

Effects of Land Use Change on Fire, Vegetation and Wildlife Dynamics in Arid Grasslands of Southern Russia

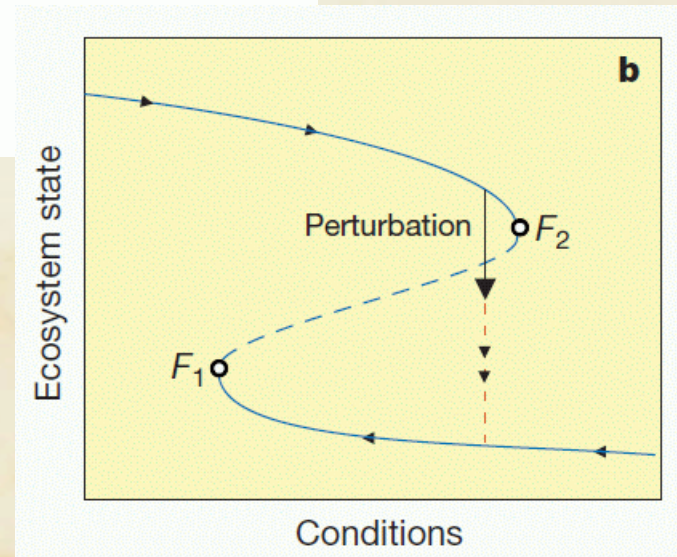
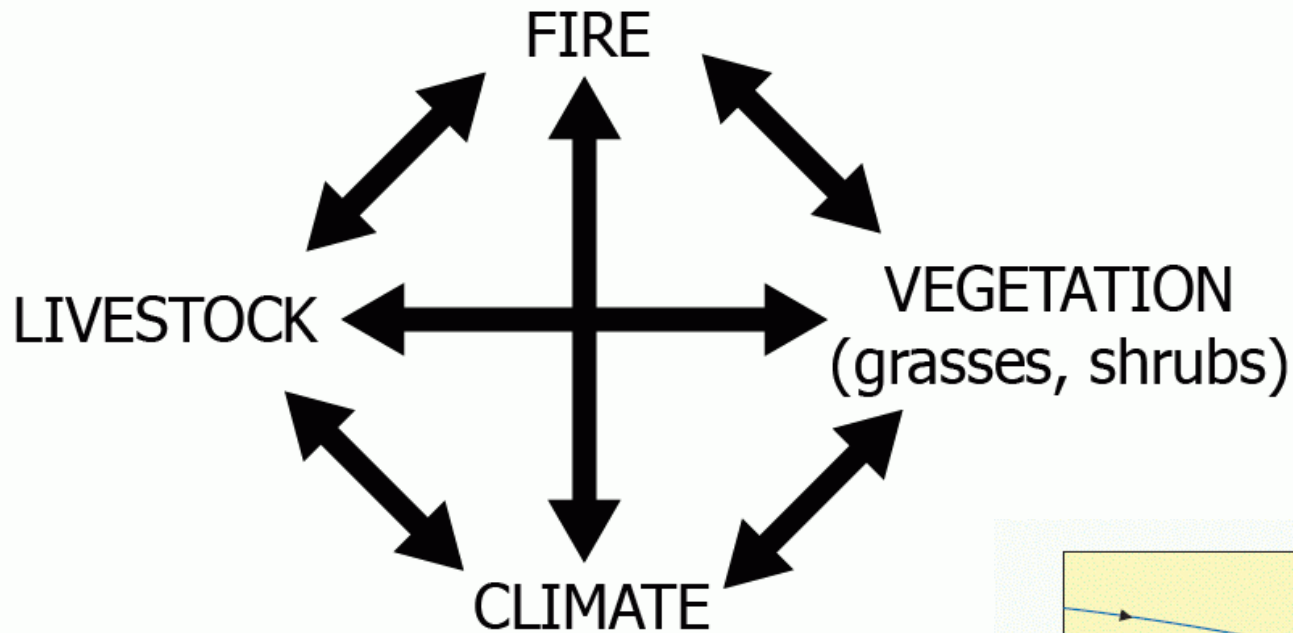
Maxim Dubinin

