Surveillance and early warning systems for climate sensitive diseases in Vietnam and Laos

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Workshop on climate change and health
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CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security
CCAFS

Outline

- Introduction of Pestforecast
- Study design in Vietnam
- Preliminary outputs in Vietnam
- Activities in Laos
  - ICRAF in China
  - VSF

Pestforecast

Main objective: develop tools to forecast climate-sensitive diseases (CSD) in Vietnam and Laos

i) Developi … and Laos

ii) Developi … for CSD

iii) Exploring … model for aflatoxins

iv) Climate s … for rubber plantation

Japanese encephalitis
- A vector-borne virus disease
- 3 billion people live in endemic areas
- Fatality rate reached 60% in humans
- Pigs are the main amplifying hosts

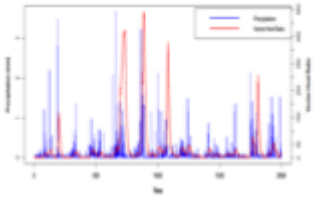
Leptospirosis
- A bacterial disease, outbreak is associated with heavy rainfall
- Fatality rate from 5% to 30% in humans
- Rodents, pigs, horses, dogs and sheep/goats are the common reservoirs.

Aflatoxin-associated diseases
- Toxin produced by Aspergillus spp.
- Fungi infect crops and animals via feed
- Responsible for around 1 in 4 human cases of live cancer

Early Warning and Forecasting System concept

Met-Data

Model development: Forecast, mapping



Decision support tools

Notification to farmers

Farmers

Climate sensitive diseases data
- Surveillance system
- Field survey

Responses
- Vaccination
- Harvesting
- Selling
- …

Adapted from ICRAF (2014)

Study design in Vietnam

Specific objectives

- **To evaluate the sero-prevalences of CSD in humans and pigs in Vietnam**
  - Understanding the epidemiology of CSD
  - Developing risk maps with GIS datasets (such as NDVI and elevation etc.)

- **To evaluate the association between CSD and climate factors**
  - Developing a model for prediction (such as time-series analysis)
  - Identifying potential risk factors (including climate factors)

- **To measure the awareness/perception of CSD among people**

Introduction of Partners in Vietnam

- **National Institute of Veterinary Research (NIVR)**
  - JE, leptospirosis and Aflatoxin M1 in swine
  - Urine/Serum samples from slaughterhouses
  - Demographic information will be collected
  - Perception / knowledge of diseases will be measures

- **Department of Animal Health (DAH) / FAO**
  - JE and leptospirosis in swine
  - Use of serum samples for EPT+ program and Swine influenza surveillance

- **Plant Protection Department (PPD)**
  - Aflatoxin B1 in maize
  - Maize samples from farms, local markets and retailers
  - Perception / knowledge of diseases will be measures

