



Prediction of mosquito-borne disease risks in Côte d'Ivoire using Earth Observation data



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➤ Côte d'Ivoire: Suitable for MBDs

■ Location

- West Africa

■ Population

- 28 millions people

■ Climate

- Tropical climate: warm & humid

■ Land-cover

- Forest – Savannah & water
- Agriculture & urbanization



Land-cover change

➤ MBDs in Côte d'Ivoire

■ Arboviruses

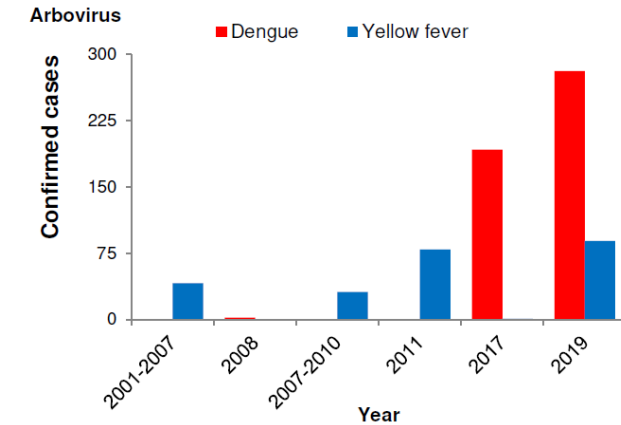
- Increased outbreaks 2017-2022
- YF & Dengue: 381 cases & 2 deaths, 2019
- Febrile illnesses

■ Malaria

- Prevalence: 45%
- 3.5 million cases & 1,685 deaths in 2022

■ Lymphatic filariasis

- Endemic (48% in Agnibelekro)



Malaria epidemiological profile
(source: Malari Report, 2018)

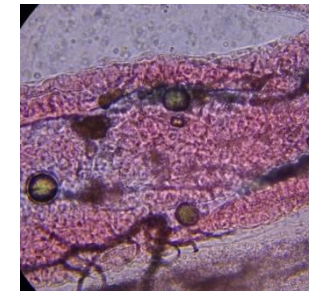
➤ Pathogens in Côte d'Ivoire

▪ Arboviruses

- **Dengue & yellow fever**
- Chikungunya Zika & West Nile viruses: humans
- West Nile & Rift valley fever viruses: domestic animals

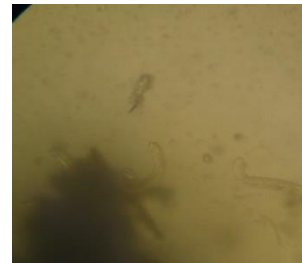
▪ Malaria

- ***Plasmodium falciparum* (98%)**
- *P. vivax*, *P. ovale* & *P. malariae*



▪ Lymphatic filariasis

- ***Wuchereria bancrofti***



➤ Vectors in Côte d'Ivoire

▪ Arboviruses

- *Aedes aegypti* & *Aedes* species
- *Culex quinquefasciatus* & *Culex* species



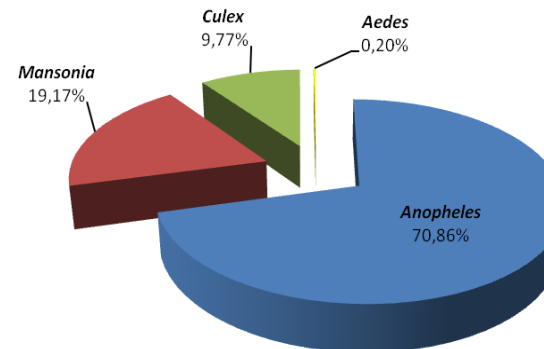
Aedes

▪ Malaria

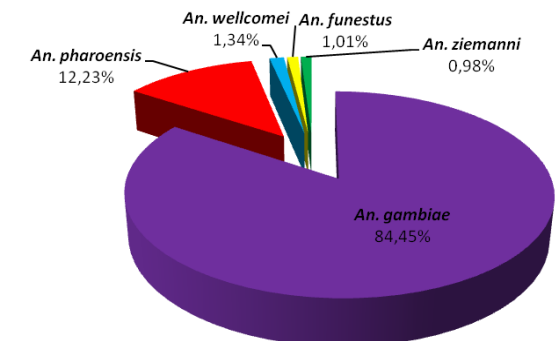
- **Anopheles gambiae**: *An. gambiae* s.s. & *An. coluzzii*
- *Anopheles funestus* & *Anopheles nili*
- *Anopheles arabiensis*

