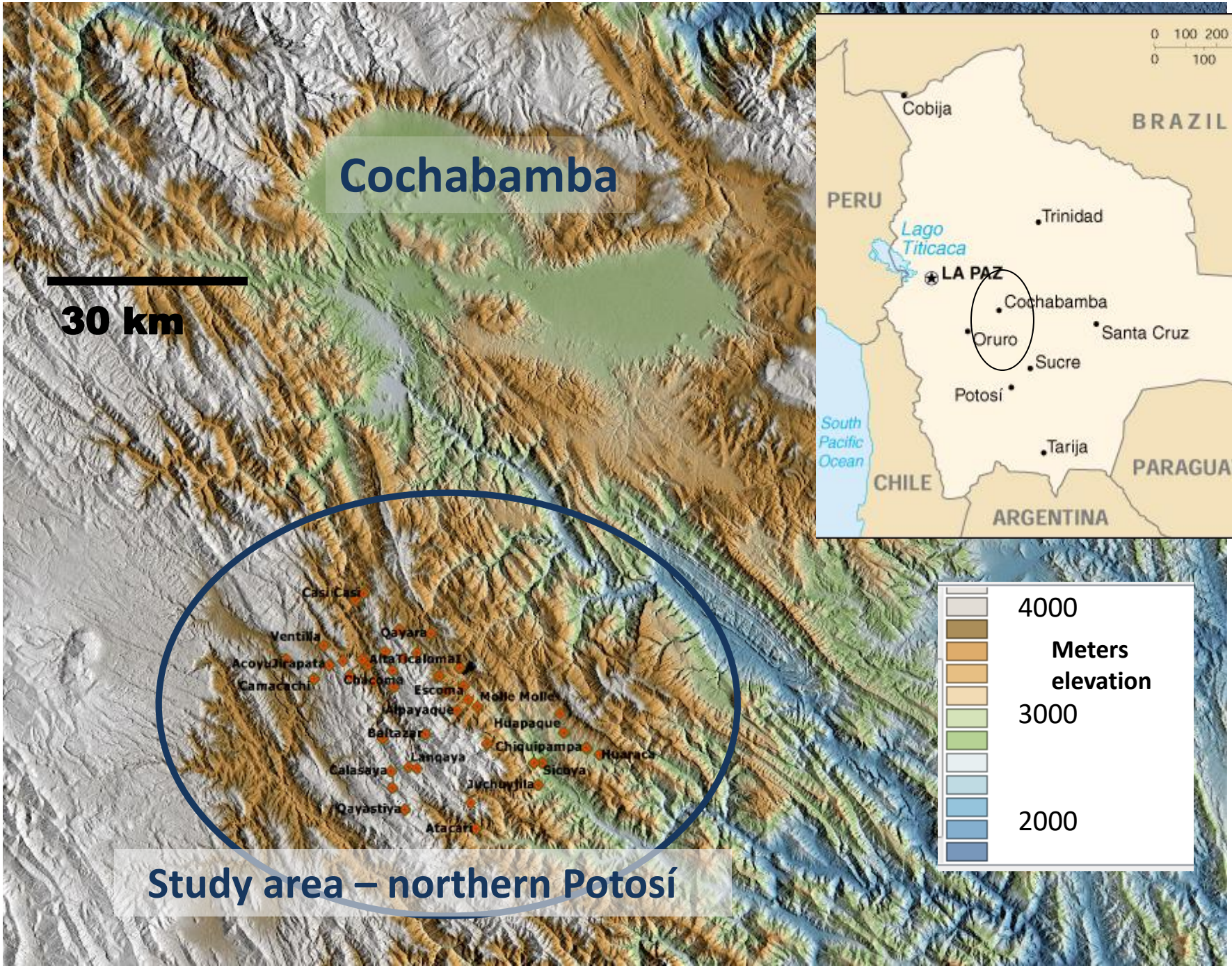
