

# WP climate change impacts on dengue and leptospirosis dynamics

**Climate :** Benjamin Sultan (IRD), Christophe Menkès (IRD), Thanh Ngo-Duc (University of Science & Technology of Hanoi)

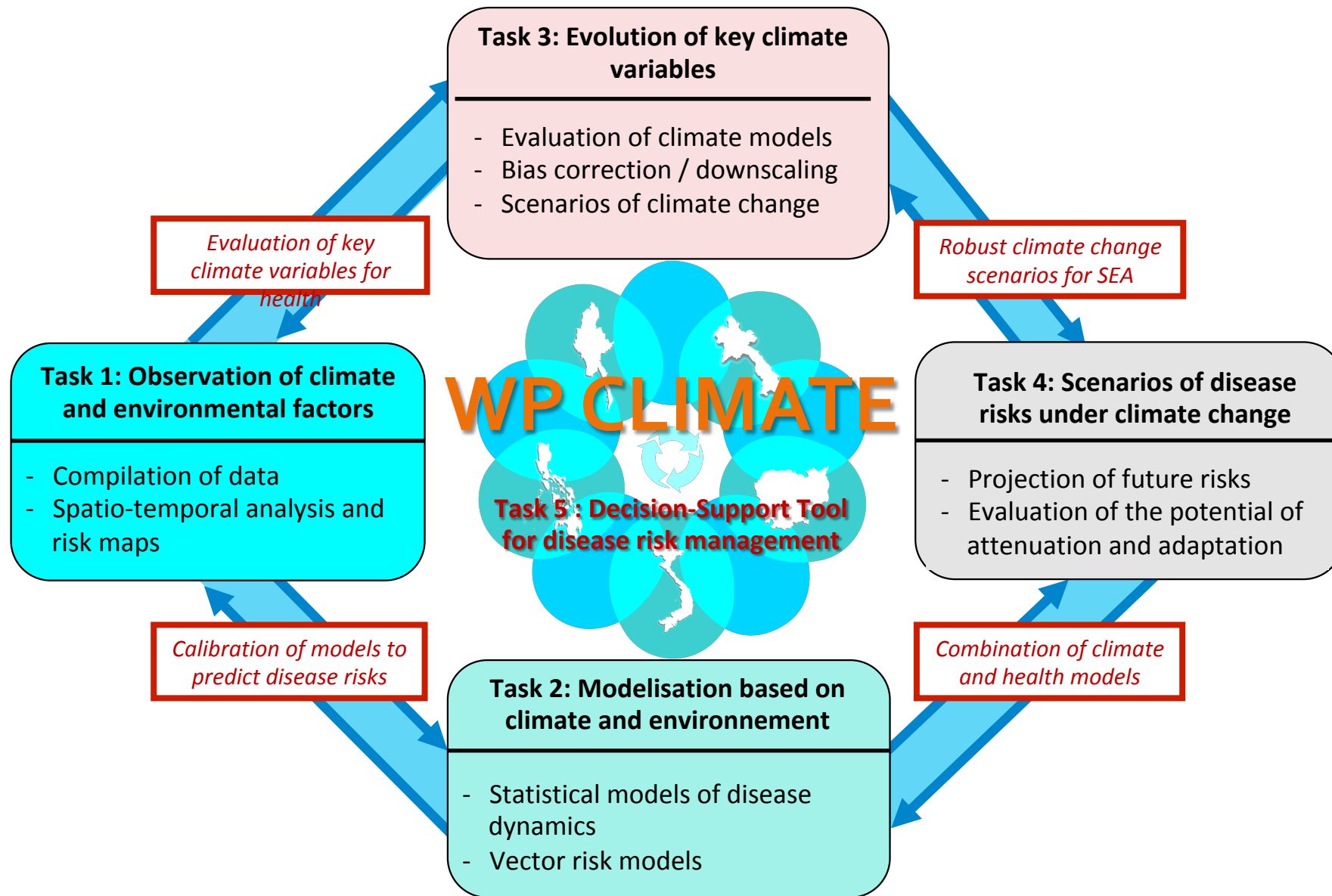
**Spatial analyses and modelling:** Vincent Herbreteau (IRD), Morgan Mangeas (IRD), Marc Souris (IRD), Annelise Tran (CIRAD)

