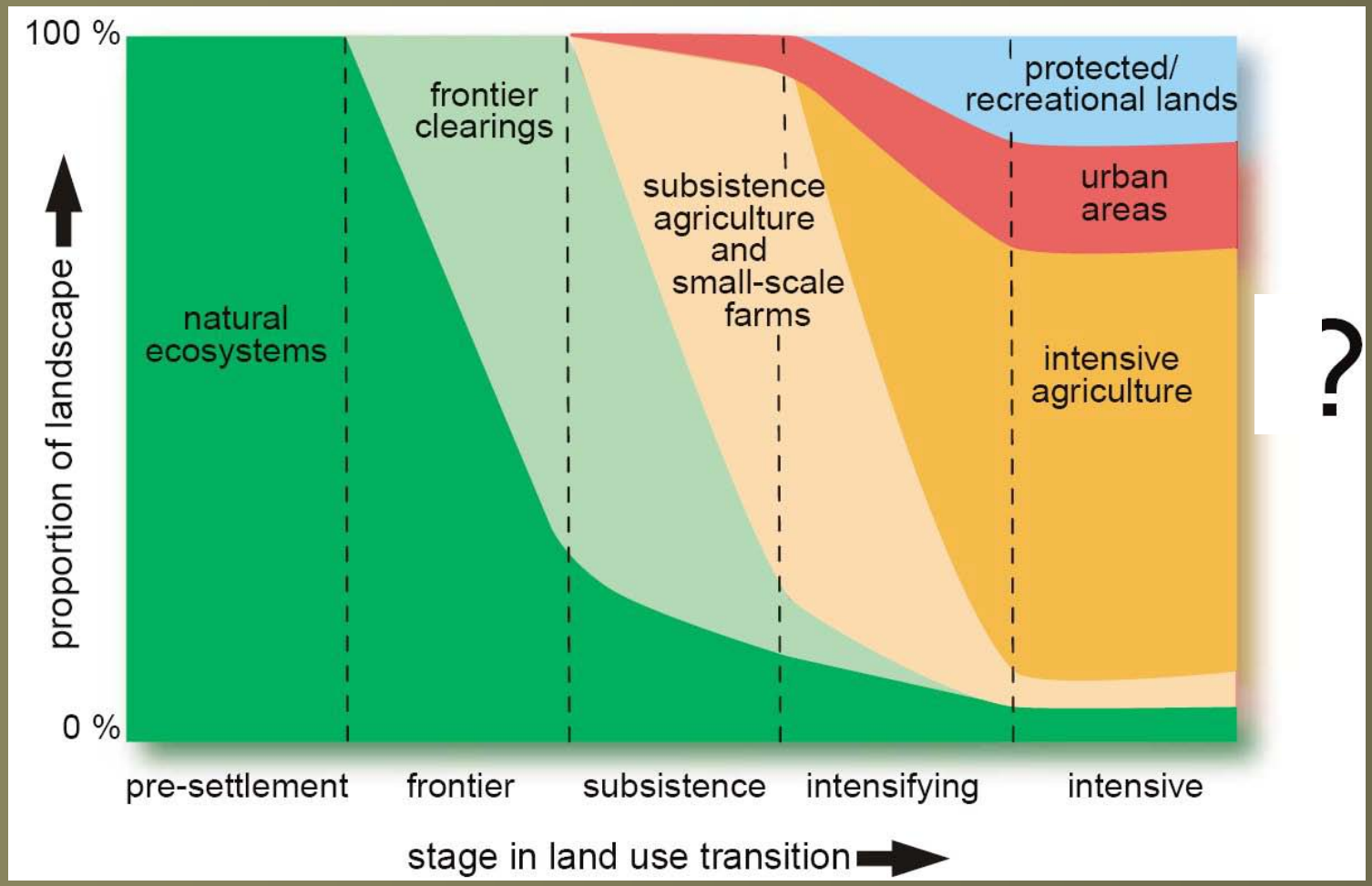
Land Changes and Institutional Drivers in the NEESPI region

Volker C. Radeloff, C. Alcantara, L. Baskin, O. Chaskovskyy, M. Dubinin, P. Hostert, J. Knorn, J. Kozak, I. Kruhlov, T. Kuemmerle, A. Lushchekina, D. Mueller, K. Perzanowski, A. Prishchepov, A. Rabe

Kirsten de Beurs, G. Henebry, G. Ioffe, T. Nefedova

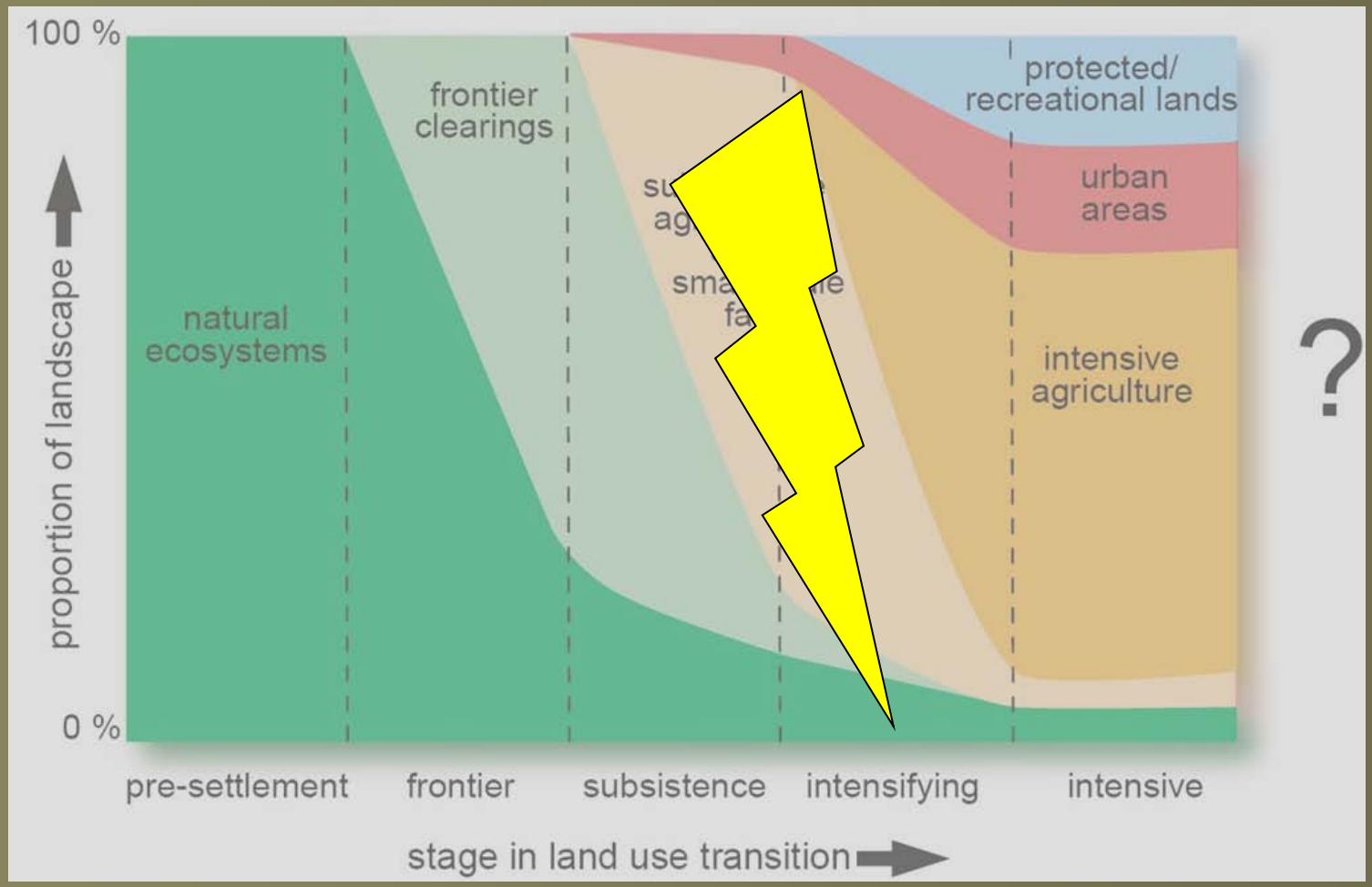
Mutlu Ozdogan, D. Aksenov, M. Baumann, A. Jaroshenko, K. Wendland

