



“Regards Croisés” sur l' **Influenza aviaire**

15-19 / 12 / 2008 • Montpellier • France



Rencontres scientifiques autour de deux projets de recherche : **GRIPAVI (CIRAD, MAEE) & ARDIGRIP (AIRD)**
Scientific meeting around two research projects:

Synthèse de la composante transversale Écologie Volet Avifaune Sauvage

Nicolas Gaidet, CIRAD



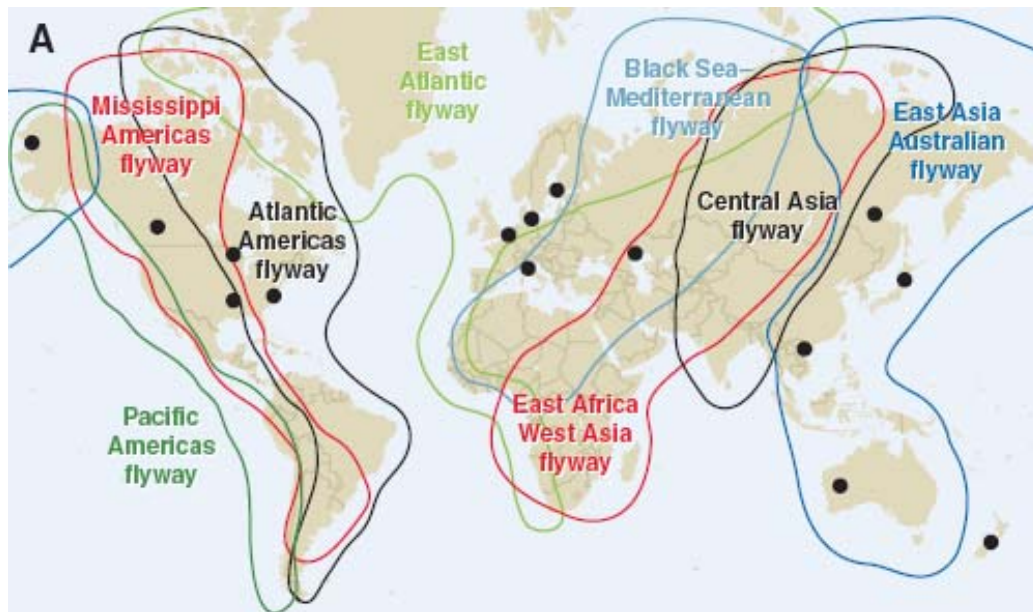
<http://avian-influenza.cirad.fr/>



A knowledge gap in the host ecology of AIVs in tropical regions

Few multi-year studies available

Most of our current understanding of ecology of AIV in wild birds comes from long-term surveillance in northern hemisphere



Main long-term AIV surveillance sites and general migratory flyways of birds (waders) (from Olsen et al. 2006)

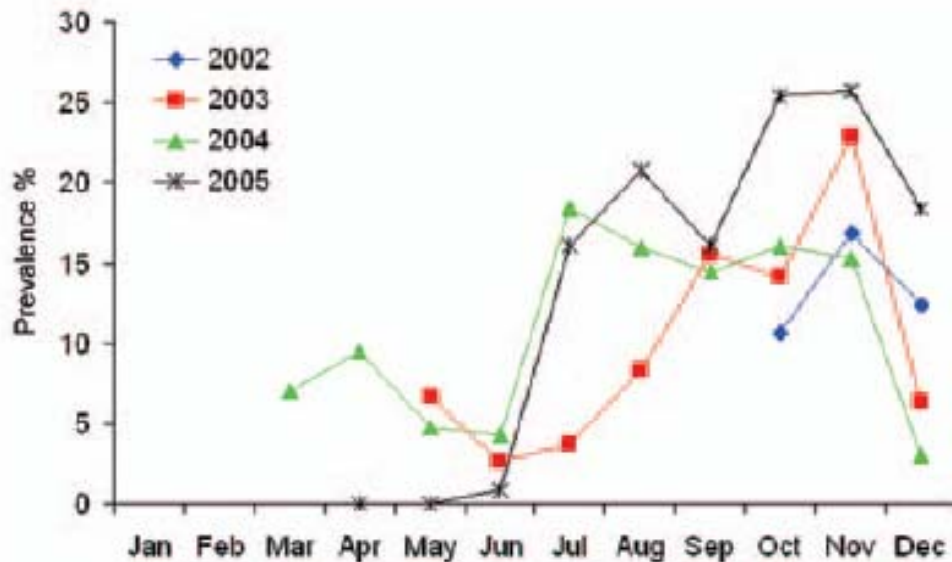
→ Knowledge on the circulation of **AIV in different continents and fly-ways** is crucial in estimating **potential of reassortment and spread** of AIV between different areas of the world