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Big Picture



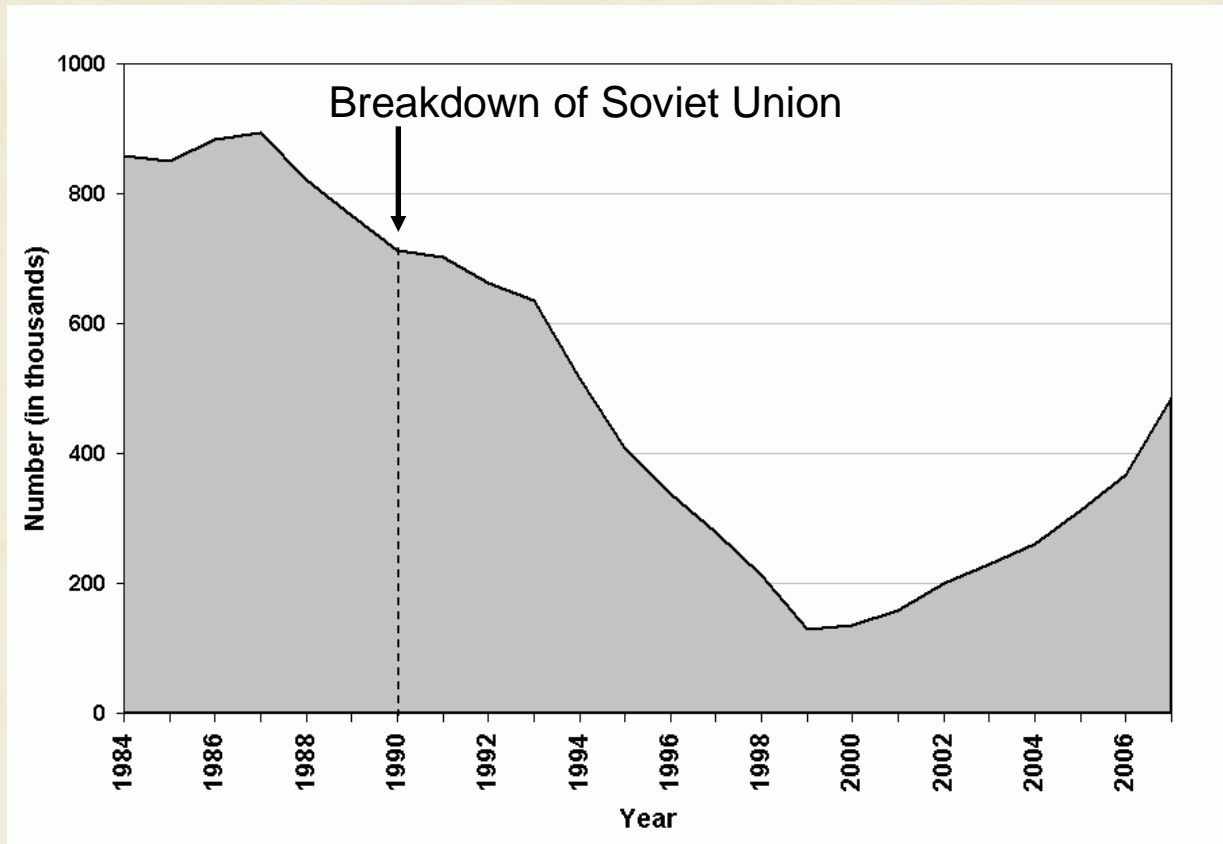


Study Area



Olson's Terrestrial Ecoregions of World

Background – land use change



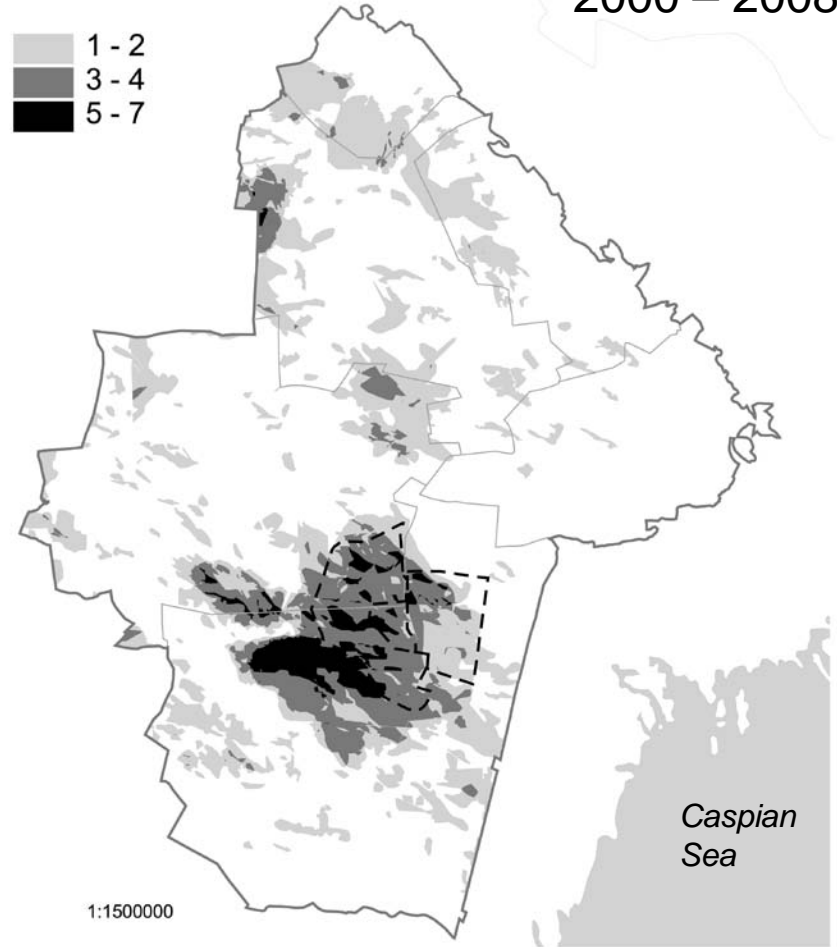
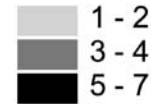
KALMSTAT, 2009