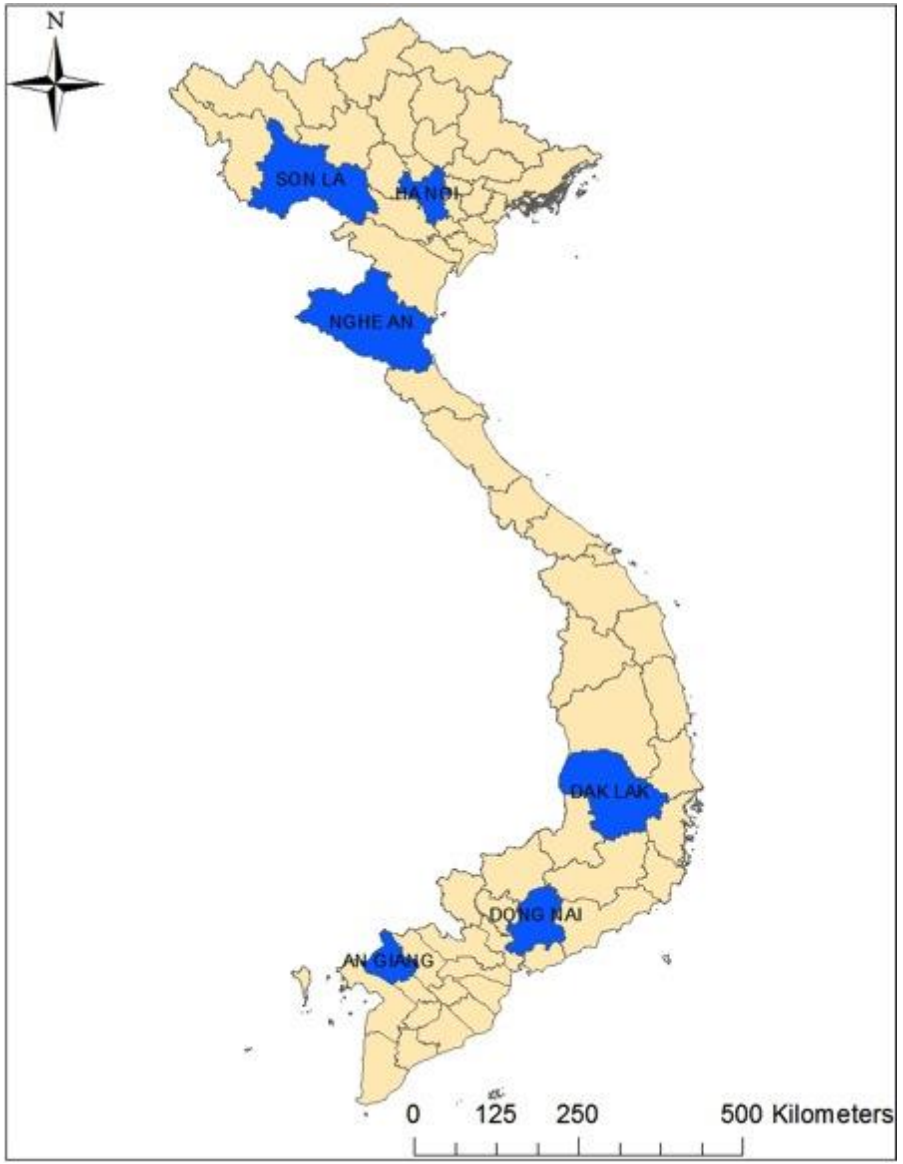
Introduction of Partners in Vietnam

- **Institute of Meteorology, Hydrology and Climate change (IMHEN)**
  - Climate data from 1960 to 2014 at province/station level
  - Precipitation, temperature, pressure and humidity etc..

- **Ministry of Health (MoH) and Hanoi School of Public Health (HSPH)**
  - Human cases for viral encephalitis (VE) and leptospirosis from 1970 to 2013 at province level

Sampling areas in Vietnam (NIVR and PPD)

- 6 provinces based on agro-ecological zones
- 2,310 maize/swine urine samples
  - 385 samples / province
  - Aflatoxin B1&M1
- 1,936 swine serum samples
  - 323 samples / province
  - JE and leptospirosis
- Demographic information will be collected

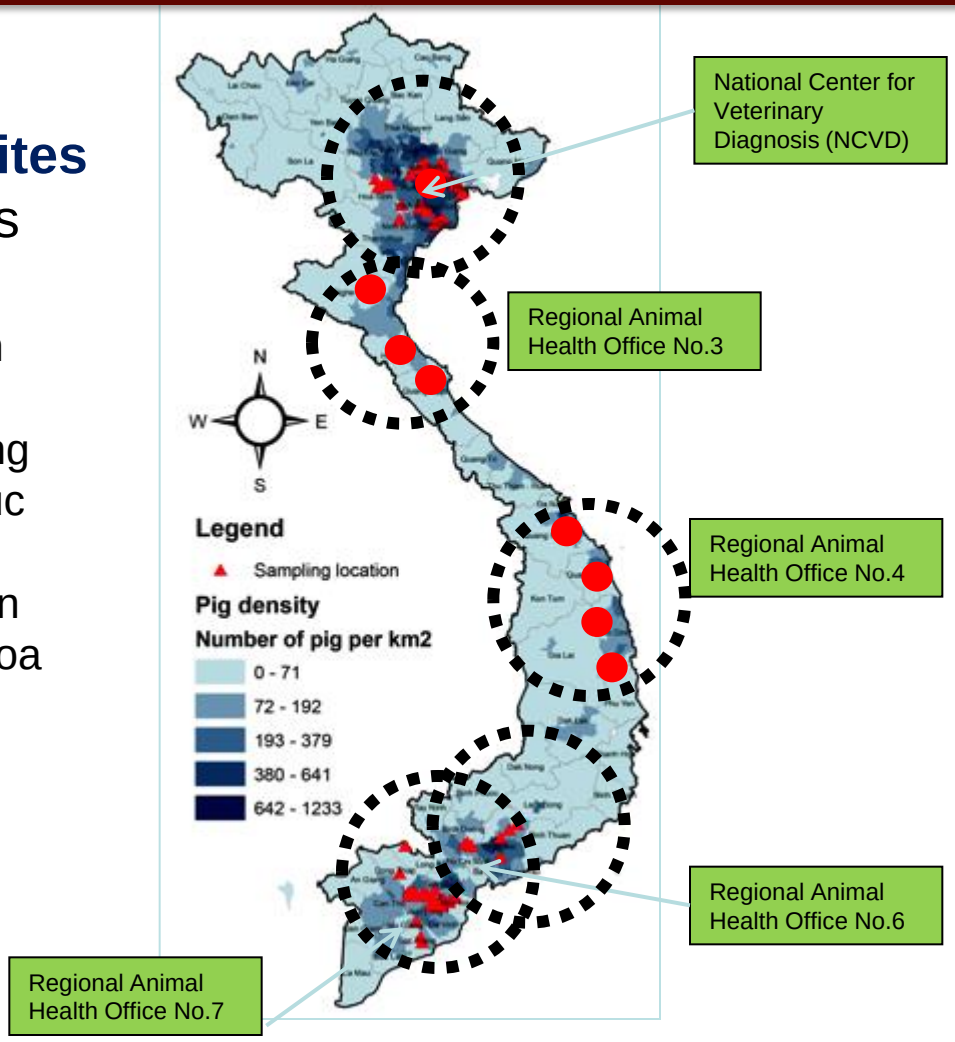


Sampling areas in Vietnam (DAH) – JE and lepto

Sampling sites

19 Provinces

- North:
  - 1 Bac Ninh
  - 2 Ha Noi
  - 3 Hai Phong
  - 4 Vinh Phuc
  - 5 Ha Nam
  - 6 Hung Yen
  - 7 Thanh Hoa
  - 8 Nghe An
  - 9 Ha Tinh



