PASTEK
Impact of global change on Mekong river base flow

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Background and Objectives

- The Mekong is one of south-east Asia's rivers most vulnerable to global change (flooding, low water drought).
- The Mekong vulnerability comes from the low water storage capacity of its tributary watersheds (shallow aquifers).
- These tributary watersheds are very reactive to rainfall variations and land use changes.

The PASTEK project aims at studying the impacts of global change on water quantity (discharge) and quality (sediment load, bacterial contamination) in one of its main tributaries, the Nam Khan river that drains 7 200 km² (Fig.1).

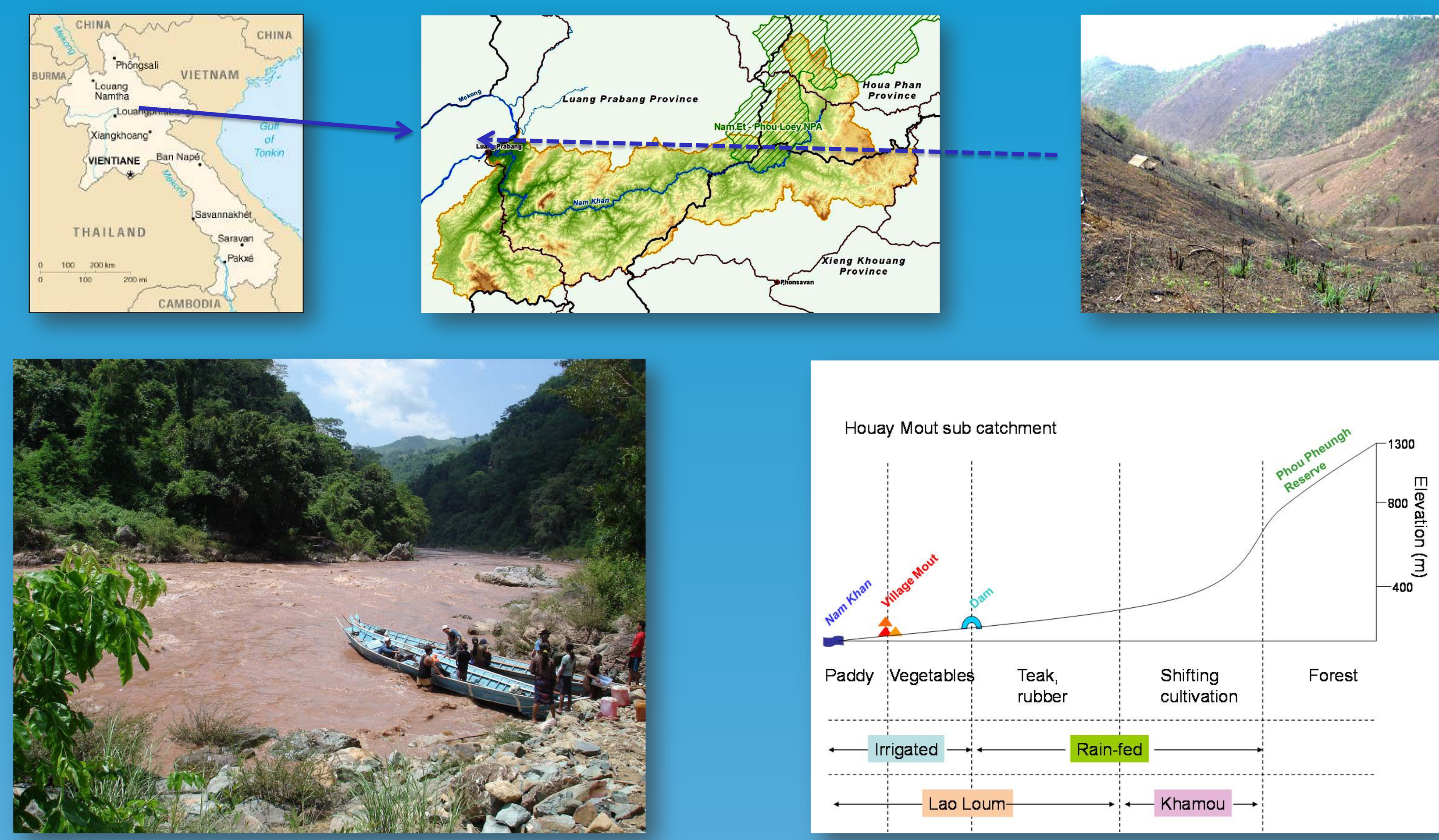


Figure 1 – The Nam Khan river and the Houay Pano catchments

Changes in river flow: impacts of bombing?