A knowledge gap in the host ecology of AIVs in tropical regions

Spatial and temporal variations in AIV prevalence are consistent in northern hemisphere

e.g. AIV prevalence in ducks peaks in late summer and autumn:

- ✓ in Europe (>25%, Wallensten et al. 2007)
- ✓ in North America (>40%, Krauss et al. 2004)



*Mallards in Sweden
(Wallensten et al. 2007)*

- Attributed to increased concentrations of susceptible juvenile birds (immunological naïve birds): prevalence in juvenile ducks > adults

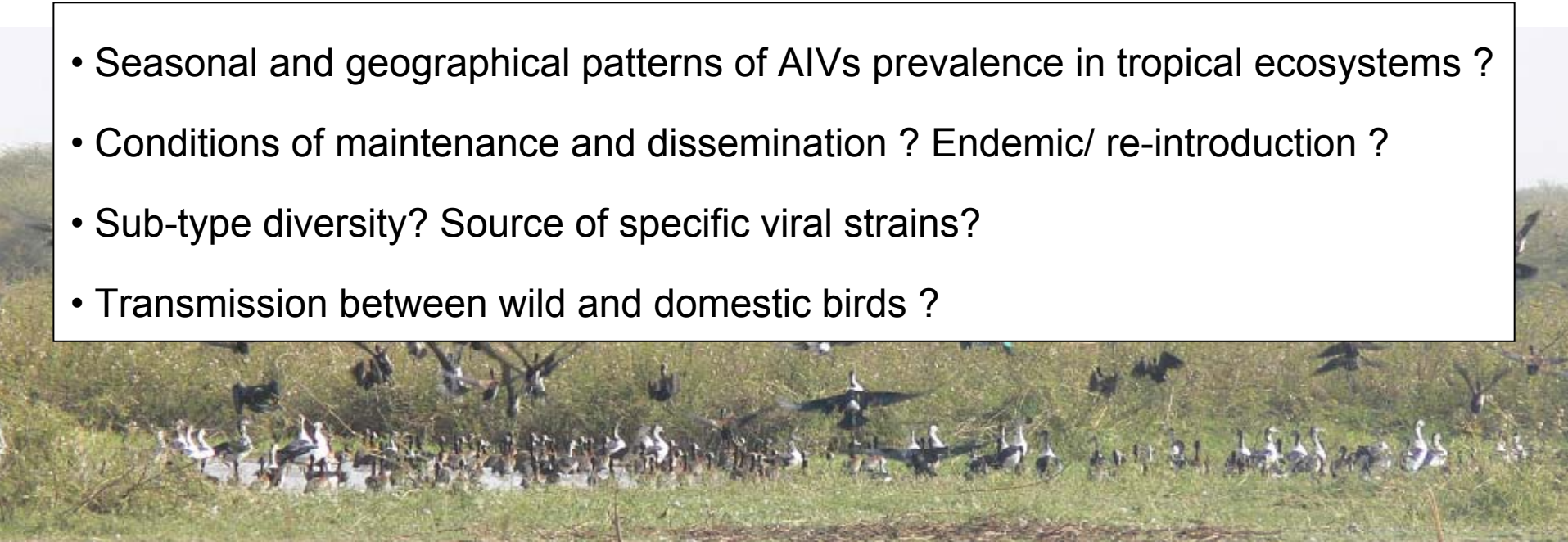
A knowledge gap in the host ecology of AIVs in tropical regions

Distinct environmental conditions in Afro-tropical regions in:

- ✓ climatic constrains
- ✓ waterbird community
- ✓ poultry production systems
- ✓ seasonality
- ✓ migration pattern of Afro-tropical birds

Conditions of AIV circulation in wild birds in Afro-tropical regions ?