**Decision support tools:** Jean-Philippe Boulanger (ECOCLIMASOL)



**ECOMORE II**



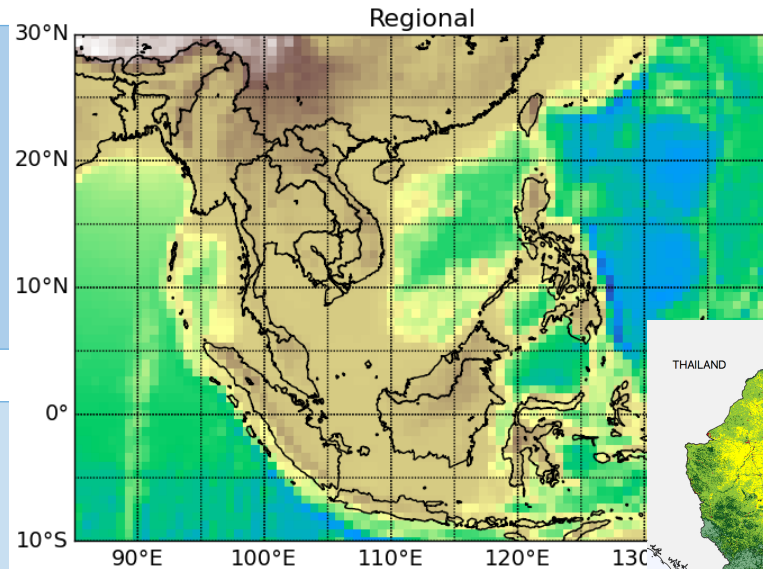


# WP organization

- **Meetings**
  - Transversal climate meeting, March 20<sup>th</sup> 2018 Bangkok
  - Kick-off meeting, December 20<sup>th</sup> 2018, video-conference
  - WP Climate & WP Vietnam meeting, January 14<sup>th</sup> 2019 Hanoi
- **First working groups :**
  - Climate modelling and web portal
  - Regional data collection and Dengue modelling
  - Local entomological / epidemiological spatial analyses
- **Recruitments :**
  - “Geomatician” Engineer, based at IPC, expected March 2019
  - “Climate” Postdoc, based at USTH, Vietnam, expected April 2019
  - “Modeller” Postdoc, based at IRD, France, expected April 2019

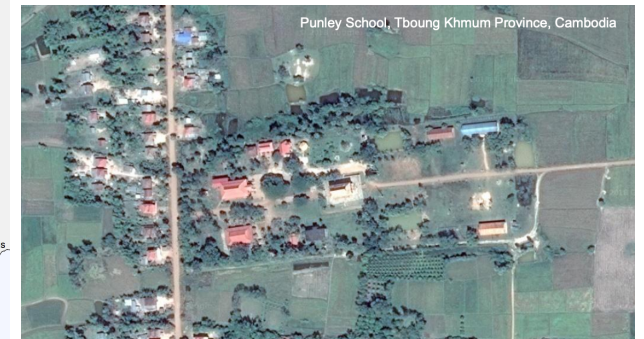
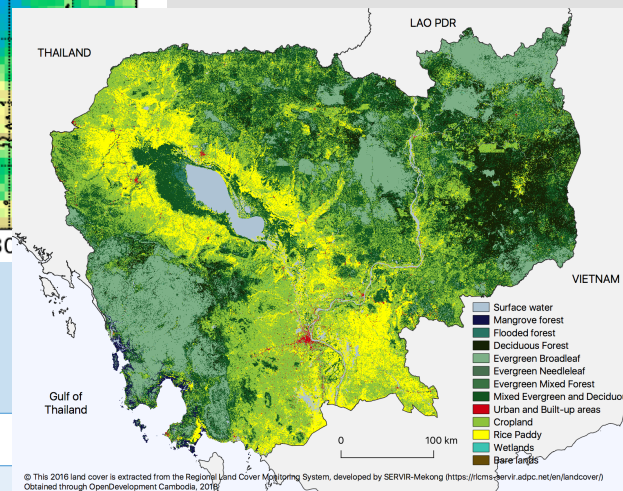
# Study scales

## Regional



**Dengue:** reported in most of the Ecomore 2 countries  
-> included for a transversal study  
-> rely on national epidemiological surveillance (passive surveillance from the public health system)

## National



## Local level

### Ecomore WP country studies:

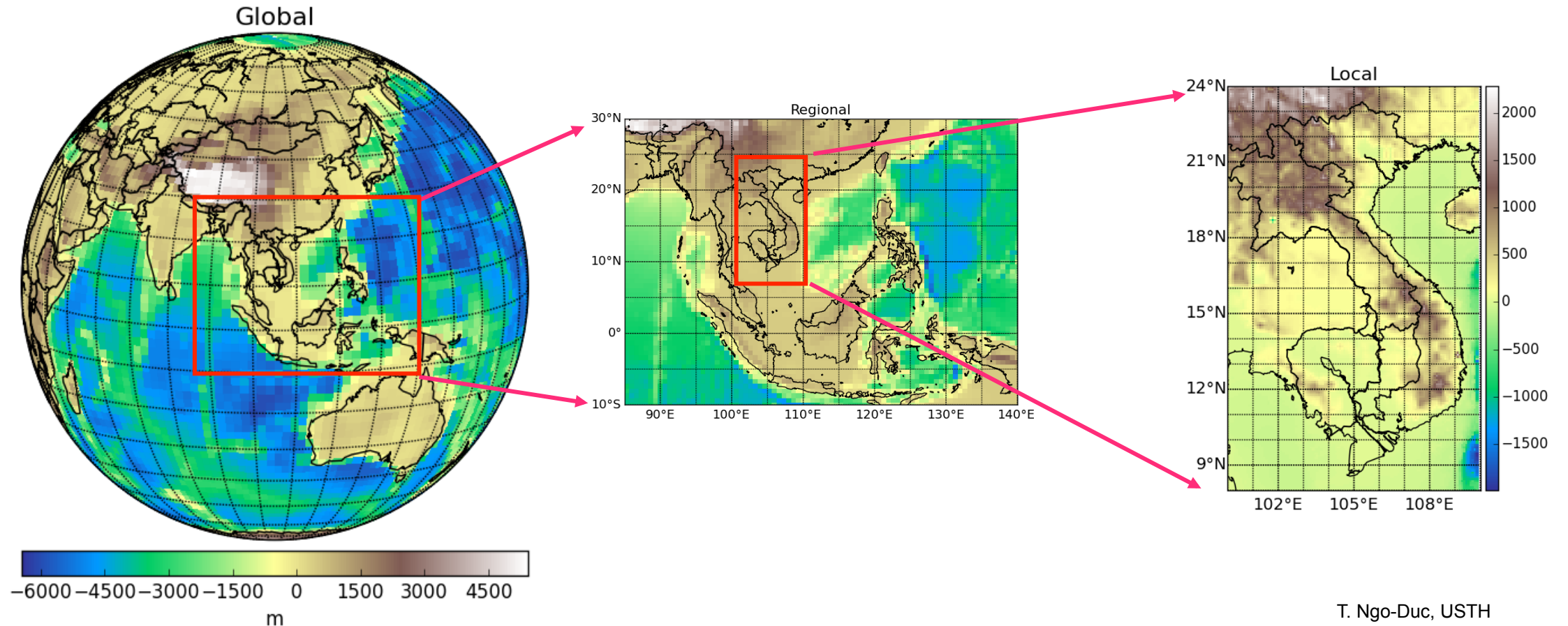
- > Active epidemiological investigations
- > either on Dengue (Cambodia, Lao) or Leptospirosis (Myanmar, Vietnam)



