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Pasture degradation in migration affected areas of Jalal-Abad region

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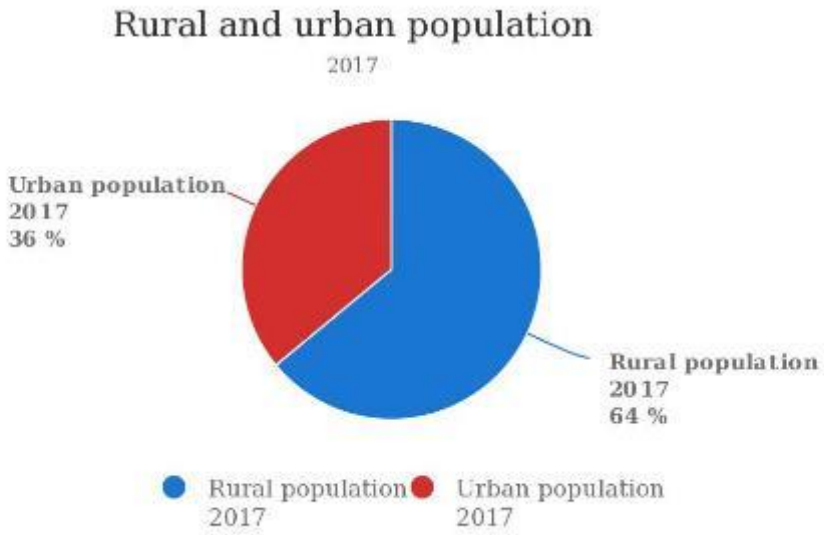
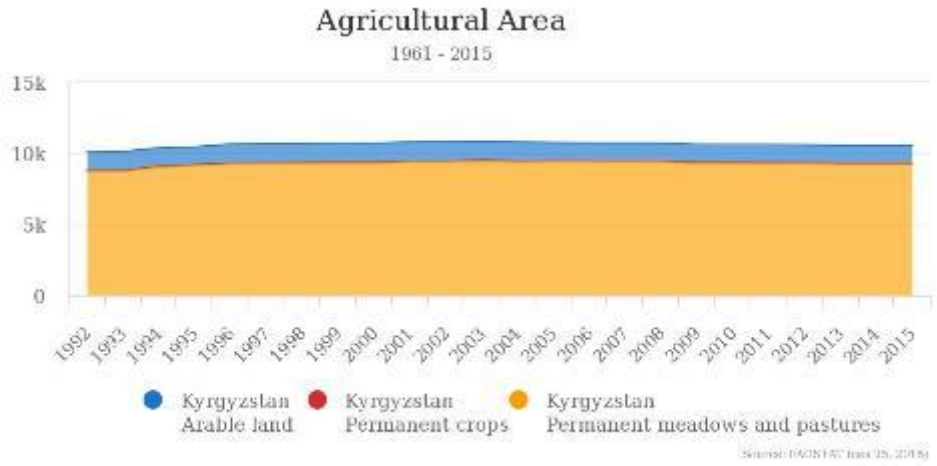
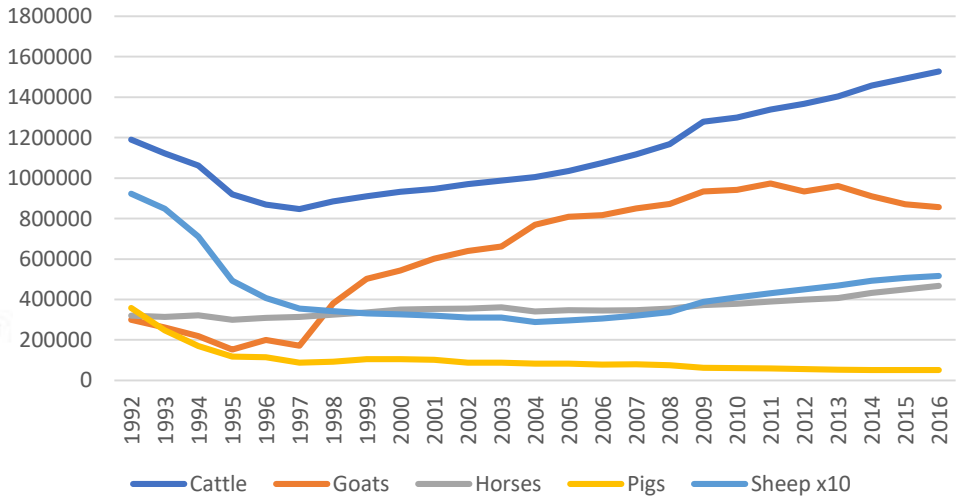
LiK, October 24, 2019

