Time and Public Health

Advances in Geospatial Technologies for Health

Santa Fe (New Mexico) Sept 12- 13, 2011

Session 8: *On and Just Beyond the Horizon*

Trans-disciplinarity

The Transcube Model & Tele-epidemiology

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Trans-disciplinarity

The ‘TransCube’ Model

(Global Health Forum, Berlin 2010)

Transition: Coping with *new challenges*

+ Translation: *Innovating* beyond benches & bedsides

+ Transformation: *Re-inventing* Health Policies & Management

Crisis = Hazards + Tipping point

Trans-disciplinarity

Transition

New Challenges and Crisis

• Rapid Population Increase & Abrupt Climate Change (ACC)
• Population movement/displacement
• Water Availability & Global Food Security
•Hygienic & Nosocomial issues

Associated Vector-Borne Diseases Case

•Vectors circulation
•Reservoirs circulation

New and Re-emerging Public Health Concerns

•WNV, Chikungunya, Avian Flu, RVF, Malaria, Dengue…

Trans-disciplinarity

Translation

Innovative

•Thinking out-of-the-box
• Tool Box & Tox

*Conceptual Approach (CA) of **Tele-epidemiology***

•New Tools: Remote Sensing (Optical + Radar)
• New High Res. Products

CA Spatio-Temporal Reproduction

• In space: Different countries and latitudes
• In time:Take LF, RCC & CC issues into account

Trans-disciplinarity

Transformation

Re-inventing Public Health Policies

• Agency & Health Institution Networking: National & International Levels
•New HIS
• Public Awareness (K & I; FAQ)

Management

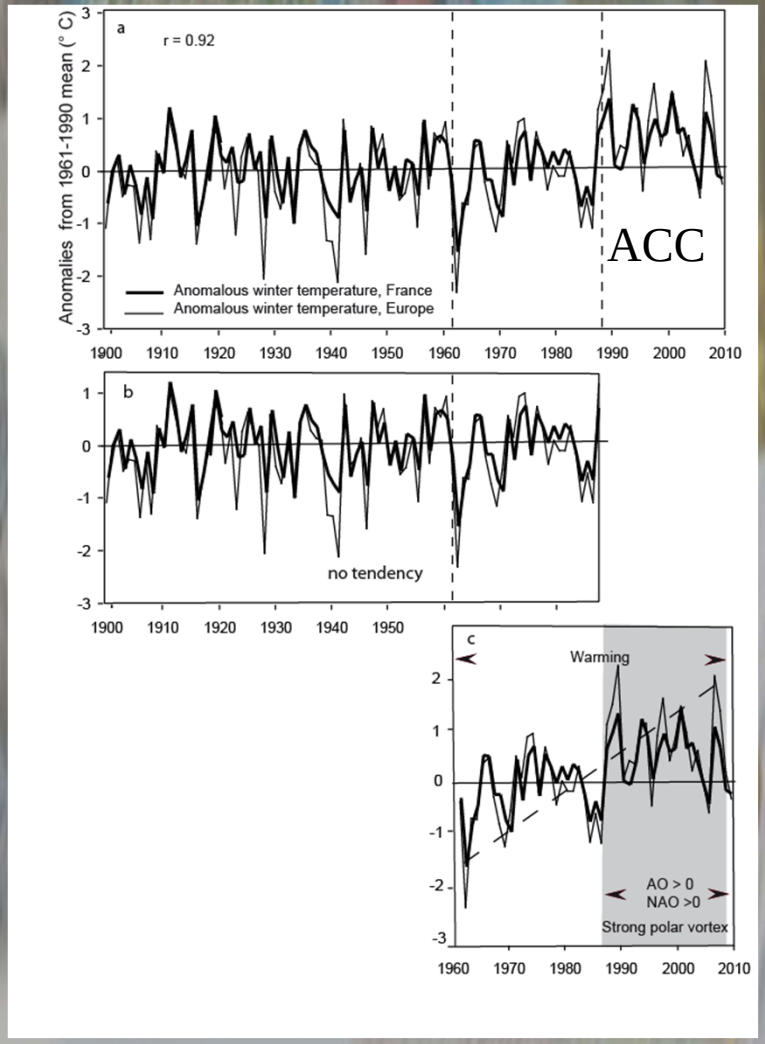
•New Guidelines and TOR

•Implementing Early Warning Systems (EWS) within Societal Benefit Areas/GEOSS

• Effective Real-time Risk Mapping

Transition

European Winter Temperatures during the 20th Century



The Rift Valley Fever 'TransCube Case'