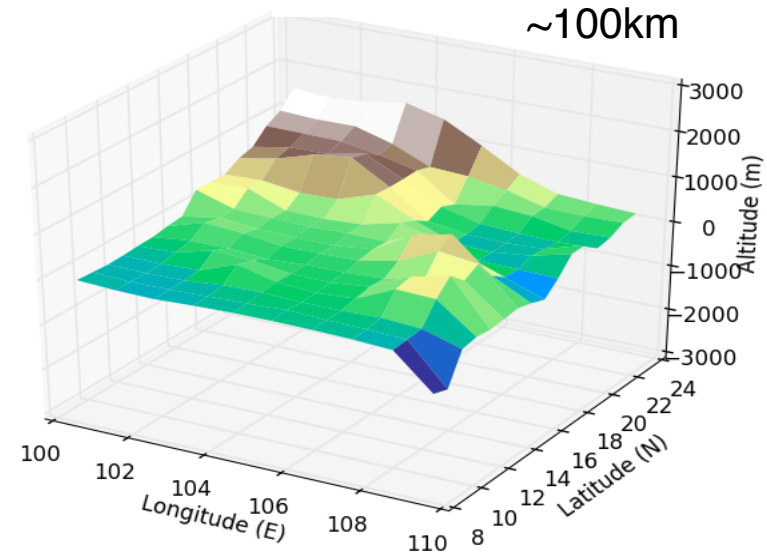
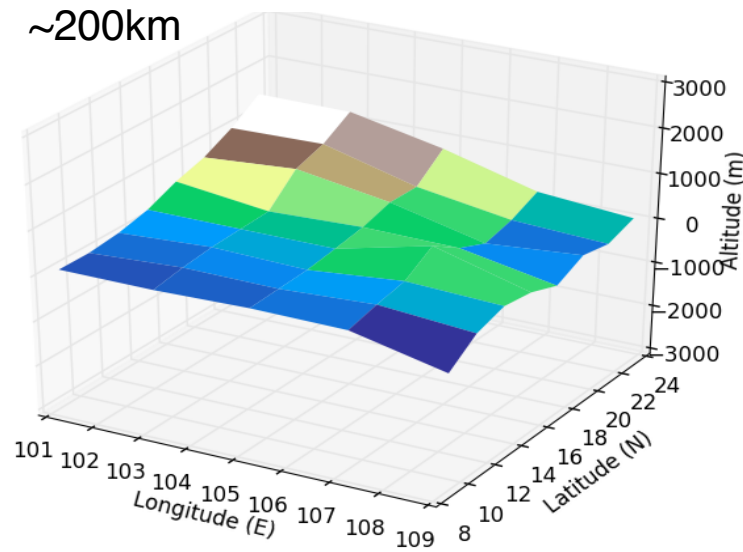
# Climate Change Simulations at multiple spatial scales

## Regional climate modelling

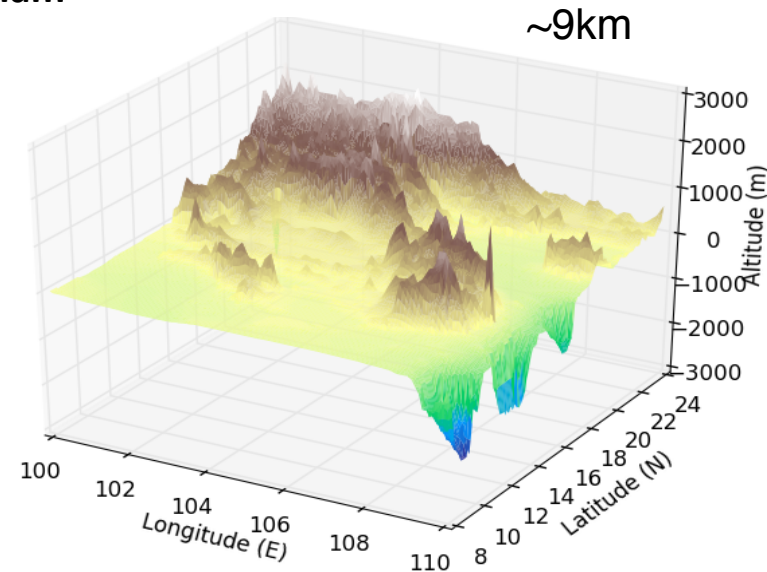
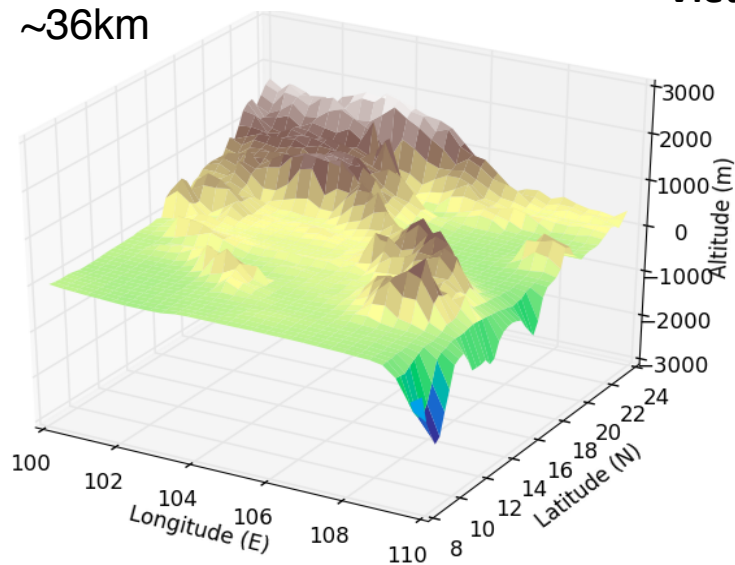
- Added Values (fine scale forcing, mesoscale circulation, extremes)
- Better simulation -> Better Climate Change Projections