- Seasonal and geographical patterns of AIVs prevalence in tropical ecosystems ?
- Conditions of maintenance and dissemination ? Endemic/ re-introduction ?
- Sub-type diversity? Source of specific viral strains?
- Transmission between wild and domestic birds ?



GRIPAVI



→ **Specific protocols / questions** in each observatory according to local contexts:

- 2 longitudinal surveys, community of wild bird reservoir
 - ✓ 2 PhD Mali: Eco-epidemiology & Ornithology
 - ✓ 2 PhD Zimbabwe: Eco-epidemiology & Ornithology
- Specific protocols in Mauritania, Madagascar and Viet Nam

→ **Shared protocols** for generic questions through comparison between observatories

Current Activities

- **Monitoring surveys of AIV circulation :**

- ✓ Prolongation to previous surveillance activities of Mesures d'Urgences (Mali, Zimbabwe) and TCP-FAO (Mauritanie, Mali)
- ✓ Implemented in Vietnam
- ✓ In preparation in Madagascar

- **Complementary surveillance of NDV**

- ✓ currently in the same bird populations
- ✓ planned in additional terrestrial bird populations (Mauritania, Mali)

- **Development of serology protocols and diagnostics for AIV and NDV**

- **Connection with other AIV surveillance network: NewFluBird (European network)**



Two main observatories: Mali and Zimbabwe

- **Two Franco-African PhD tandems**

- ✓ Bouba Fofana : Univ. Bamako - DNCN - Wetlands Int.
- ✓ Julien Cappelle : Univ. Montpellier - Univ. Bruxelles
- ✓ Josphine Mundava : Univ. Bulawayo (NUST)
- ✓ Alexandre Caron : Univ. Pretoria - Mammal Research Institute
 - 4 PhD students have started field and research activities in 2008
 - Training of local technicians

- **A working group on wild birds and AIV ecology** in place in order to promote:

- ✓ information exchange
- ✓ assist students theoretical and technical questions
- ✓ connections between research activities
- ✓ standardise methodologies to facilitate comparative analysis

Two main observatories: Mali and Zimbabwe

- **Longitudinal protocols of capture and sampling of waterbirds** are in place:

- seasonal profiles of AIV circulation in waterbirds in tropical ecosystems (n = 1168 bird in Mali; n= 1597 birds in Zimbabwe)

- comparison of between Western and Austral African regions



- **Longitudinal waterbirds counts** are in place:

- seasonal variation in host community composition and abundance

- theoretical framework of host pathogens interactions at the wild/domestic interface



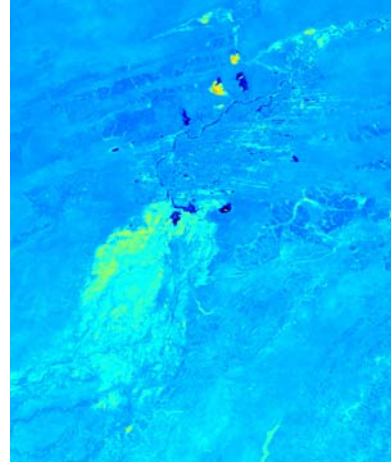
- **Analysis of multi-year bird database (>10 years)** available on both observatories

