

# HABITAT SUITABILITY MODELING OF domestic mosquitoes (*Aedes aegypti* / *Ae. albopictus* / *Culex quinquefasciatus*) in Cambodia

STAGIAIROTHON DE LA MAISON DE LA TÉLÉDÉTECTION

IDIL-M2: Eco-Epidemiology of Emerging Disease

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& SCIENCE IMPLIQUÉE



# CONTEXT

- Cambodia hosts 290 mosquito species, 17 identified as arbovirus carriers. Dengue fever (DEN) is one of the most prevalent mosquito-borne diseases, and Japanese encephalitis (JE) remains endemic.
- Research on mosquito species distribution, especially in predictive modeling, remains limited. Accurate models and maps of the distribution of mosquitoes are essential for entomologists and health authorities to improve disease surveillance and vector control measures.

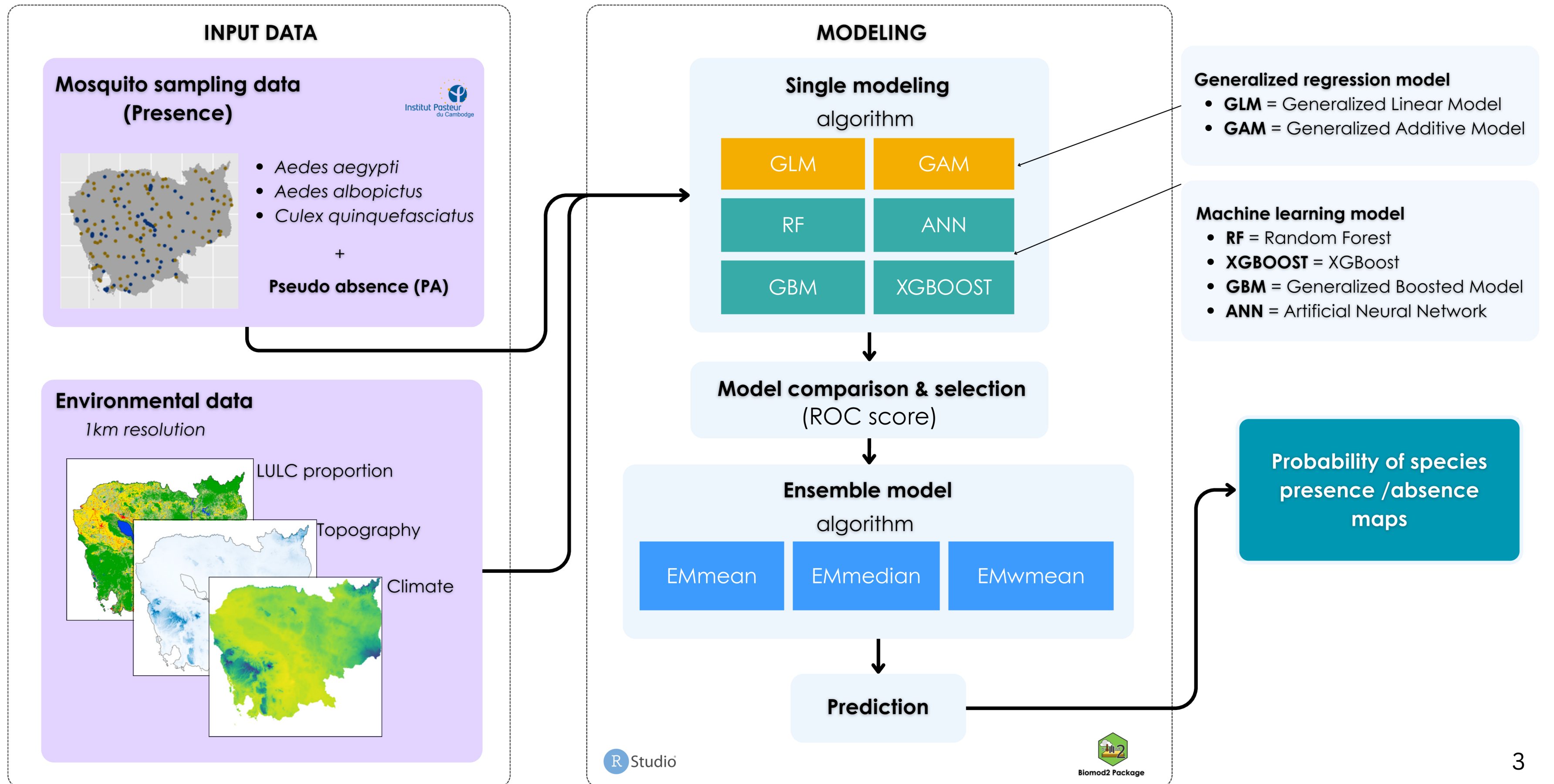


This study aims to develop a spatial model of suitable habitats for the principal domestic mosquito species, ***Ae. aegypti***, ***Ae. albopictus***, and ***Cx. quinquefasciatus***, which transmit viruses in Cambodia.



