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Changing rainfall pattern in Northeast Thailand and implications for cropping systems adaptation

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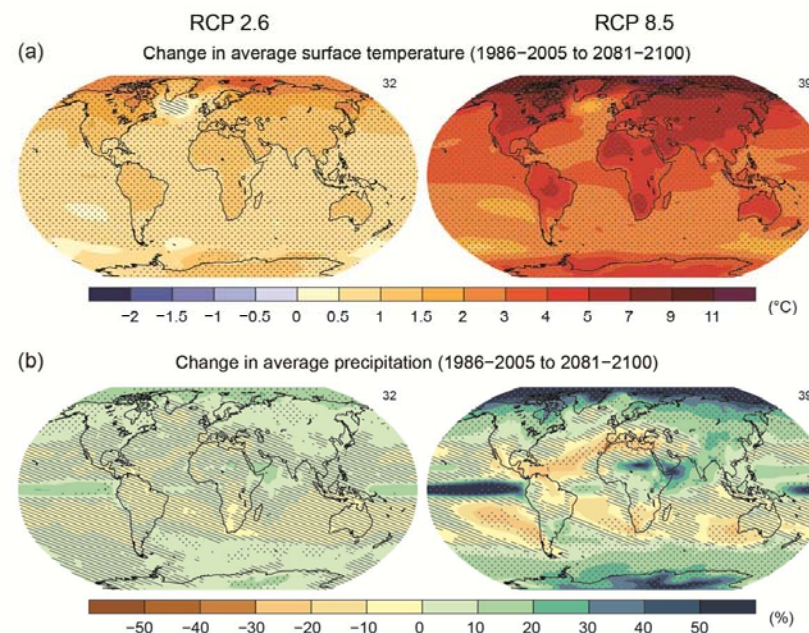
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Introduction

- Rainfed lowland rice: 2nd rice ecosystem (25% global harvest), by-passed by green revolution
- Yields sensitive to rainfall patterns
- High uncertainty in rainfall projections
- **Objectives:** investigate historical trends in rainfall patterns, discuss their significance and effects on main cropping systems