- Central
  - 10 Quang Nam
  - 11 Quang Ngai
  - 12 Phu Yen
  - 13 Binh Dinh

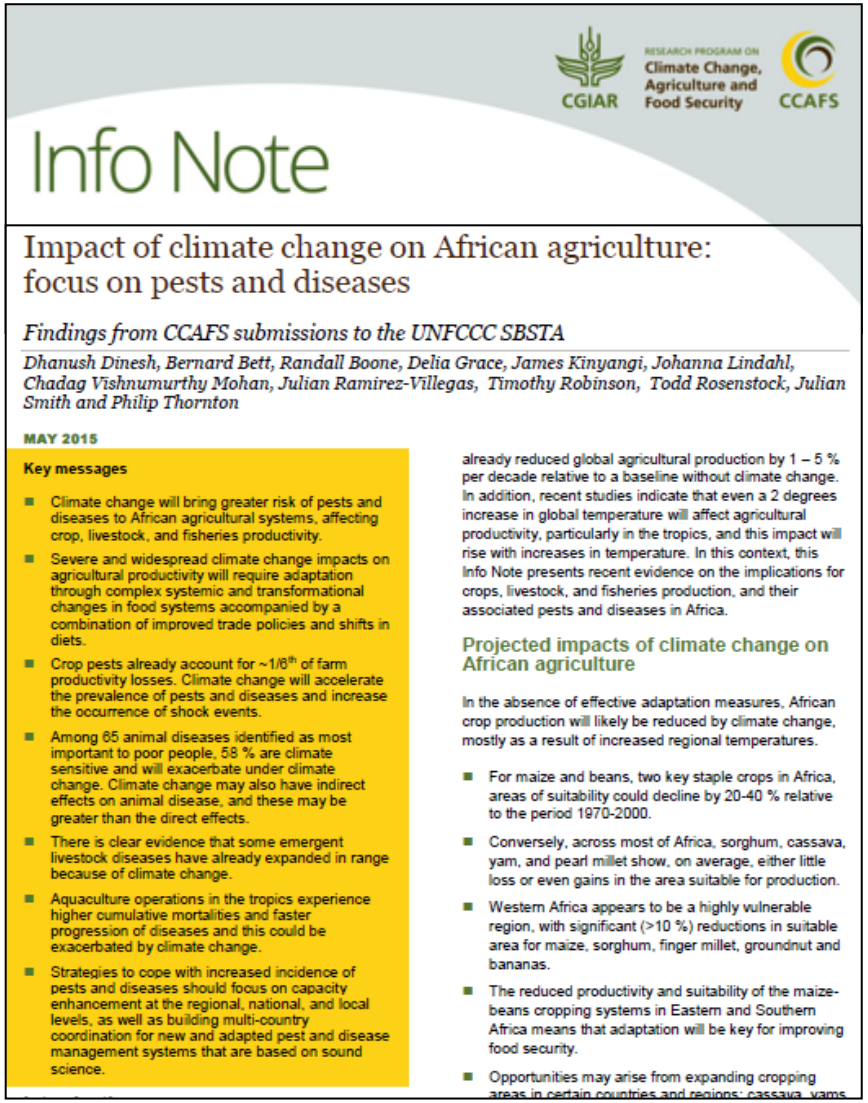
- South:
  - 14 Dong Thap
  - 15 Vinh Long
  - 16 Dong Nai
  - 17 Ben Tre
  - 18 Binh Duong
  - 19 Soc Trang

No. of samples (Sow)	No. of samples (Piglet)	Total samples
740	1,690	2,430

EPT+

Preliminary outputs in Vietnam

Some early outputs



CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security CCAFS

Info Note

Impact of climate change on African agriculture: focus on pests and diseases

Findings from CCAFS submissions to the UNFCCC SBSTA

Dhanush Dinesh, Bernard Bett, Randall Boone, Delia Grace, James Kinyangi, Johanna Lindahl, Chadag Vishnumurthy Mohan, Julian Ramirez-Villegas, Timothy Robinson, Todd Rosenstock, Julian Smith and Philip Thornton