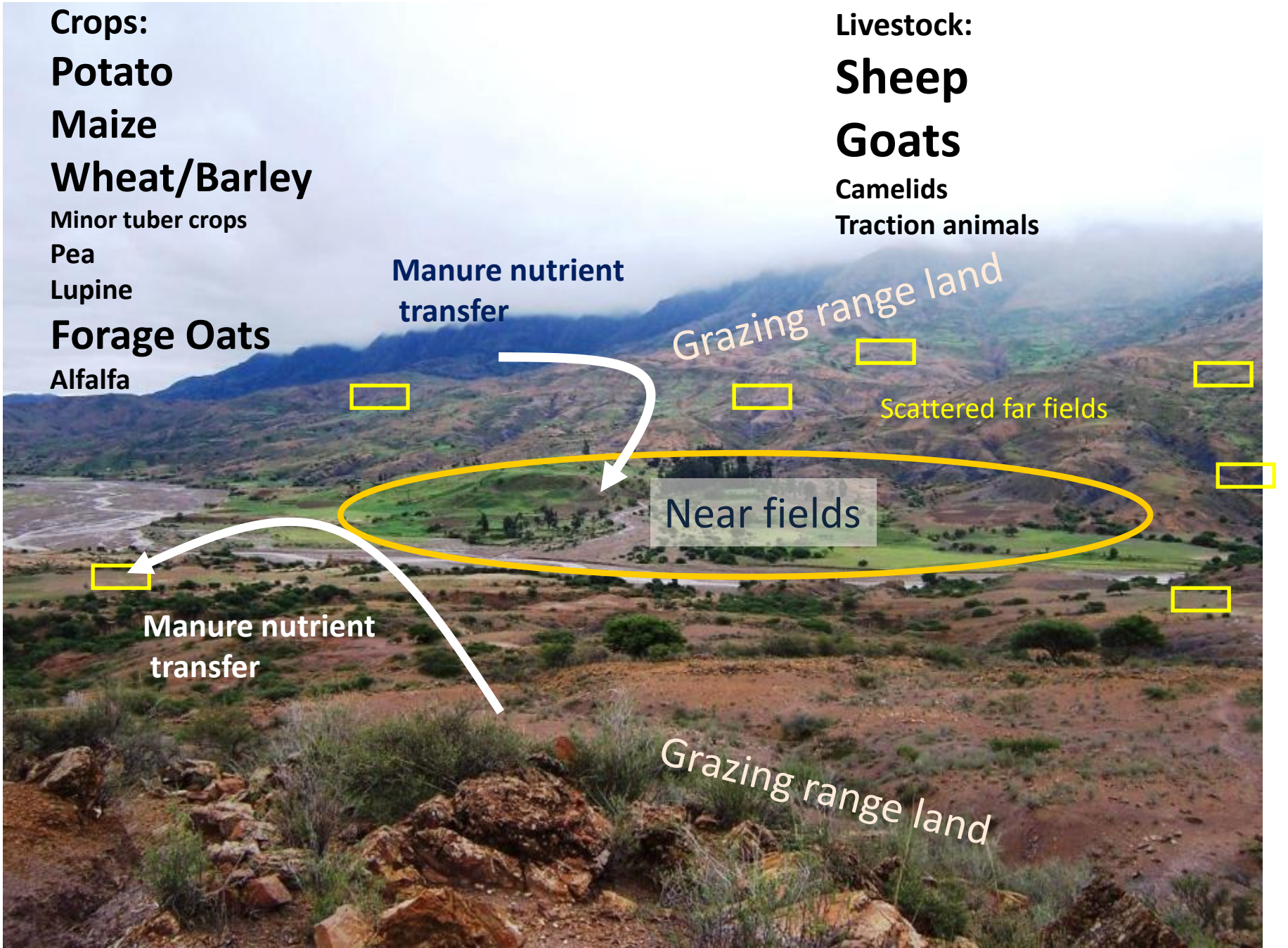
# Steve Vanek