Introduction

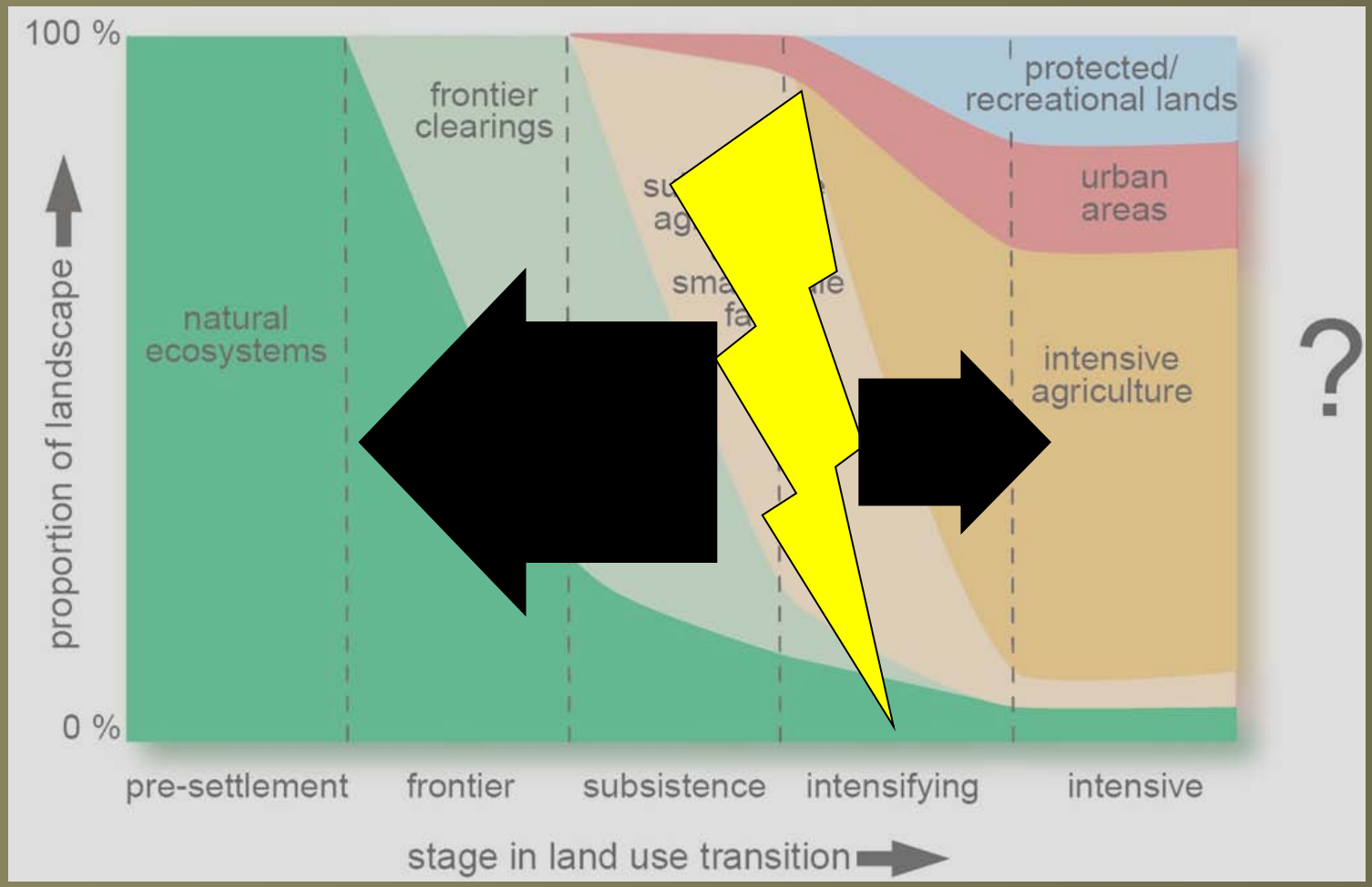


Foley et al., 2005, Science

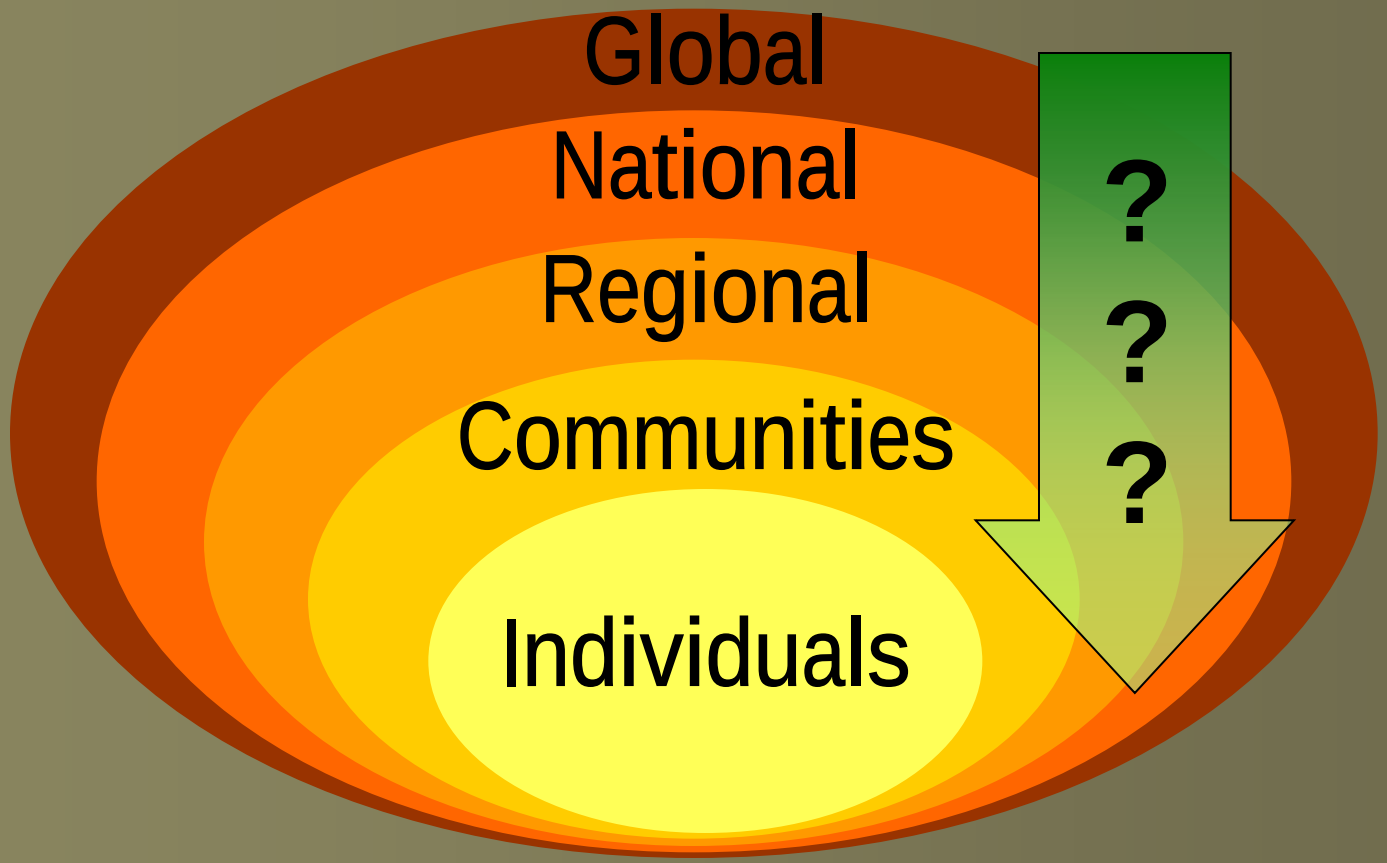
Introduction



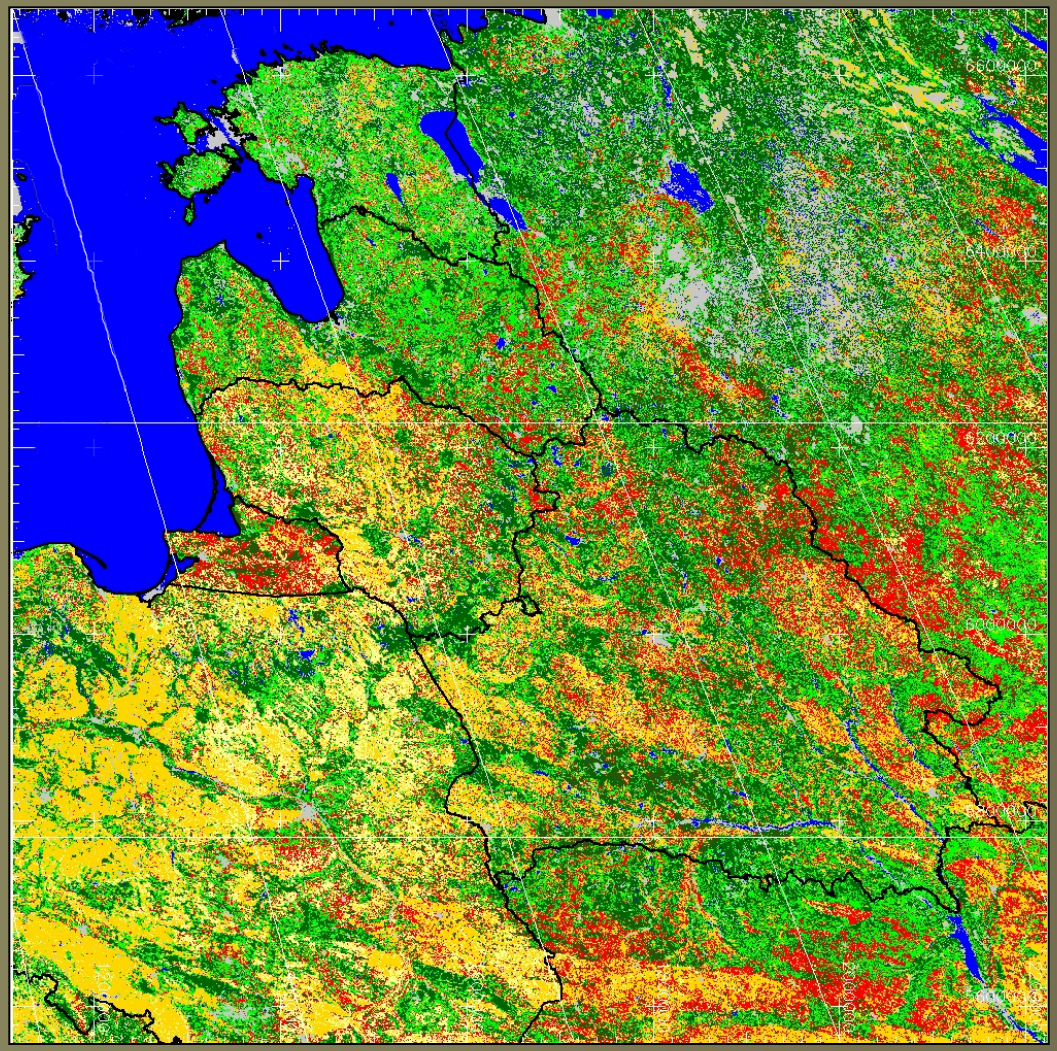
Introduction



Introduction



Introduction



Introduction

Outline

1. *Institutional changes*
2. *Farmland abandonment*
3. *Logging*

Outline

1. Institutional changes
2. Farmland abandonment
3. Logging

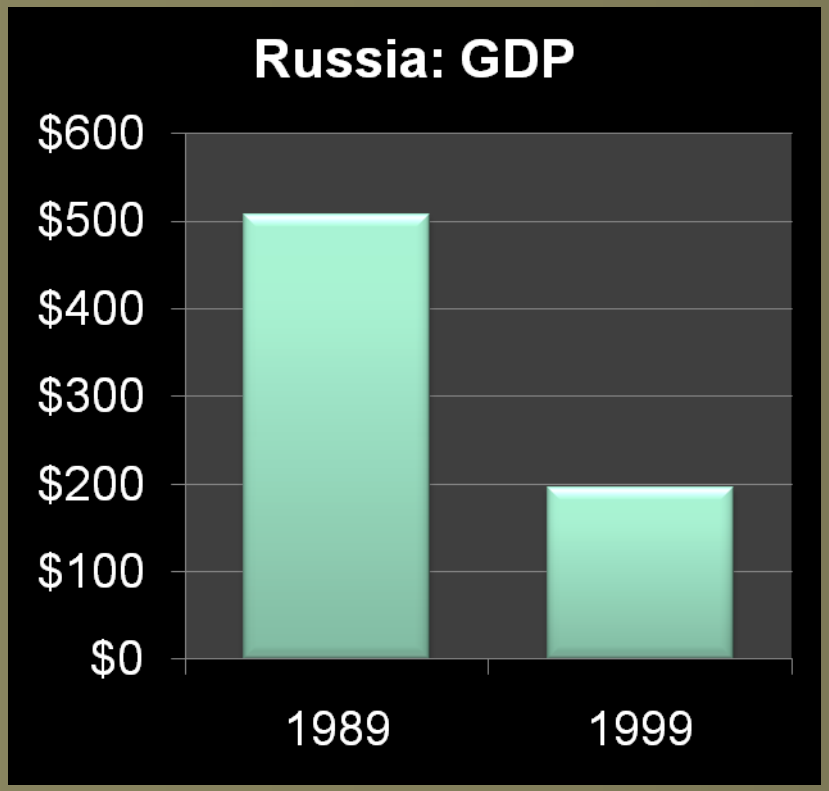
Institutional changes

Institutional changes

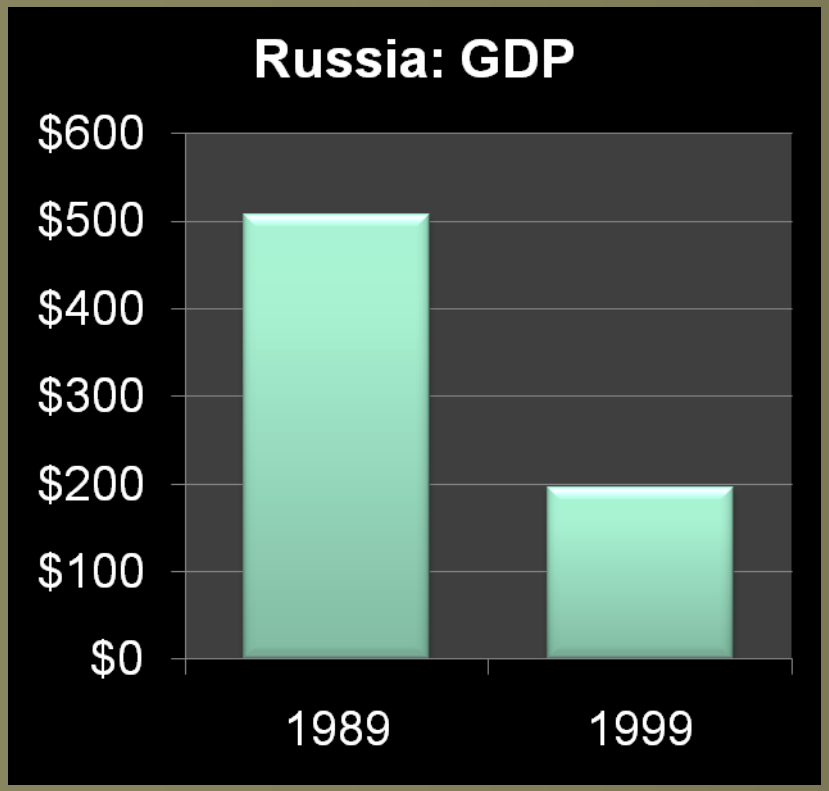
Shock therapy:

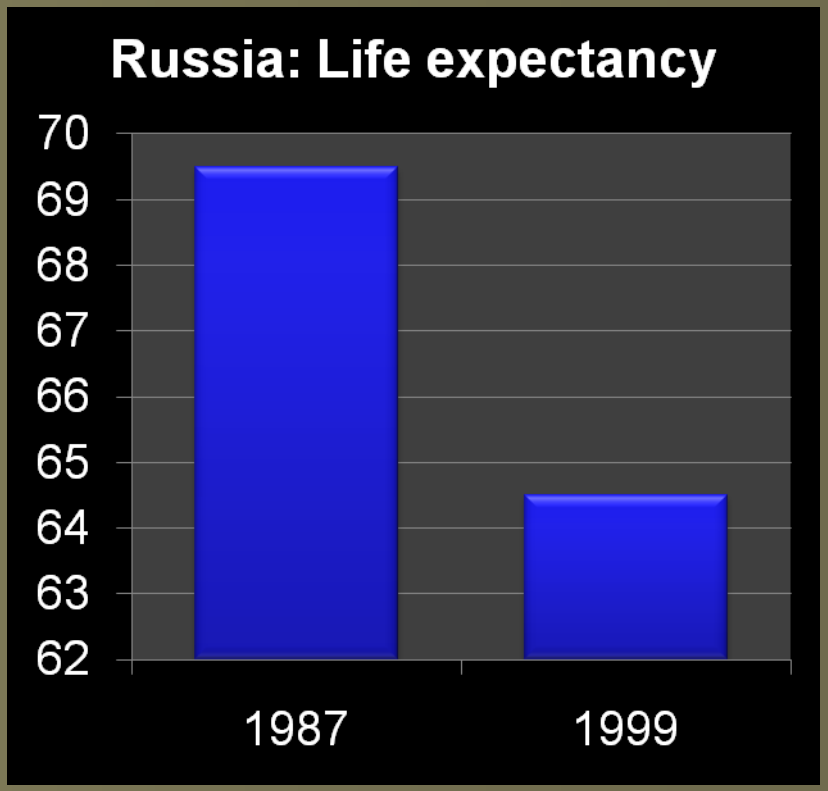
- ***Open markets***
- ***Subsidy cuts***
- ***Privatization***