IPCC AR5, 2014

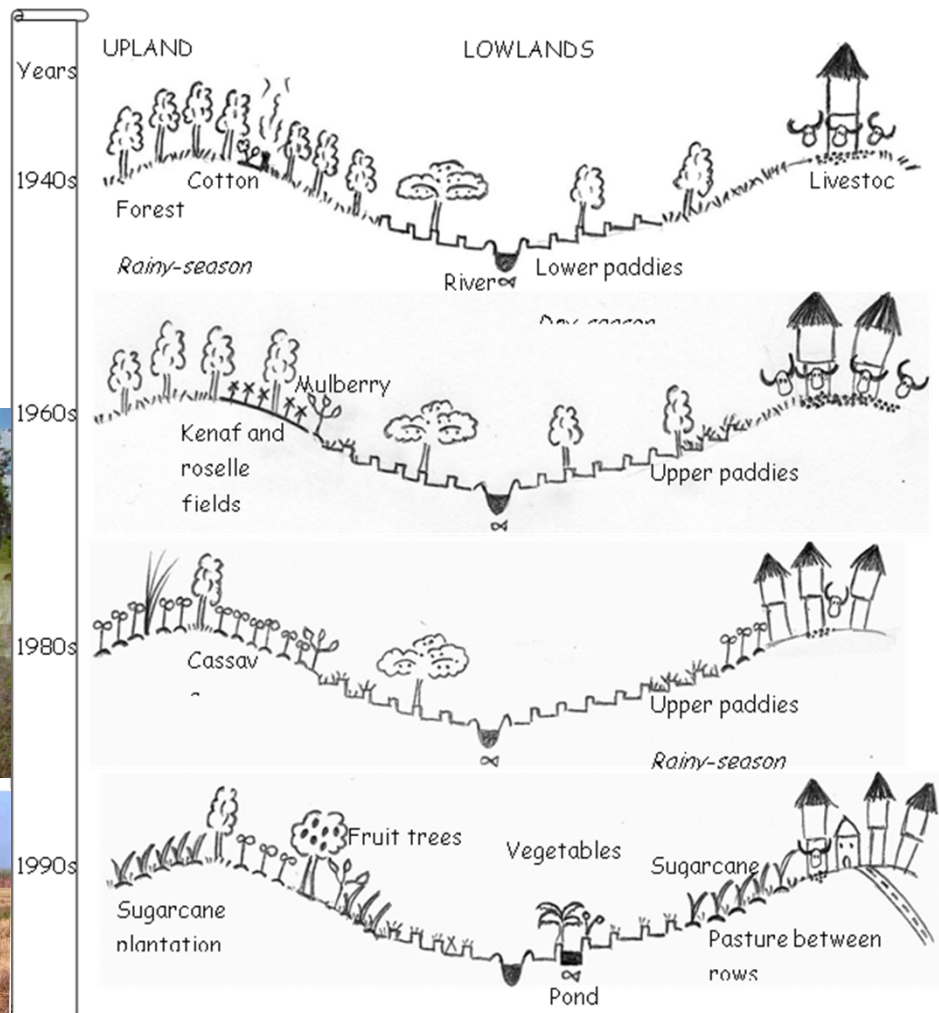
Outline

- Study area: the Issan Plateau in Northeast Thailand
- Rainfall trend analyses
- Effects of changing rainfall on main cropping systems



Northeast Thailand