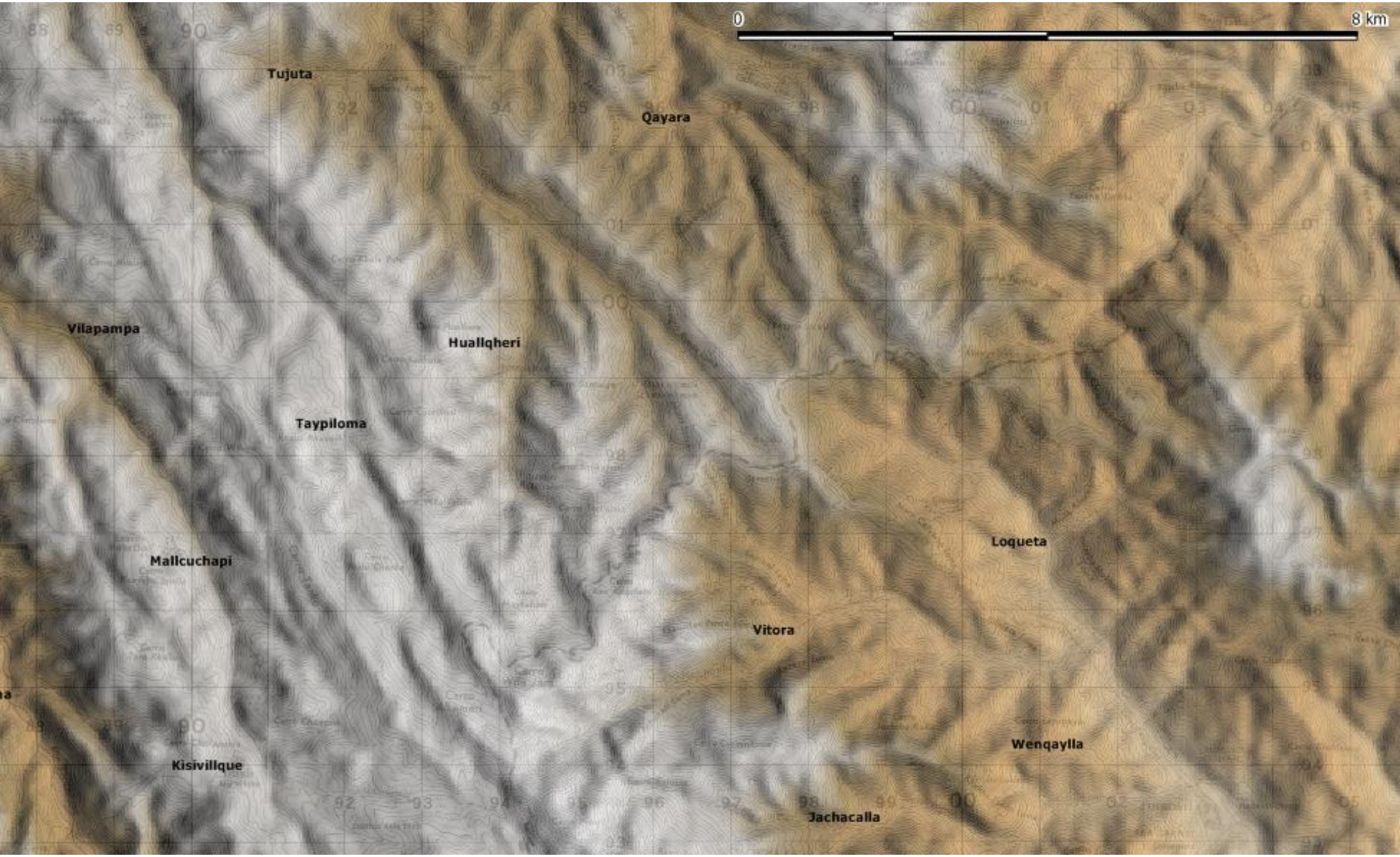
## GIS contributions to the study of Soil Nutrient management by farmers in highland Bolivia

