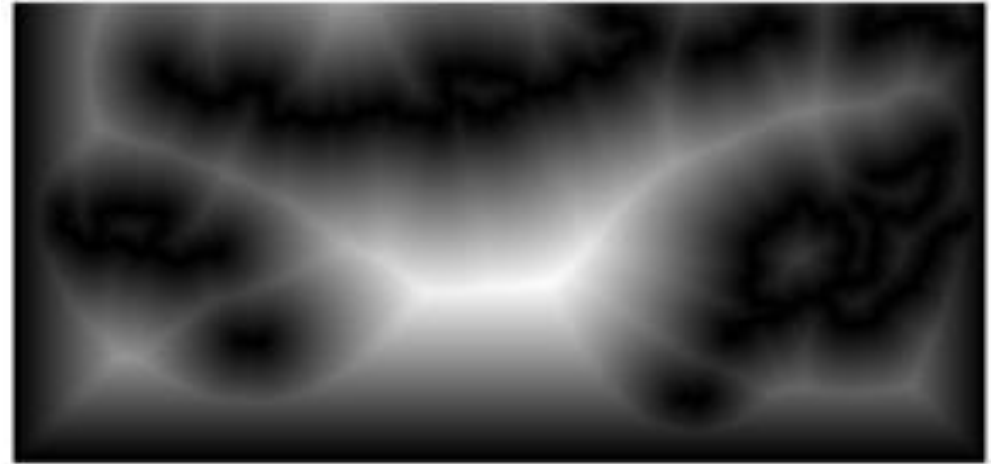
1. Pig density: heatmap radius 20km
2. Market: heatmap radius 30km
3. Port: heatmap radius 30km



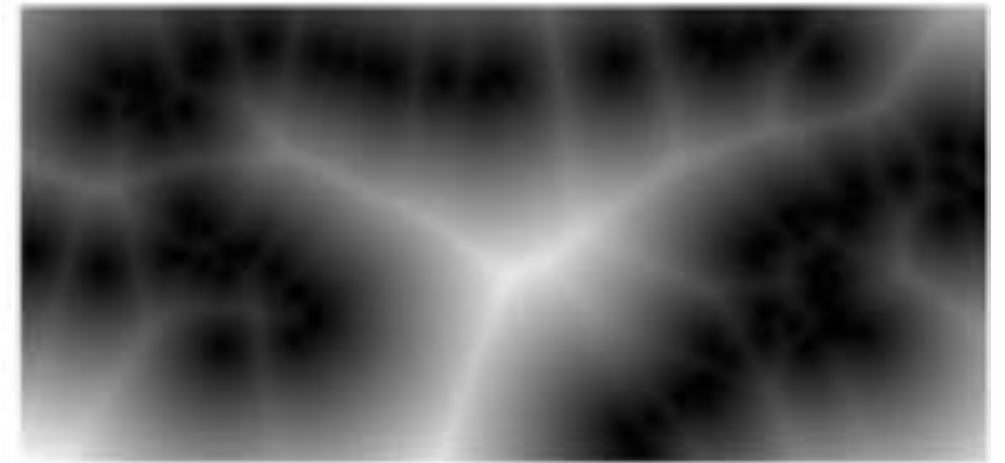


Convert Vector to Raster: Road and River

Roads

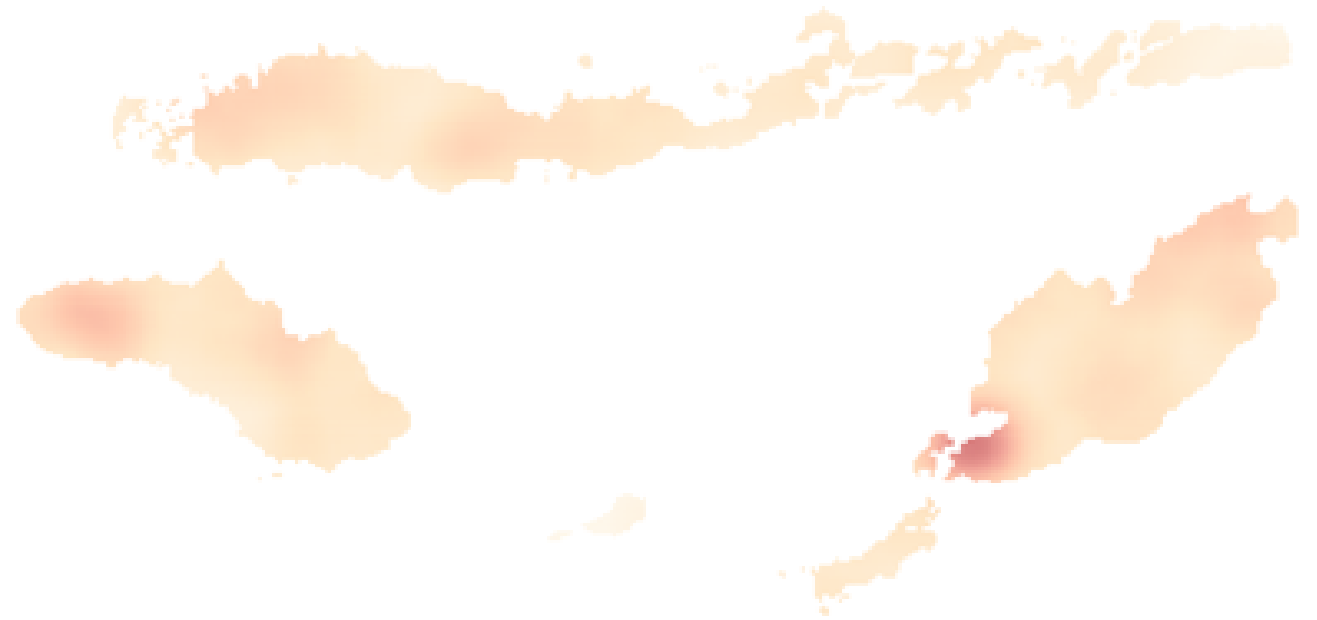


Rivers





SRA for ASF Spread in NTT Province in Indonesia



Validate SRA map against recorded outbreaks/cases

- the number of rows for which there is no Longitude and Latitude value: 4
- the number of rows with non-missing coordinates : $(677-4)=673$
- Proportion of proportion of outbreaks/cases in the high risk (risk probability ≥ 0.3) zone = $168/677 = 25\%$
- Proportion of proportion of outbreaks/cases in the high risk (risk probability ≥ 0.2) zone = $548/677 = 81\%$
- Proportion of proportion of outbreaks/cases in the high risk (risk probability ≥ 0.2) zone = $358/677 = 53\%$



Validation using outbreak data



Summary

Are the most important risk factors for which information is available for accounted for in the SRA map? **Yes, it is the pig density, would be interesting to check if pop density in village level will improve the SRA**

Of the risk factors evaluated, could the parameters be changed to improve the accuracy of the SRA map e.g. diameter of smoothing of heat map of livestock markets density? **We need to check more carefully the diameter, for example for pig density**

Is there a possibility of information/reporting bias affecting our SRA map? **It is likely that some of the outbreak data are not reported, the quantity of the dots in the map**

What additional data could be gathered to improve our SRA? **We were wondering if slaughter houses data and human population data will improve our SRA**