Modern burning

1980s – 1990s



2000 – 2008



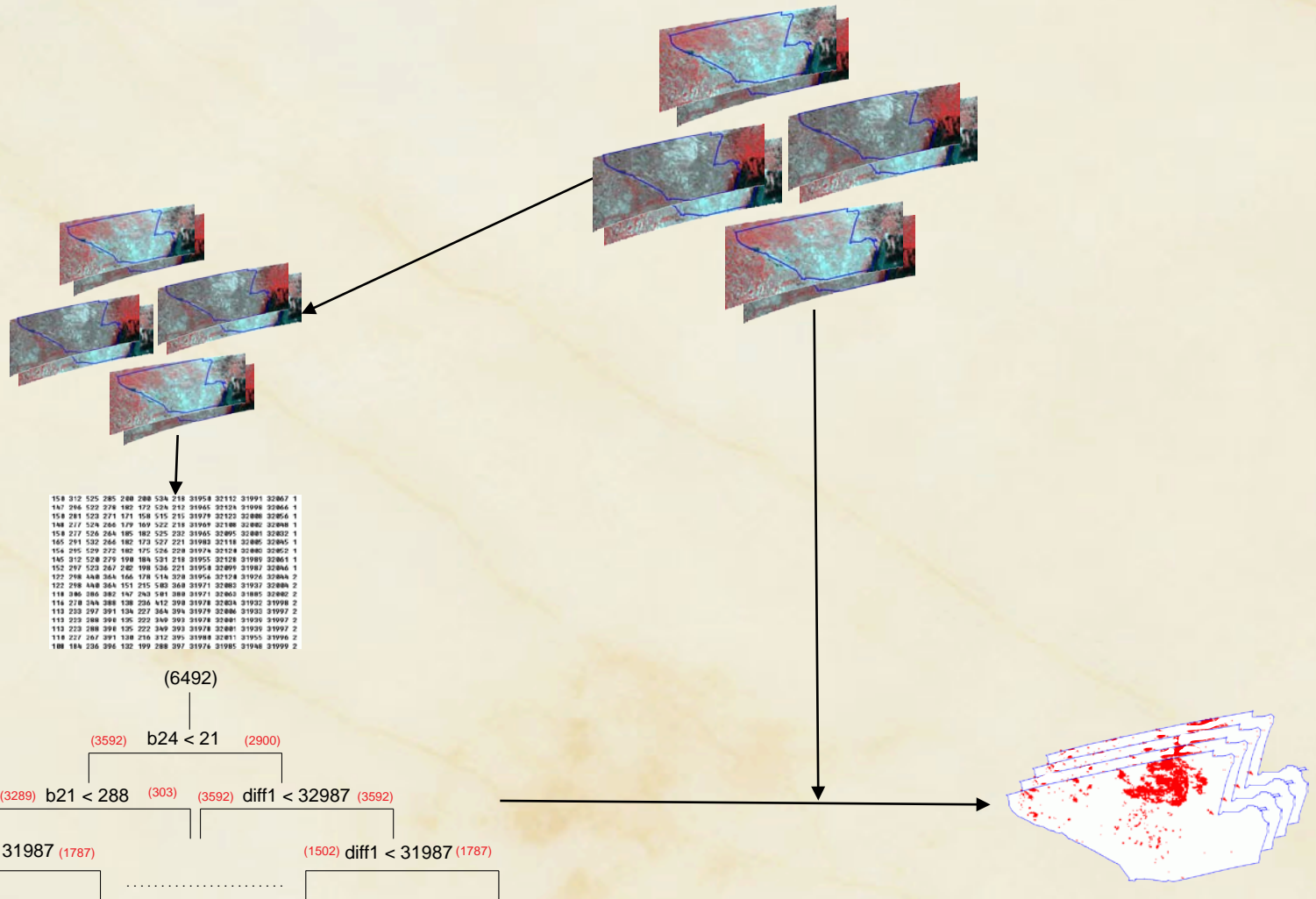
MODIS-based classification, number of times area burned