Entomological data were collected by the **Medical and Veterinary Entomology Unit** of Institut Pasteur du Cambodge (IPC) with climate, topography, and land use/land cover data extracted from satellite image.

# METHODOLOGY: Presence-Absence modeling (National scale)



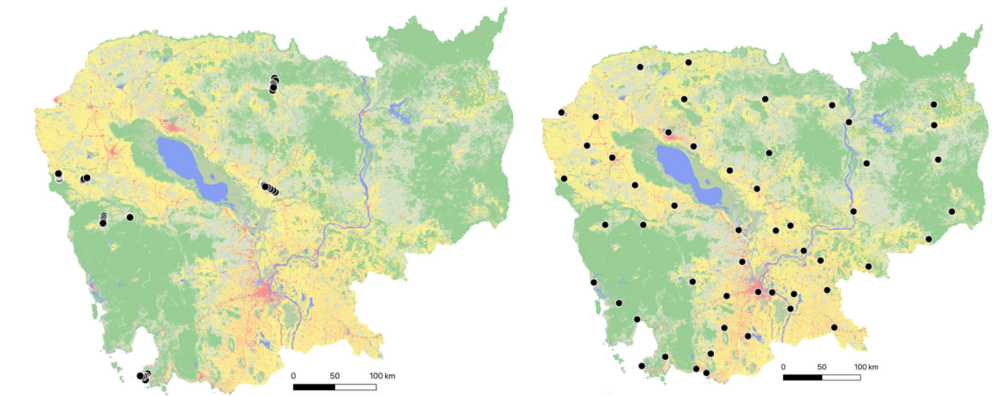
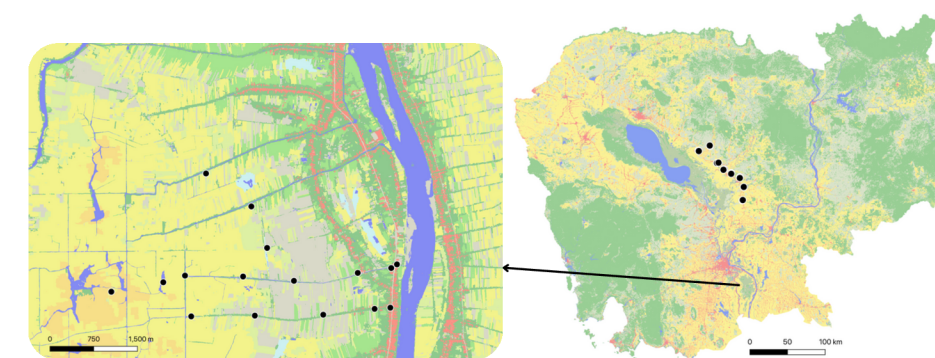
# DATA: Entomological & Environmental data

## Entomological Data

Project name	Wat-Health (2021 - 2022)	NIH PICREID (2021- 2024)	FSPI (August/2019 - March/2021)	Kasai (2024)
Scale	Local (1 district)	Provincial (1 provinces)	Provincial (5 provinces)	National
Number of sites (revisit)	16 (monthly)	52 (monthly)	80 (every 3 months)	50 (1 time)
Location of traps	wetlands/ rice field/ villages	residential area (inside & outside)	forest - city	residential area
Used traps	CDC light traps	BG-sentinel traps	CDC light + BG-sentinel traps	ovitrap