# Climate Change Simulations at multiple spatial scales



Vietnam



# An archive of state-of-the-art climate simulations by CORDEX-SEA

## RegCM

- 25 km
- RCP 4.5
- RCP 8.5

## CCAM

WRF

PRECIS

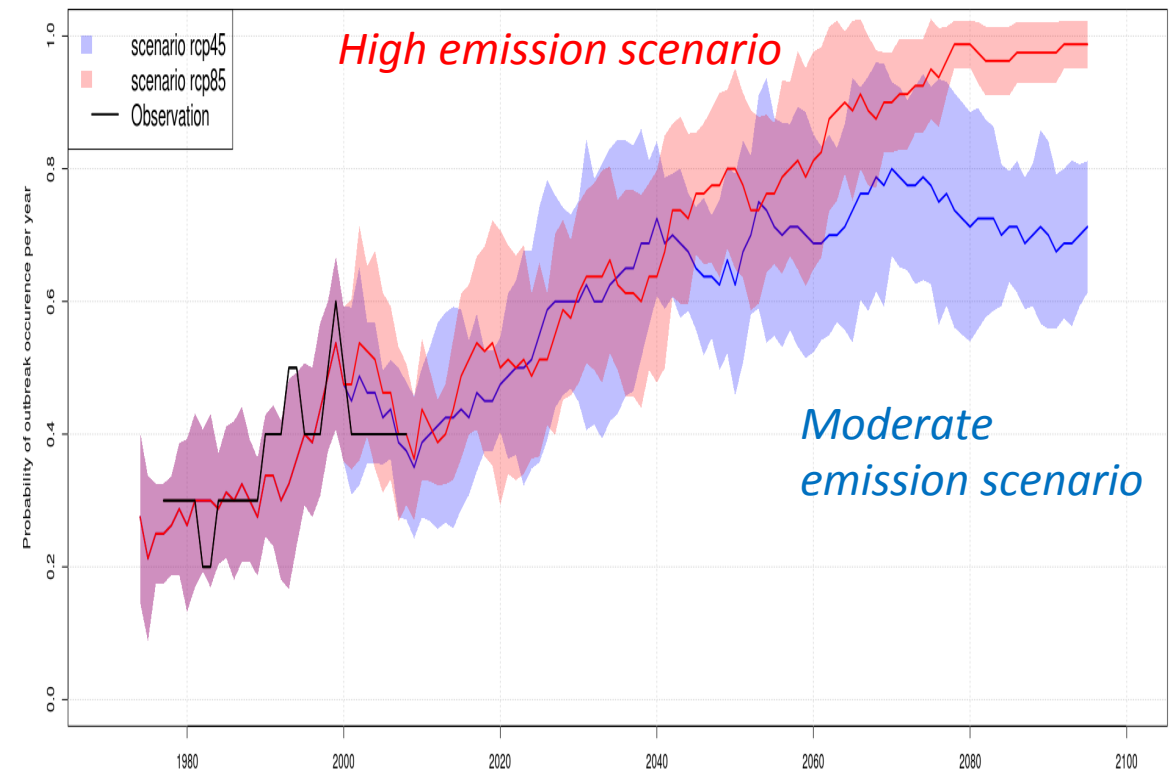
REMO

Country	GCMs	Country and Institution developed the GCMs	RCPs
Vietnam	CNRM-CM5	Centre national de Recherches Meteorologiques, France	RCP8.5, 4.5
Philippines	HadGEM2	Hadley Centre, UK	RCP8.5, 4.5
Thailand	MPI-ESM-MR	Max Planck Institute for Meteorology, Germany	RCP8.5, 4.5
Thailand	EC-Earth	EC-Earth consortium	RCP8.5, 4.5
Indonesia	ACCESS1.3	CSIRO, Australia	RCP8.5, 4.5
Malaysia	CanESM2	Canadian Centre for Climate Modeling and Analysis, Canada	RCP8.5, 4.5
Malaysia	IPSL-CM5A-LR	Institute Pierre-Simon Laplace, France	RCP8.5, 4.5
Malaysia	GFDL-ESM2M	GFDL, USA	RCP8.5, 4.5
Australia	CNRM-CM5	Centre national de Recherches Meteorologiques, France	RCP8.5
Australia	CCSM4	NCAR, USA	RCP8.5
Australia	ACCESS1.3	CSIRO, Australia	RCP8.5
Hong Kong SAR	CCSM or CESM	NCAR, USA	RCP8.5, 4.5
United Kingdom	HadGEM2-ES	Hadley Centre, UKMO	RCP8.5, 4.5
South Korea	HadGEM2-AO	Hadley Centre, UKMO	RCP8.5, 4.5

# Next steps: Analysis of scenarios of climate change and impacts on disease dynamics

- Analysis of climate change scenarios in South East Asia: how temperature, rainfall will evolve in the regions?
- Application of climate change scenarios to the disease risk models to identify the evolution of the risk of disease: how climate change will affect health risk?