MAY 2015

Key messages

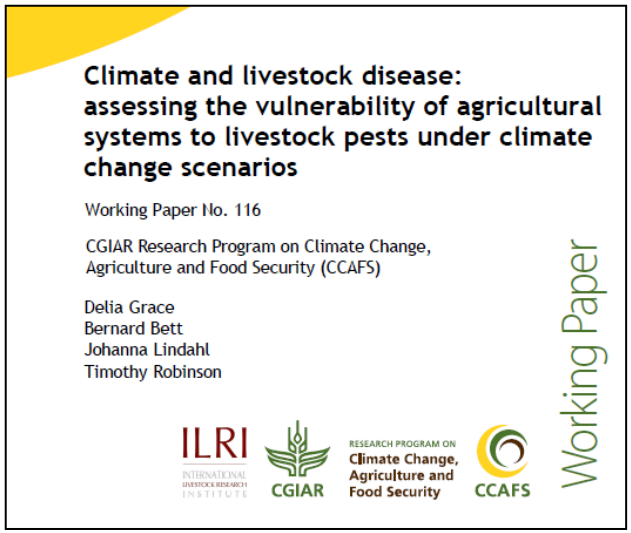
- Climate change will bring greater risk of pests and diseases to African agricultural systems, affecting crop, livestock, and fisheries productivity.
- Severe and widespread climate change impacts on agricultural productivity will require adaptation through complex systemic and transformational changes in food systems accompanied by a combination of improved trade policies and shifts in diets.
- Crop pests already account for ~1/6th of farm productivity losses. Climate change will accelerate the prevalence of pests and diseases and increase the occurrence of shock events.
- Among 65 animal diseases identified as most important to poor people, 58 % are climate sensitive and will exacerbate under climate change. Climate change may also have indirect effects on animal disease, and these may be greater than the direct effects.
- There is clear evidence that some emergent livestock diseases have already expanded in range because of climate change.
- Aquaculture operations in the tropics experience higher cumulative mortalities and faster progression of diseases and this could be exacerbated by climate change.
- Strategies to cope with increased incidence of pests and diseases should focus on capacity enhancement at the regional, national, and local levels, as well as building multi-country coordination for new and adapted pest and disease management systems that are based on sound science.

already reduced global agricultural production by 1 – 5 % per decade relative to a baseline without climate change. In addition, recent studies indicate that even a 2 degrees increase in global temperature will affect agricultural productivity, particularly in the tropics, and this impact will rise with increases in temperature. In this context, this Info Note presents recent evidence on the implications for crops, livestock, and fisheries production, and their associated pests and diseases in Africa.

Projected impacts of climate change on African agriculture

In the absence of effective adaptation measures, African crop production will likely be reduced by climate change, mostly as a result of increased regional temperatures.

- For maize and beans, two key staple crops in Africa, areas of suitability could decline by 20-40 % relative to the period 1970-2000.
- Conversely, across most of Africa, sorghum, cassava, yam, and pearl millet show, on average, either little loss or even gains in the area suitable for production.
- Western Africa appears to be a highly vulnerable region, with significant (>10 %) reductions in suitable area for maize, sorghum, finger millet, groundnut and bananas.
- The reduced productivity and suitability of the maize-beans cropping systems in Eastern and Southern Africa means that adaptation will be key for improving food security.
- Opportunities may arise from expanding cropping areas in certain countries and regions: cassava, yams



Climate and livestock disease: assessing the vulnerability of agricultural systems to livestock pests under climate change scenarios

Working Paper No. 116

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Delia Grace
Bernard Bett
Johanna Lindahl
Timothy Robinson