Kyrgyz rural economy



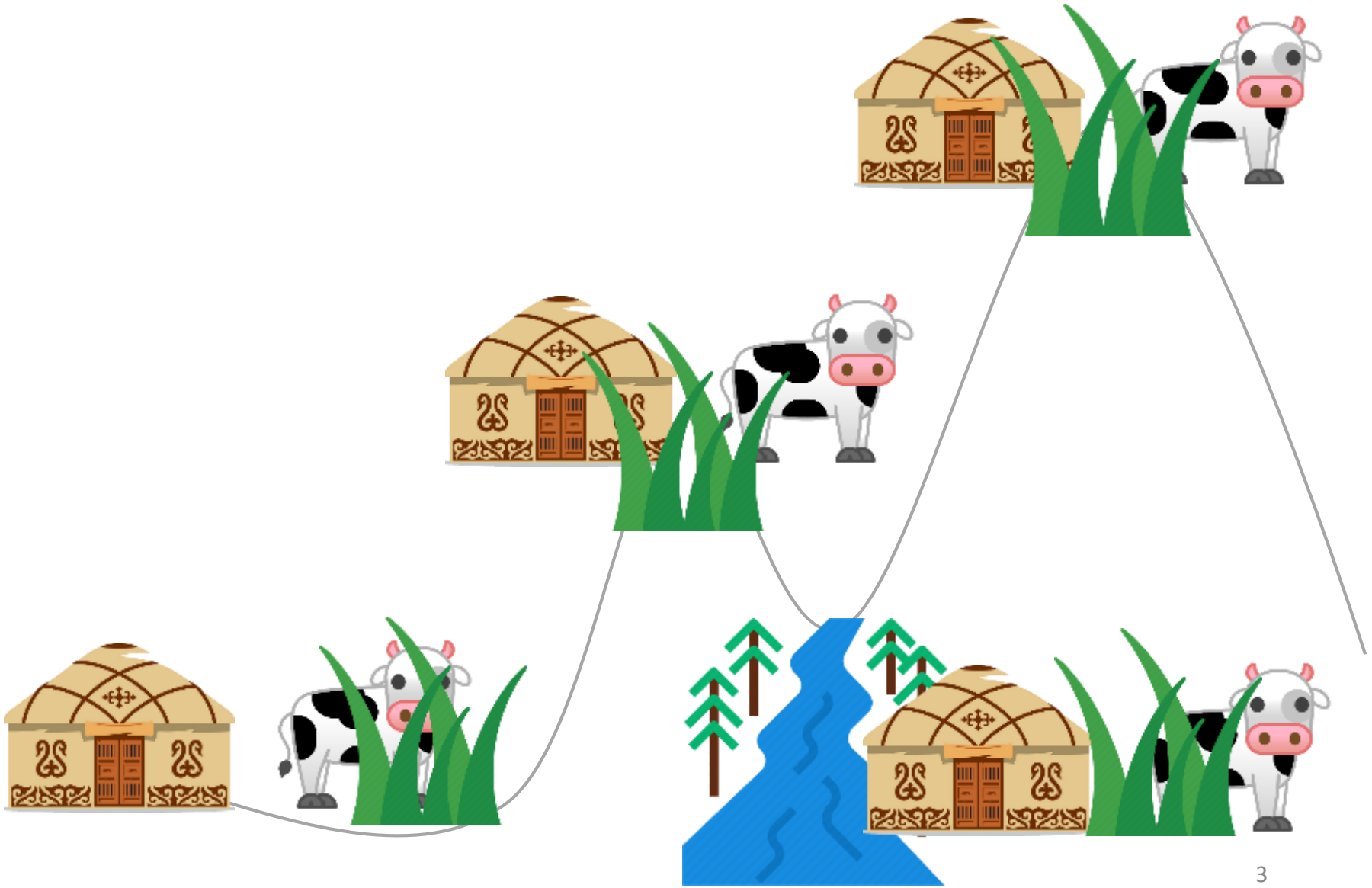


Livestock in