▪ Lymphatic filariasis

- **Anopheles gambiae**
- *Culex quinquefasciatus*



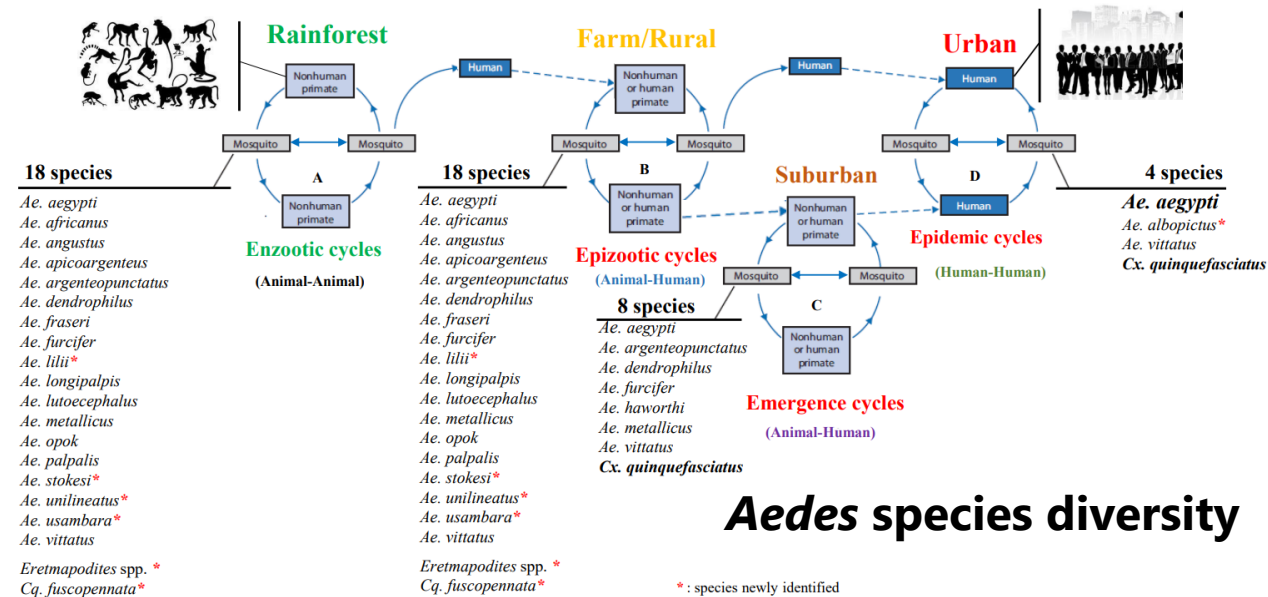
Genus



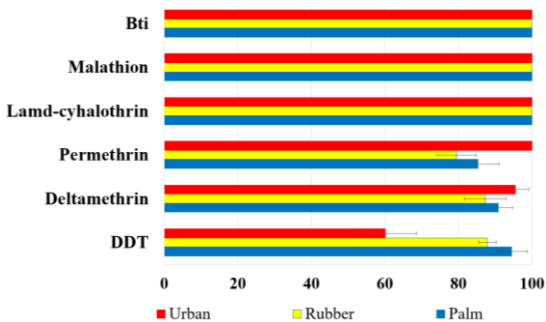
Anopheles

MBDs in Côte d'Ivoire

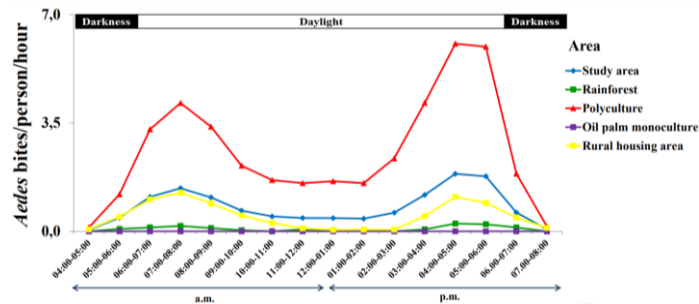
Aedes in Côte d'Ivoire



Aedes species diversity



Insecticide resistance



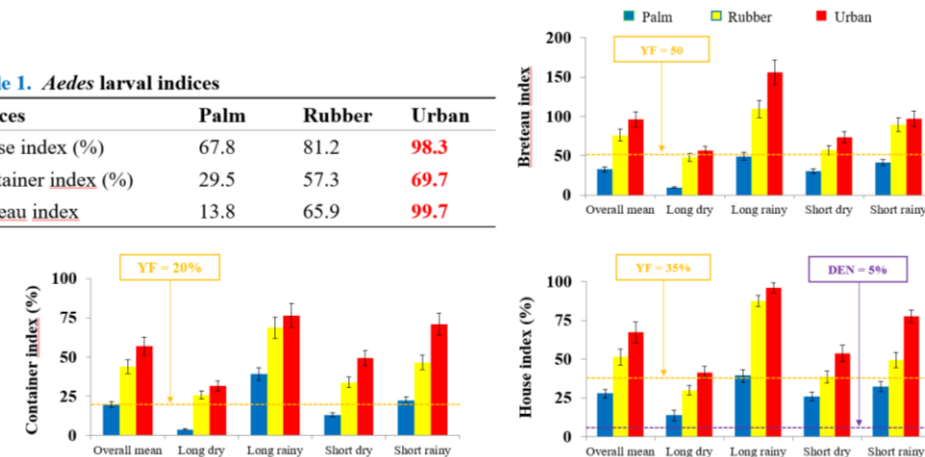
Aedes behaviours



Aedes larval breeding sites

Table 1. Aedes larval indices

Indices	Palm	Rubber	Urban
House index (%)	67.8	81.2	98.3
Container index (%)	29.5	57.3	69.7
Breteau index	13.8	65.9	99.7



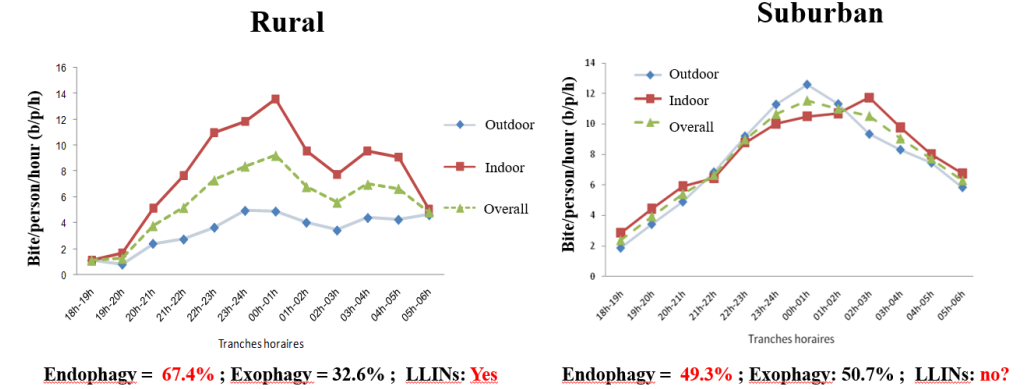
Epidemic risk indices

MBDs in Côte d'Ivoire