Question 1

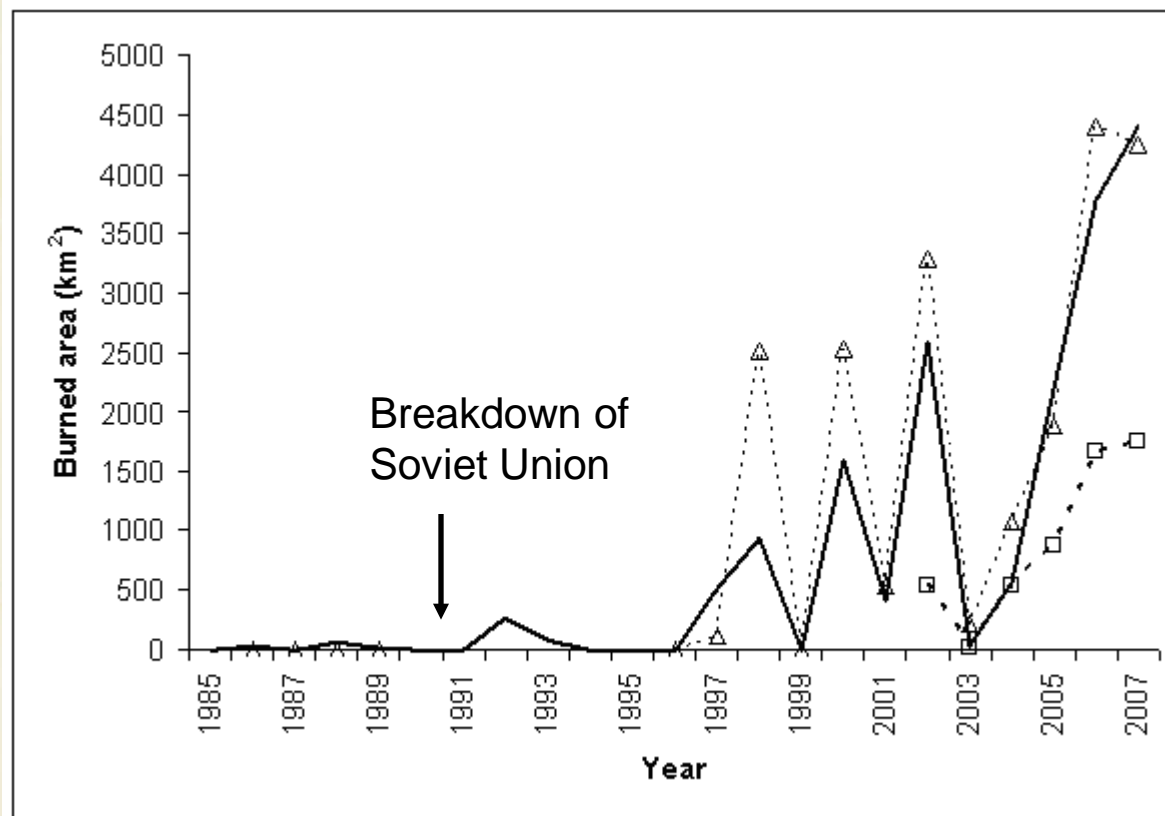
How did the burning regime change before and after Soviet Union breakdown?

Methods – burned area mapping

Decision trees classification, AVHRR, 1.1km, 1985-2007



Results – burned area change



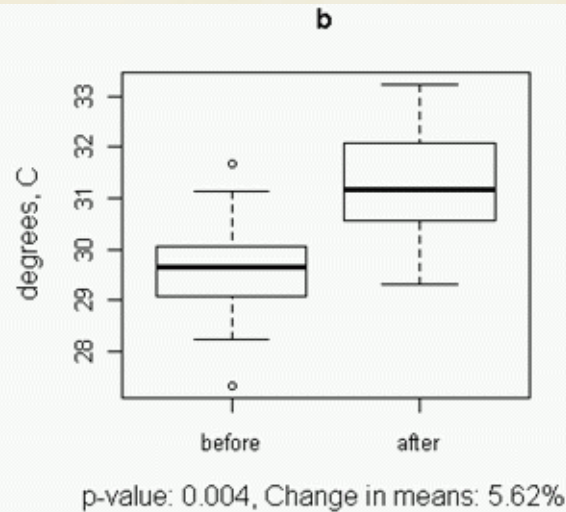
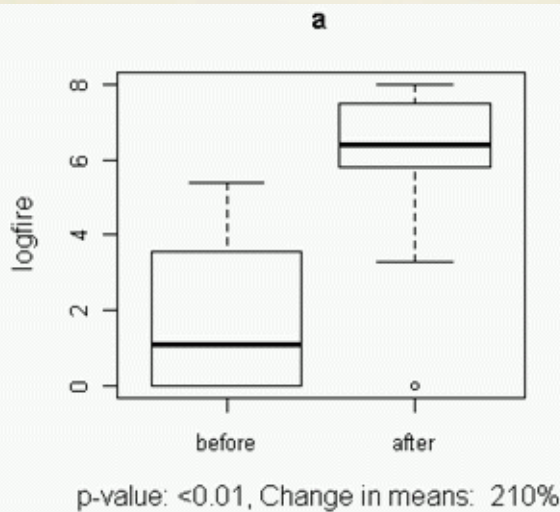
- - estimated trend (AVHRR)
- △ - △ - - validation (MODIS, RESURS, TM/ETM+)
- - □ - - official data

Question 2

What are the driving forces for the change in burning?