Institutional changes

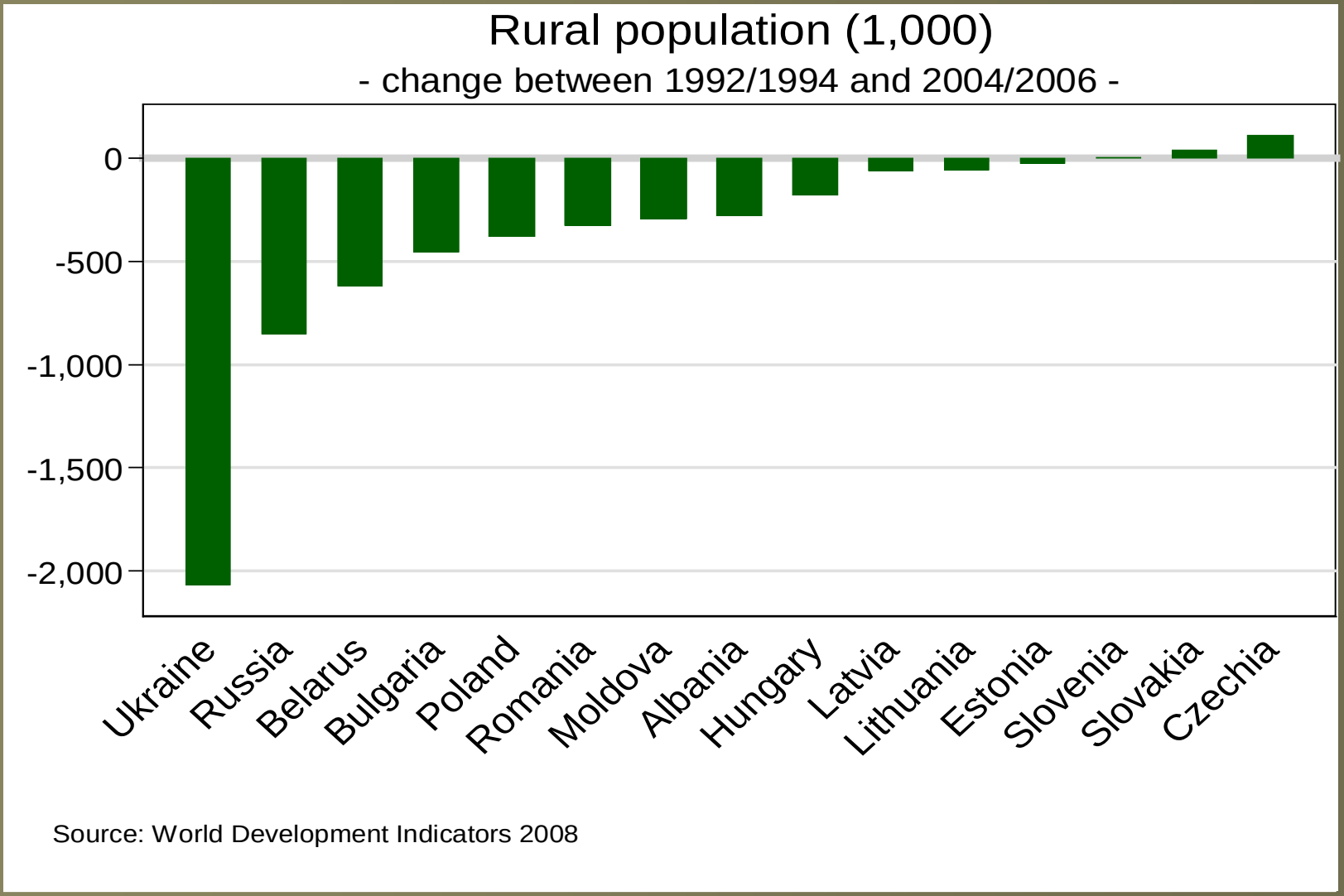


Institutional changes



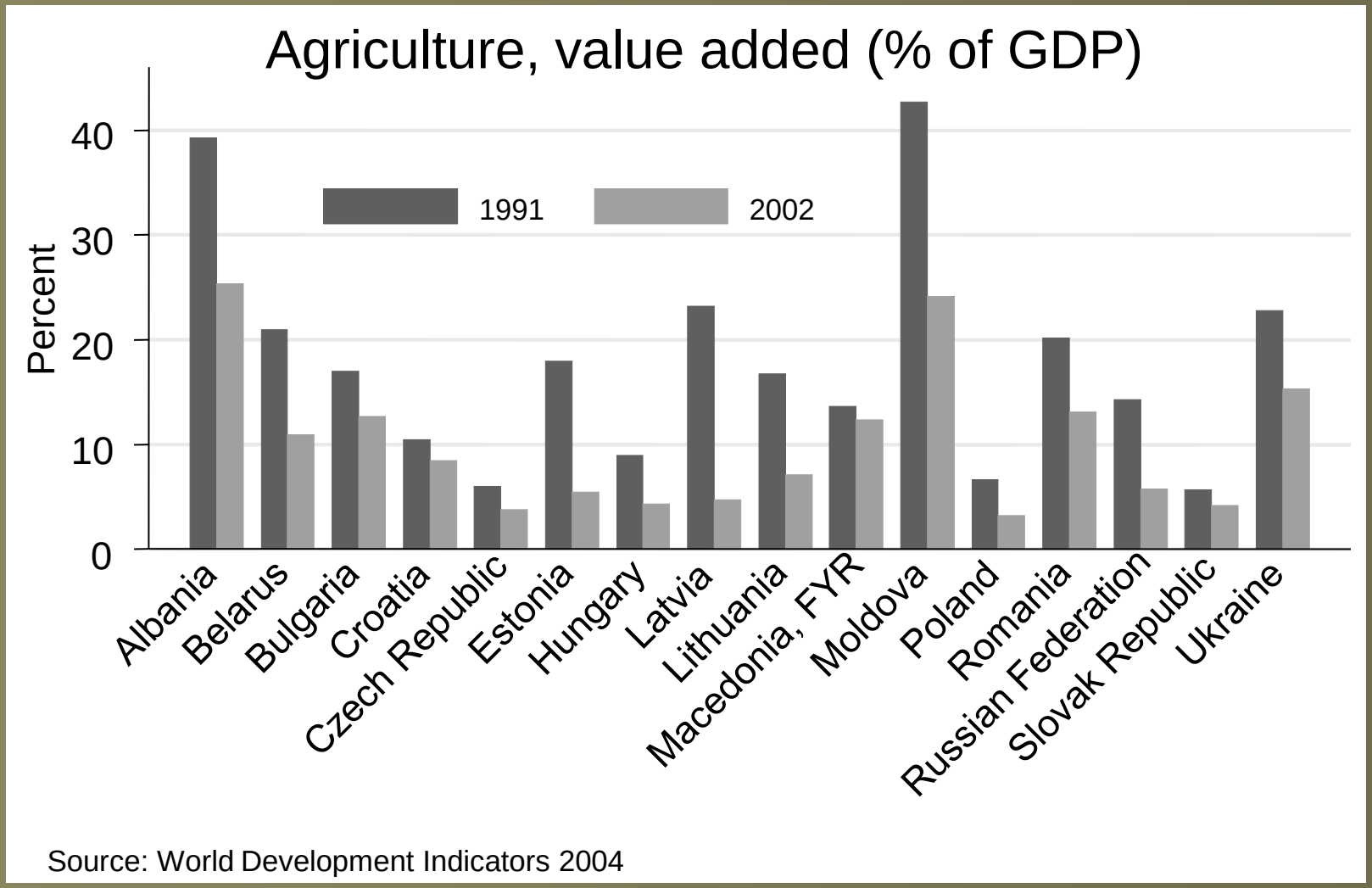


Institutional changes



Source: World Development Indicators 2008

Institutional changes

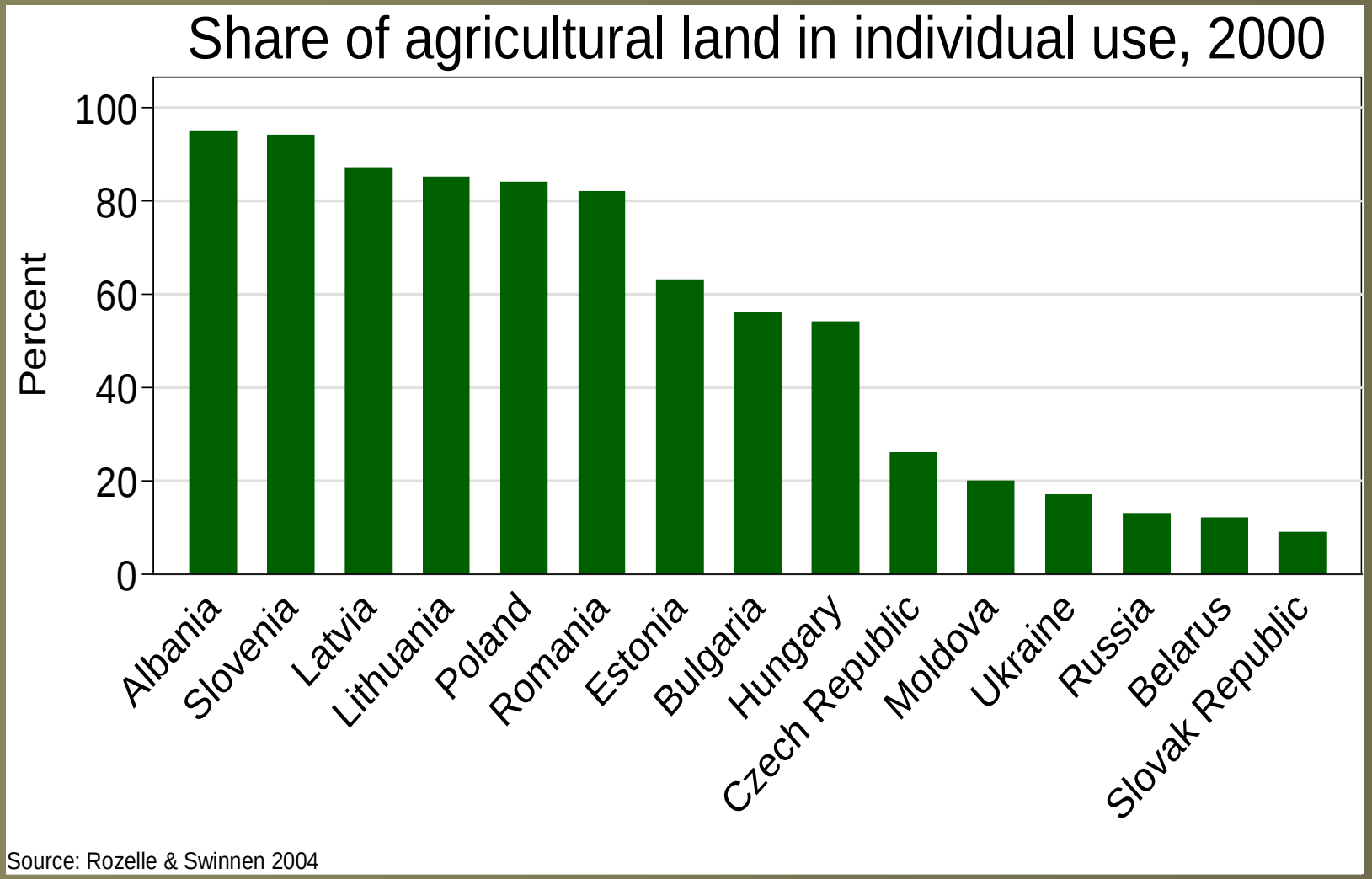


Source: World Development Indicators 2004

Institutional changes

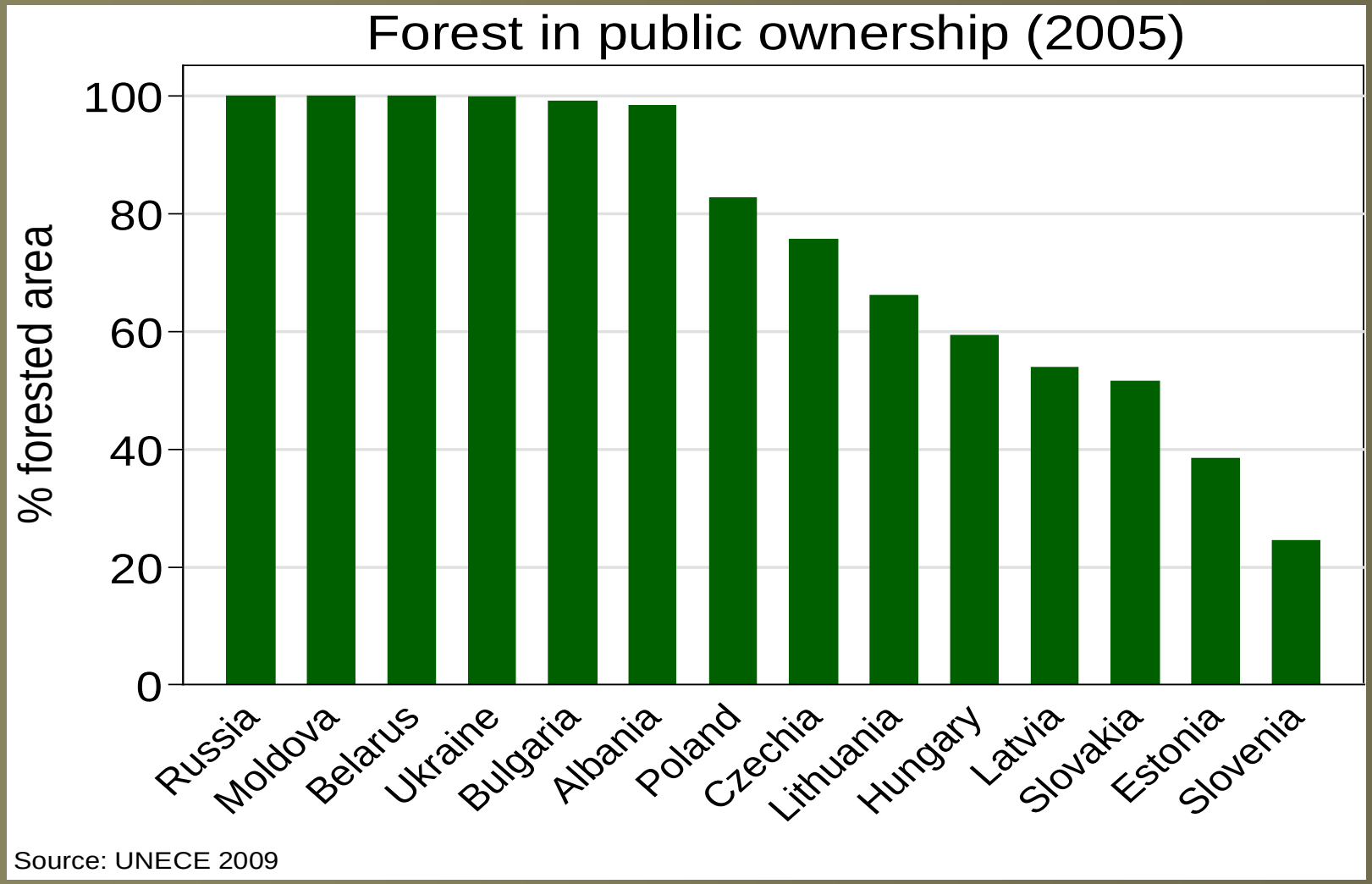
Country	Privatization strategy
Albania	Distribution
Baltics	Restitution
Czechia	Restitution
Hungary	Restitution, distribution, voucher
Poland	Auction
Romania	Restitution, distribution
Slovakia	Restitution
European CIS	Share distribution