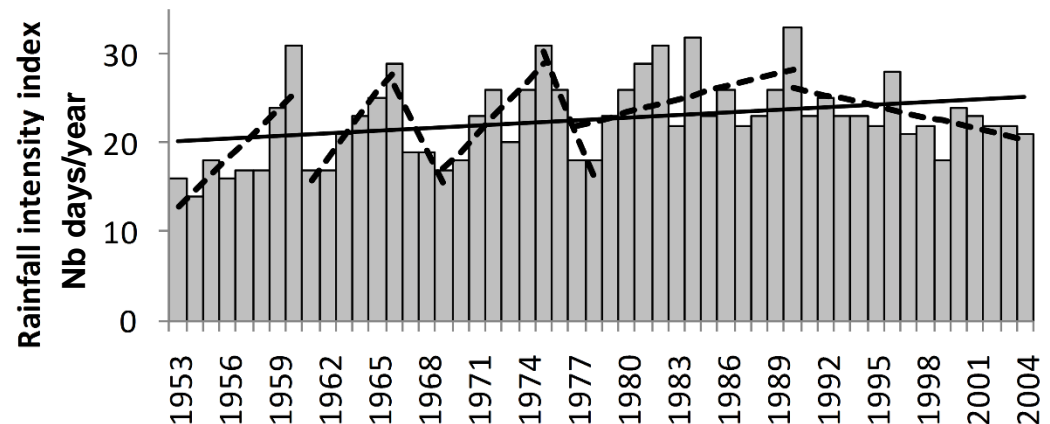
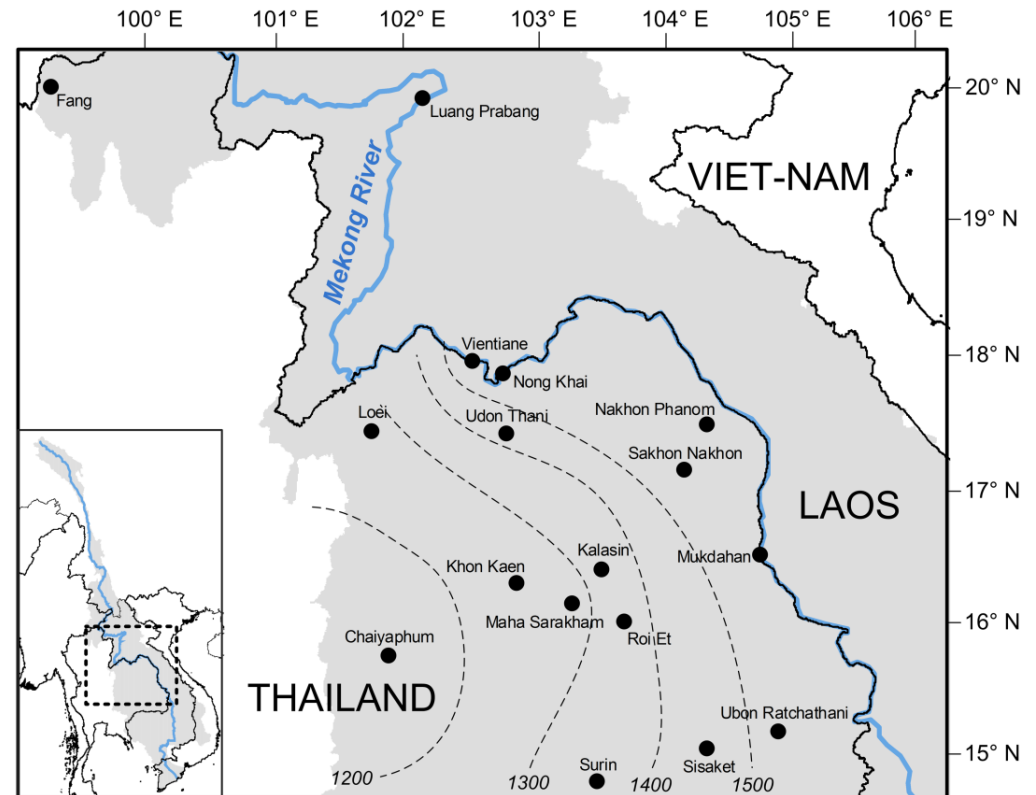
- Undulating sandstone plateau, relatively dry monsoon climate, coarse-textured soils
- Rainfed lowland rice, industrial cash crops, limited dry season crops