- inter-annual fluctuation in host community

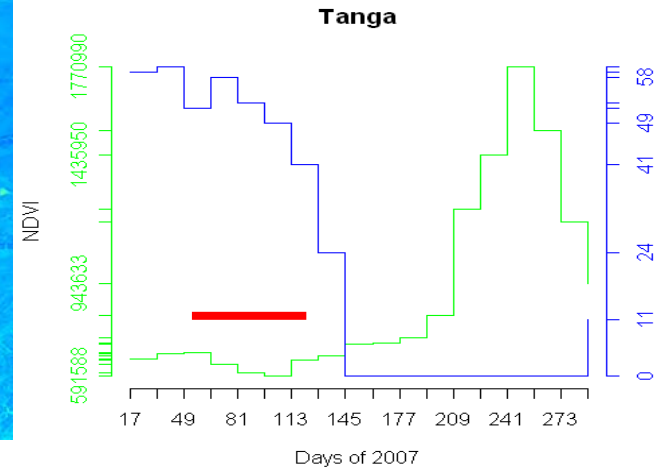
- test epidemiological scenarios



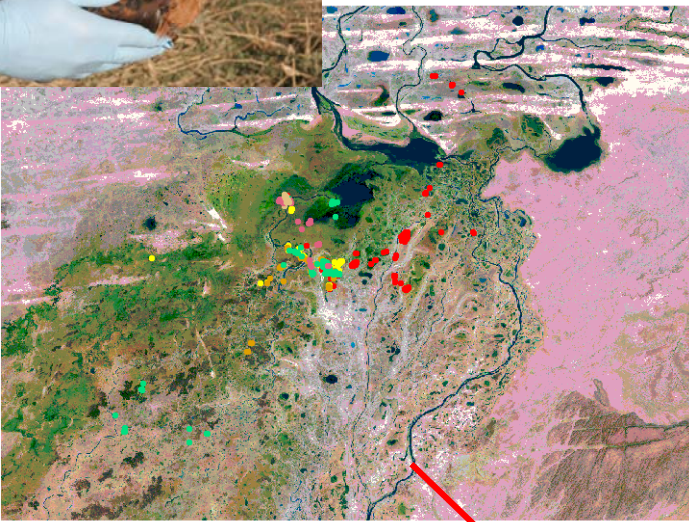
Probability distribution models of waterfowl



Remote Sensing

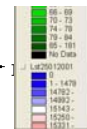
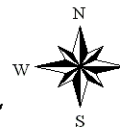