With Murielle Lafaye & Cécile Vignolles (CNES)

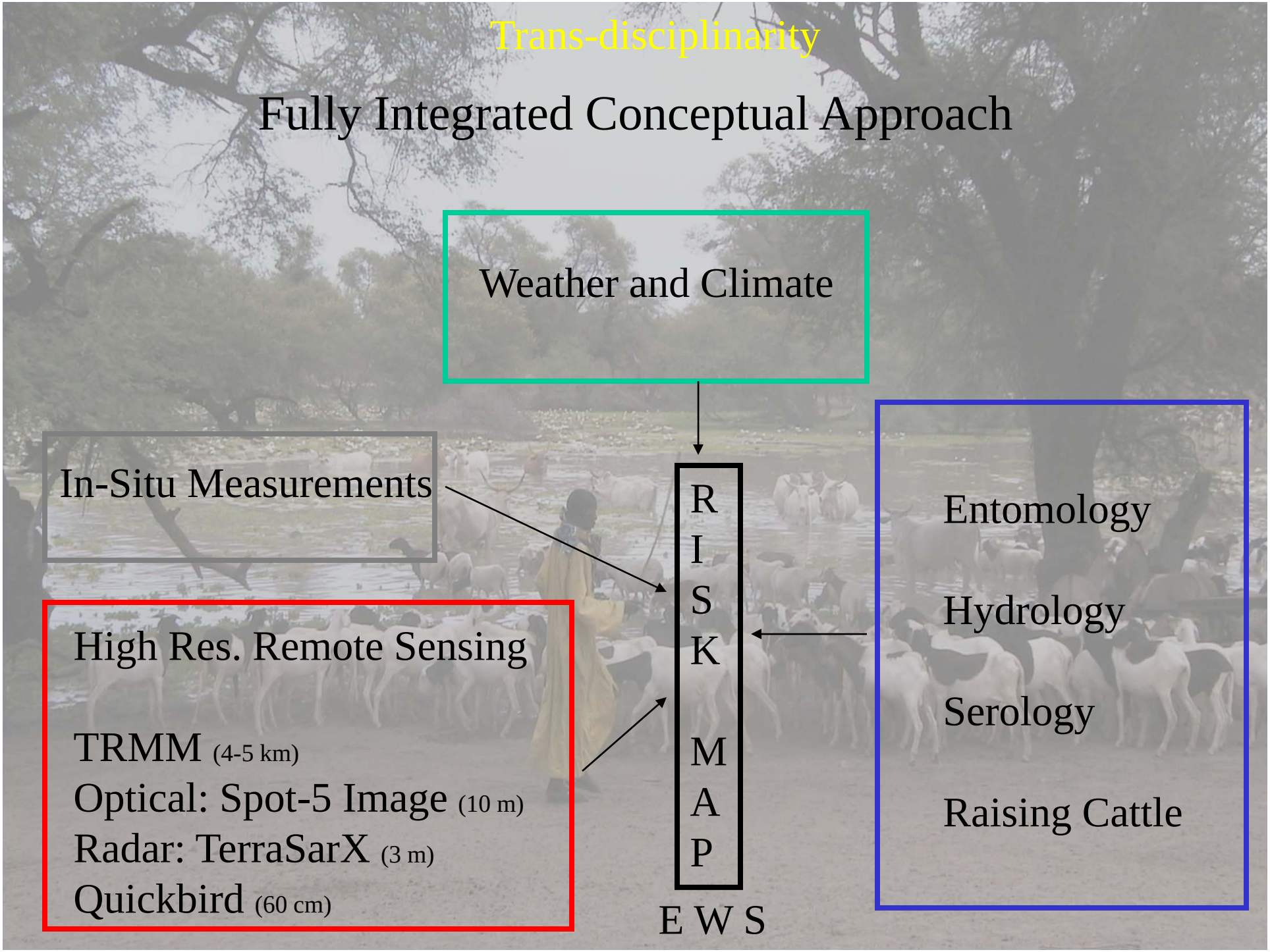
Lamont-Doherty Earth Observatory
COLUMBIA UNIVERSITY | EARTH INSTITUTE