## Environmental Data

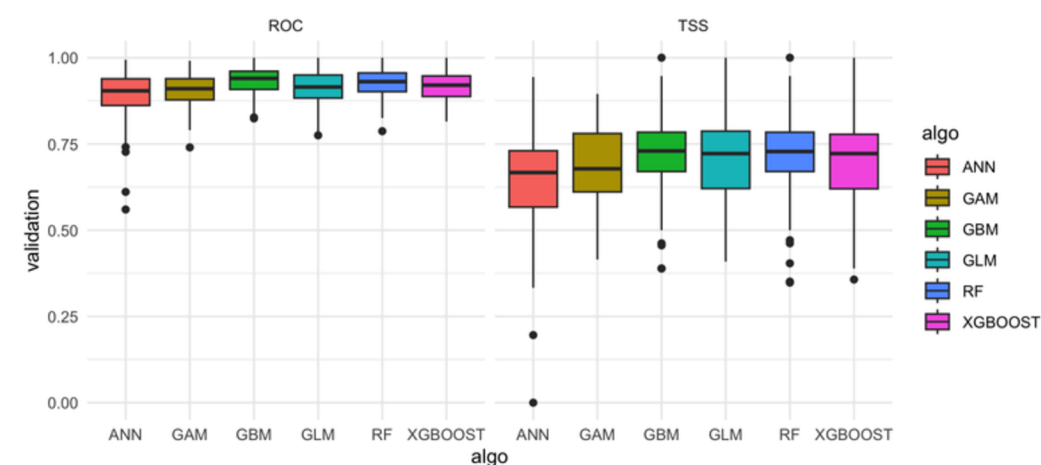
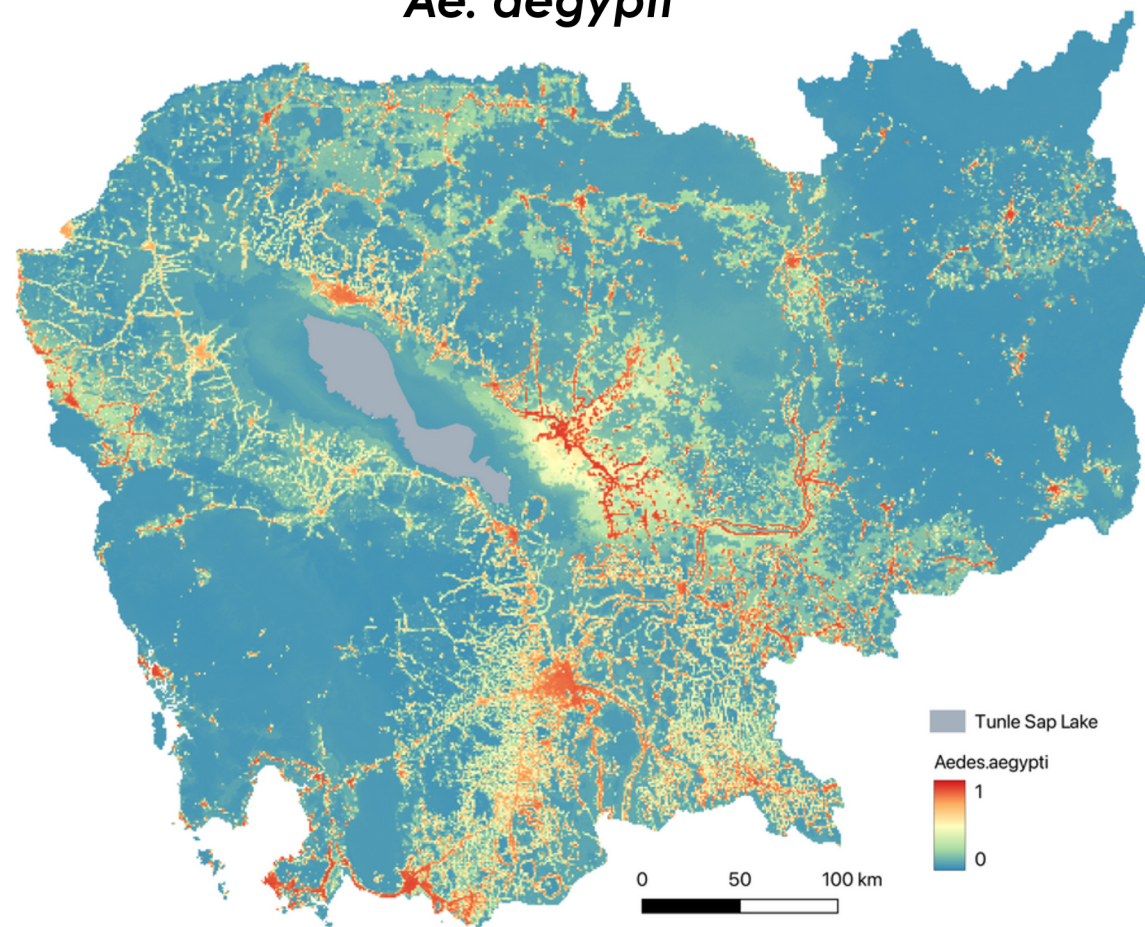
Data	Variables	Source	Spatial resolution	Total variables
<b>Climate</b>	19 variables (precipitation & temperature)	WorldClim (Global climate data platform)	1km	27
<b>Topography</b>	Digital Elevation Model			
<b>LULC</b>	Proportion of each of 7 classes in 1km squares	Calculated from ESRI World-Land Cover Explorer (10m)	1km	4