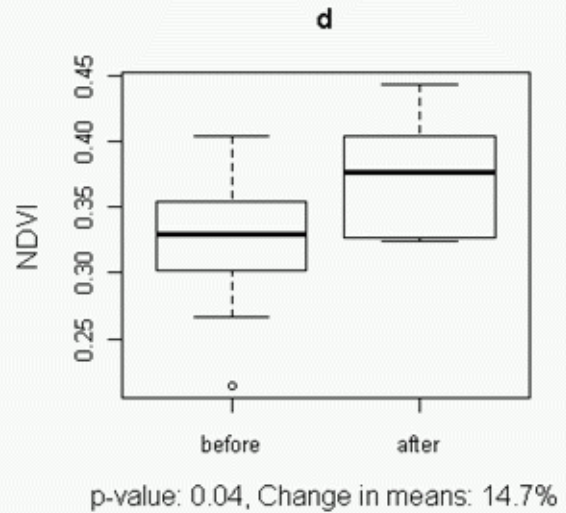
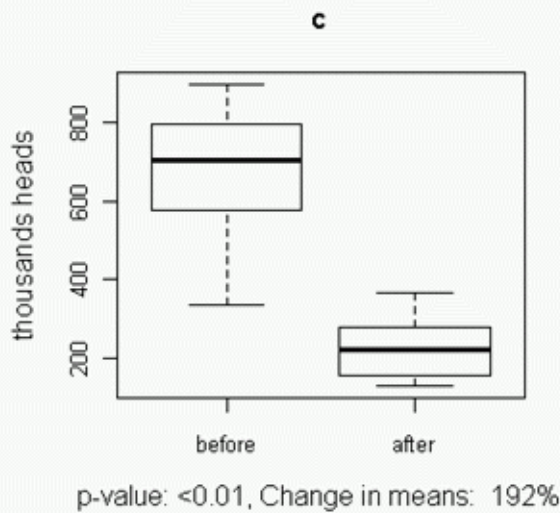
Explanation – burned area change

Burned area



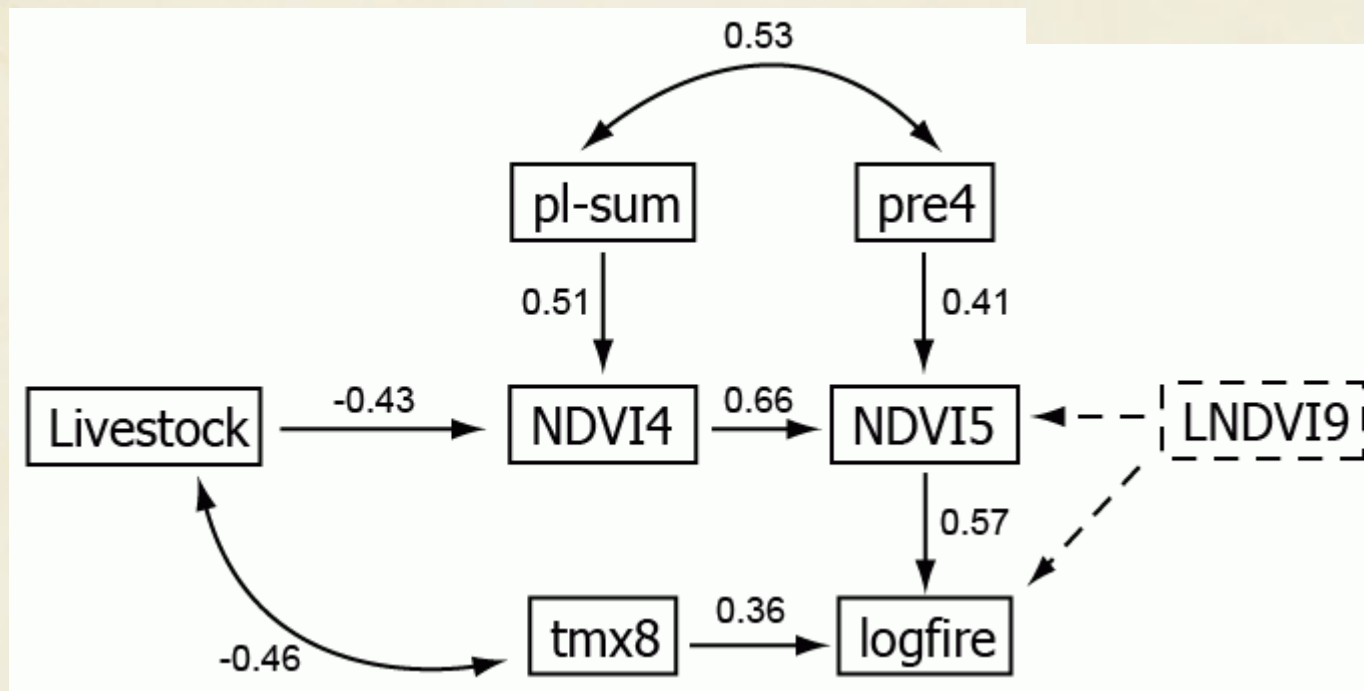
Maximum summer temperature

Livestock numbers



Spring NDVI

Explanation – burned area change



pl-sum – previous year summarized precipitation

pre4 – precipitation in April

tmx8 – maximum T in August

NDVI4,5 – NDVI in April, May

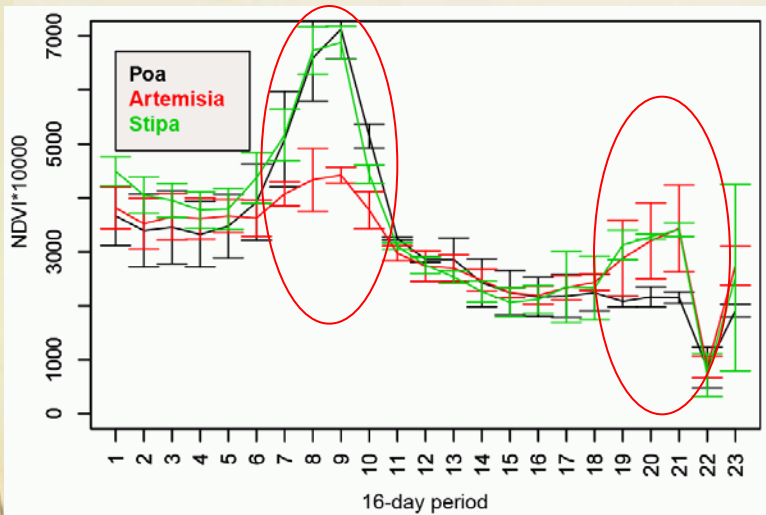
LNDVI9 – previous year NDVI in September