Kyrgyzstan

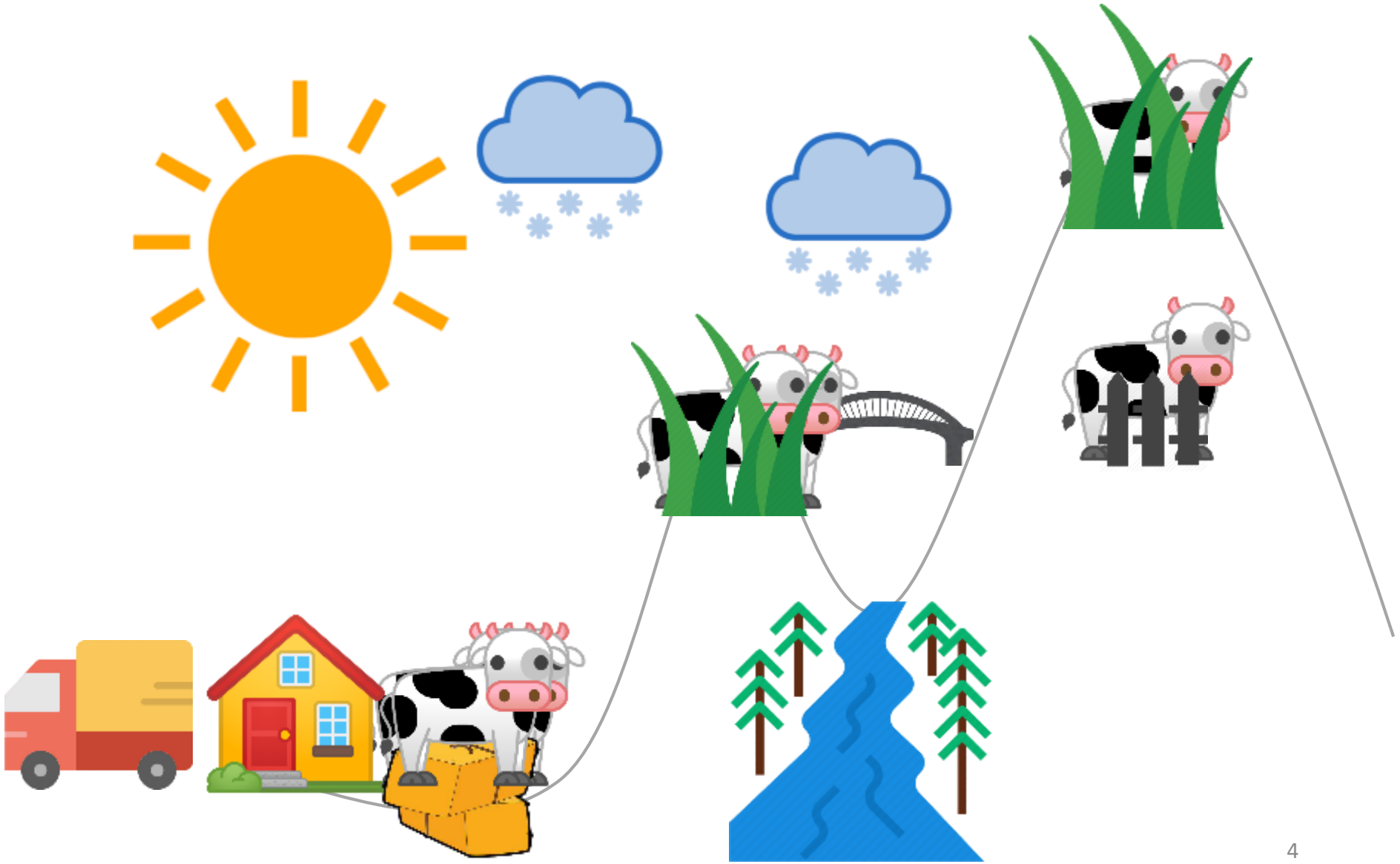


Source: FAOSTAT (2018)