INSTITUT PASTEUR DE DAKAR

DIREL/DSV

Trans-disciplinarity

Fully Integrated Conceptual Approach



Translation: Thinking out of the box (1)

The Brand-new Normalized Difference Pond Index

NDPI

NDPI from MIR (1.58-1.75 µm) and Green (0.50-0.59µm) channels.
using SPOT-5 digital counts (DCs or reflectance proxies)

NDPI = (DC4-DC1) / (DC4 + DC1)

Where DC4 = digital count from MIR channel and
DC1 = digital count from Green channel

DC4 is a function of water content
DC1 is a function of biological structures of the target itself.
DCs include radiometric and geometric corrections

Translation: Thinking out of the box (2)

The Brand-new Normalized Difference Turbidity Index

(*Aedes* vs. *Culex*)

NDTI

Clean water has a specific radiometric response (weak for green wavelength and weaker for red wavelength), thus:

NDTI is defined from Red (0.61-0.68 µm) and Green (0.5- 0.59 µm) channels. using SPOT-5 DCs

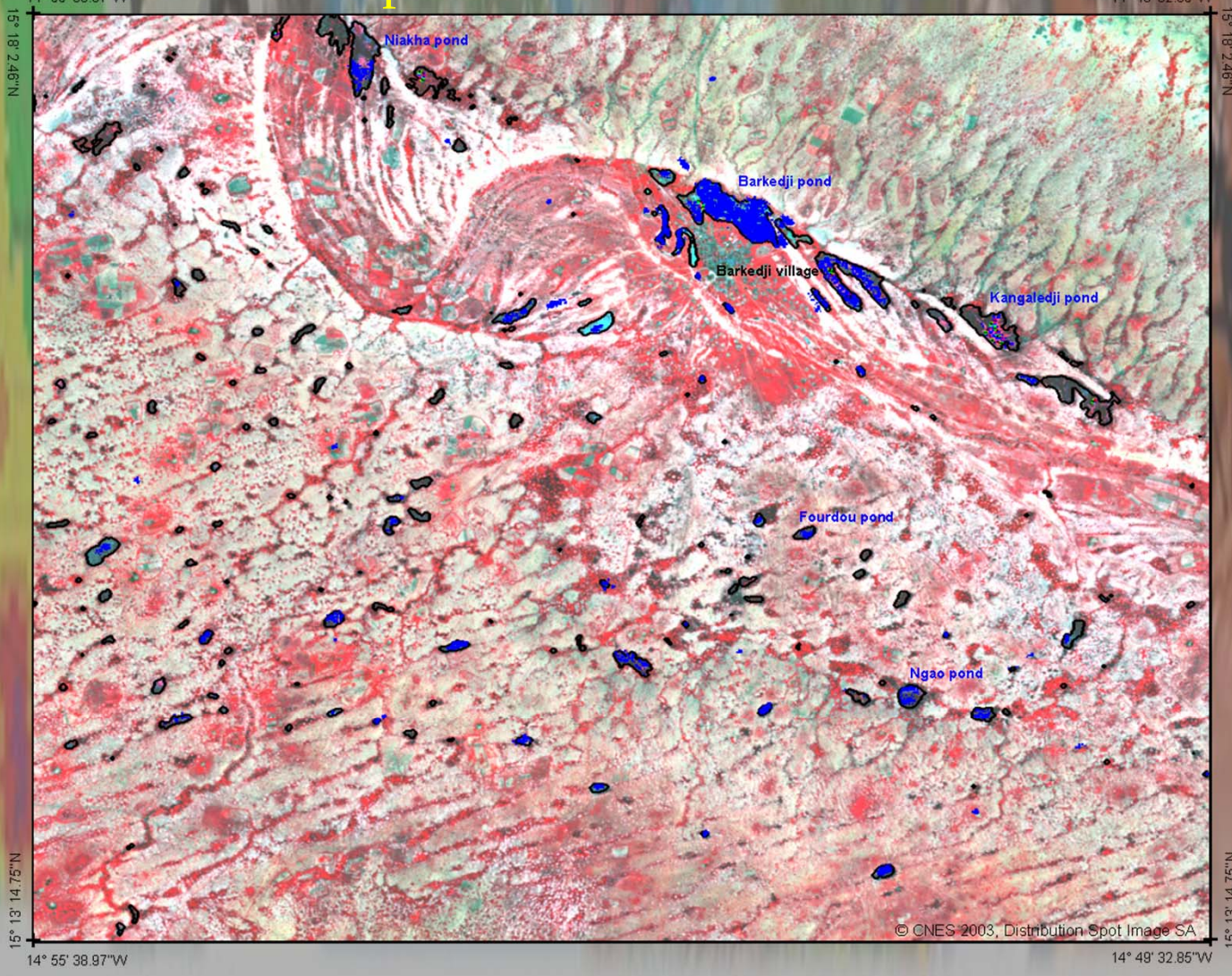
NDTI = (DC2-DC1) / (DC2 + DC1)