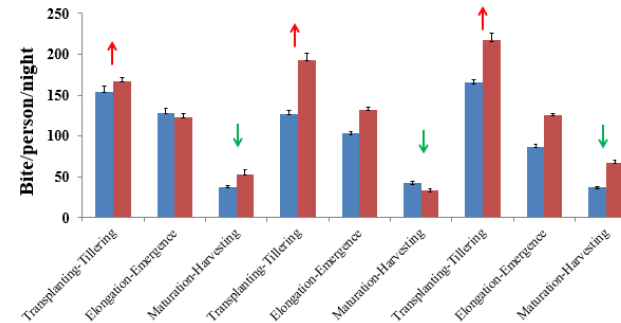
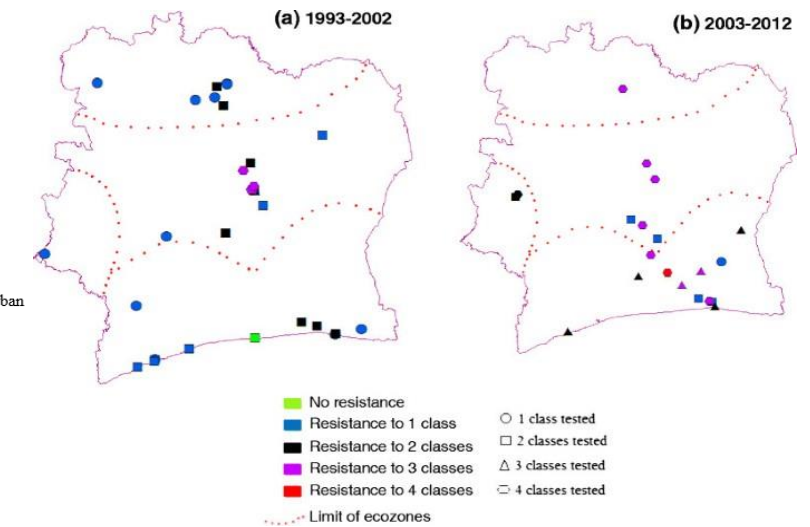
➤ Anopheles in Côte d'Ivoire



Anopheles breeding sites



Behavior change



Insecticide resistance

➤ Study protocol

▪ Aim

- Develop an algorithm for optimizing the placement of mosquito traps combining:
 - in-situ data
 - Earth observation data
 - MAMOTH mosquito abundance prediction model

▪ Benefits

- Identification of appropriate vector control tool, strategy, place and time
- Developing an early warning system → Improving malaria prevention
- Saving resources

Acknowledgments

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Thank You !