Livestock – annual livestock numbers

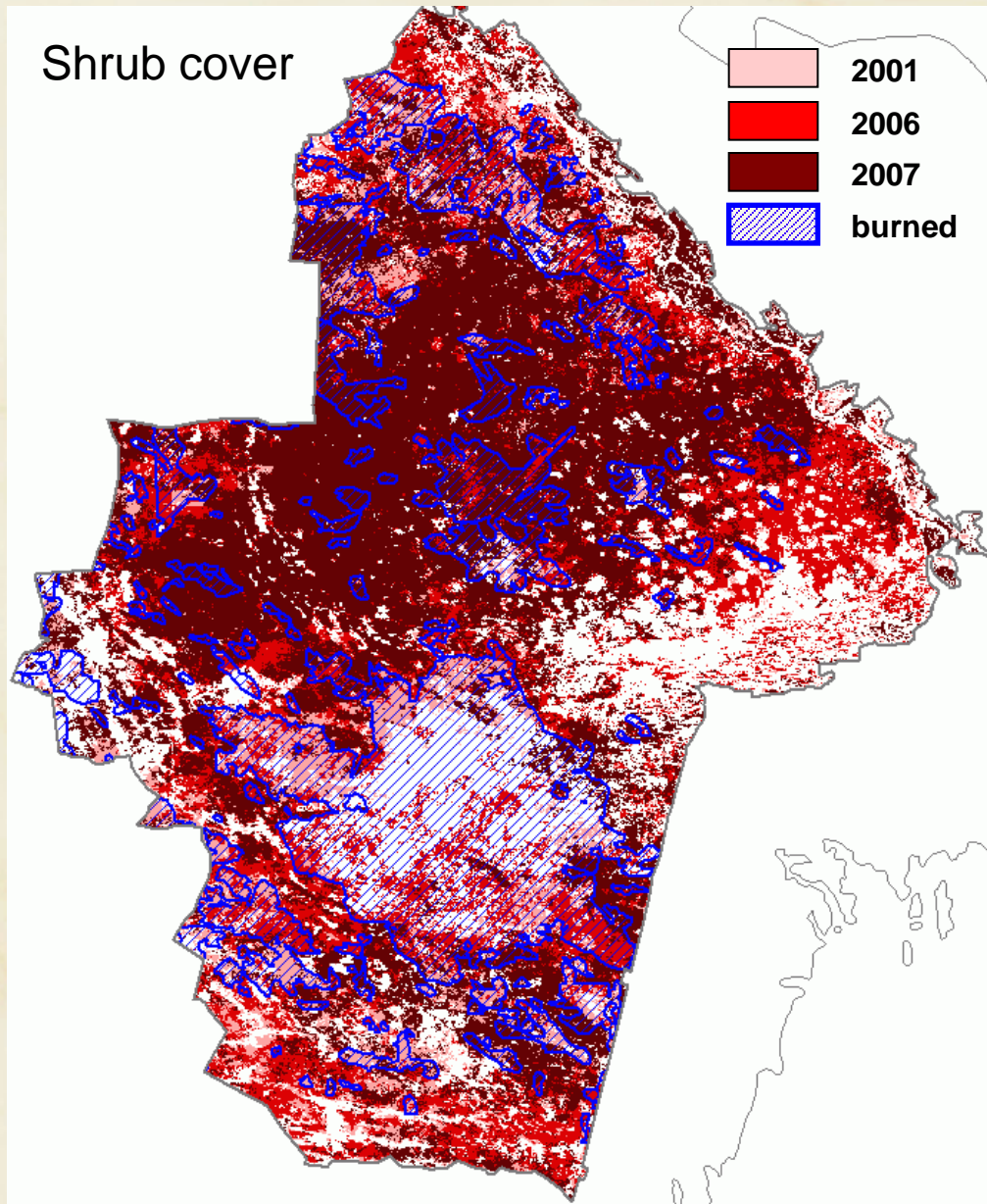
Question 3

What is the effect of the increase in burning on vegetation?