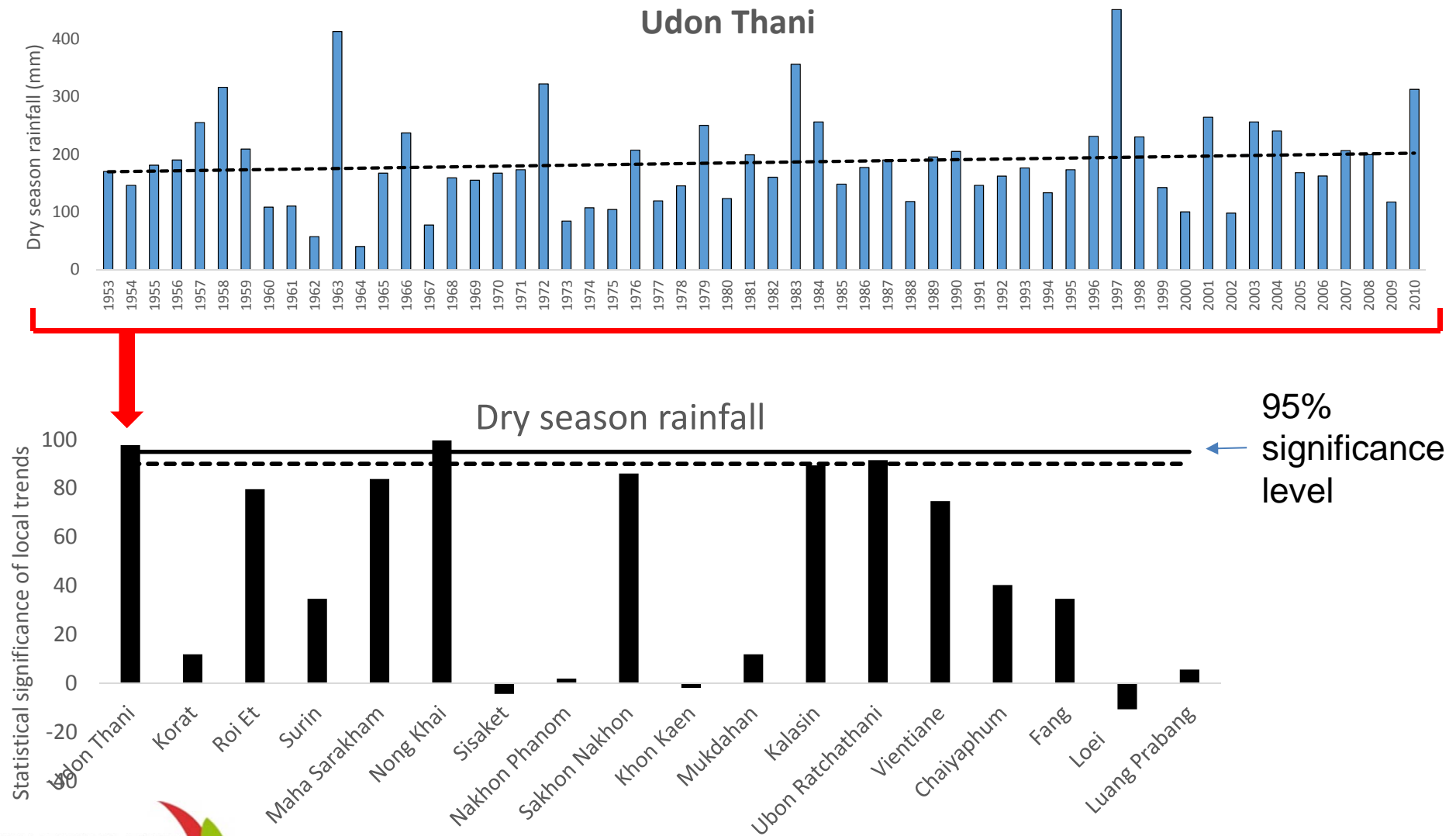
(Barnaud C, 2004)