Probability of dengue outbreak occurrence in New Caledonia



*Outputs: Production of future risk maps under climate change, evaluation of attenuation potential*



## Next steps: Decision Support Tool for disease risk management

- Design an interactive open-public platform, where each user will be able to visualize and interact with maps of climate change scenarios and impacts in terms of health of the entire region of the ECOMORE2 Project.
- Highlight regions of major risk under climate change in order to guide public health policies. Researchers and decision-makers could use such information in their strategy making, as well as for teachers and professors for dissemination purpose

- Picture

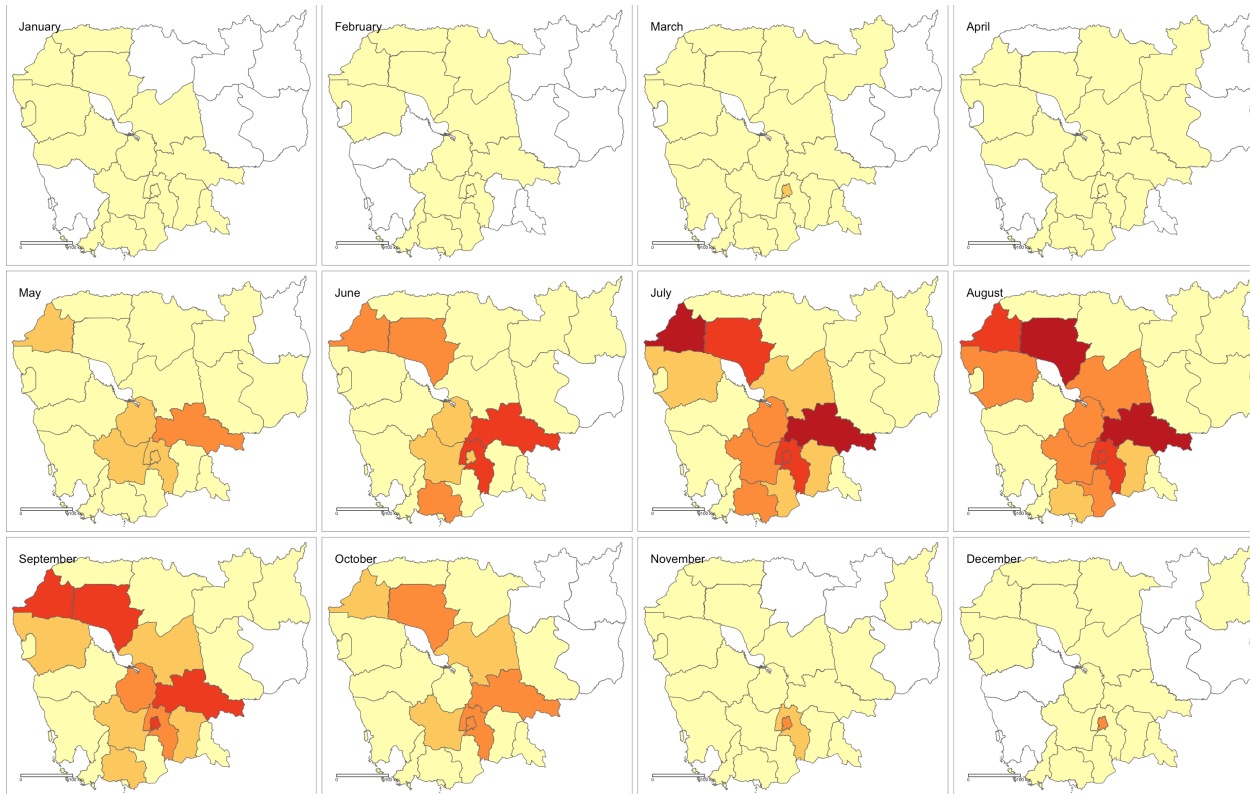


*Outputs: Design of a perennial Web-based platform to visualize current and future disease and vector risks*

