Distribution of *Aedes aegypti* in Madagascar

Background

The factors explaining the distribution of *Aedes aegypti* in Madagascar remains unknown, several authors advanced different assumptions on this matter: distribution of *Aedes aegypti* in Madagascar would be affected by altitude (Fontenille et Rhodain et al. 1989) , temperature (Reinhold et *al.* 2018) , precipitation (Chen et *al*. 2009) and coverage forest (Raharimalala et *al.* 2011).

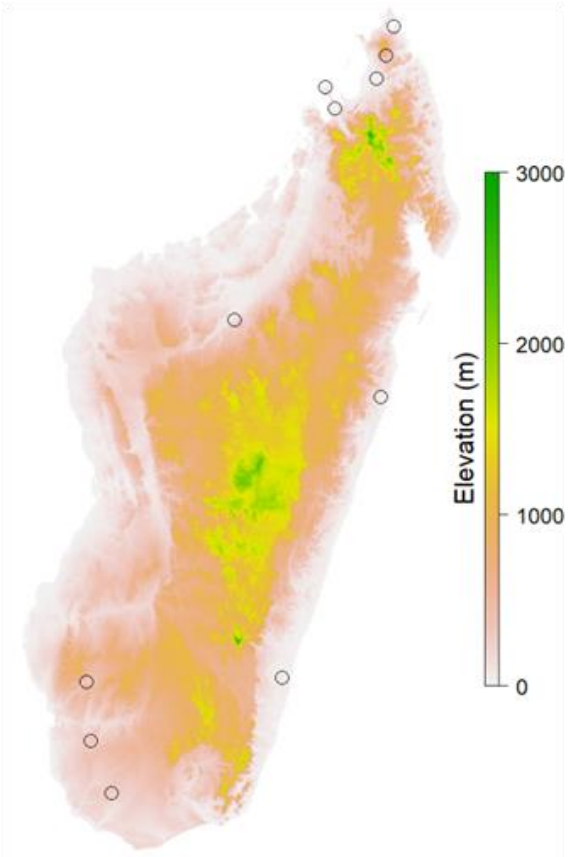
Statistical question

What are the factors wich influence the distribution of *Aedes aegypti* in Madagascar ?

Mechanic question

How does precipitation/temperature influence the growth of *Aedes aegypti* (Mosquito)

Aedes aegypti dengue , yellow fever in Eastern of Africa , zika in Malaisie Marchette et al. 1969



Current distribution of *Aedes aegypti* under the altitude

What are the factors wich influence the distribution of *Aedes aegypti* in Madagascar ?

Statistic model

Predictor variable (X)
- Temperature
- Precipitation
- Altitude

Response variable (Y)
- Presence (1)
- Absence (0)

Distribution of the statistical model: Binomial

Family function link : logit

HYPOTHESIS :

We expect that the temperature altitude favorise the presence of this species, and is not affected by precipitation.

R function:

glm (Aeg~Altitude+Temperature (mean)+Precipitation (mean), family="binomial", data)

Table: Explanatory variable and response variable

Locality	Altitude	Temperature (mean)	Precipitation (mean)	Aeg
Antsiranana 2	**105**	23	800	0
Ambilobe	**105**	24	900	1
Ambanja	**143**	25	900	0

How does precipitation/temperature influence the density of *Aedes aegypti* (Mosquito)?

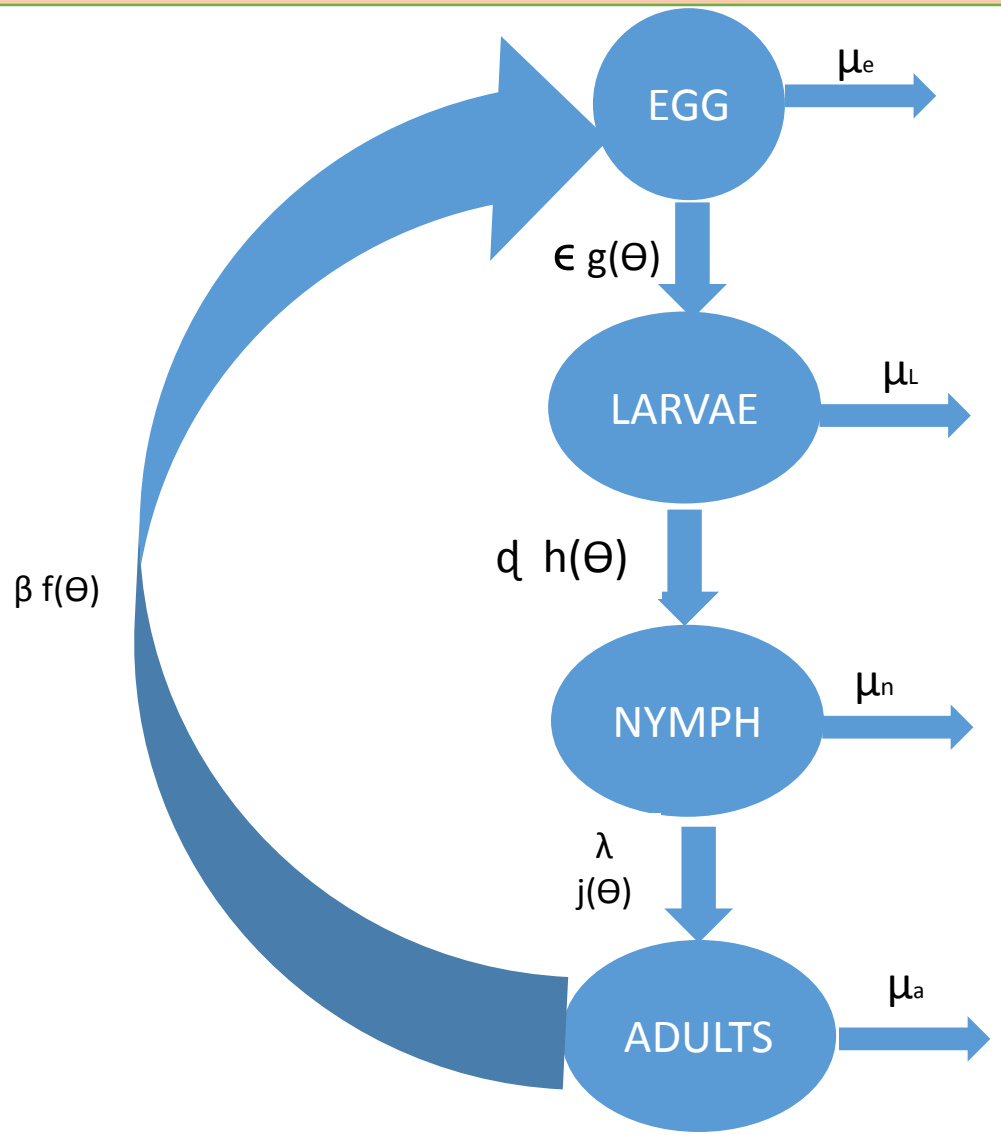
Dynamic model

Populations

Ae. aegypti

States

Egg, larvae, nymph, adults



Process

μe: egg mortality rate

μa: adult mortality rate

μl: larvae mortality rate

μn: pupal mortality rate

ϵ : Egg hatch rate

ɖ : Larval development rate

λ : Nymphosis rate

β : Egg-laying rate

Θ: Precipitation and temperature

f, h, j, g: Function

NEXT STEPS

- Data collection and organization
- Study experimental to test the correlation between density and temperature and humidity in laboratory for Ae. aegypti and another species *Aedes albopictus*
- Virus detection in the sample and prediction risk areas.

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