## Dissertation work

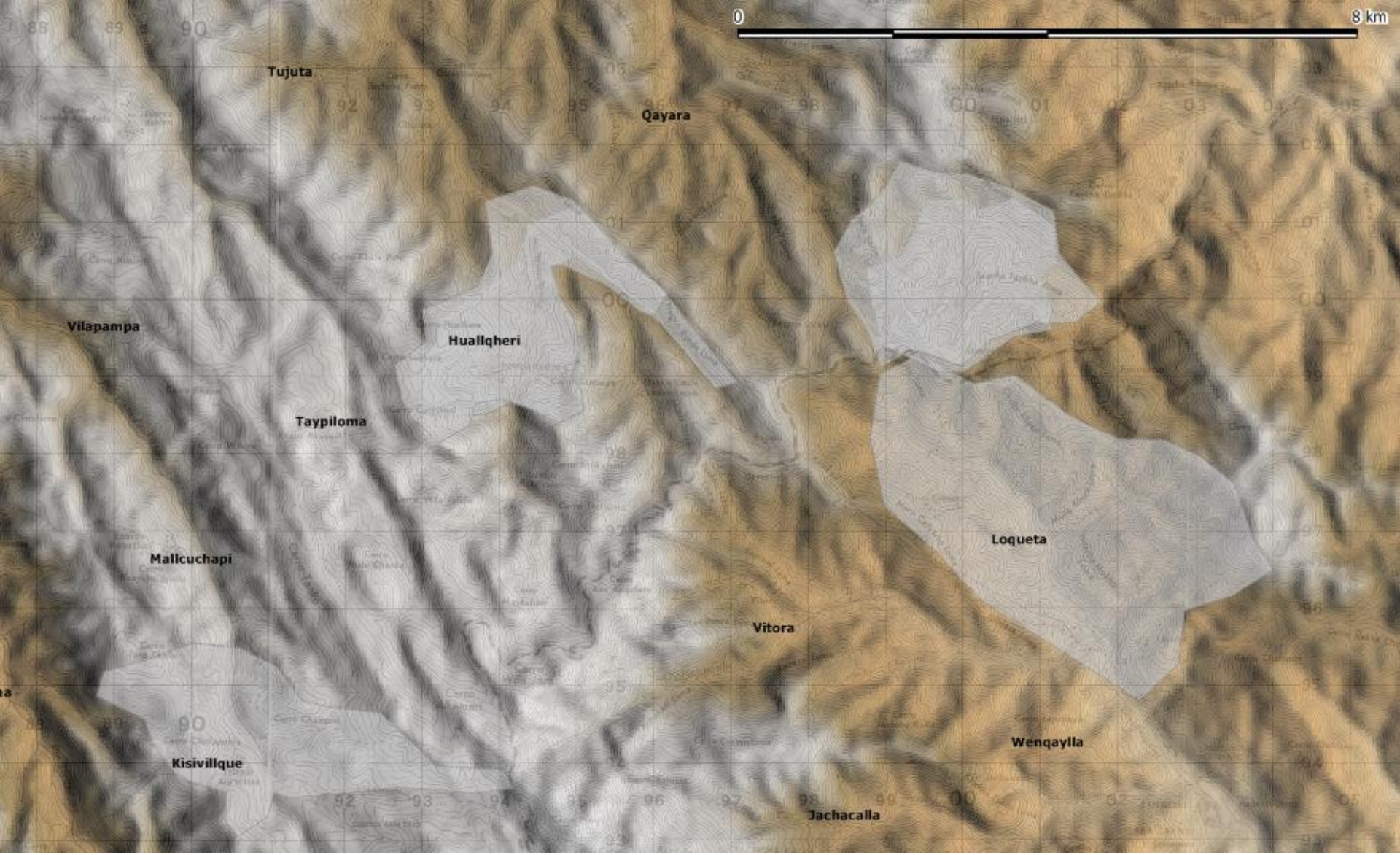
**Thanks**: Laurie Drinkwater, Keith Jenkins, Rebecca Nelson, Alice Pell, Johannes Lehmann, Andy Jones