# Ecomore 2 spatial database

## Acquire and integrate available databases:

- Epidemiological information
- Socio-demographic data

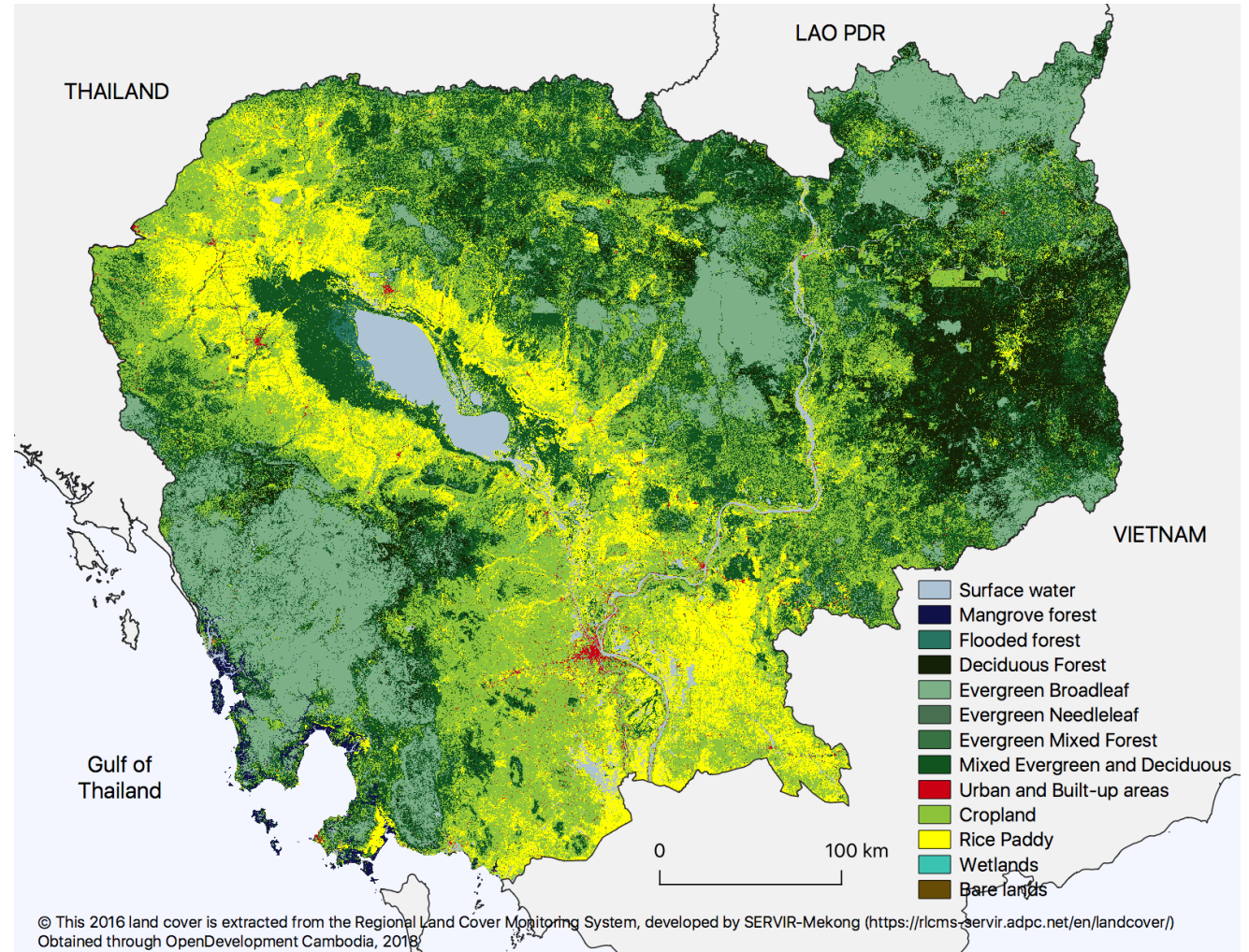


1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

# Ecomore 2 spatial database

## Acquire and integrate available databases:

- Epidemiological information
- Socio-demographic data
- Environmental information
- Topographic information
- Meteorological information



# Ecomore 2 spatial database

## Build complementary information:

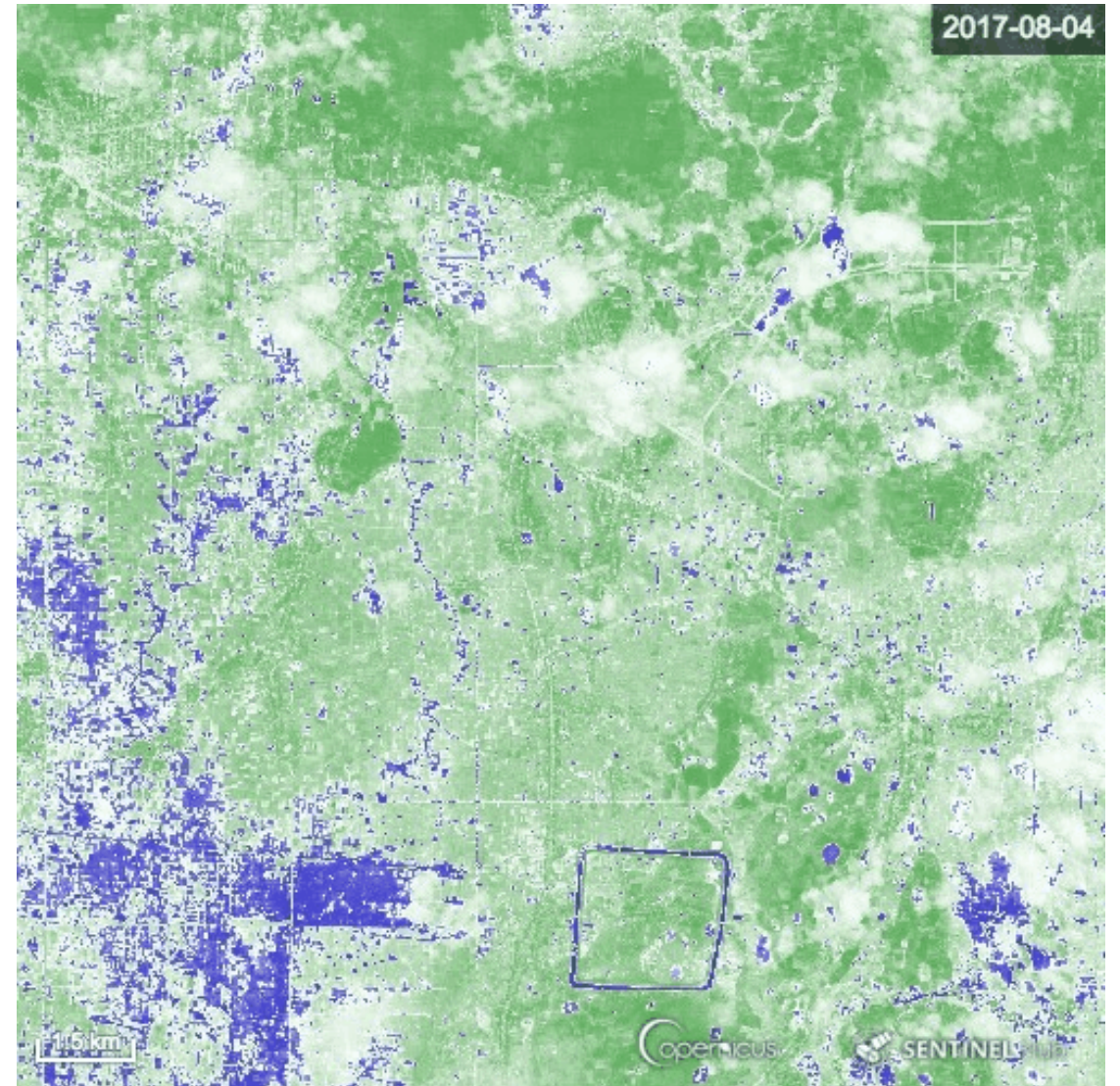
- Remote sensing analysis of environment
  - Land Use / Land Cover classifications