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Working Paper

Forum

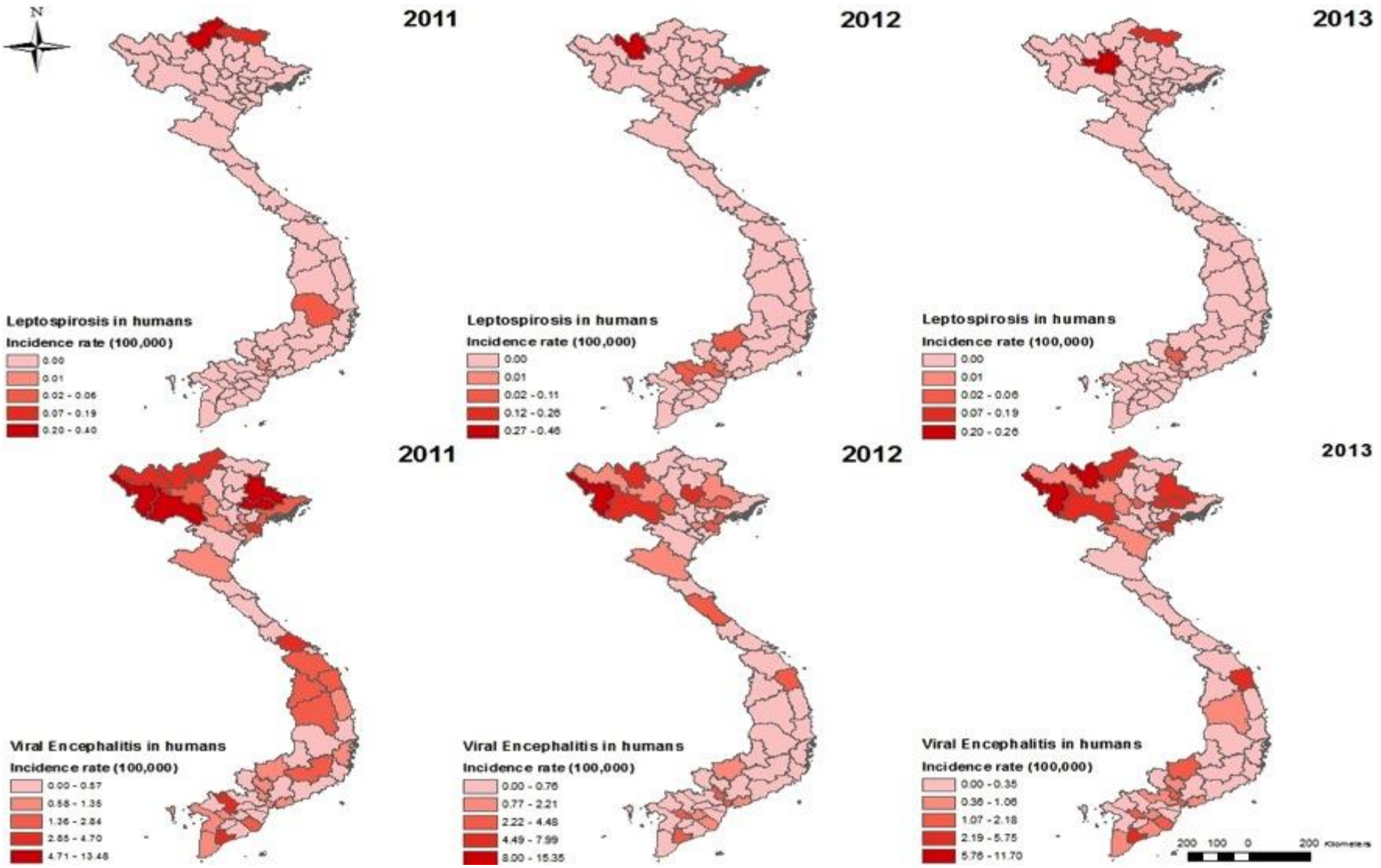
EcoHealth

Toward Operational Criteria for Ecosystem Approaches to Health

Carsten H. Richter,[1,2] Jennifer A. Steele,[3] Hung Nguyen-Viet,[4,5] Jianchu Xu,[6] and Bruce A. Wilcox[7]

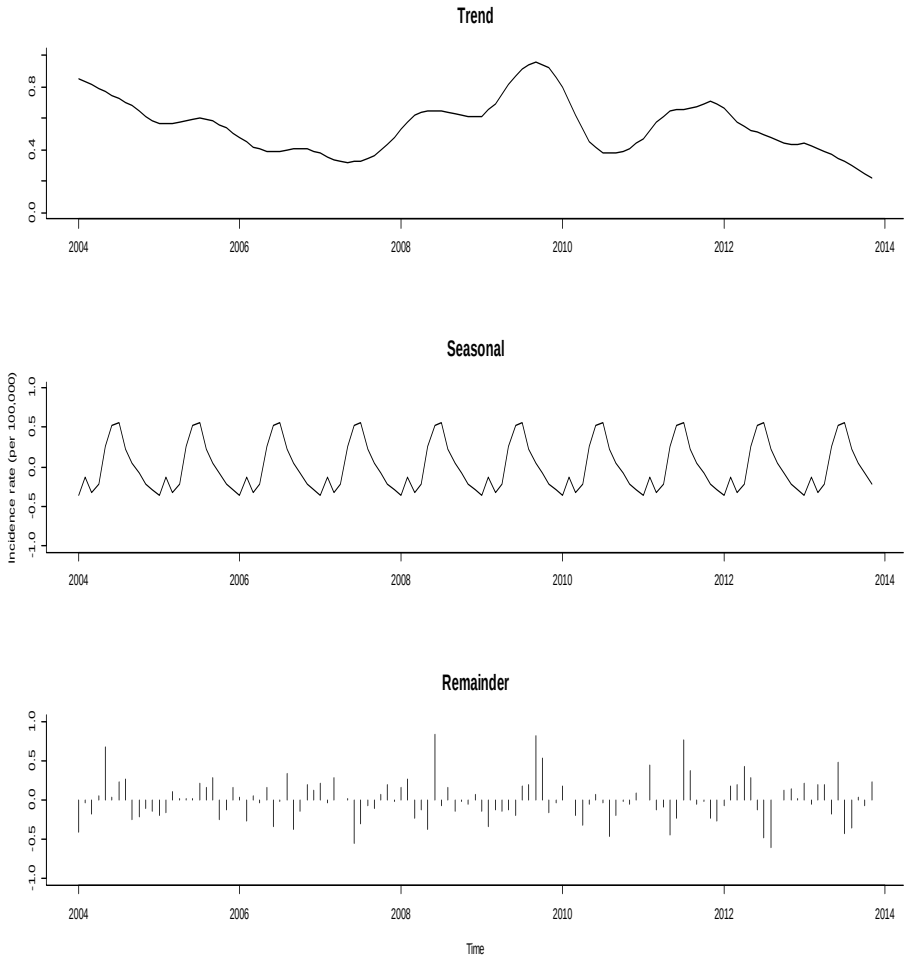
Systematic literature review of zoonotic diseases and aflatoxins in Vietnam

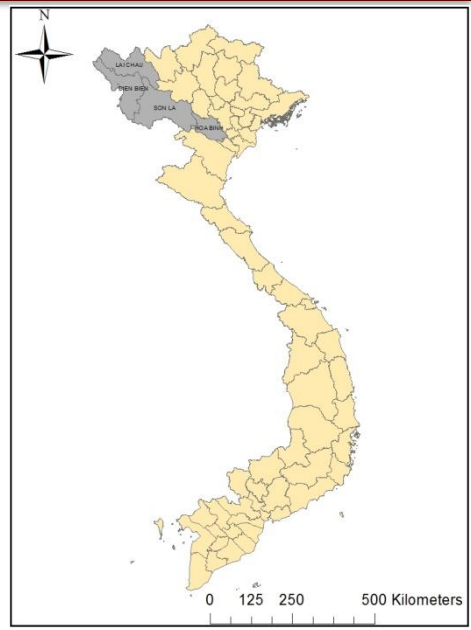
Annual incidence rates for lepto and VE in humans