Cochabamba
30 km
Study area – northern Potosí
Casi Casi
Ventilla
Qayara
AcoyuJirapata
AltaTicalomai
Camacachi
Chacoma
Escoma
Molle Molle
Hipayaque
Hdapaque
Baltazar
Chiquipampa
Huaraca
Lamqaya
Calasaya
Sicaya
Juchuyjila
Qayastiya
Atacari
0 100 200 km
0 100 200 mi
Cobija
BRAZIL
PERU
Trinidad
Lago Titicaca
LA PAZ
Cochabamba
Oruro
Santa Cruz
Sucre
Potosí
South Pacific Ocean
Tarija
CHILE
PARAGUAY
ARGENTINA
4000
Meters elevation
3000
2000

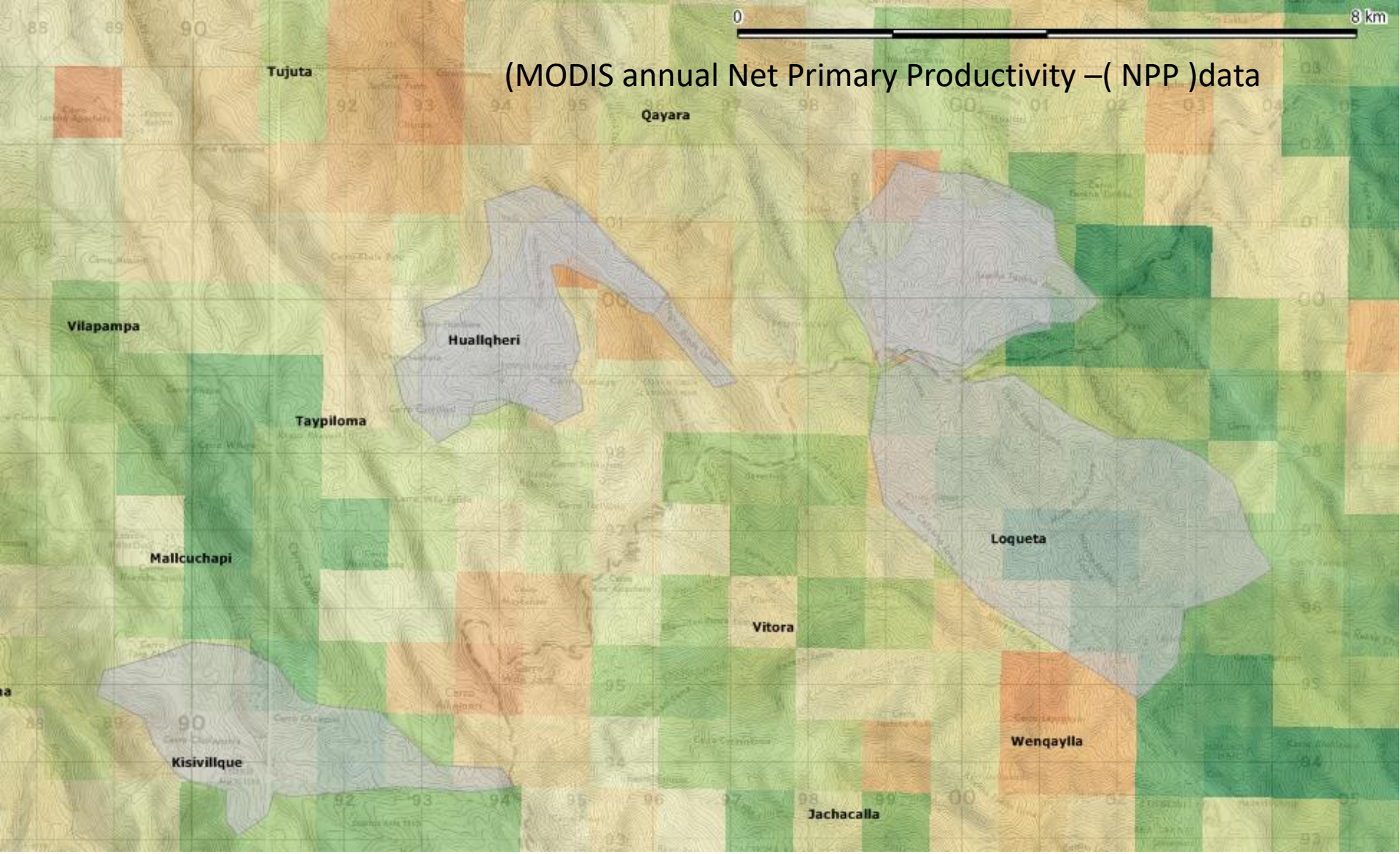

Crops:
Potato
Maize
Wheat/Barley
Minor tuber crops
Pea
Lupine
Forage Oats
Alfalfa
Livestock:
Sheep
Goats
Camelids
Traction animals
Manure nutrient transfer
Grazing range land
Scattered far fields
Near fields
Manure nutrient transfer
Grazing range land




**ASTER remotely sensed Digital Elevation Model**

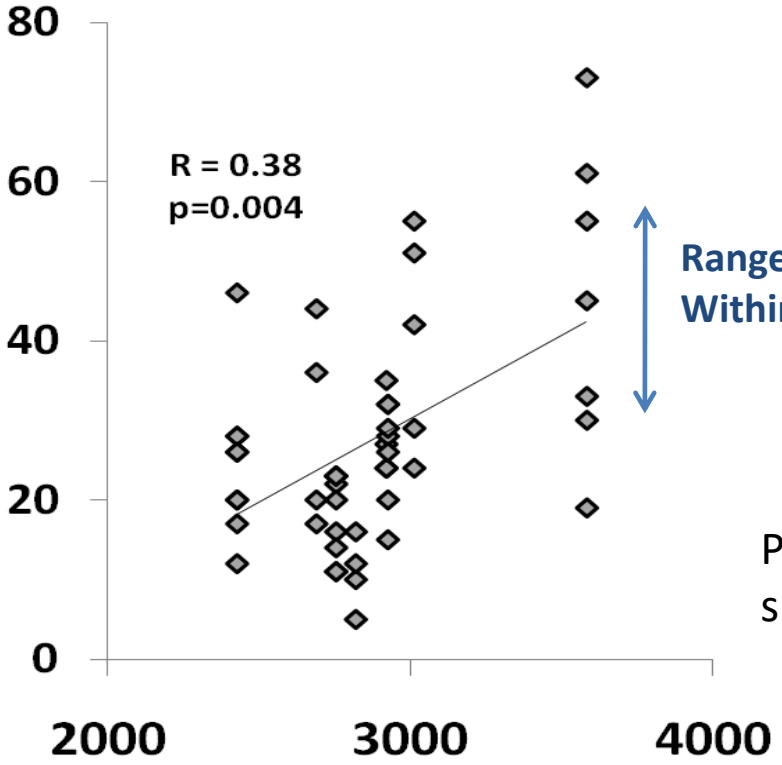



**ASTER remotely sensed Digital Elevation Model with community boundaries (consultation with farmers)**




**Rangeland productivity**: **Red = 1/5 of a cornfield, green= ½ a cornfield's worth of forage per year** (2000 to 5000 kg/ha)