Telemetry

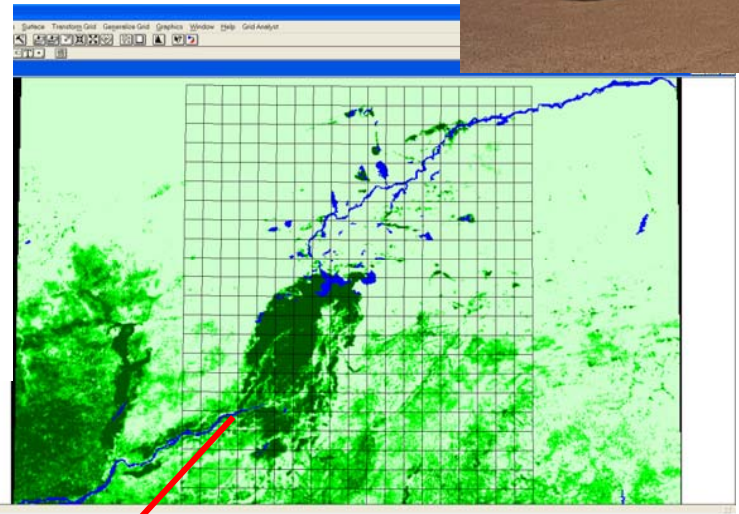


Mali

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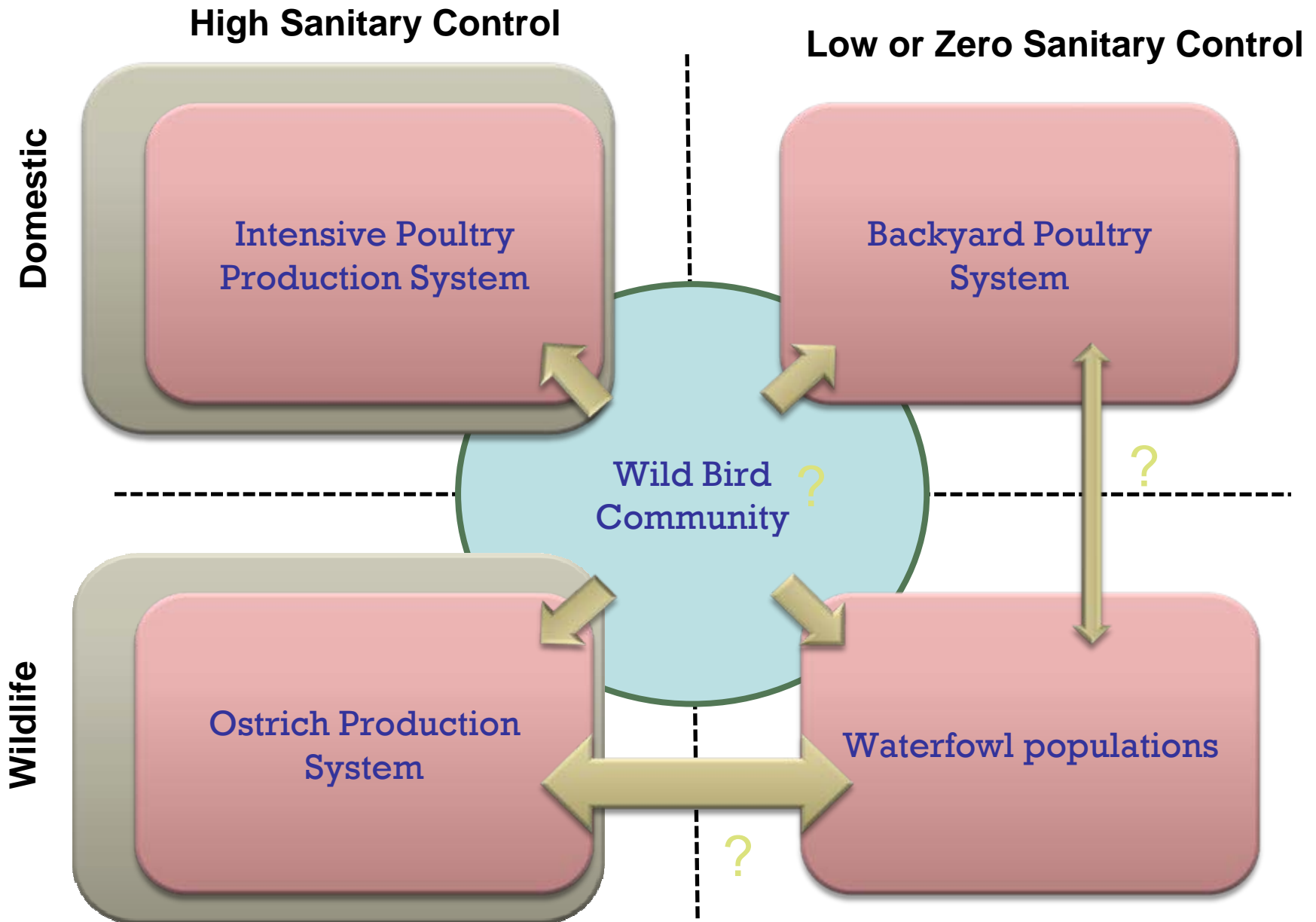


Aerial Census



$$\text{Nb Whistling Duck} \sim s(\text{NDVI}) + s(\text{NDWI}) + s(\text{LST})$$

Host pathogens interactions at the wild/domestic interface



Activities in Mauritania & Vietnam

- **Specific protocols in Mauritania:**

- ✓ Potential role of shorebirds in the introduction and transmission of AIV and NDV from Eurasia to Africa
- ✓ One surveillance campaign in Apr. 2008, approx. 400 bird sampled and tested



- **Specific protocols in Vietnam:**

- ✓ Potential role of bridge species (passerines, herons) in the local spread of H5N1 HPAI virus
- ✓ Mission in Jan. 2008: define the protocols, assist in setting up a local team
- ✓ Surveillance in place since Aug. 2008, approx. 300 bird sampled



Results for 2008

Approx. 3500 wild birds sampled in four observatories

Approx. 1000 birds tested so far for AIV/NDV, most analyses in progress

Scientific article accepted in *Infection, Genetics and Evolution*:

Caron et al. Evolutionary Biology, Community Ecology and Avian Influenza Research

Oral presentations:

✓ Symposium “Wild birds and avian influenza in Africa” - 12th Pan-African Ornithological Congress - South Africa, sept 2008: Gaidet et al.

✓ Second Pan-European Duck Symposium à Arles – France march 2009: Mundava et al., Gaidet et al.



Thank you