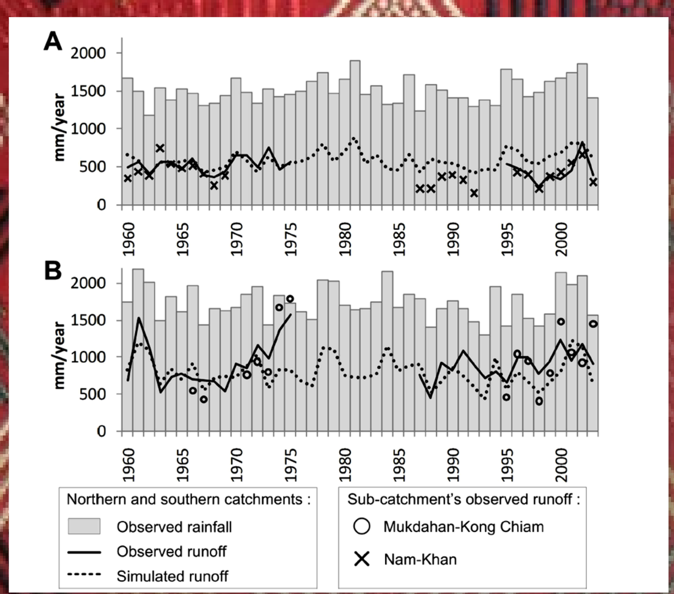


Figure 3-Hydrological changes in northern catchment (A) and southern catchment (B).

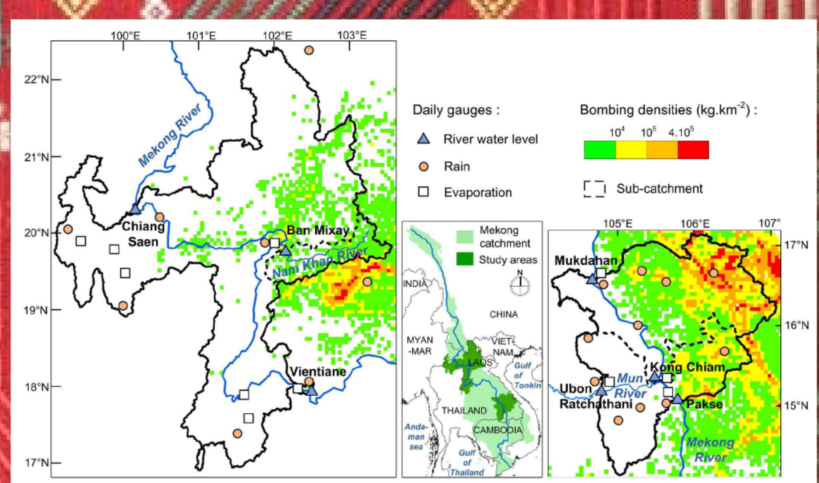


Figure 4 - Hydro-meteorological stations and bombing densities over the period 1965-1973 in the study areas.