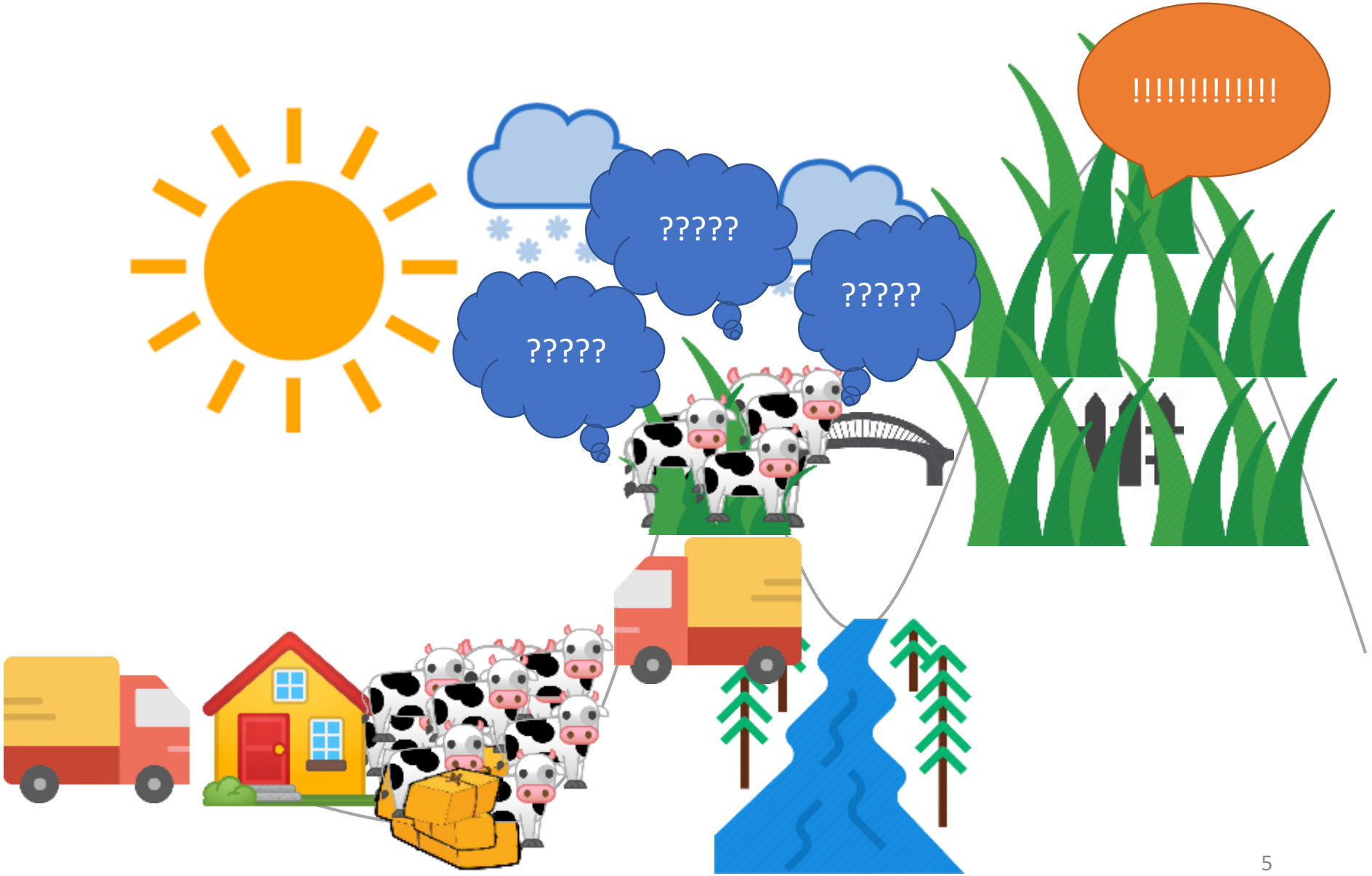
Nomadic transhumance



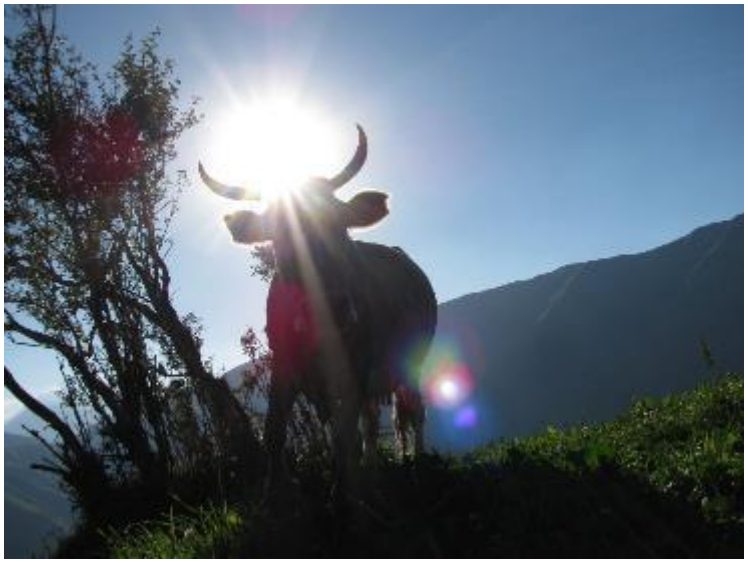
Supported settled transhumance



Unsupported settled transhumance



Pasture degradation



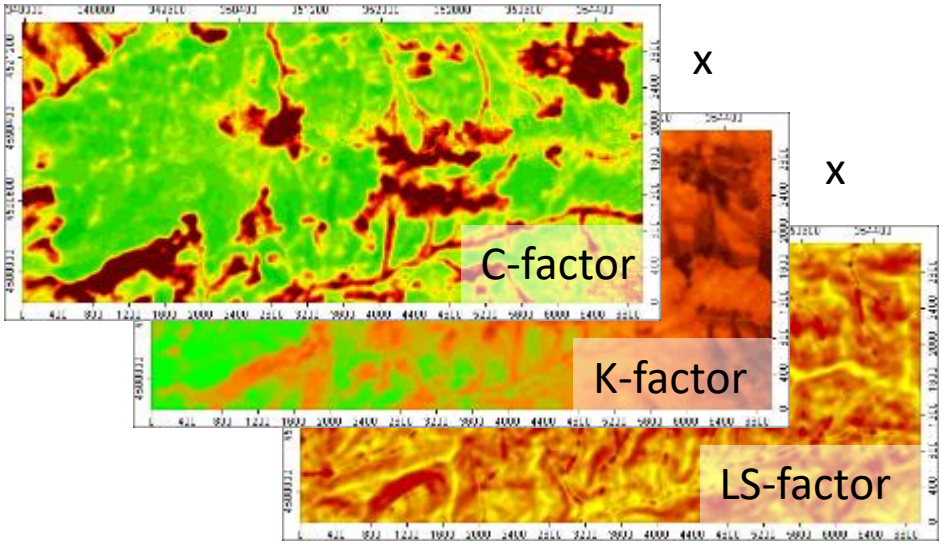
Erosion evaluation with RUSLE

RUSLE – Revised Universal Soil Loss Equation

$$A = R*K*LS*C*P$$

- **A** = Annual mean soil erosion (t/ha)
- **R** = Precipitation erosivity
- **K** = Soil erodibility
- **LS** = Topographic index of length (L) and slope (S)
- **C** = Surface management factor
- **P** = Factor of soil conservation measures