*Previous study showed that 17~71% of VE were caused by JE in Vietnam

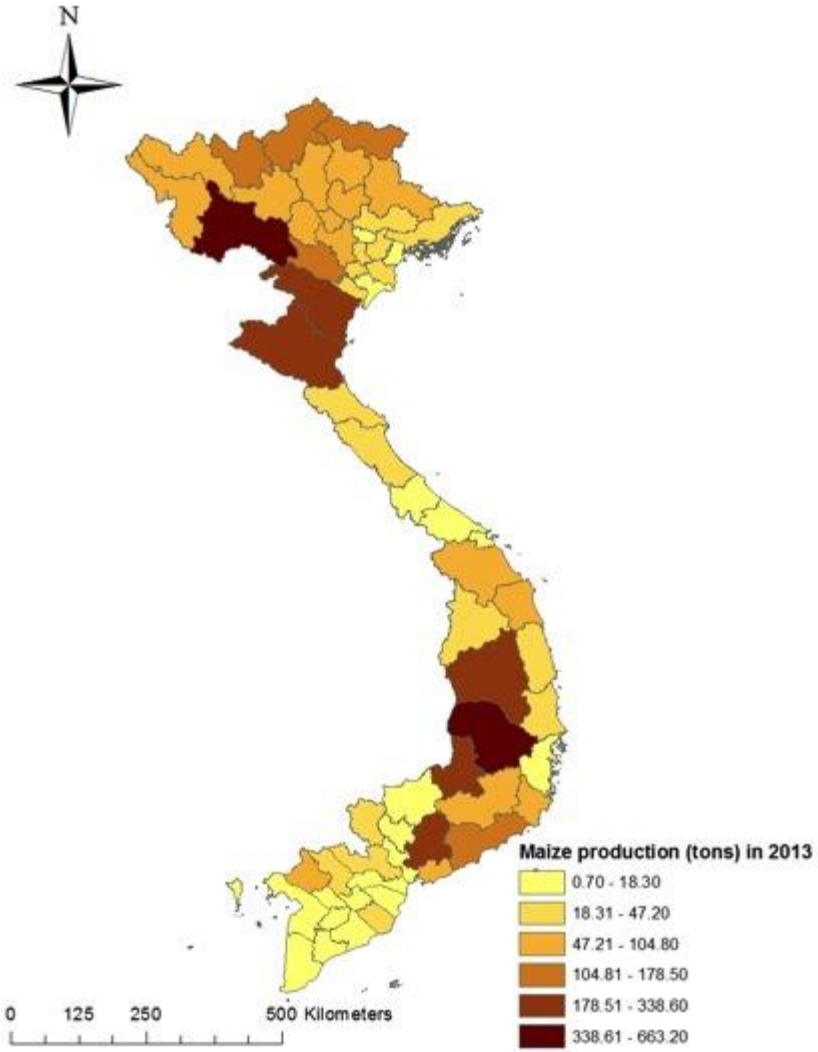
Seasonality of VE in humans between 2004 and 2013 (Dien Bien, Hoa Binh, Lai Chau and Son La)