# NPP of rangeland is one predictor of manure P inputs to fields across 6 communities




Phosphorus (P) Application Rate to fields in manure, Kg per Ha

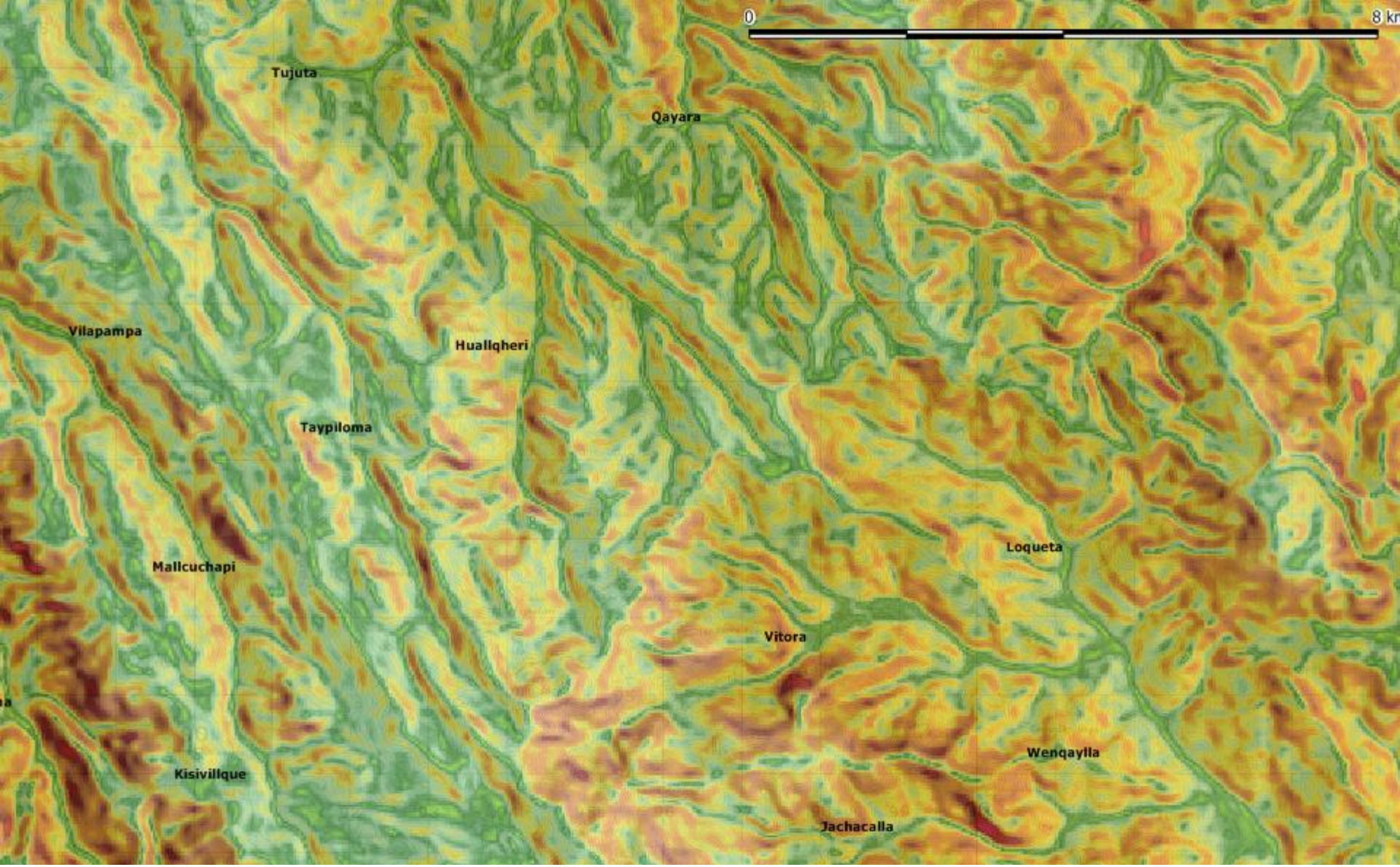