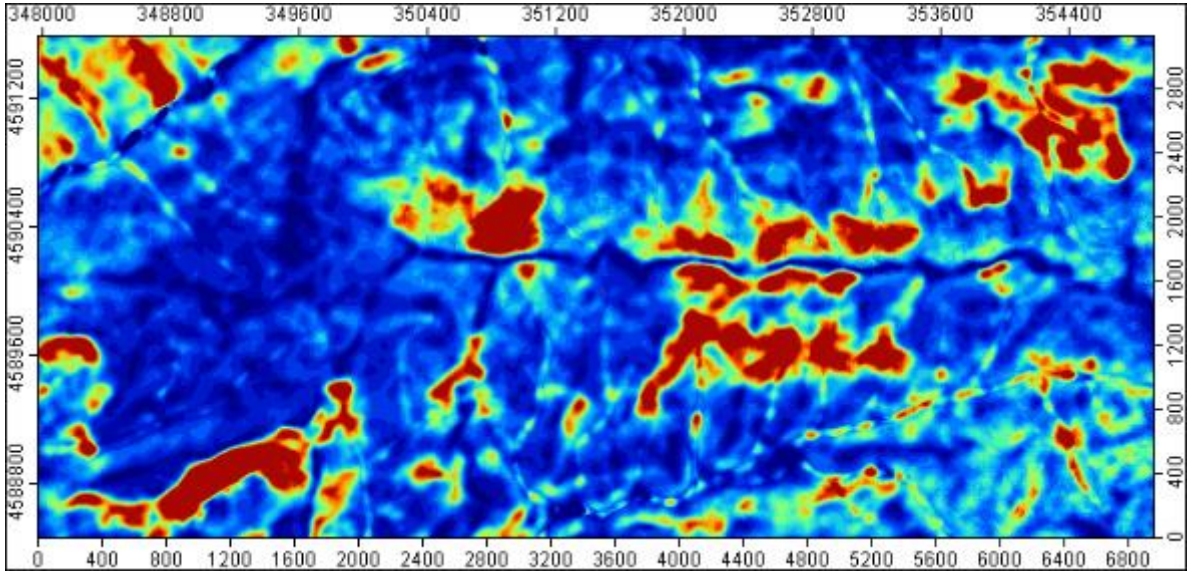
RUSLE and GIS



x

x

x R-factor =



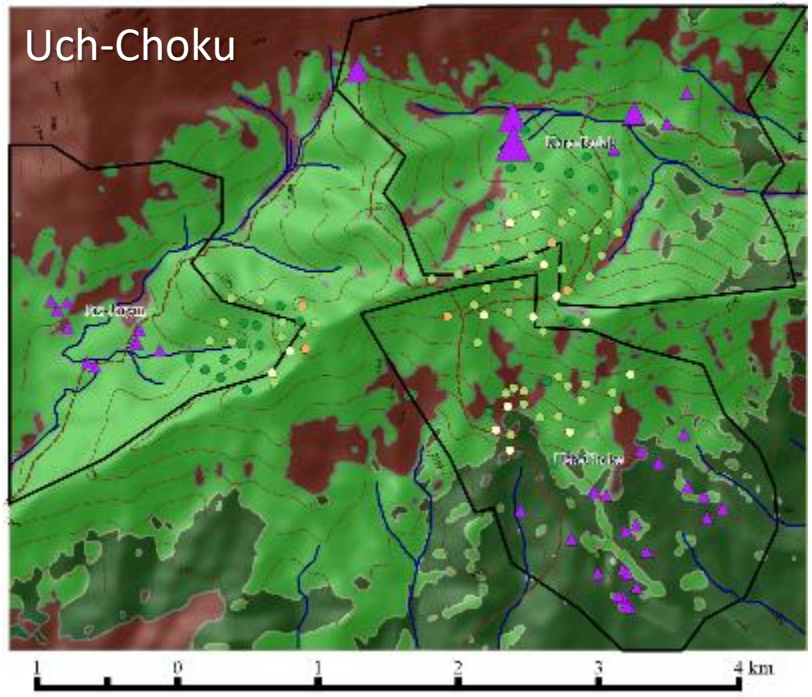
Data collection

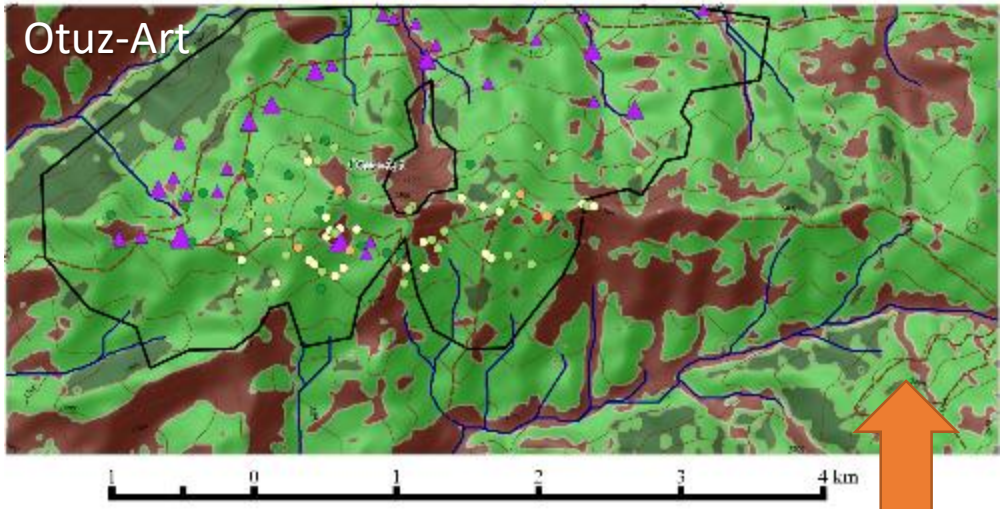


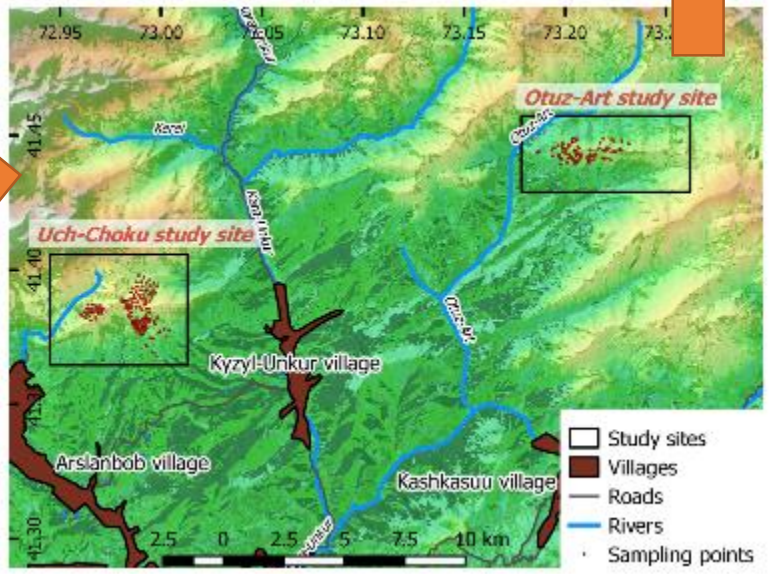



- Vegetation description
- Soil sampling & analysis
- Interviews
- Climate data collection
- Remotely sensed data