Vegetation change



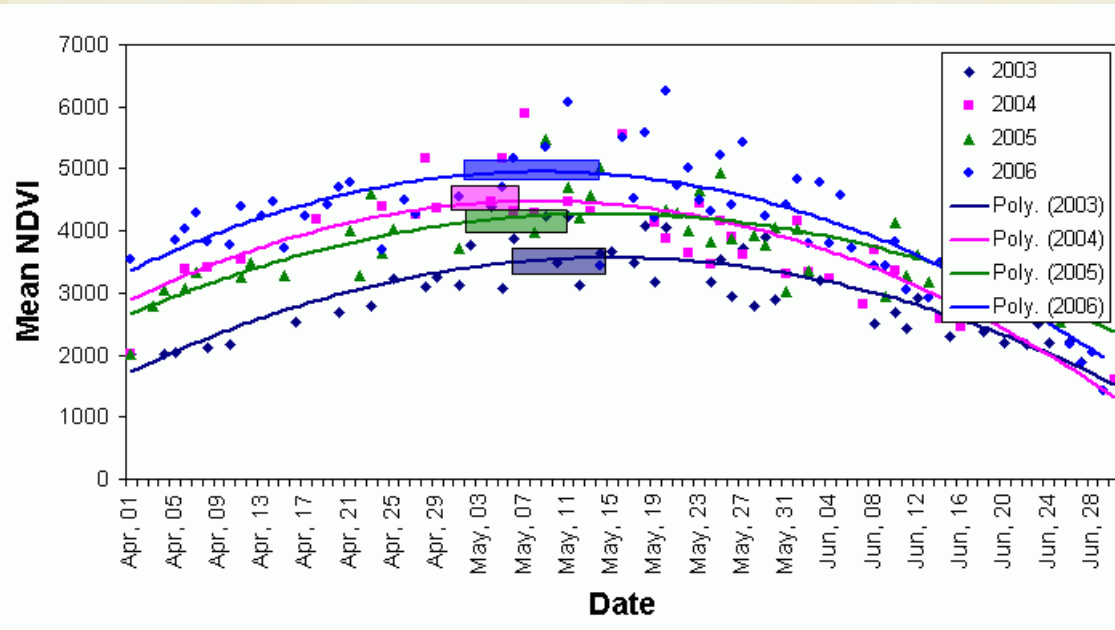
MOD13Q1 NDVI, Field data



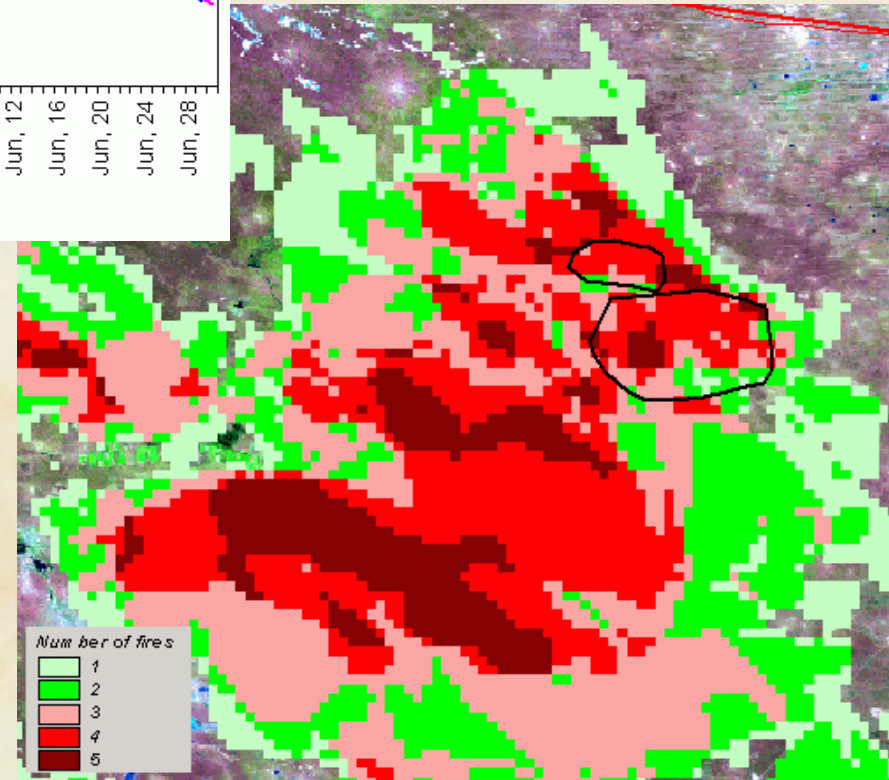
Question 4

What is the effect of ecosystem changes on habitat selection?