# Ecomore 2 spatial database

## Build complementary information:

- Remote sensing analysis of environment
  - Land Use / Land Cover classifications
  - Time series of environmental indices (ex: vegetation or water indices)



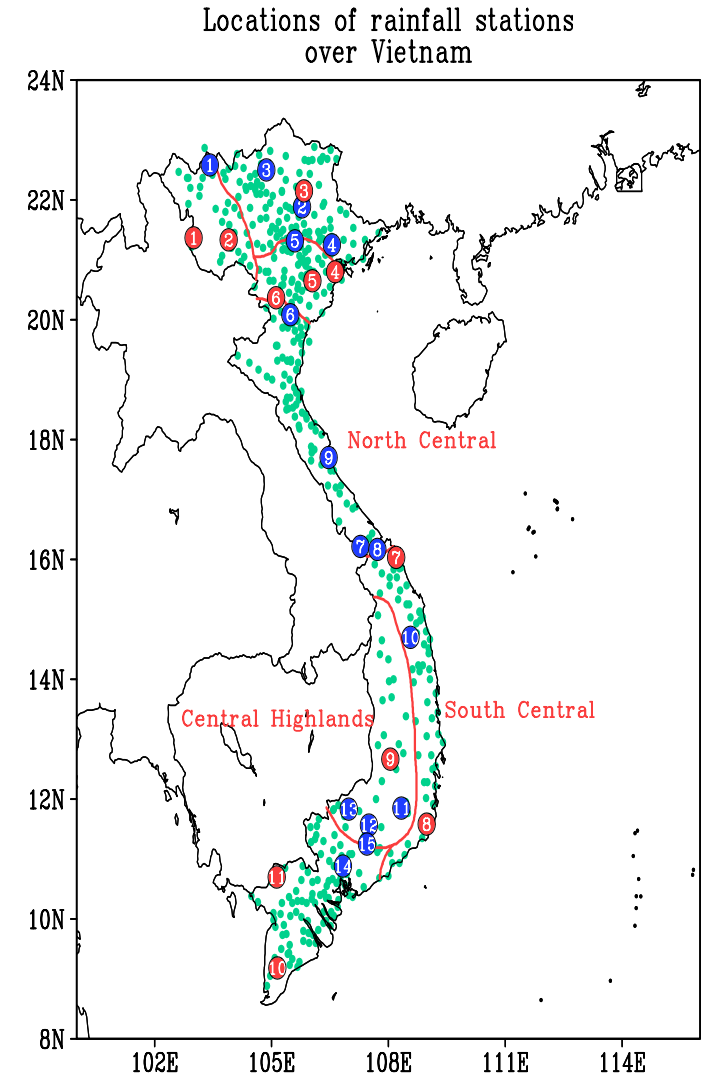
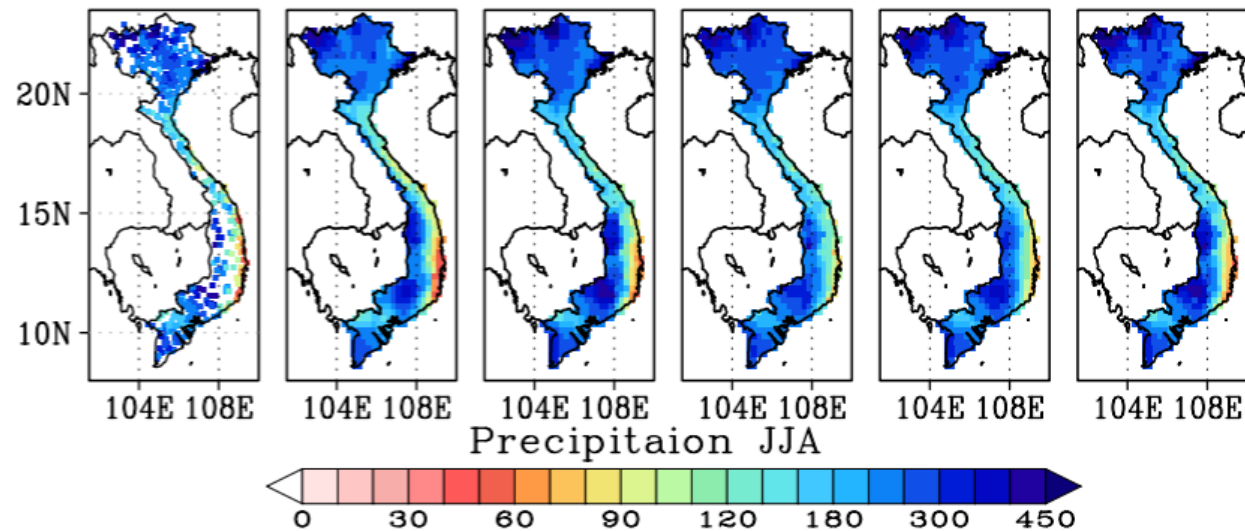
Detection of water using Sentinel-2 images