Institutional changes

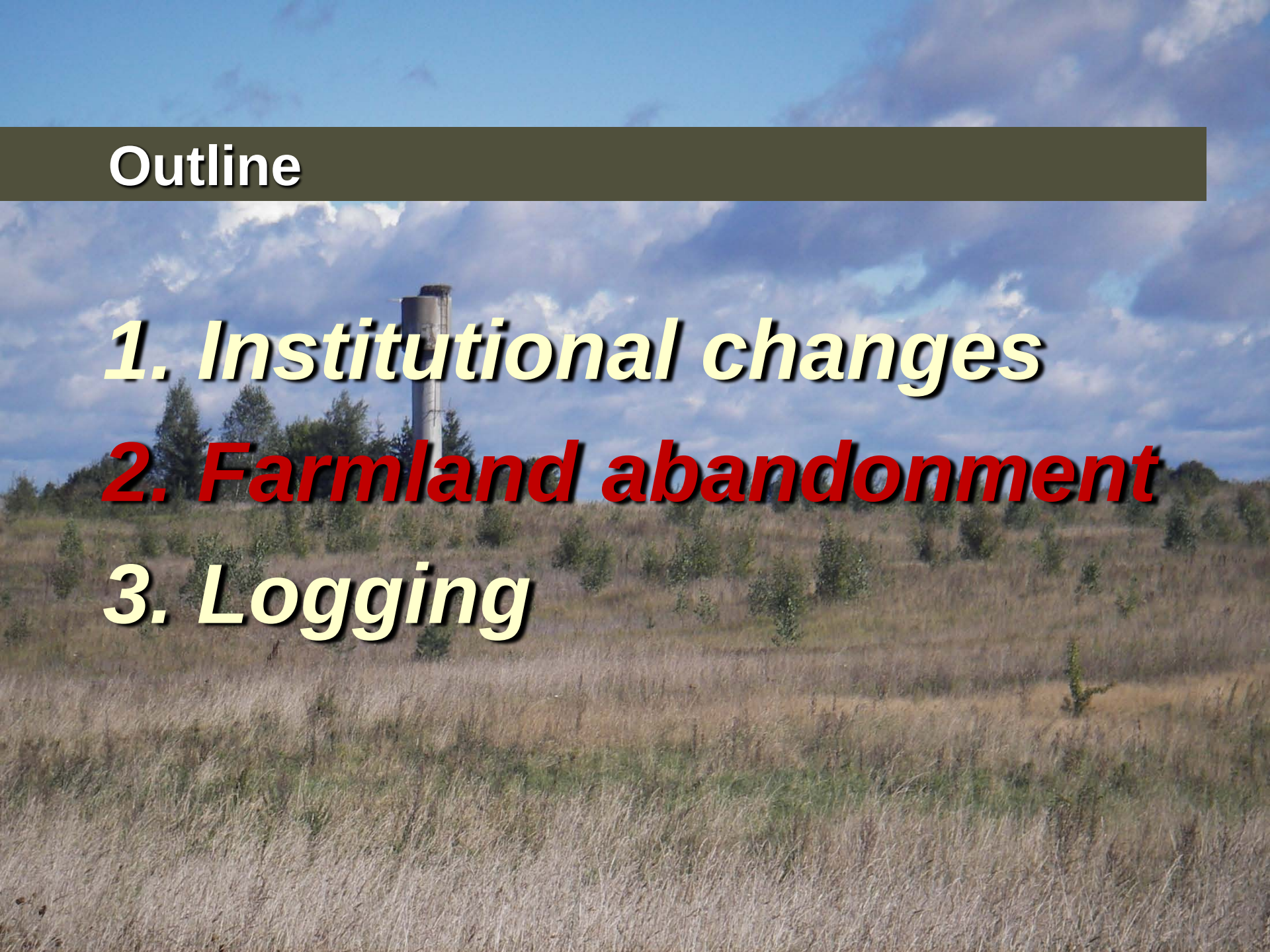


Source: Rozelle & Swinnen 2004

Institutional changes



Institutional changes



Outline

1. Institutional changes

2. Farmland abandonment

3. Logging

Farmland abandonment

Land Abandonment in Russia: Understanding Recent Trends and Assessing Future Vulnerability and Adaptation to Changing Climate and Population Dynamics

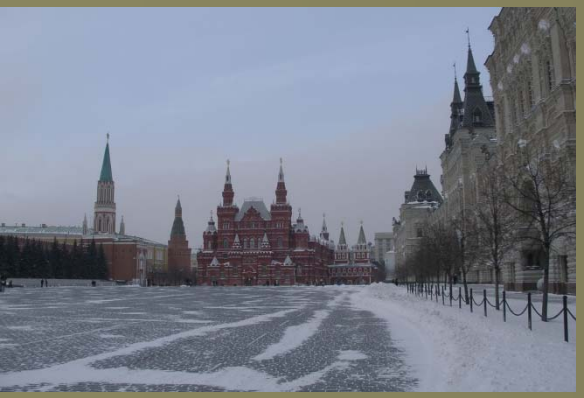
September 1990

September 2000

Agricultural de-intensification in Stravropol Kray evident in Landsat TM as substantial reduction in center pivot irrigation

Farmland abandonment

- Land abandonment is not random or unexpected
- Abandonment is preceded by low crop yields and/or declines in rural population density.



North: rural population density driven by proximity to major cities.

South: rural population density is driven by soil fertility *and* proximity to major cities.

Field work:
May – June 2010!

Kostroma

Chuvash

Samara

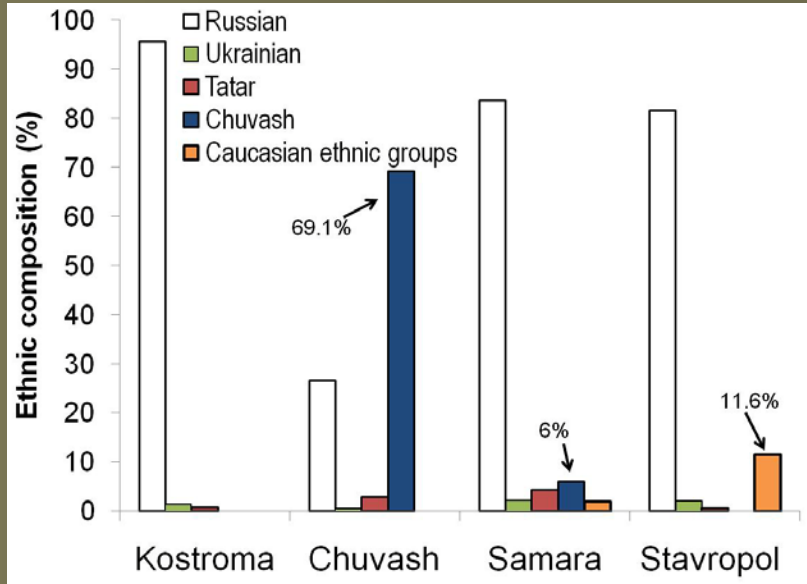
Stavropol

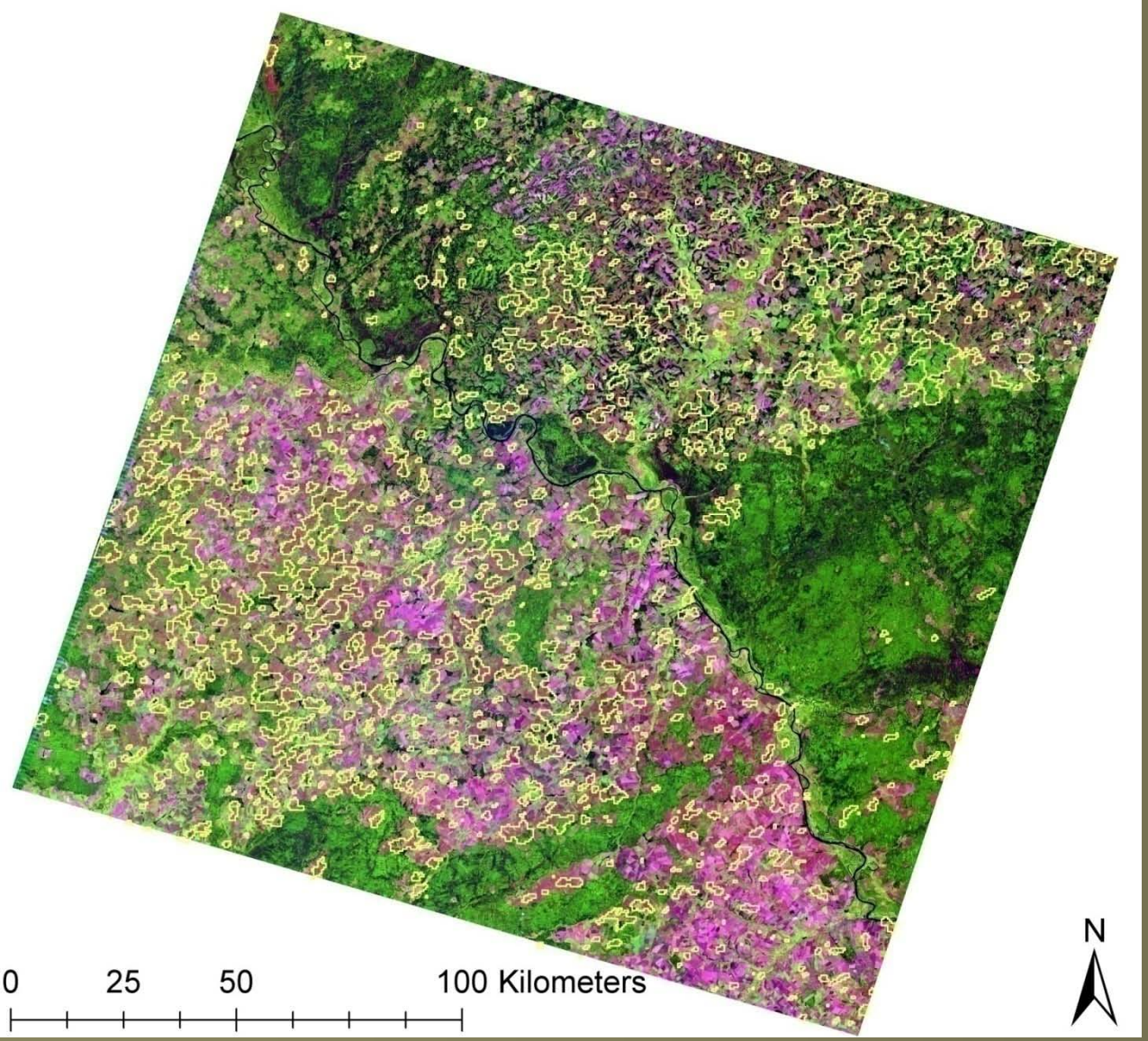
N

0 250 500 1,000
Kilometers

Vegetation trends from 2000 – 2008 revealed by MODIS (500 m resolution)

Population decline is dependent on ethnic composition of the rural population → may indirectly influence land abandonment.





Yellow:

Positive trends are found mainly in croplands and not in other land cover classes.

Greens:

No changes found

- Anthropogenic rather than climatic cause.
- Selected region is characterized by depressed agriculture.
- Succession of weeds, grasses and forbs can lead to increased NDVI.