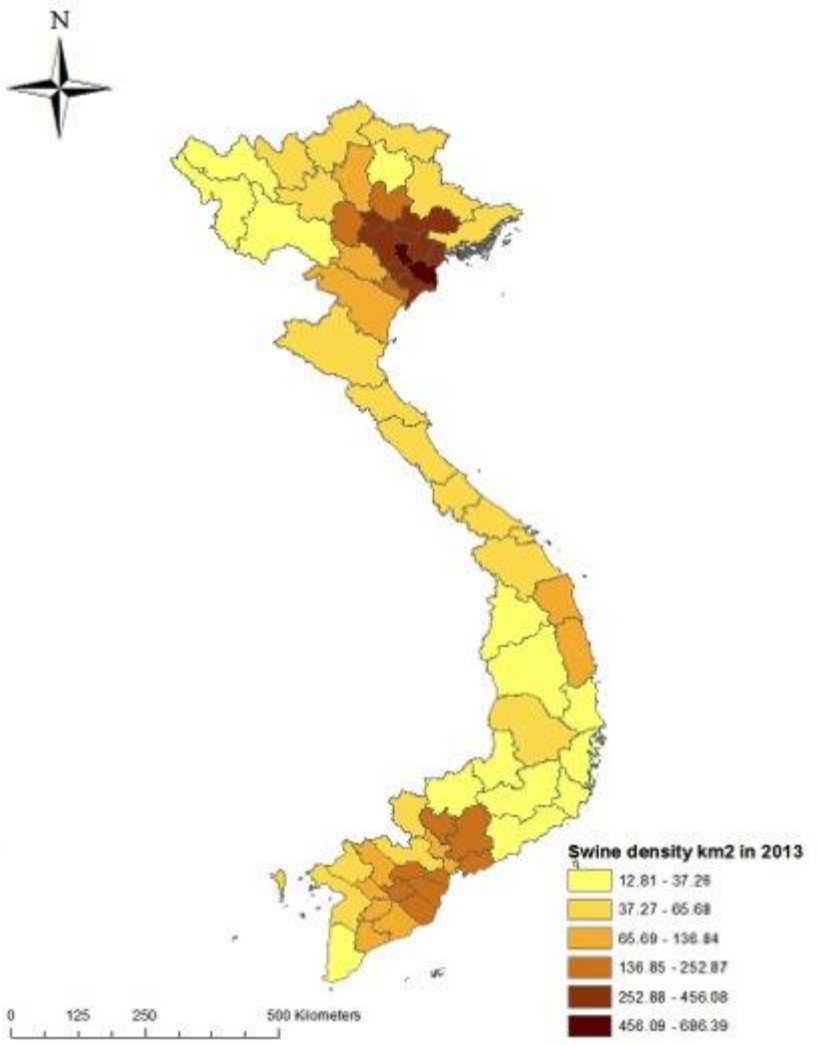




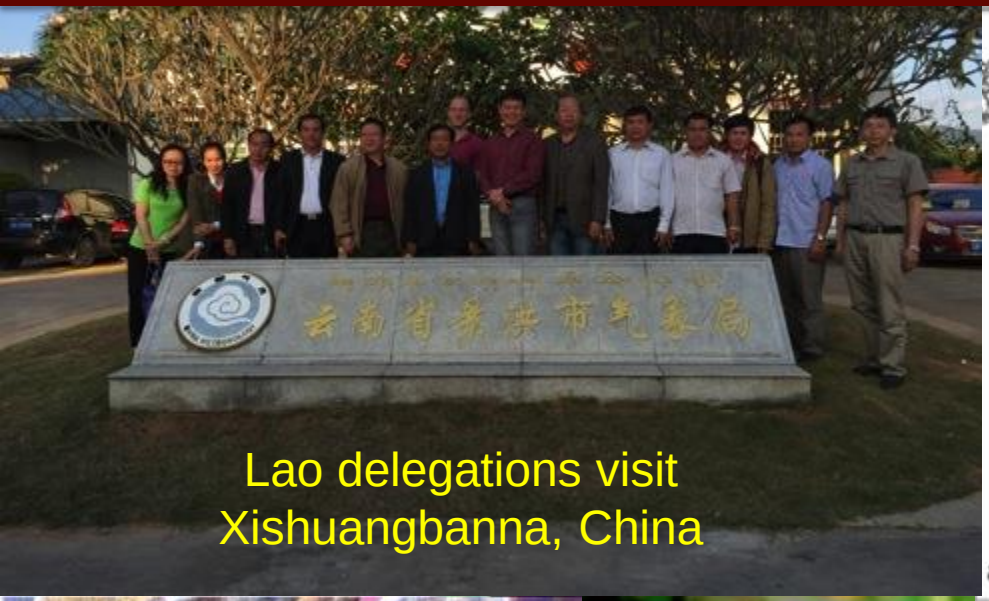
*Previous study showed that 17~71% of VE were caused by JE in Vietnam

Maize production (tons) and swine density (km^2) in 2013





Activities in Laos by ICRAF Activities in 2015



Lao delegations visit
Xishuangbanna, China

Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloenvcha

Current trends of rubber plantation expansion may threaten biodiversity and livelihoods☆

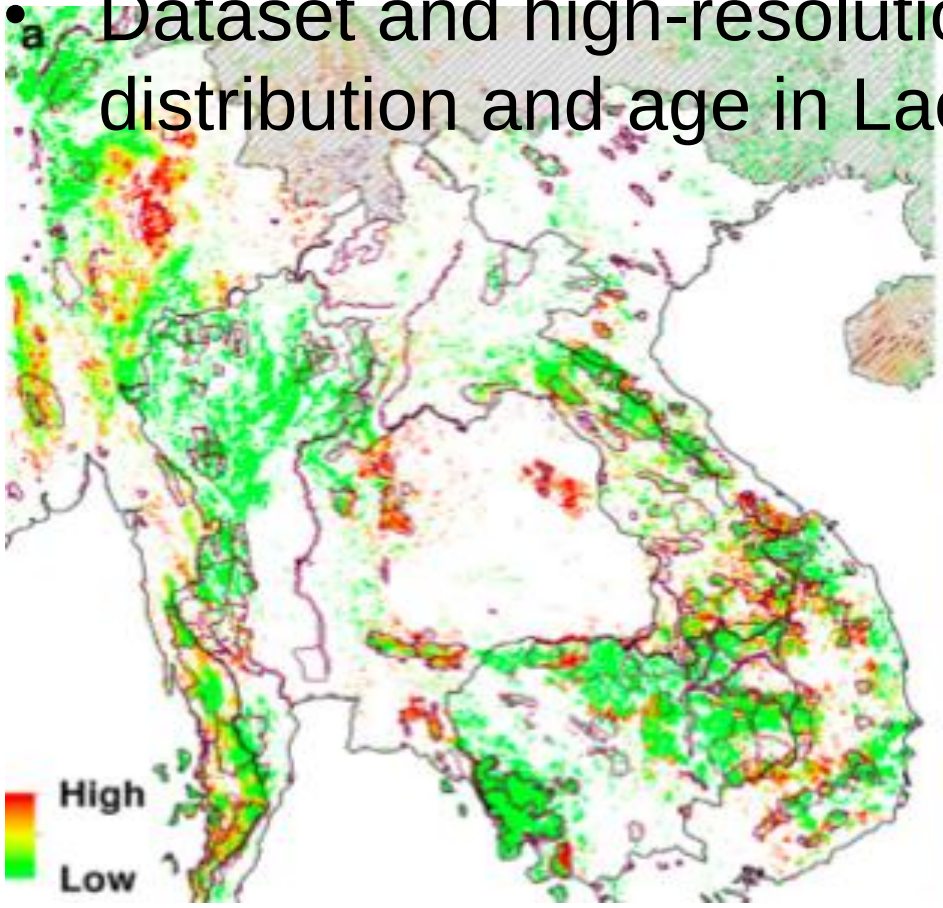
Antje Ahrends[a,b,1,*], Peter M. Hollingsworth[b,a], Alan D. Ziegler[c], Jefferson M. Fox[d], Huafang Chen[a,e], Yufang Su[a,e], Jianchu Xu[a,e,1,**]