Sampling design





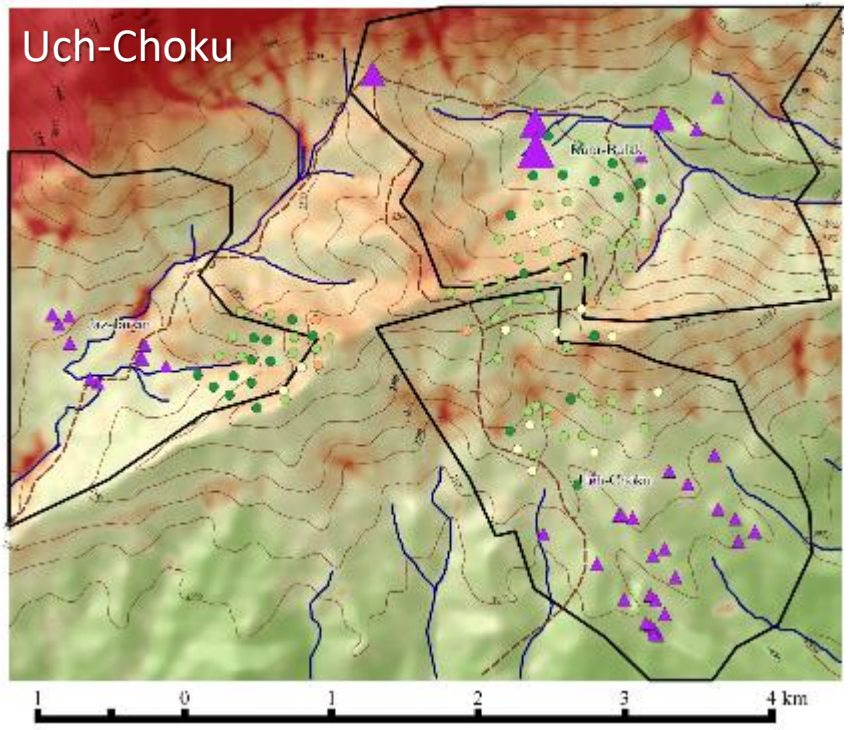


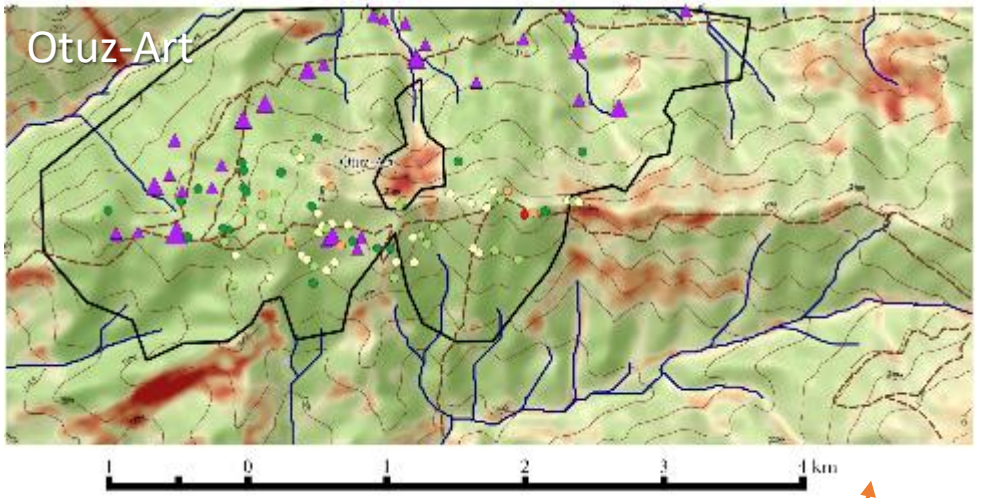
Elevations: 2000 – 2800 m a.s.l. with 100 m step