4

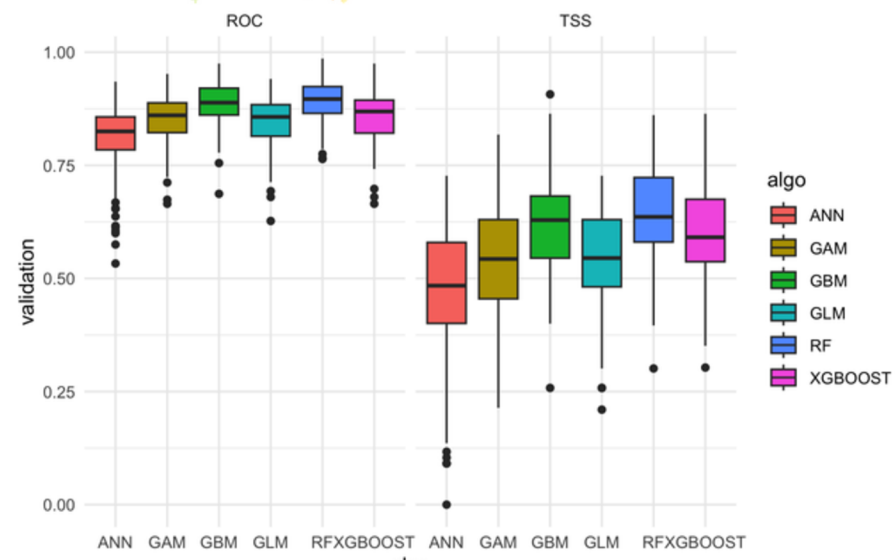
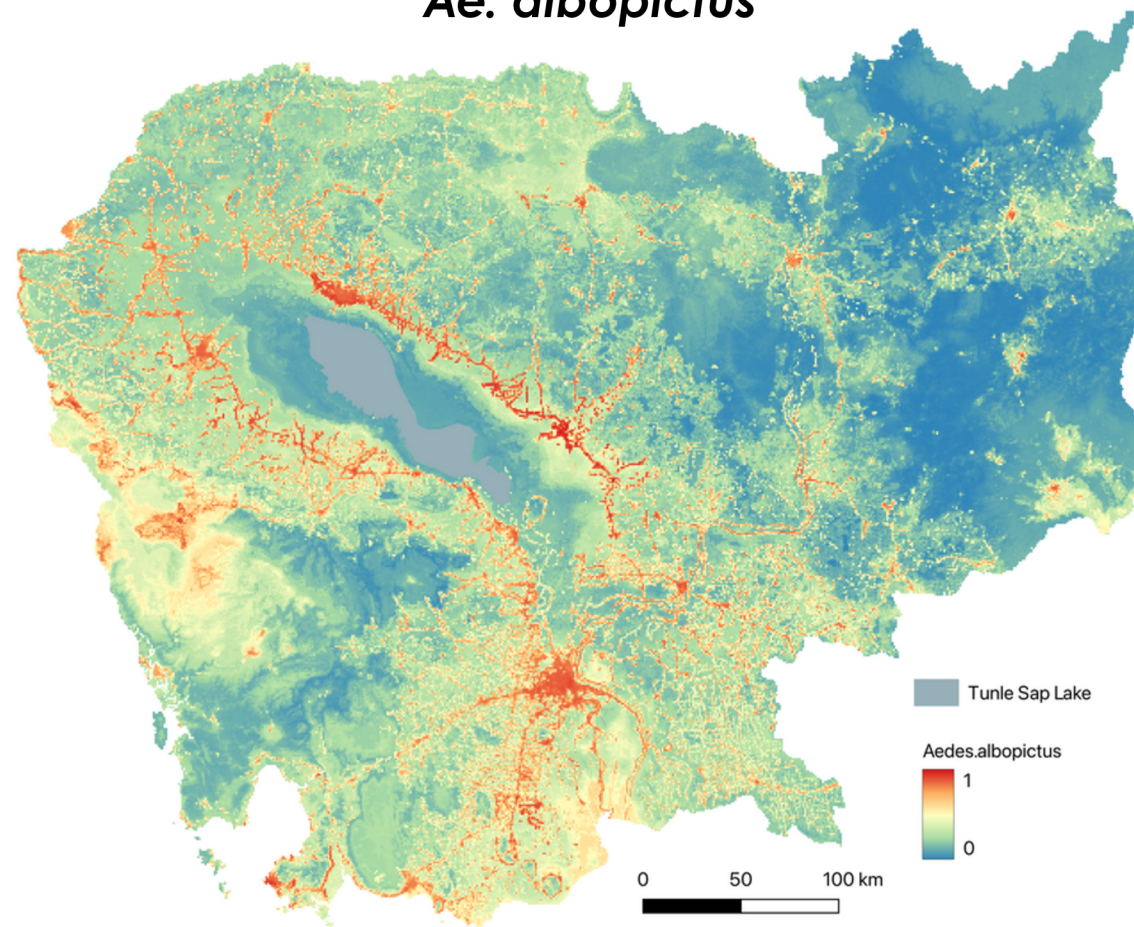
# RESULTS: Distribution possibility of the 3 species