P-sufficient

**Range of households Within a community**

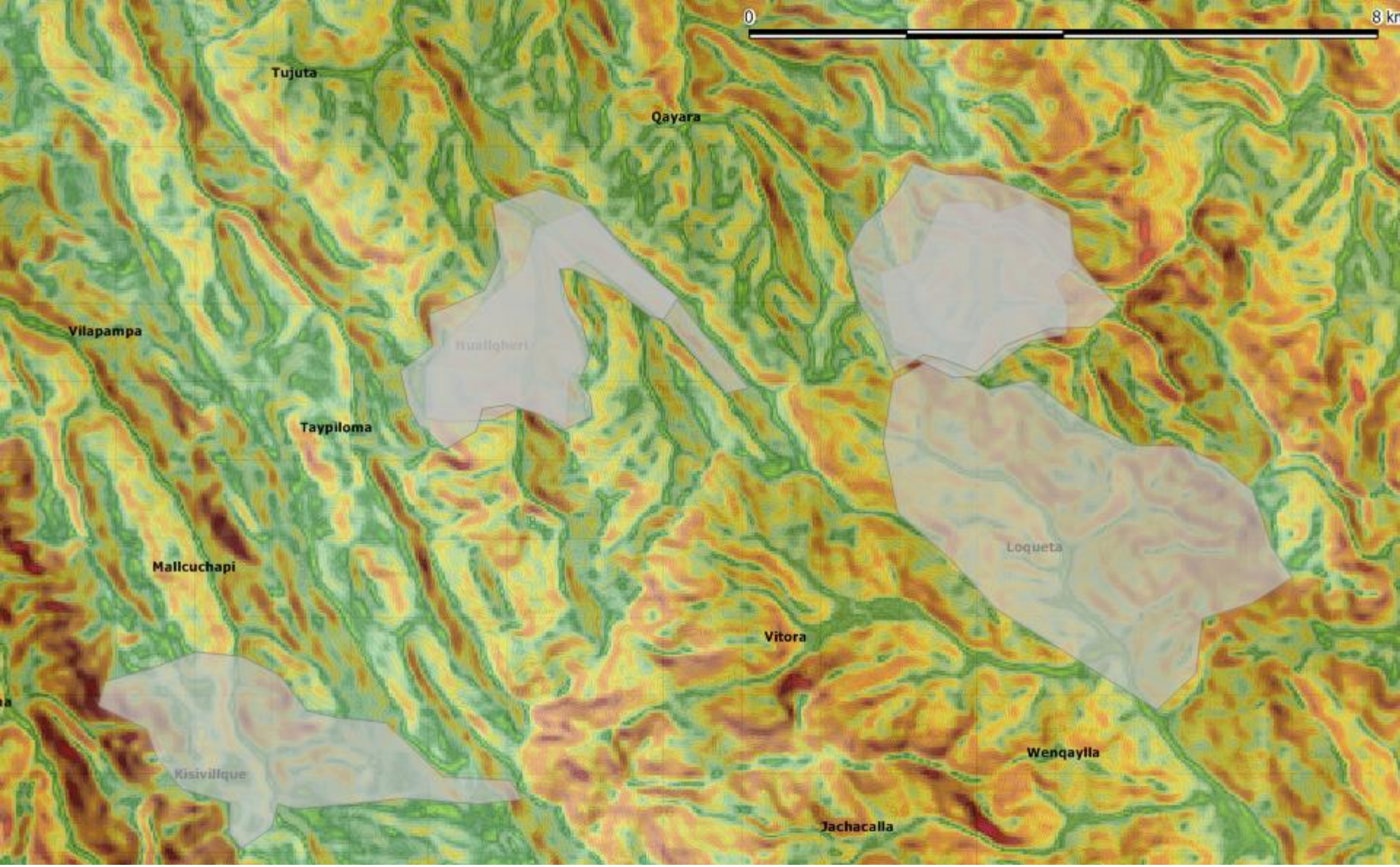
P probably not sufficient for crops

Remote-sensed rangeland productivity (source of grazing)