Bearings: N, NE, E, SE, S, SW, W, NW

Slopes: 0°-15°, 15°-30°, 30°-45°

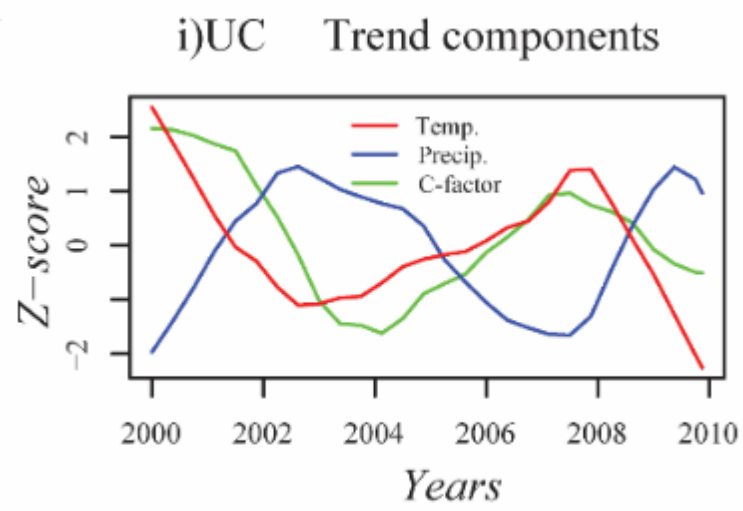
C-factor spatial distribution

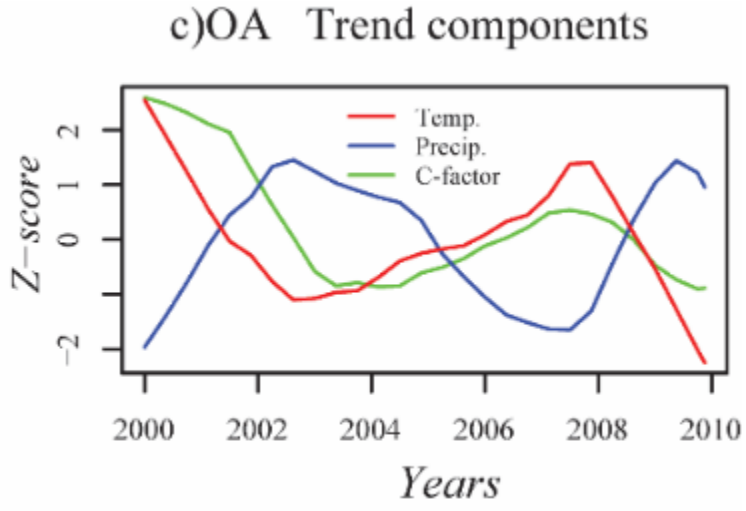


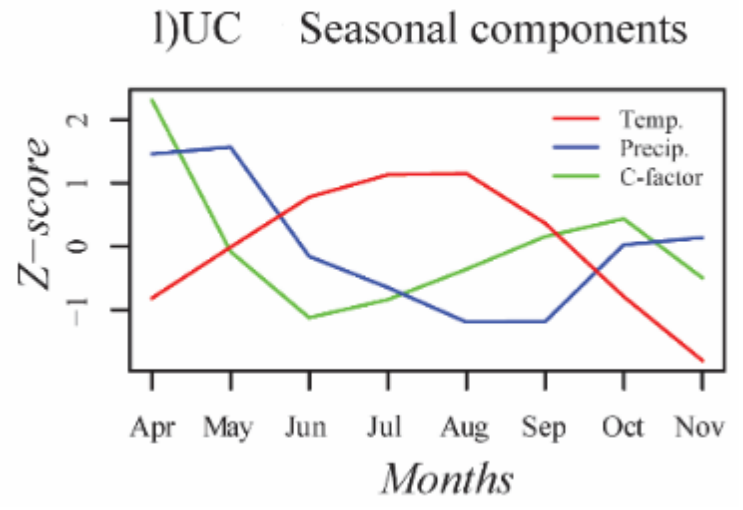


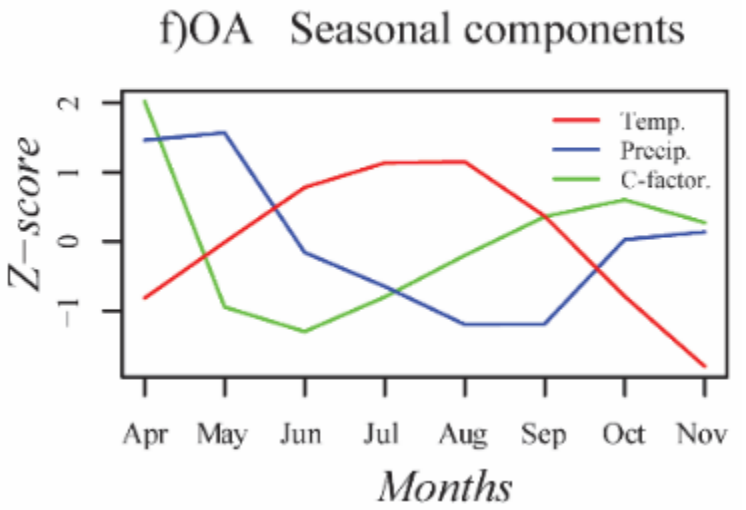
C-factor values per month and *EI*-weighted year mean									
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Year
Mean Otuz-Art	0,53	0,18	0,13	0,20	0,25	0,32	0,36	0,32	**0,20**
Std.dev Otuz-Art	0,24	0,09	0,06	0,07	0,07	0,07	0,07	0,20	0,07
Mean Uch-Choku	0,46	0,30	0,20	0,26	0,26	0,31	0,35	0,22	**0,27**
Std.dev Uch-Choku	0,28	0,15	0,08	0,08	0,08	0,08	0,07	0,20	0,10

Interactions of C-factor, temperature and precipitation (13-year mean)