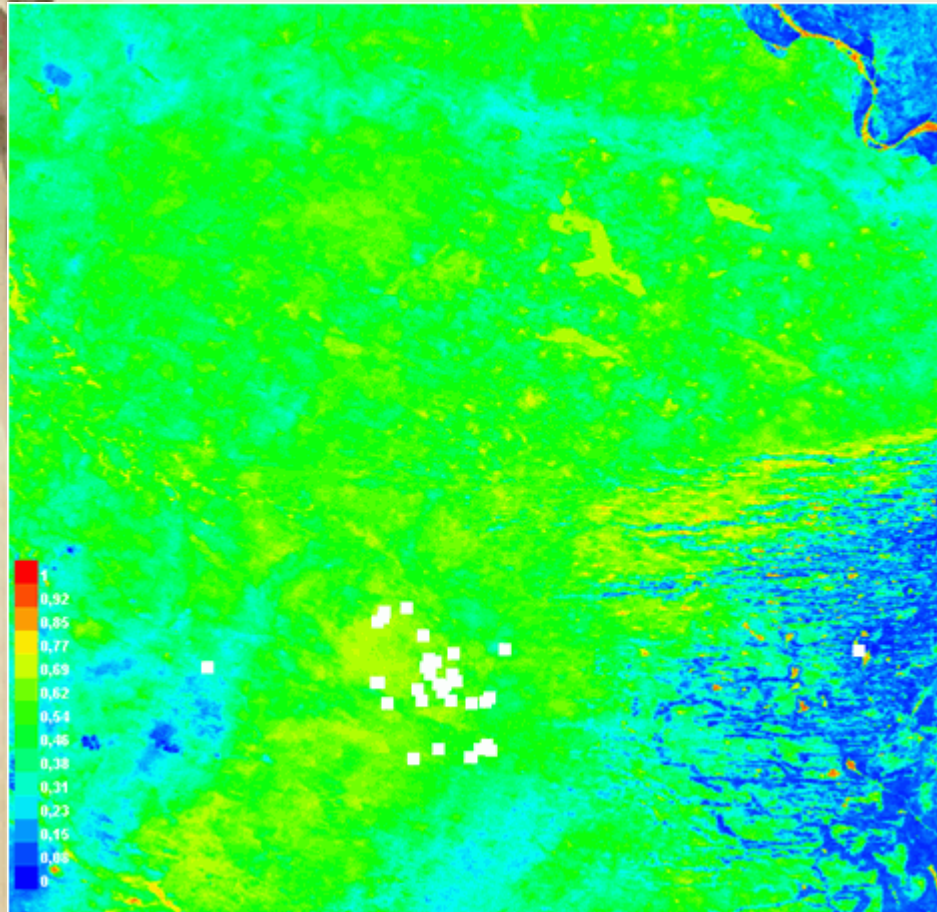
Saiga antelope habitat selection



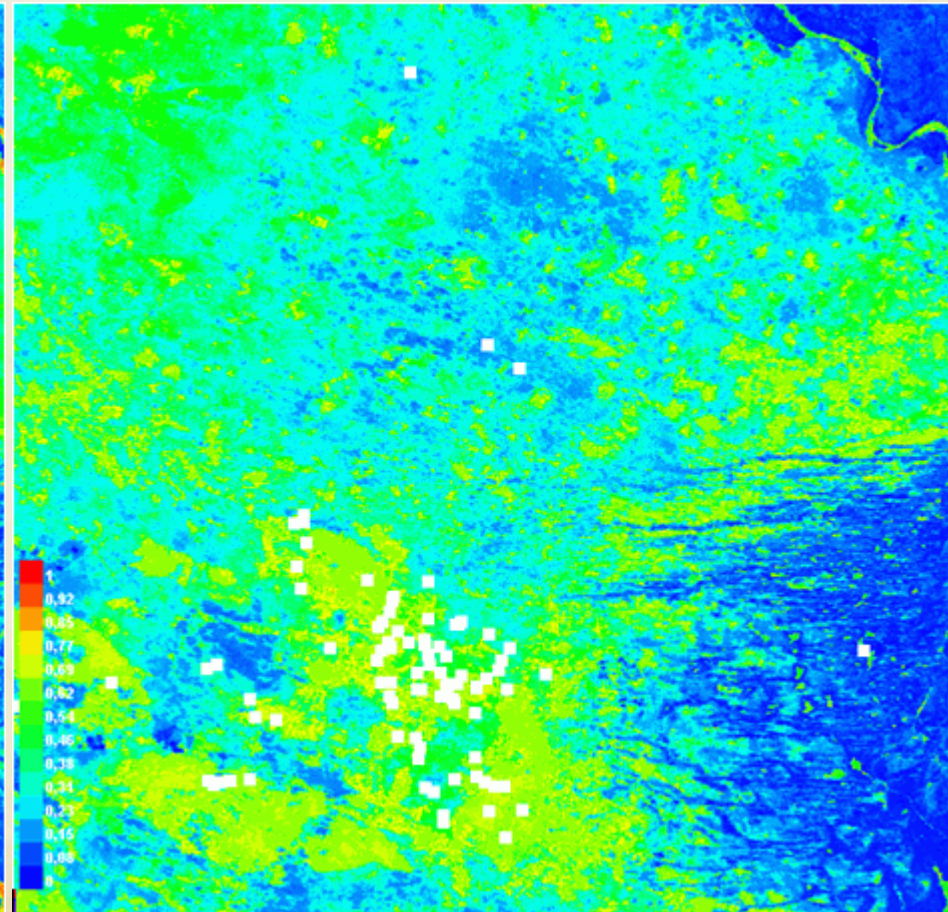
Daily MOD09GQK NDVI,
Calving timing data



Saiga antelope habitat selection



September, 2004



September, 2005

Conclusions/Summary

- Institutional change was followed by the increase in burning
- It took 5-6 years after the breakdown for vegetation to restore
- Livestock was strong determinant of burning, but not alone
- Fire facilitated the transition from shrub to grass-dominated vegetation communities, but was not exclusive reason for that.

Acknowledgements

NESSF!

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