Land Cover yellow is significant positive trend in MODIS 500m data

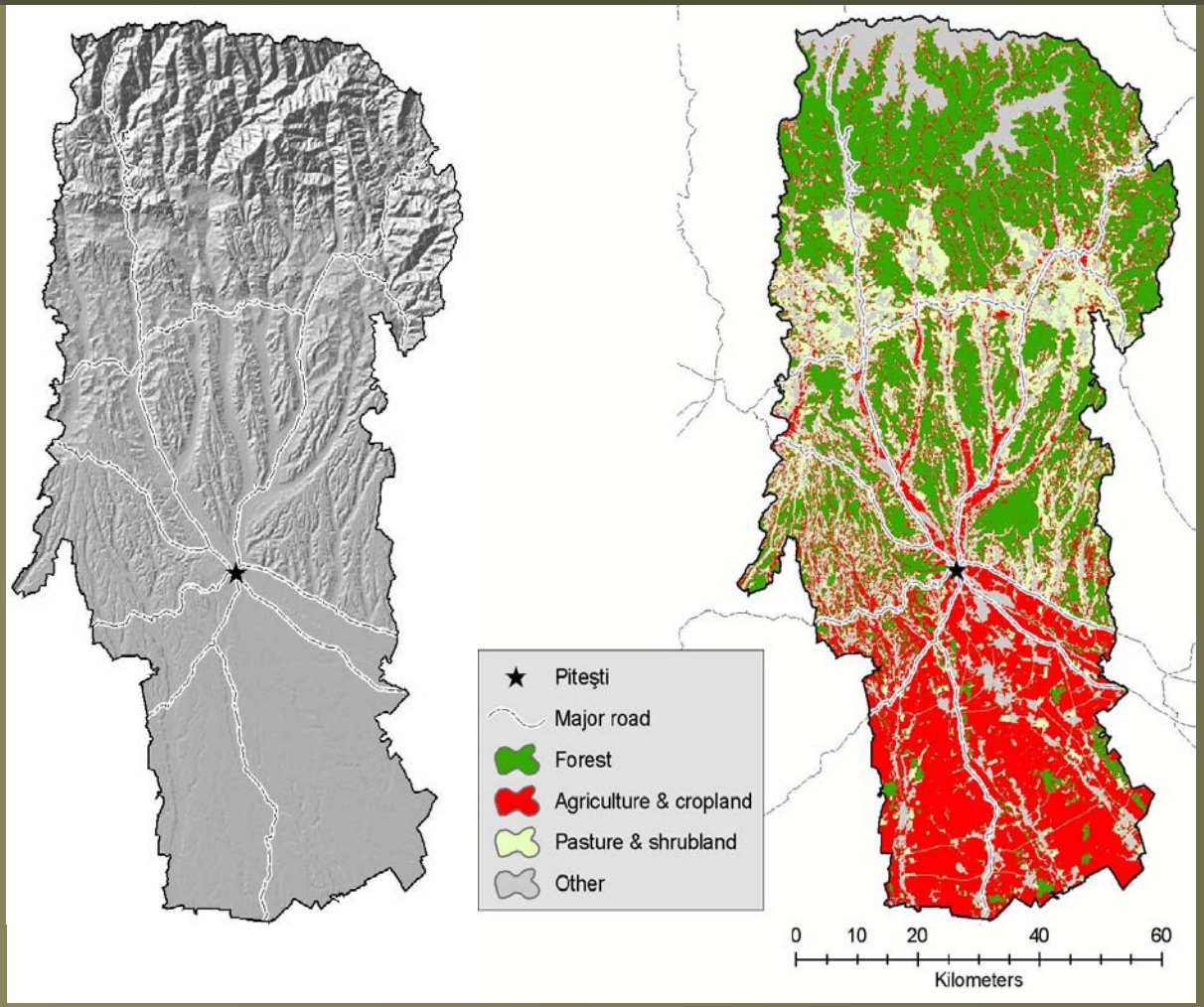
MODIS Land Cover data is significant positive trend in MODIS 500m data

de Beurs, K.M., Wright. C.K., Henebry, G.M. 2009. Dual scale trend analysis distinguishes climatic from anthropogenic effects on the vegetated land surface. *Environmental Research Letters*, 4 045012.

Farmland abandonment

Mueller et al., 2009, Journal of Land Use Science

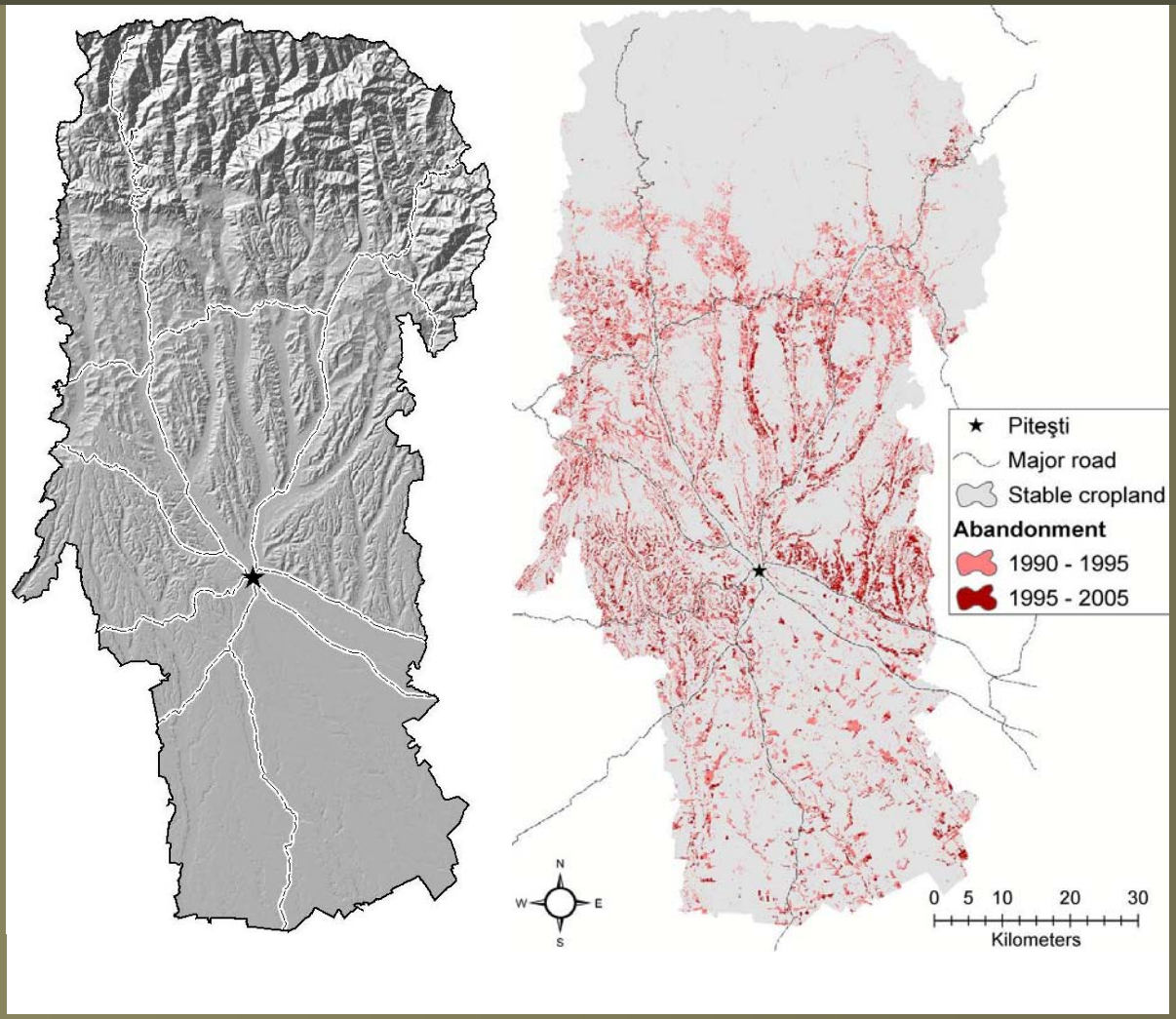
Farmland abandonment



Mueller et al., 2009, Journal of Land Use Science

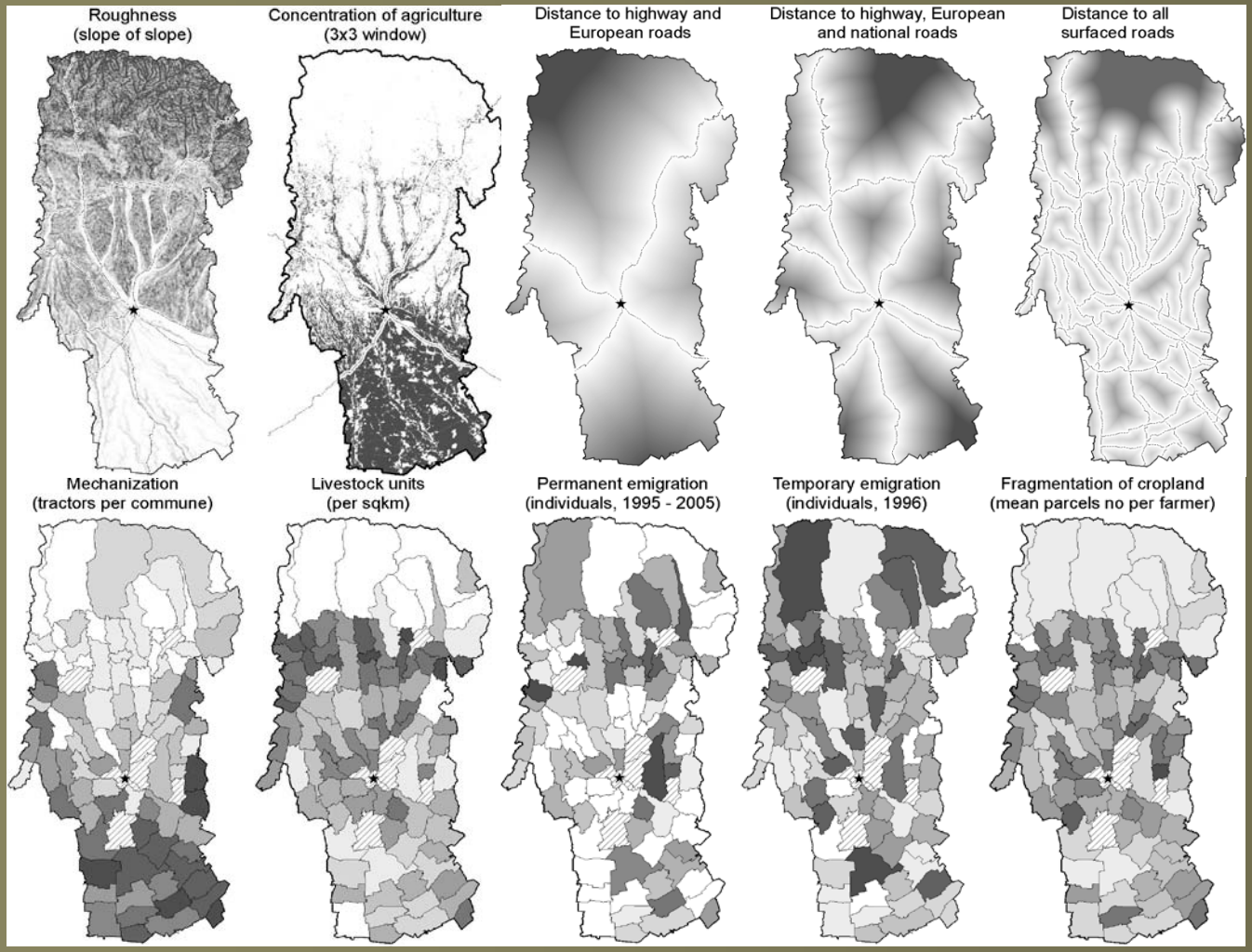
Farmland abandonment

Farmland abandonment



Mueller et al., 2009, Journal of Land Use Science

Farmland abandonment



Mueller et al., 2009, Journal of Land Use Science

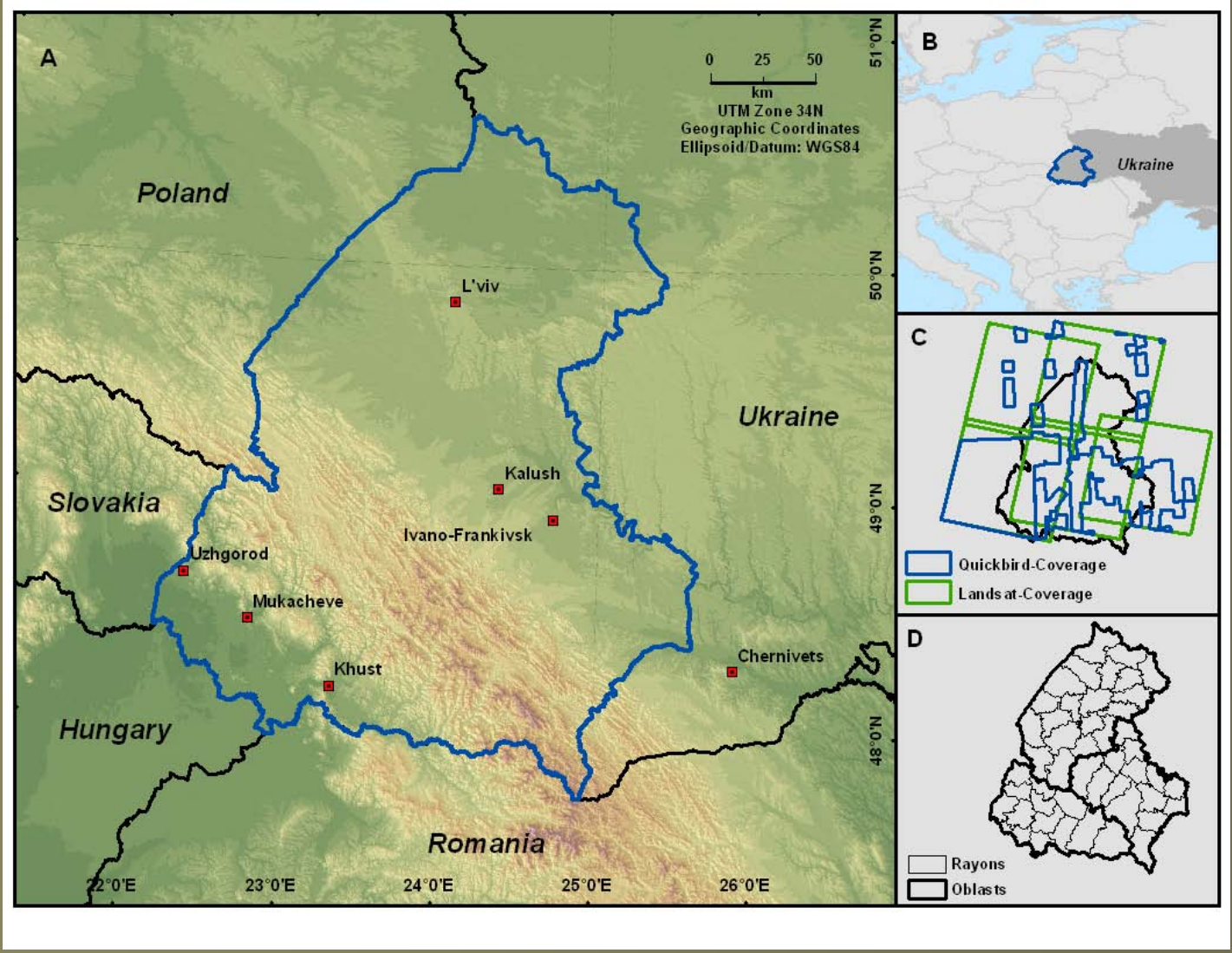
Farmland abandonment

Highest abandonment rates:

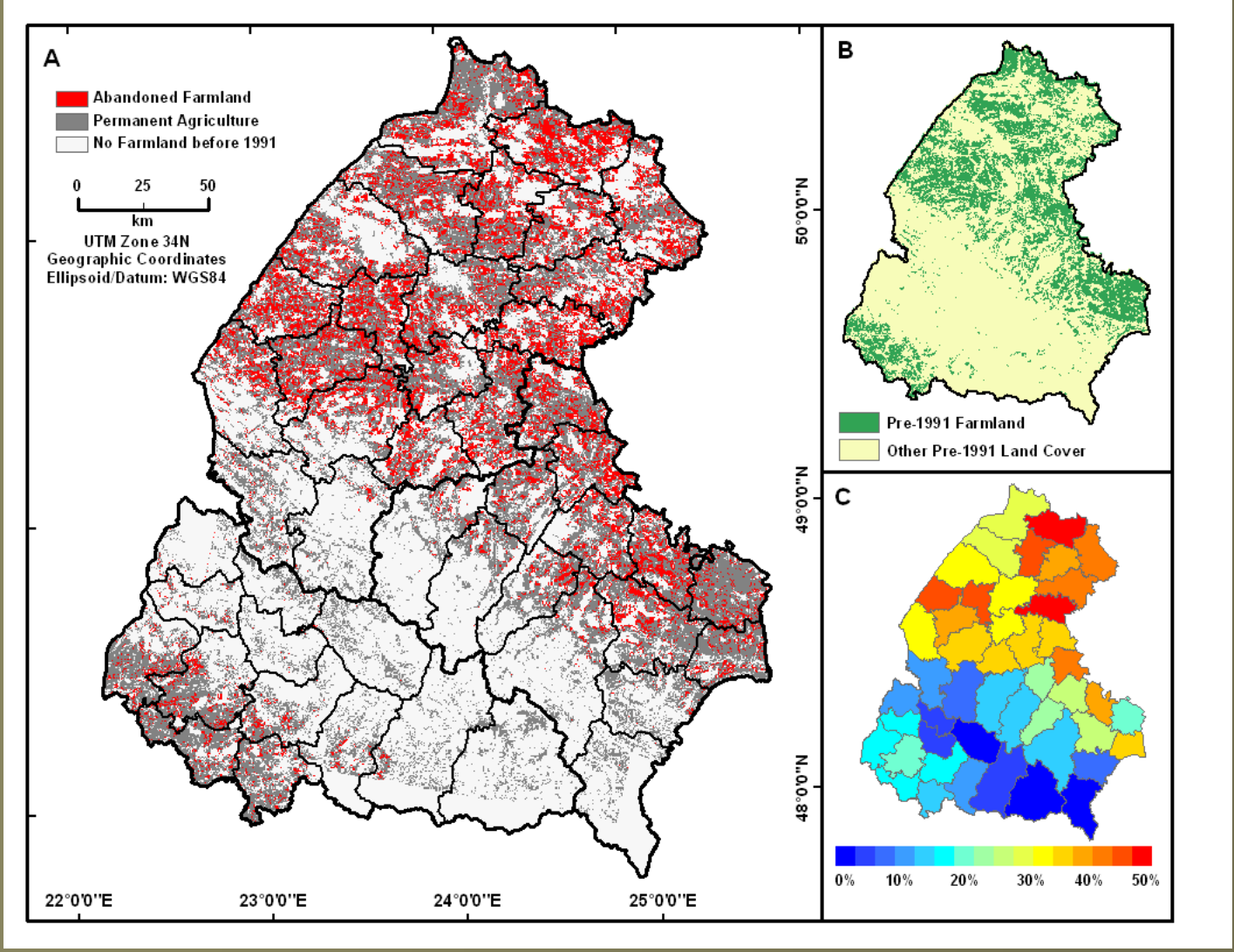
- ***In steep terrain***
- ***On isolated fields***
- ***Afar from roads***

Mueller et al., 2009, Journal of Land Use Science

Farmland abandonment



Farmland abandonment



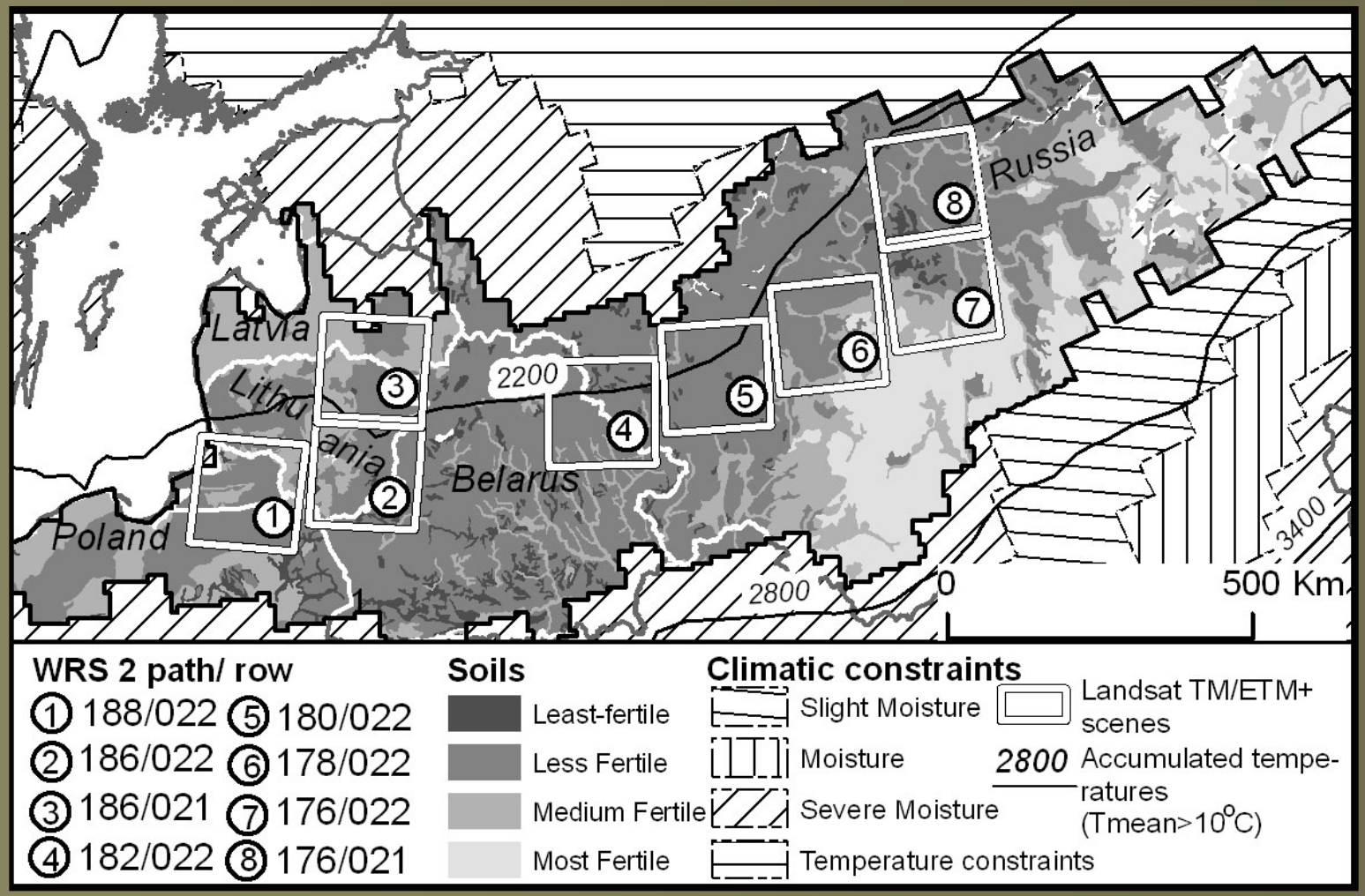
Farmland abandonment

Highest abandonment rates:

- ***Closer to cities***
- ***At lower elevations***
- ***On flatter slopes***

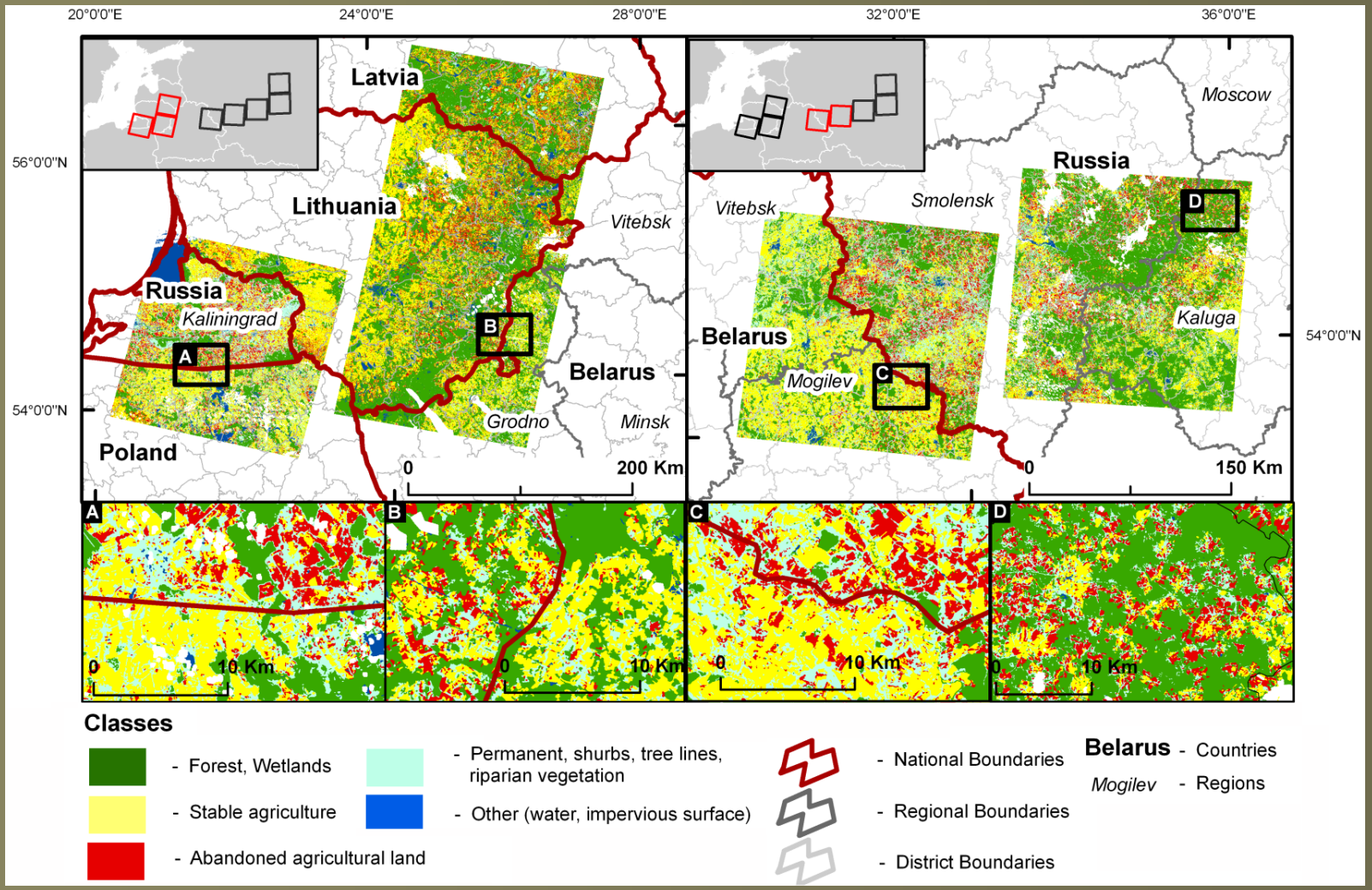
- ***?????***

Farmland abandonment



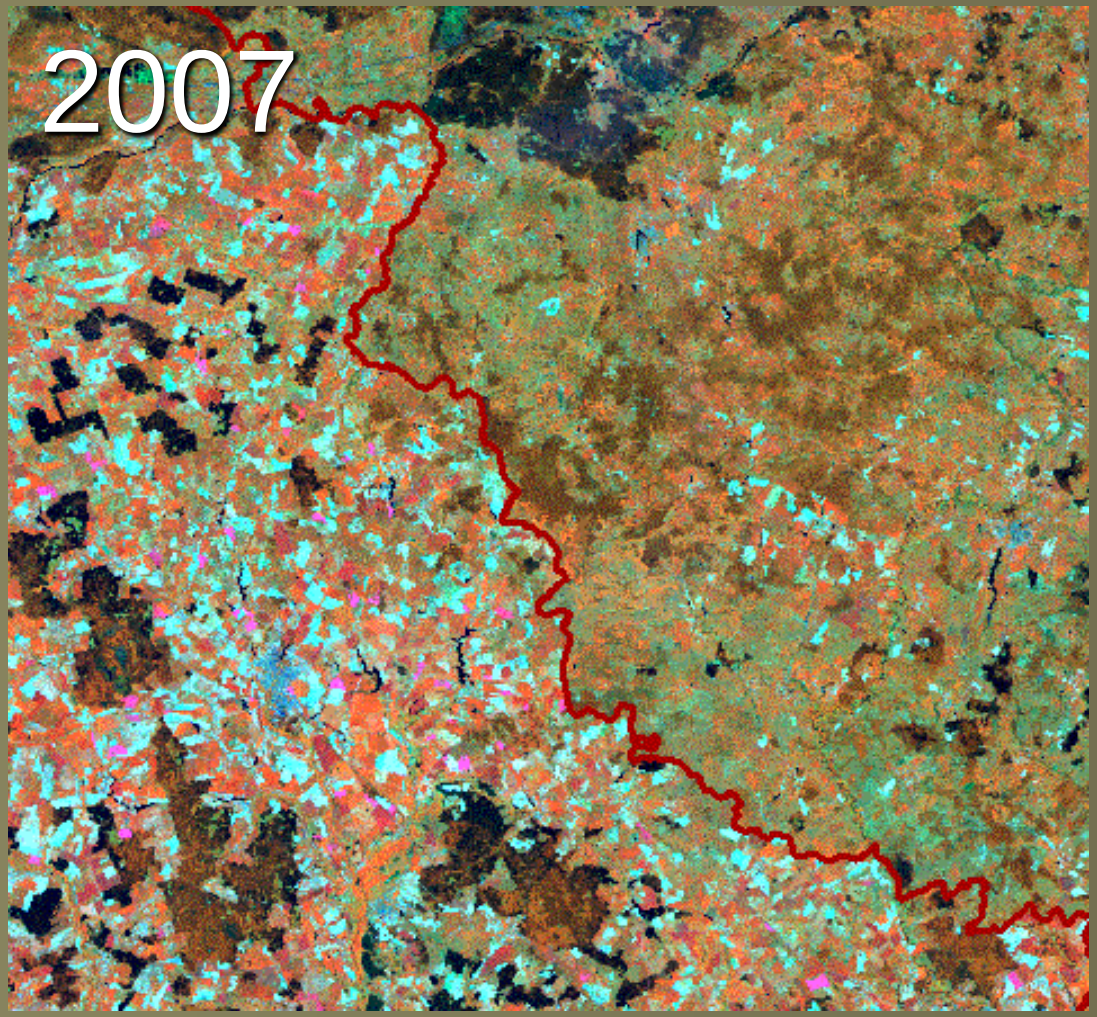
Prishchepov et al., *see poster*

Farmland abandonment



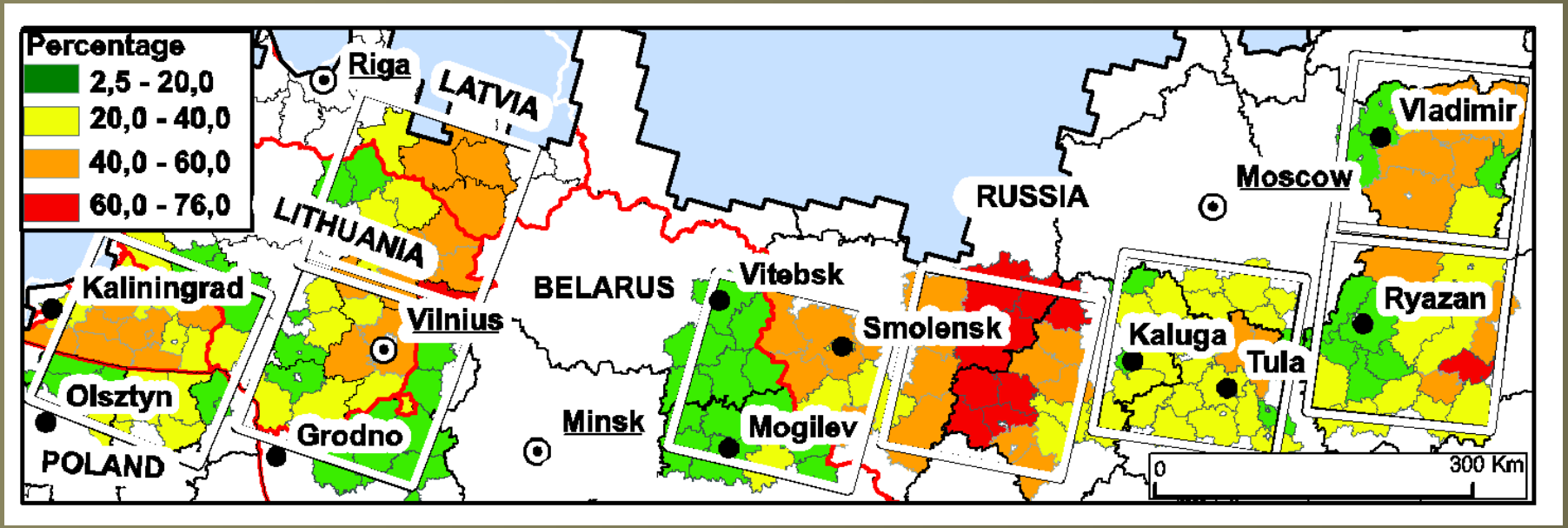
Prishchepov et al., *see poster*

Farmland abandonment



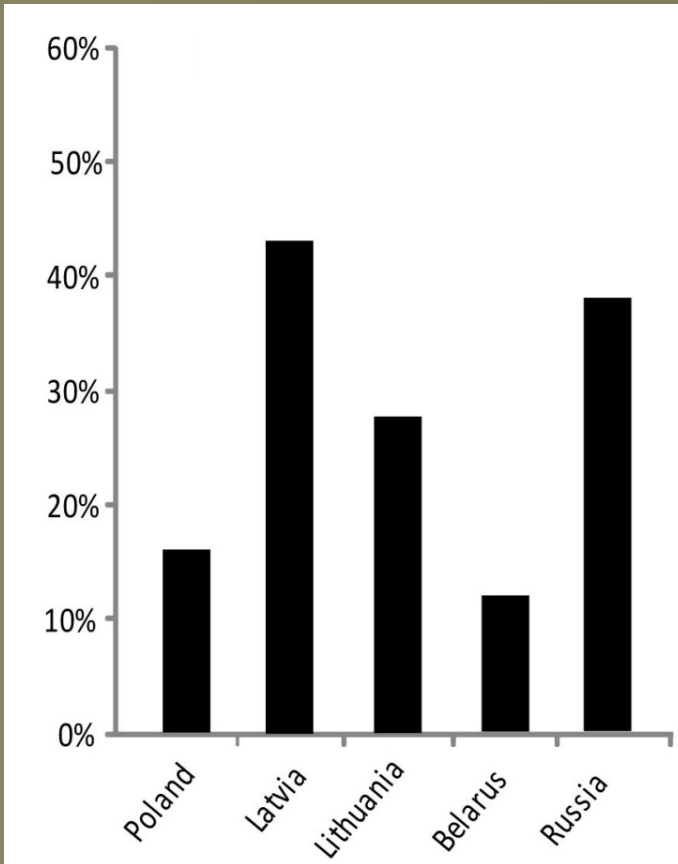
Prishchepov et al., *see poster*

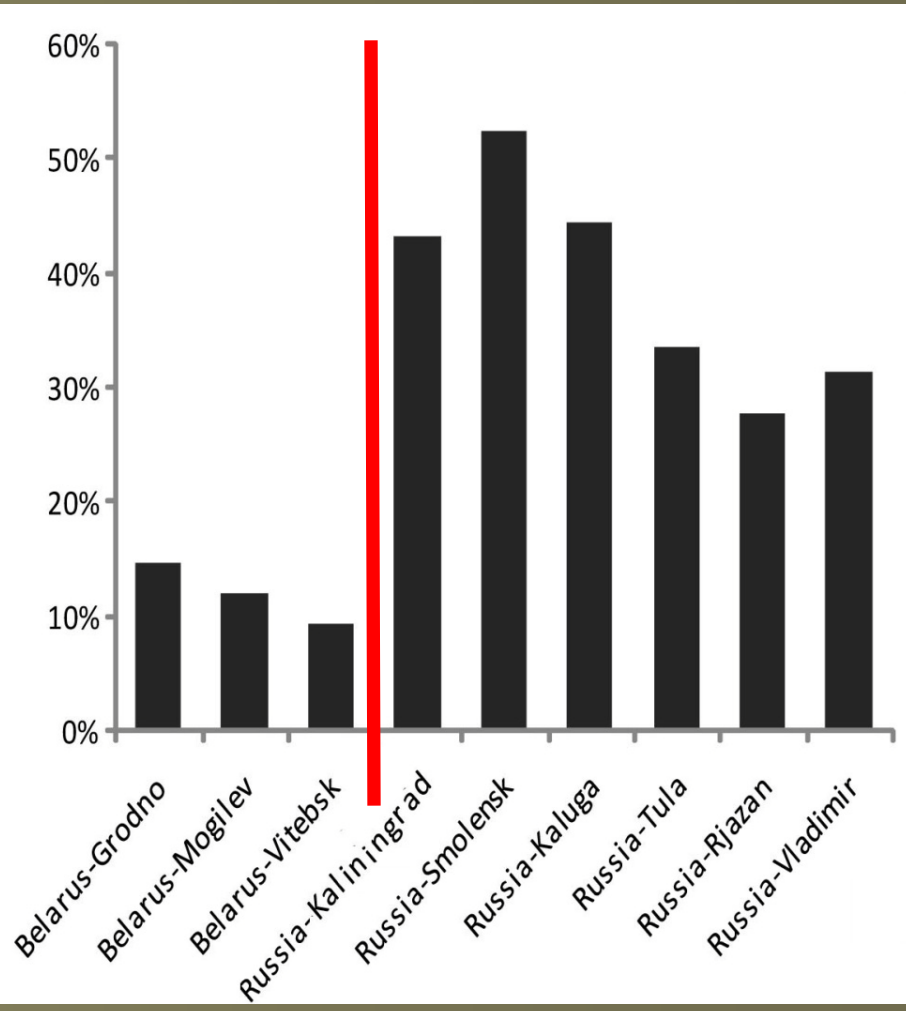
Farmland abandonment



Prishchepov et al., *see poster*

Farmland abandonment





Prishchepov et al., *see poster*

Outline

1. Institutional changes

2. Farmland abandonment

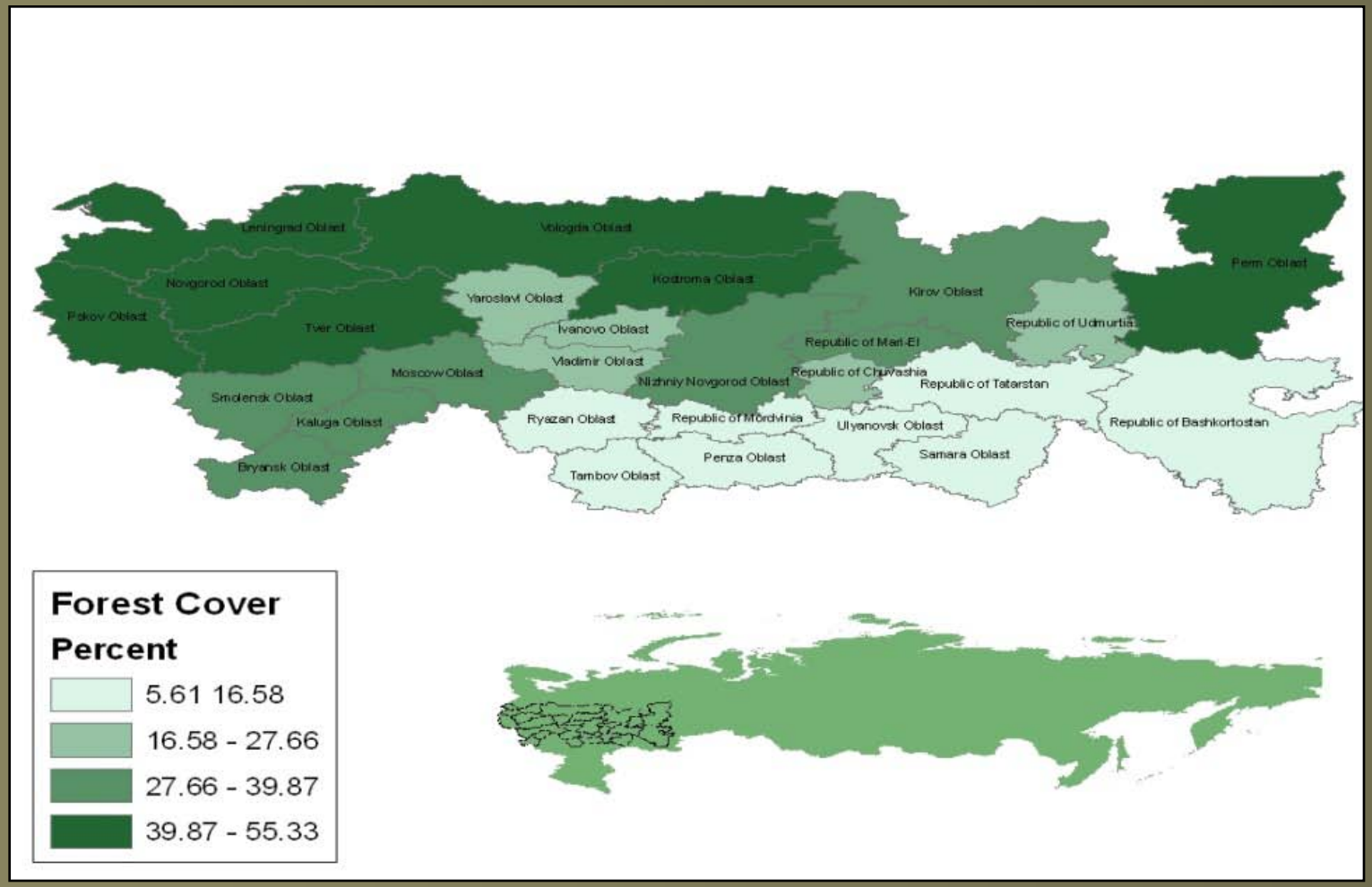
3. Logging

Logging

Land-Use And Land-Cover Changes In Temperate Forests Of European Russia