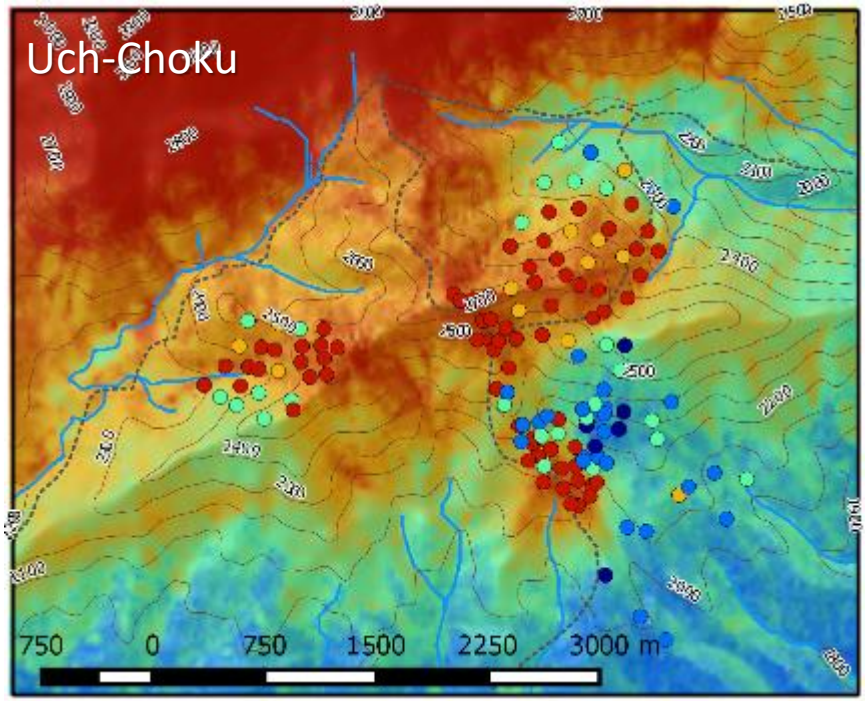


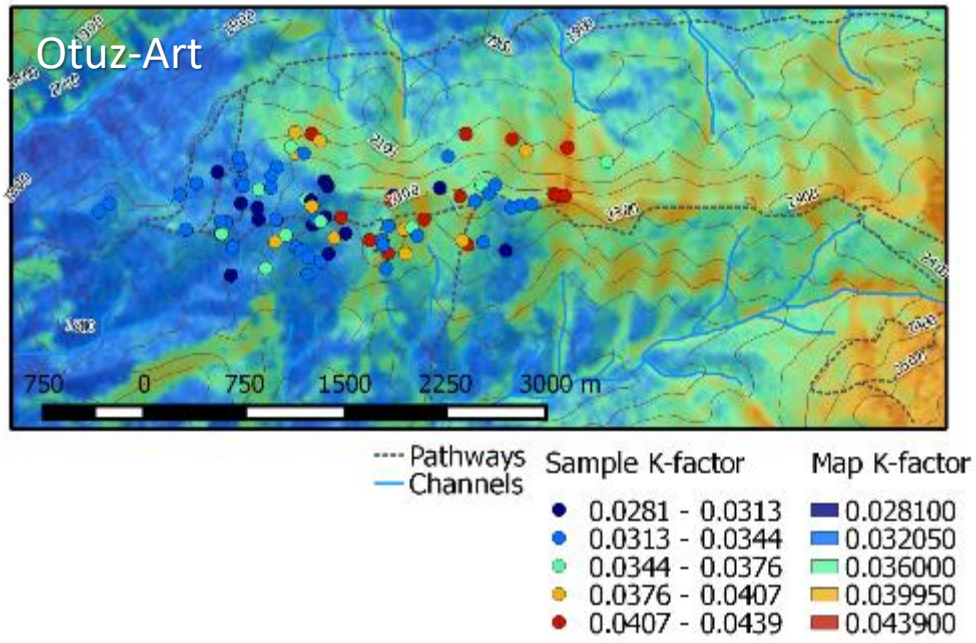


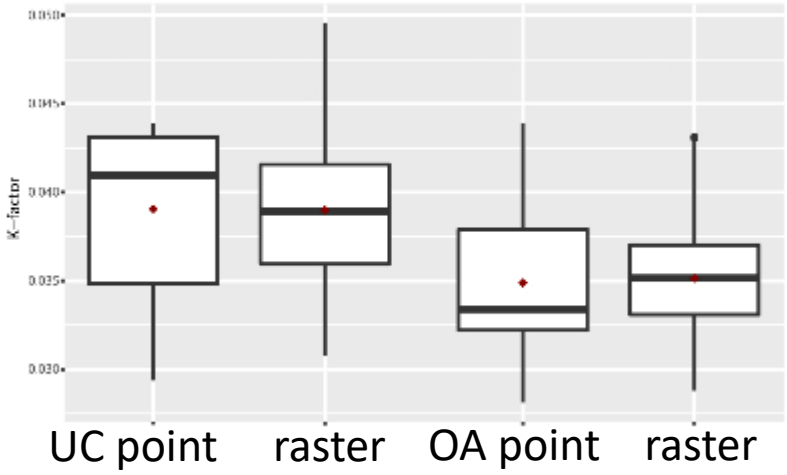




Universal kriging of K-factor







1000-fold validation with permutation: $R^2 = 0.4701$

Summary

- Overgrazing causes more damage on steeper slopes, then on flat terrain
- Close pastures are expected to have higher soil loss rates due to overgrazing than remote pastures
- Soil and vegetation features can be predicted with terrain and remotely sensed indices
- Vegetation is positively influenced by precipitation and negatively by temperature in the study site










Thank you!
Any questions?

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Integrated Climate Data Center - ICDC

Boettinger, J. L., Ramsey, R. D., Bodily, J. M., Cole, N. J., Kienast-Brown, S., Nield, S. J., … Stum, A. K. (2008). Landsat Spectral Data for Digital Soil Mapping. In A. E. Hartemink, A. B. McBratney, & M. de L. Mendonca-Santos (Eds.), *Digital Soil Mapping with Limited Data* (pp. 193–203). Springer.

Renard, K., Foster, G., Weesies, G., McCool, D., & Yoder, D. (1996). *Predicting soil erosion by water: a guide to conservation planning with the Revised Universal Soil Loss Equation*. *Agriculture Handbook No. 703*. Washington, D.C.: USDA.