# Ecomore 2 spatial database

## Build complementary information:

- Remote sensing analysis of environment
  - Land Use / Land Cover classifications
  - Time series of environmental indices (ex: vegetation or water indices)
- Gridded meteorological datasets

-> Vietnam Gridded Precipitation (VnGP) Dataset (Nguyen, Ngo-Duc et al., SOLA, 2016), based on 481 stations, 1980-2010, daily observations, resolution: 0.25°, 0.1°



# Ecomore 2 spatial database

## Build complementary information:

- Remote sensing analysis of environment
  - Land Use / Land Cover classifications
  - Time series of environmental indices (ex: vegetation or water indices)
- Gridded meteorological datasets
- Precise cartography of study sites

***-> Effort to use open data and open-source softwares and share the data produced***



## Training & capacity building

- Trainings should **focus on key persons** that need and will get autonomy in spatial analysis
- Proposition to have a WP Climate “referent” in each country:
  - The referents will received a set of trainings in compensation of their involvement in the project
  - Contribute to interactions between WPs
- **Proposal:**
  - Main training (plan 1<sup>st</sup> Semester 2019 in Cambodia): topic to be discussed
  - Short modules / remote trainings
  - Follow-up of main training / methodological discussions
  - Host participants to work on a specific task



# Main training

- **Possible topics / needs**
  - Review of the possible contribution of geomatics tools for health studies
  - Handling specific softwares and methods:
    - Geographic Information Systems and spatial analyses:
      - Basics / advanced use
      - with QGIS and/or R
    - Geostatistical analyses
    - Remote sensing
      - Land Use / Land Cover classifications with Object-Based Image Analysis (OBIA)
      - Time series analyses
    - Climate
  - Discussions on each case study
- **Proposal:**
  - Possibly, between March and June 2019

# Short modules / remote trainings

- Organized through video-conference
- Short modules : few hours
- With oral presentations and tutorial for practical exercises

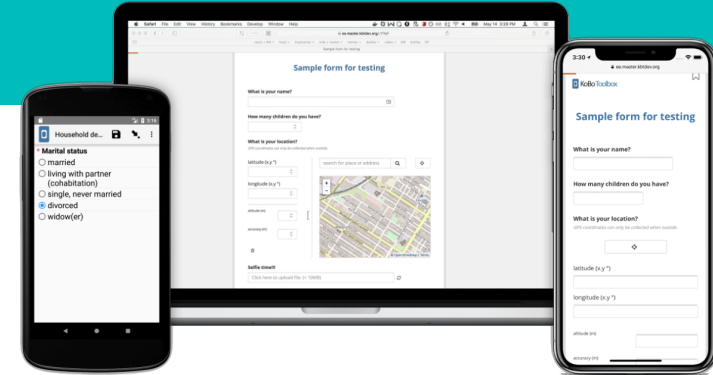
The screenshot displays a remote training session interface. The main window shows a QGIS 2.18.4 application with a map of West Africa. The map features a blue shaded area representing a specific region, with a purple polygon overlaid on it. The QGIS interface includes a toolbar, a layer list on the left, and a console at the bottom.

On the right side of the interface, there are several panels:

- Notes 11:** Contains text instructions: "Télécharger le support de TP support - tuto QGIS suite.pdf", "Dans QGIS, installer les extensions World Bank Data FAOSTAT Data Downloader TRMM Data Downloader", and "Accès aux données TRMM S'enregistrer sur le site PPS : <https://registration.pps.eos.nasa.gov/registration/newContact.html>".
- Vidéo (1):** Shows a video feed of Vincent Herbreteau.
- Participants (27):** Lists active participants, including Vincent Herbreteau, Abdourahamane DIALLO, Abdourahim CISSE, and Aissatou sarassa SOUGOU.
- Conversation (Tout le monde):** Displays a chat log with messages from participants like Kossi dovone ABALO, Marie-astrid BERNON, Gaspard LOUA, and Shabani KAMENA.

# Short modules / remote trainings

- Possible topics:
  - Mobile Data Collection / KoboToolbox



Criteria for the choice of health structure	Yes	No	No Opinion
Proximity	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Reputation	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

A screenshot of the KoboToolbox web interface. The browser address bar shows the URL: https://kf.kobotoolbox.org/#/forms/aPS6qqwEpNzeyuiwufZ5P/data/map. The page title is 'KbT exercise' and it shows '7 submissions'. The interface includes a navigation menu with options like 'NEW', 'Reports', 'Table', 'Gallery', 'Downloads', and 'Map'. The main area displays a map with several red location markers. A 'Disaggregate by survey responses' button is visible at the bottom of the map.

# Short modules / remote trainings

- Possible topics:
  - Mobile Data Collection / KoboToolbox
  - Participatory mapping / OpenStreetMap
  - Web mapping