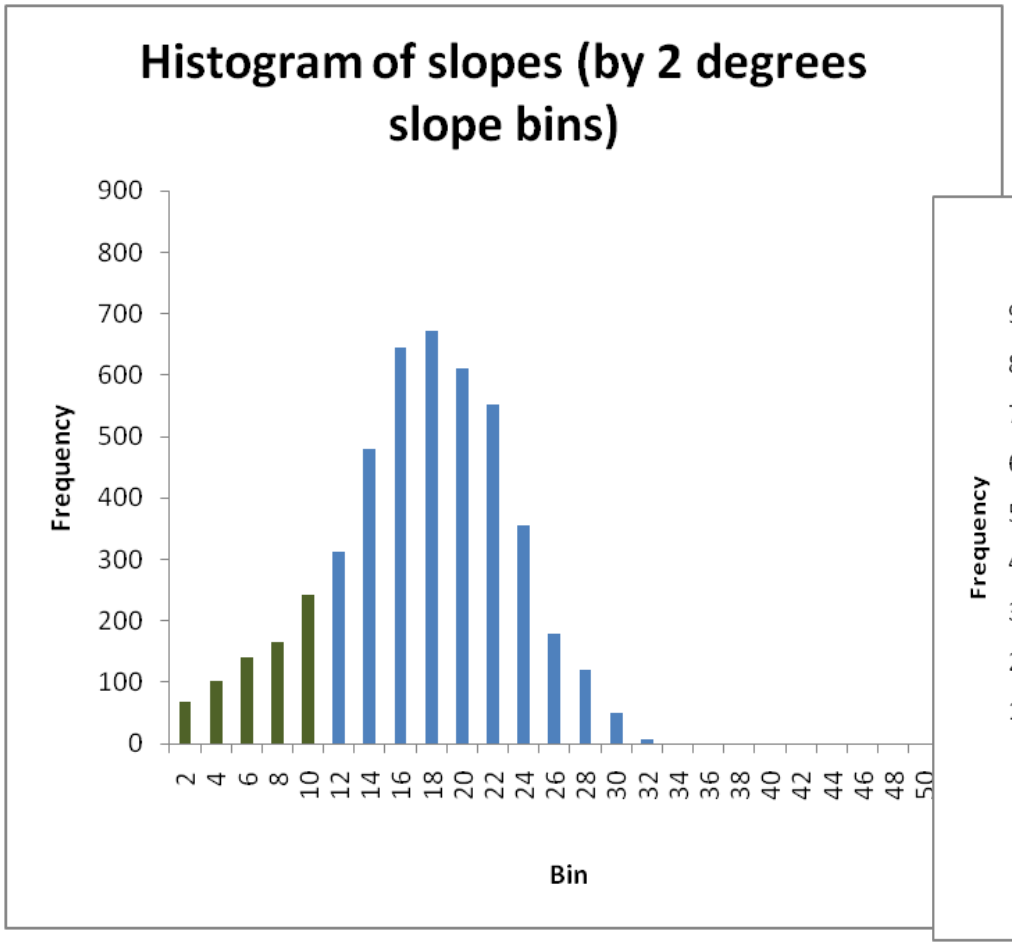
**MODIS- NPP (kg·ha$^{-1}$)**
**2000-2006 average**

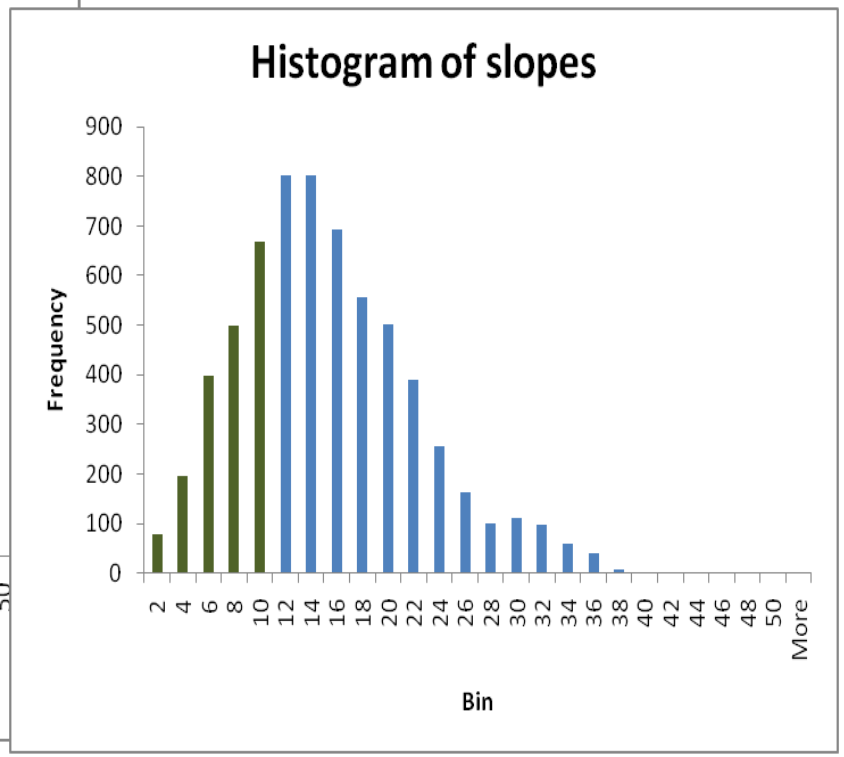



**Slope layer extracted from ASTER DEM (green=Flat, red = VERY steep)**


0
8 km
Tujuta
Qayara
Vilapampa
Taypiloma
Malicuchapi
Vitora
Wenqaylla
Jachacalla
Loqueta
Kisivillque

Comparison of percentage of sloped land in two communities




Only 15% of land with slope <17%

29% of land with slope <17%

Does this explain soil nutrient balance outcomes, and perhaps patterns in nutrition? Collaboration with Andy Jones, PIN, Cornell.