DC2 = Red channel and DC1 = Green channel

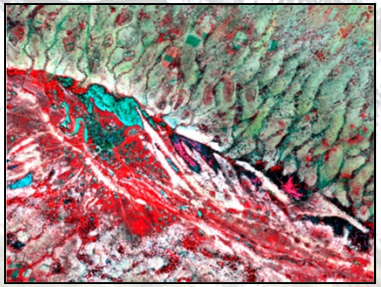
Turbid water ➡ High NDTI values

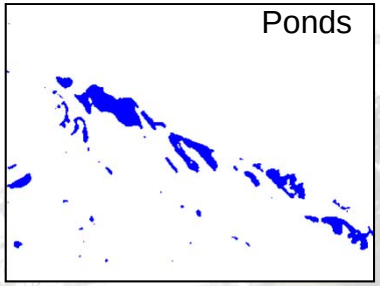
Translation: Thinking out of the box (3)

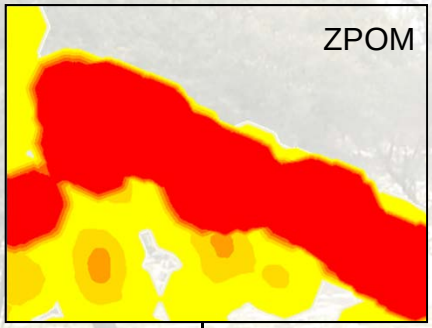
New Tools: Optical SPOT-5 + Radar TerraSar-X