Rainfall trend analysis

- Data
 - 18 rain gauges
 - Long records (since 1953)
 - Limited data gaps (1.2%)
- Method
 - 31 rainfall variables
 - Modified Mann-Kendall test
 - Regional Kendall Test

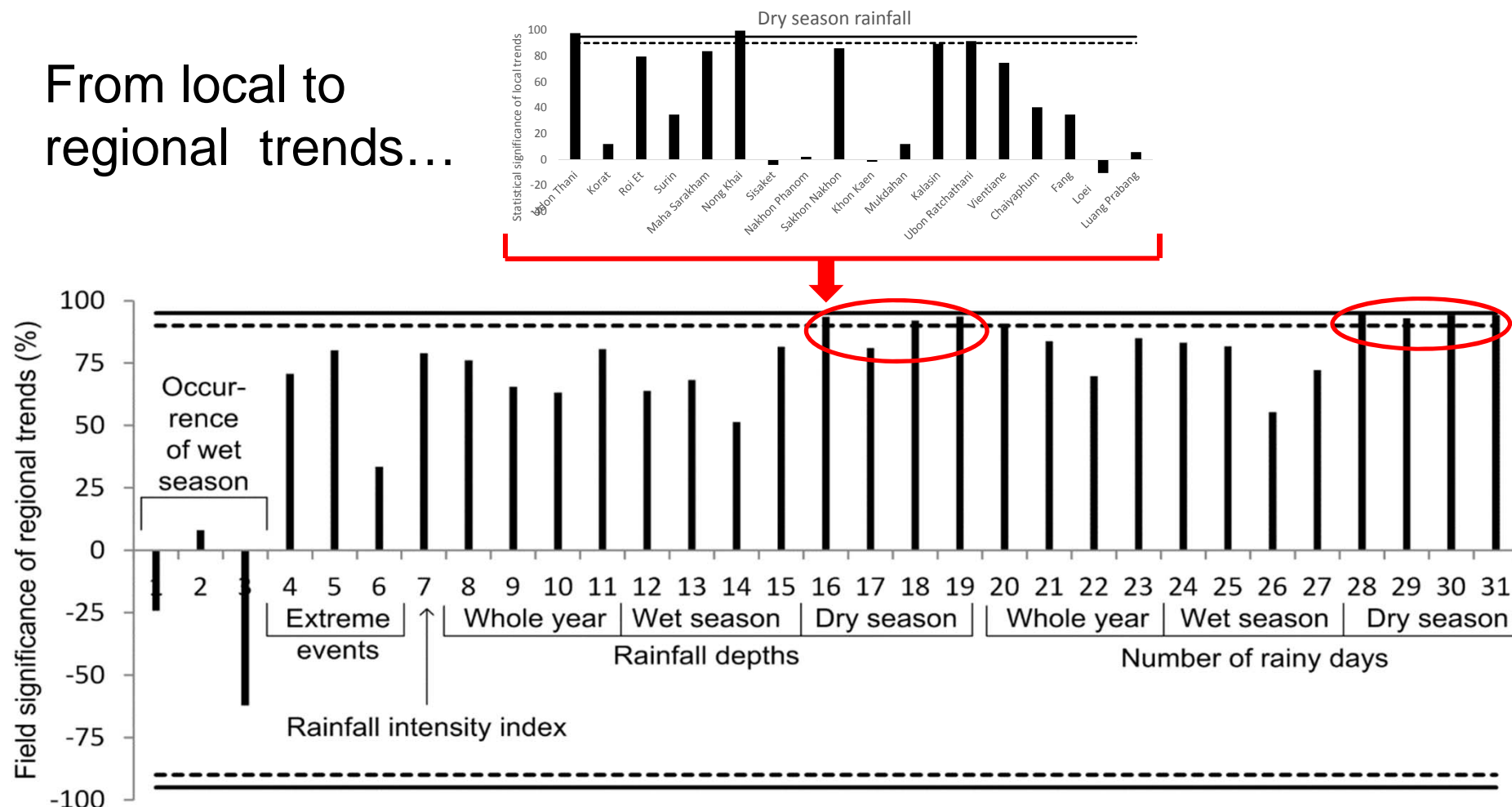


Results for dry season rainfall (Nov-Apr)



Results for dry season rainfall (2)

From local to regional trends...



Minor change (+15 mm over 1953-2010, for an average of 187mm/year), likely to continue in the future

(Lacombe *et al.* 2013)

Effects of additional dry season rainfall on rainfed lowland rice systems

(including non-irrigated double cropping in some areas):

- No effect on **rice** grain quality, controlled by number of rainy days during wet season
- **Groundnut** after rice: unfavourable at planting, favourable at pod filling
- **Sesame** before rice: favourable at crop establishment



(Polthanee and Promkhambut, 2014)

Effects of additional dry season rainfall on upland cropping systems

Industrial crops from conversion of upland rice:

- **Sugarcane:** i/facilitate establishment of crop planted at end of wet season, ii/ benefits ratoon crop by limiting water stress
- **Cassava:** same benefits; preferred to sugarcane because of drought resistance
- **Rubber:** wetter DS to benefit this relatively new perenial crop planted in humid areas of the region



Effects of additional dry season rainfall on receding cropping systems

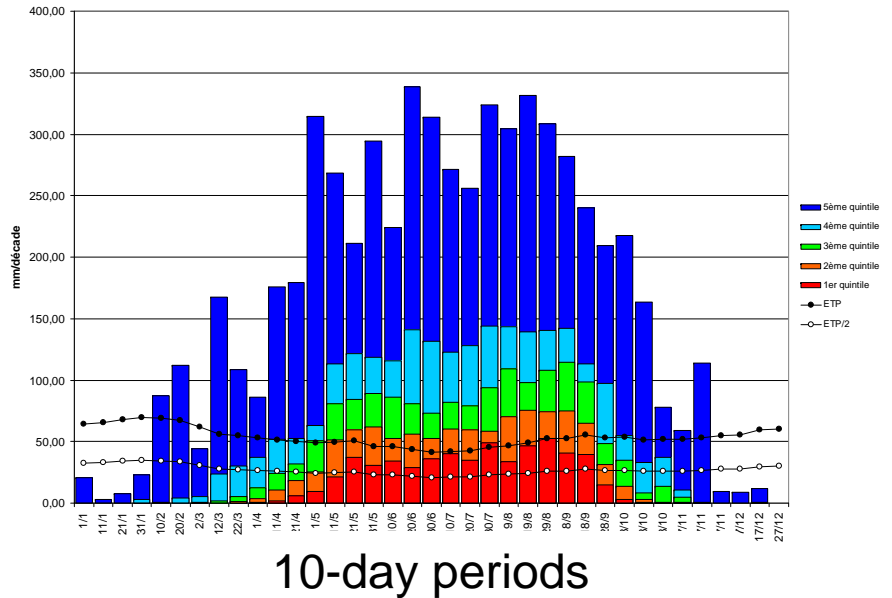
- Small-scale **horticulture** after water recedes: tobacco, sweet corn, fruits & vegetables for home consumption & local markets
- To benefit from wetter dry season, especially during cool first half
- Rainfall increase too limited to help recharge shallow wells & small (fishing) ponds on which these systems depend frequently



Conclusion

- Benefit from additional dry season rainfall is marginal
- Benefit enhanced if drought risk moderated by supplemental irrigation water resources
- Population adapted to rainfall variability, with resilience mechanisms

Frequential distribution of rainfall



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