*Ae. aegypti*



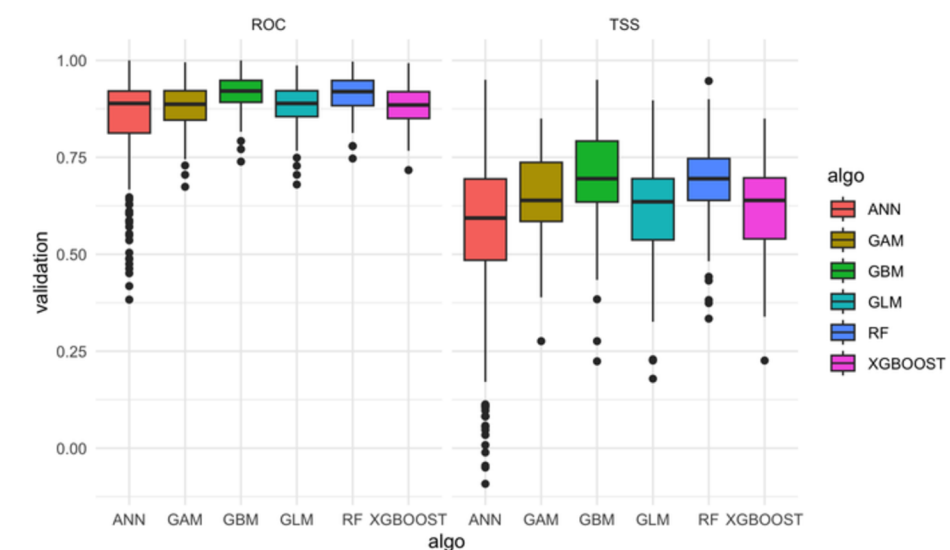
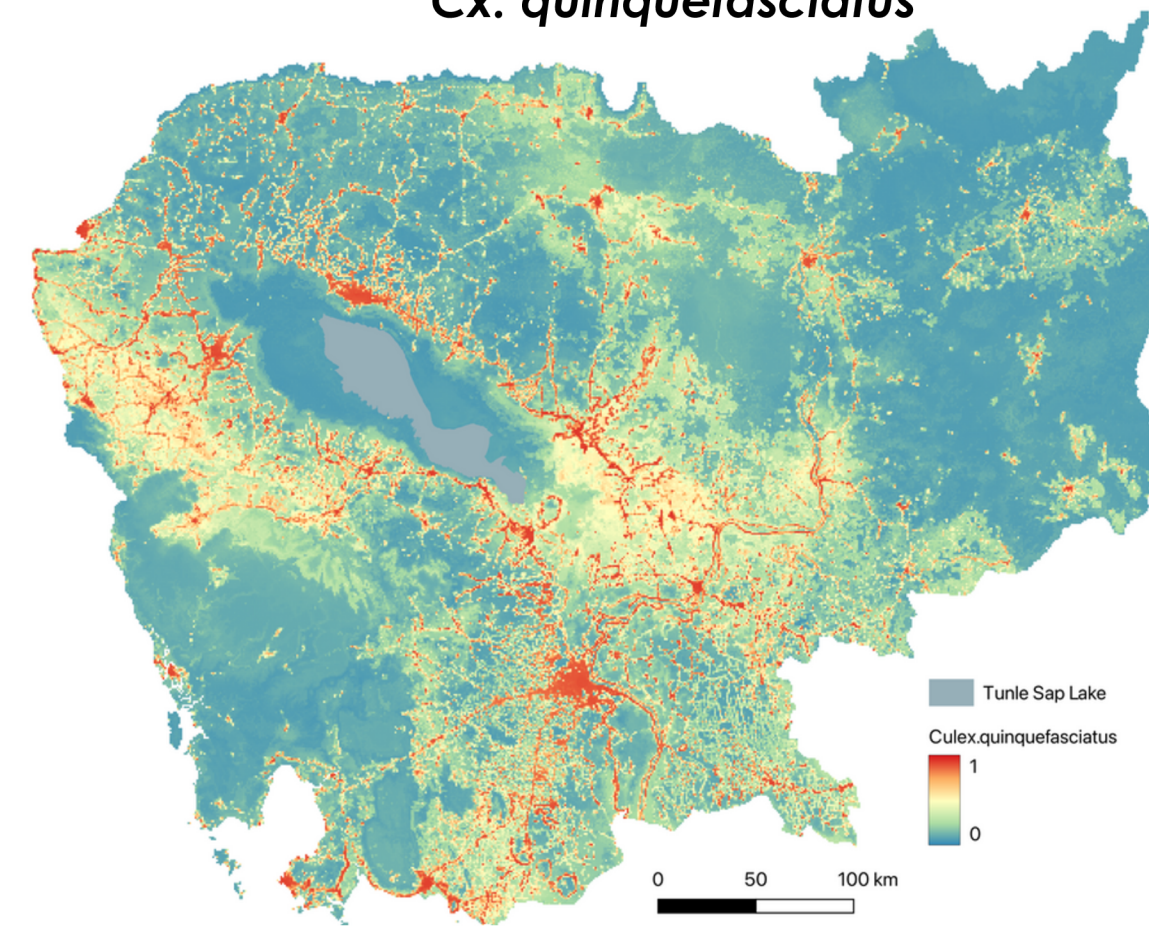
	name	mean1	mean2	sd1	sd2
1	ANN	0.8935400	0.6488733	0.06456115	0.1376559
2	GAM	0.9076600	0.6894667	0.04340968	0.1067395
3	GBM	0.9324600	0.7272733	0.03760081	0.1103909
4	GLM	0.9140733	0.7106733	0.04709523	0.1234101
5	RF	0.9274000	0.7261000	0.03870973	0.1083844
6	XGBOOST	0.9155733	0.6994000	0.04331705	0.1148266

*Ae. albopictus*



	name	mean1	mean2	sd1	sd2
1	ANN	0.8084333	0.4695800	0.07884224	0.14646406
2	GAM	0.8535867	0.5387000	0.05241794	0.11514990
3	GBM	0.8883800	0.6252867	0.04615347	0.09980742
4	GLM	0.8466933	0.5453333	0.05601976	0.11260328
5	RF	0.8912333	0.6396867	0.04584105	0.10240590
6	XGBOOST	0.8594867	0.5982533	0.05380511	0.10888034

*Cx. quinquefasciatus*



	name	mean1	mean2	sd1	sd2
1	ANN	0.8369800	0.5466467	0.13714253	0.2312741
2	GAM	0.8795667	0.6420867	0.05802619	0.1107516
3	GBM	0.9170000	0.6955800	0.04792668	0.1227414
4	GLM	0.8846200	0.6174667	0.05528397	0.1306418
5	RF	0.9143933	0.6862000	0.04598744	0.1127285
6	XGBOOST	0.8825000	0.6288333	0.05097713	0.1157892