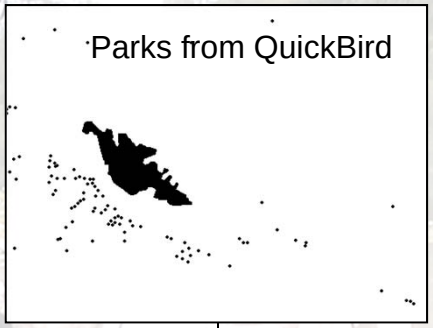


Transformation: from Teledetection to Risk Mapping





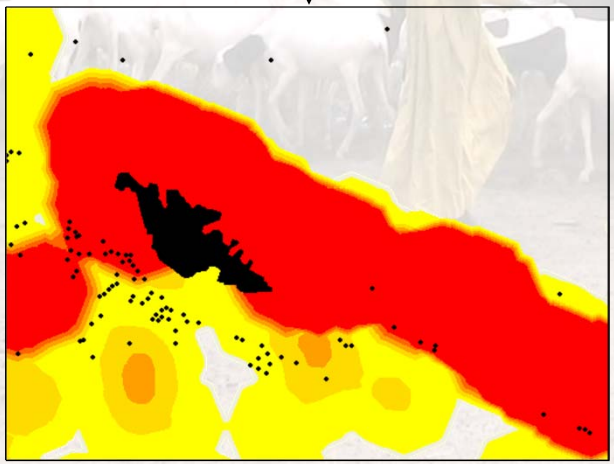




Hazards

Vulnerability

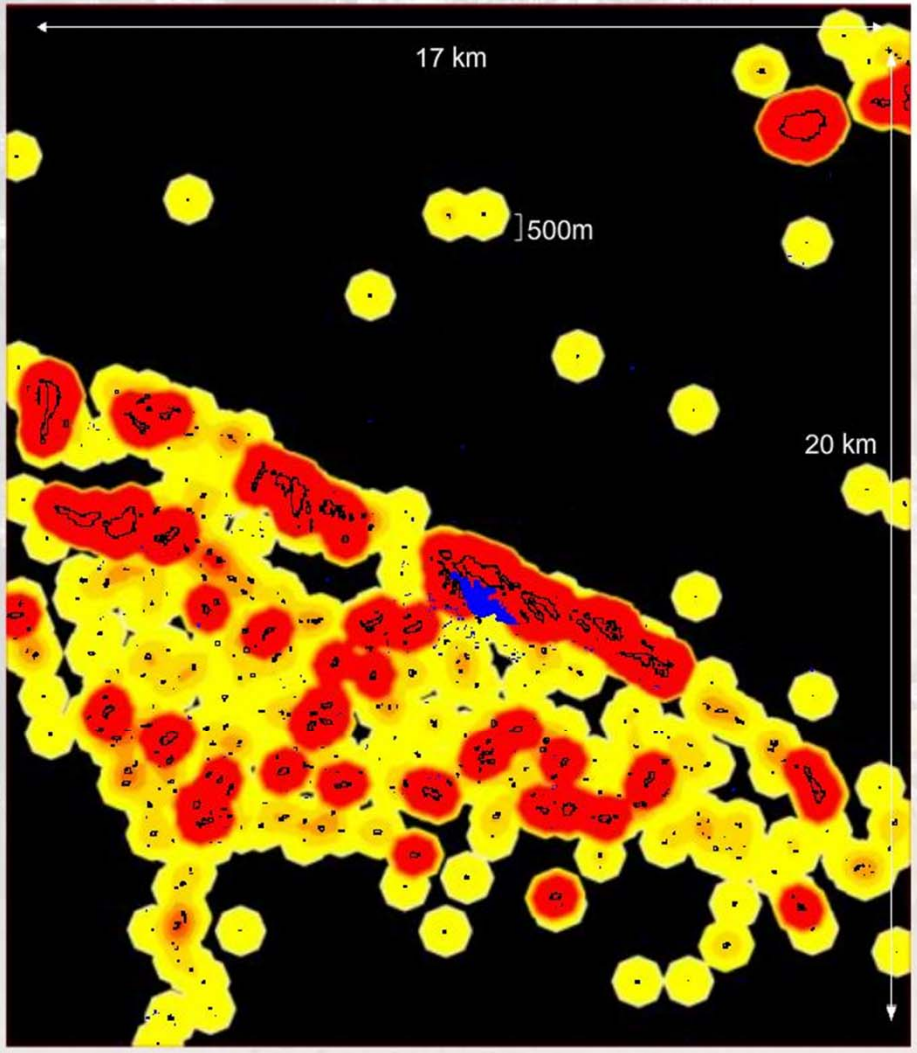
Risks



Risks = Hazards + Vulnerability

Transformation: New Products

Dynamical ZPOM and associated risks



July 1st, 2003

July 28th, 2003

August 26th, 2003

September 6th, 2003

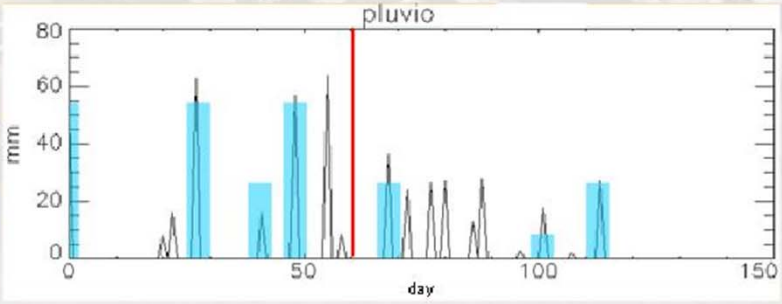
October 9th, 2003

Scale ● ON ● OFF

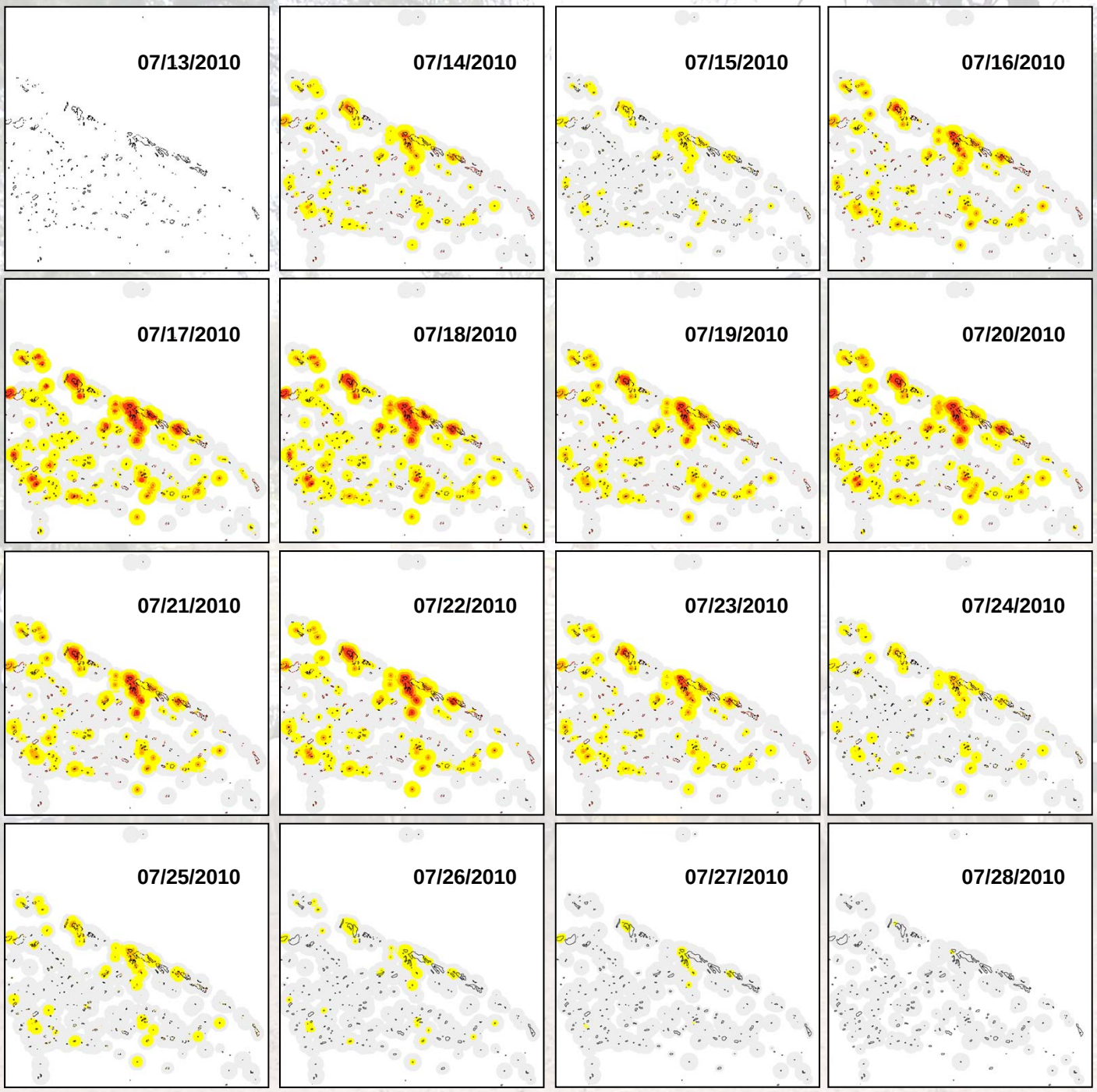
Ponds ● ON ● OFF

Cattle Parks ● ON ● OFF

Productive rainfall events ● ON ● OFF



HAZARD : very unlikely | very low | low | moderate | high | very high



Transformation

HAZARD

- low
- moderate
- high
- very high

First EWS Real-time Bulletin, July 2010

Transition

Hazard + Vulnerability + Tipping Point = Crisis

Three Levels of Intervention/Prevention from Effective 'Risks Mapping'

- Moving parked animals around
- Vaccinating Animals
- Larvaciding (Bti) + Light & Thermal Traps

+

Continued Distribution of impregnated bed-nets

The Clock is Ticking