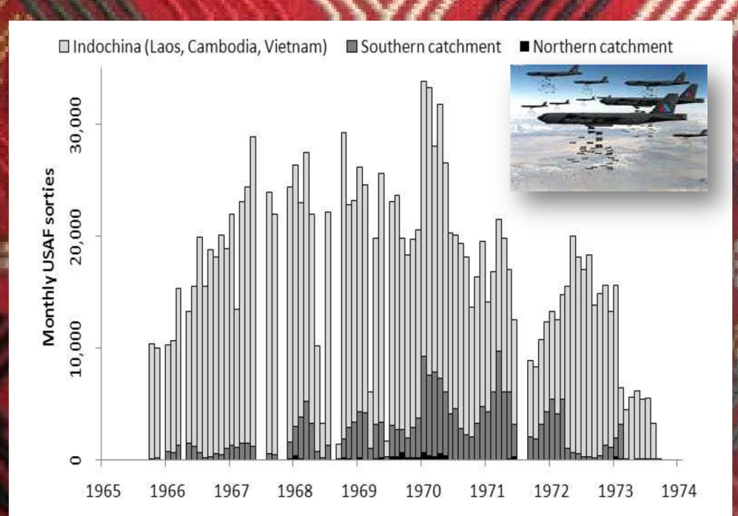


Figure 5-Monthly USAF sorties in Indochina and in the two studied catchments, as recorded in the UXO NRA data base.

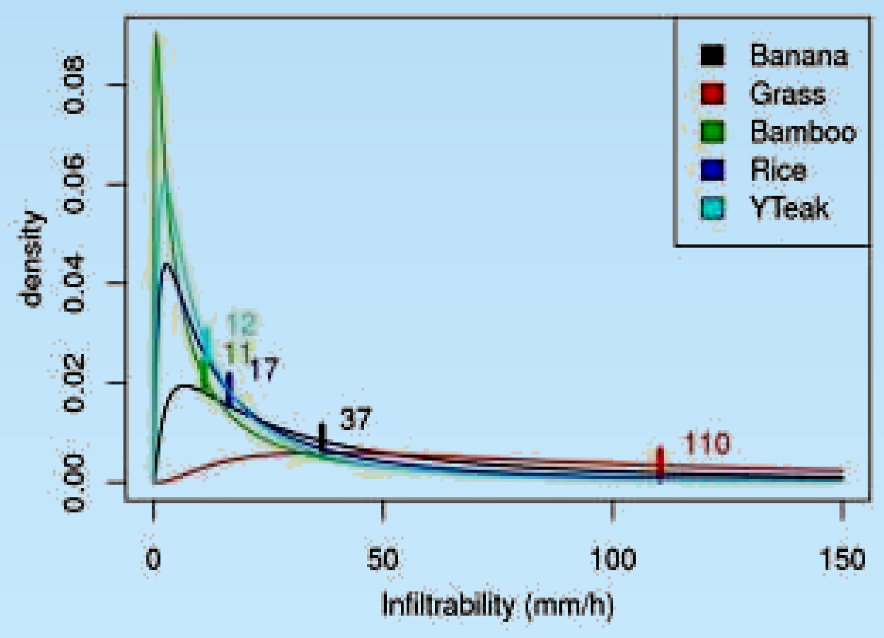
Methodology

Two-scale approach:

- Characterization and simulation of the hydrology of a small scale catchment, Houay Pano (9 nested sub-catchments, from 0.1 to 10 km²) ; numerous available data collected since 2001 and 2010.
- Characterization of the Nam Khan hydrology since 1960, upscaling of small scale hydrological models developed in Houay Pano and predicting the discharge during the period 2010-2050 for different climate and land use scenarii.
- This project relies on a large array of disciplines including, agronomy, sociology, epidemiology, ecology, climatology, hydrology, superficial geophysics and biogeochemistry.

First Results

- Infiltration follows $i = Im(1-\exp(-(R/Im)))$ where R (mm h^{-1}) is the rainfall intensity and Im the maximum infiltration intensity. Im is distributed spatially according to a lognormal distribution. It depends on the type of landcover (Fig. 2)



- From 1995 onward, the northern and southern catchment's runoff productions were significantly lower and higher than in the pre-war conditions, respectively (Fig. 3). These long-term hydrological shifts are attributed to permanent changes in the vegetation cover, either denser in the north (in response to abandonment of cultivated lands) or sparser in the south (as a result of bomb-degraded soil conditions) (Fig. 4 & 5).

Figure2 - *Examples of maximum infiltration rate lognormal distribution for different land uses (Rice for upland rice; YTeak for young teak)*

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