Climatic risks assessment for rubber plantation

Early warning model for rubber disease

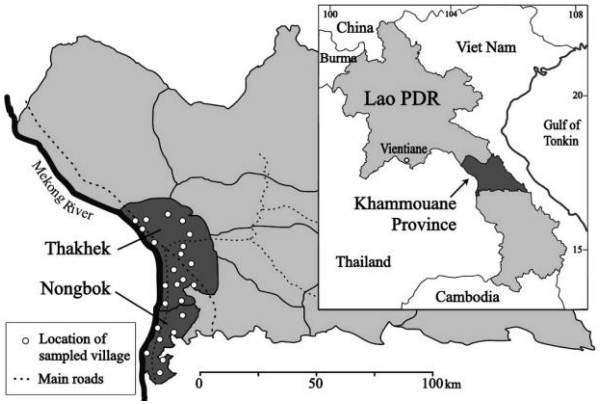
Activities in Laos by ICRAF Planning for 2016

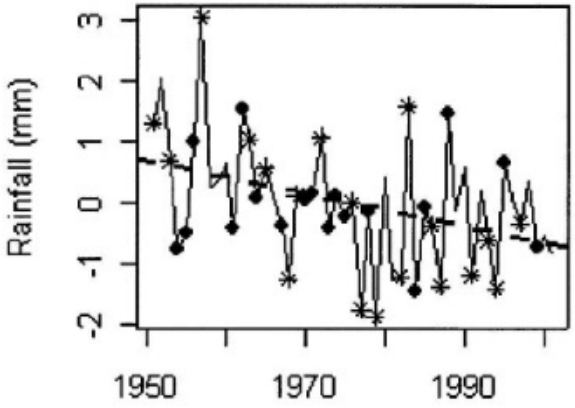
- Early warning model for rubber disease（continue）
- Map detailing geographic suitability for growing rubber trees (with profitability) in Laos
- Dataset and high-resolution map detailing rubber distribution and age in Laos.



Activities in Laos by VSF in 2015

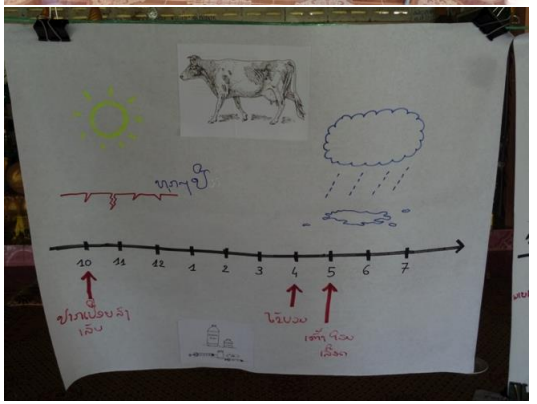
- Getting Operation Permit and writing of MOU
- Setting up of a Pest Forecast team in the Faculty
- Literature review:
  - Lepto: 23,9% seroprev. in humans (Southern Laos)
  - JE: 2,3% seroprev. in pigs (Northern Laos)
  - Climate change: drier, more tightly linked to ENSO
- Project introduction to Department of Livestock and Fishery
- Meeting with partners
  - Lao Lux Laboratory: Analyses
  - IRD: prediction model for JE in SEA
  - CIRAD: pig samples from other areas
  - LOMWRU: human samples & data
  - IRAS: Climate resilient agriculture practices manual





Activities in Laos by VSF in 2016

- Risk map for JE & Lepto
  - Not enough data available for case map
    - Only few surveys
    - No record of animal cases
- Sampling: high risk area & season
  - To confirm risk factors and map
- Development of prevention package for farmers
  - Broad range of animal diseases: not only JE and Lepto
  - Introduced during village meeting
- Early warning system for pilot farmers
  - Using Verboice
  - Remind farmers on when applying prevention measures
- Follow up
  - Check implementation of prevention measures
  - Case alert from farmers & disease confirmation by team



Key partners

CGIAR centers
- ILRI (Africa and E&SE Asia)
- ICRAF (China, Vietnam)

Vietnam
- NIVR, Department of Animal Health and Plant protection (MARD)
- IMHEN (MONRE)
- Hanoi School of Public health /CENPHER
- Provincial DARDs

Laos
- NAFRI
- National University of Laos
- Provincial government in northern Laos
- Meteorological Bureau

China
- China Climate Center
- China Meteorological Administration
- Yunnan Tropical Crop Institute
- Xishuangbanna Meteorological Bureau

Thank you

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