- Past and current rates of LCLUC in European Russia?
- How to monitor forest dynamics with MDGLS and Landsat-like datasets (e.g. AWiFS)?
- Socio-economic drivers of forest harvest?
- Can satellite classifications and socio-economic variables predict future harvest rates?

Logging

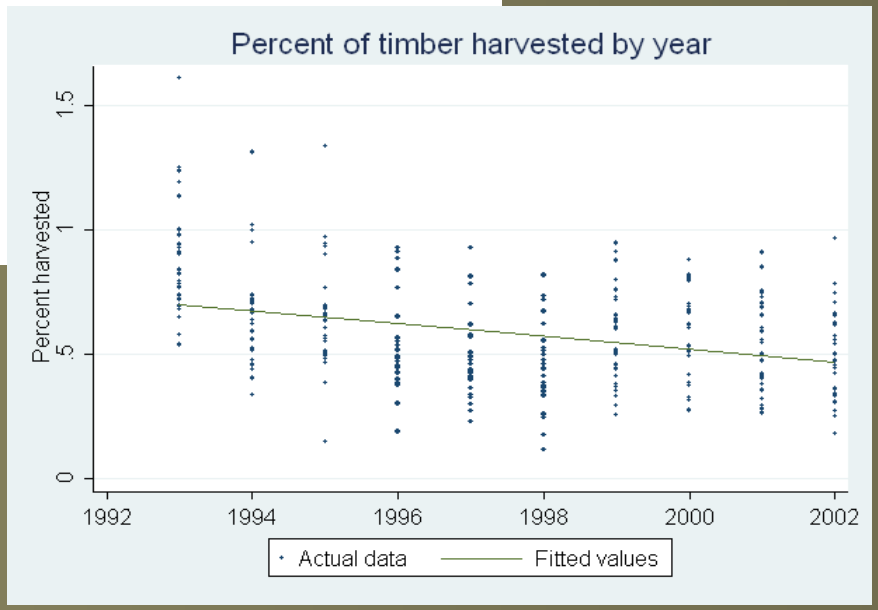


Wendland et al., *see poster*

Logging

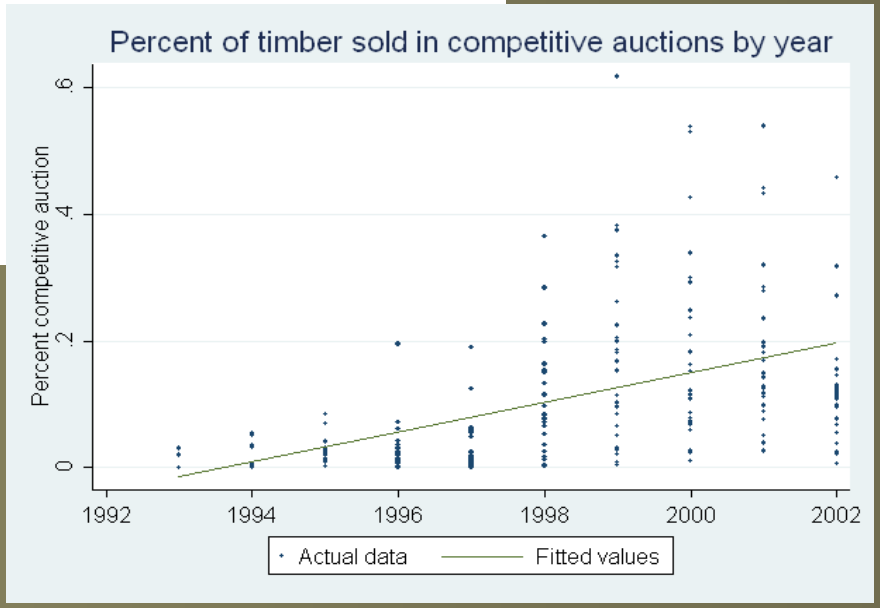
Change in percent harvested

- -0.90 to -0.68
- -0.68 to -0.50
- -0.50 to -0.28
- -0.28 to 0.39



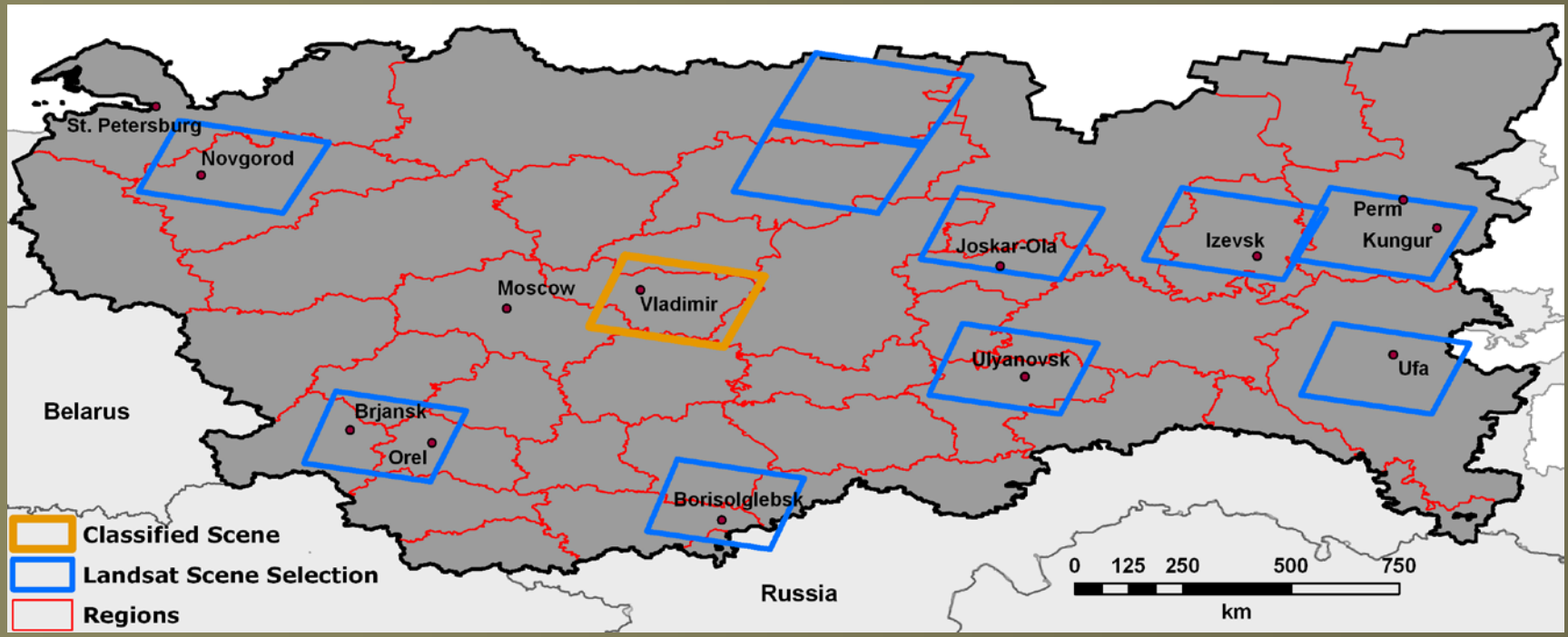
Wendland et al., *see poster*

Logging



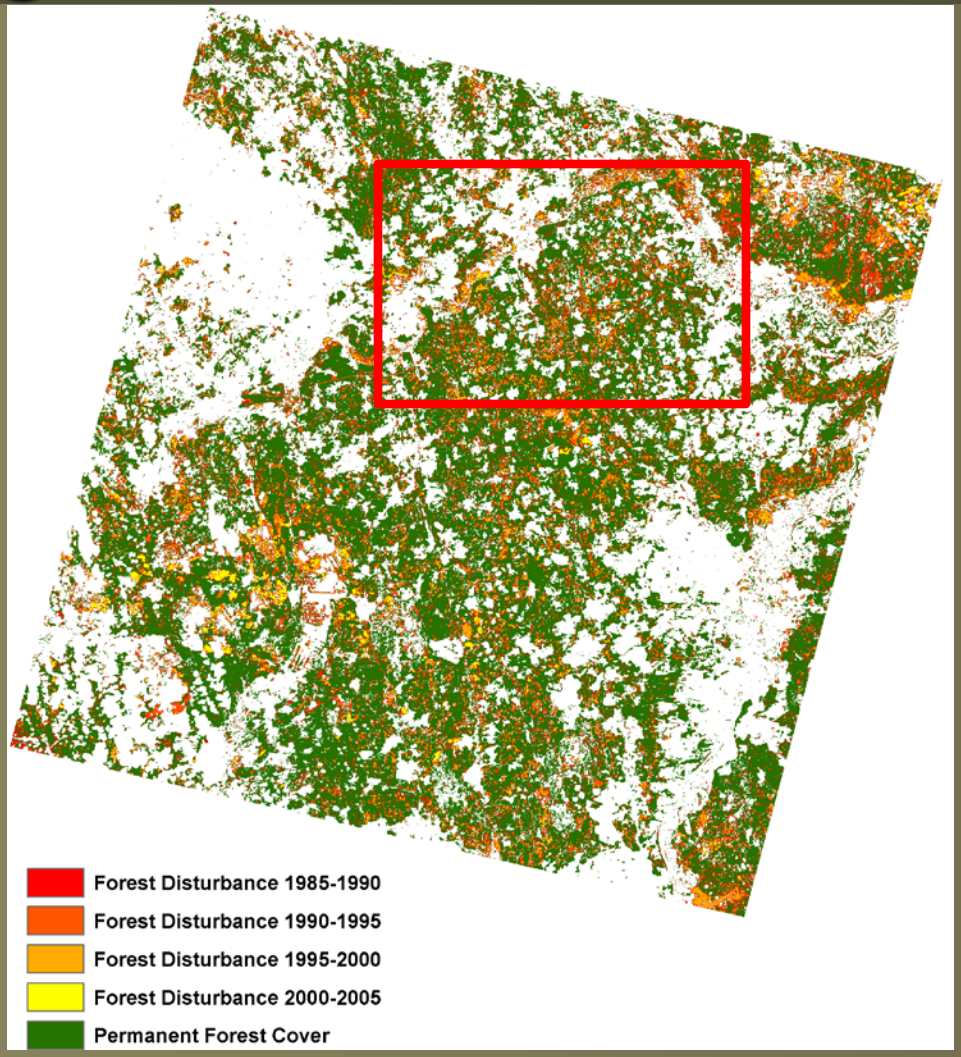
Wendland et al., *see poster*

Logging



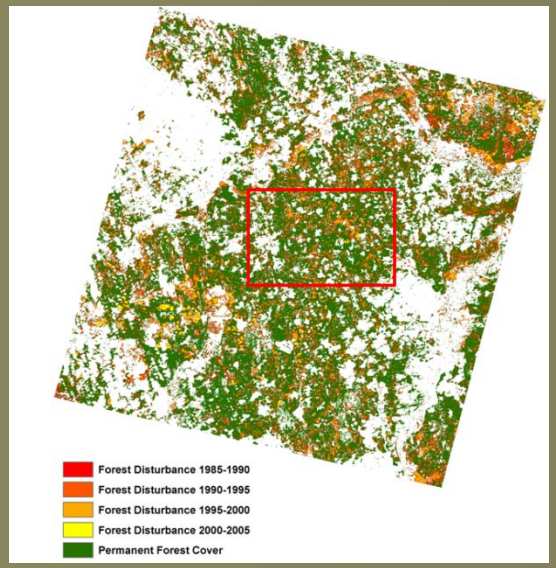
Baumann et al., *see poster*

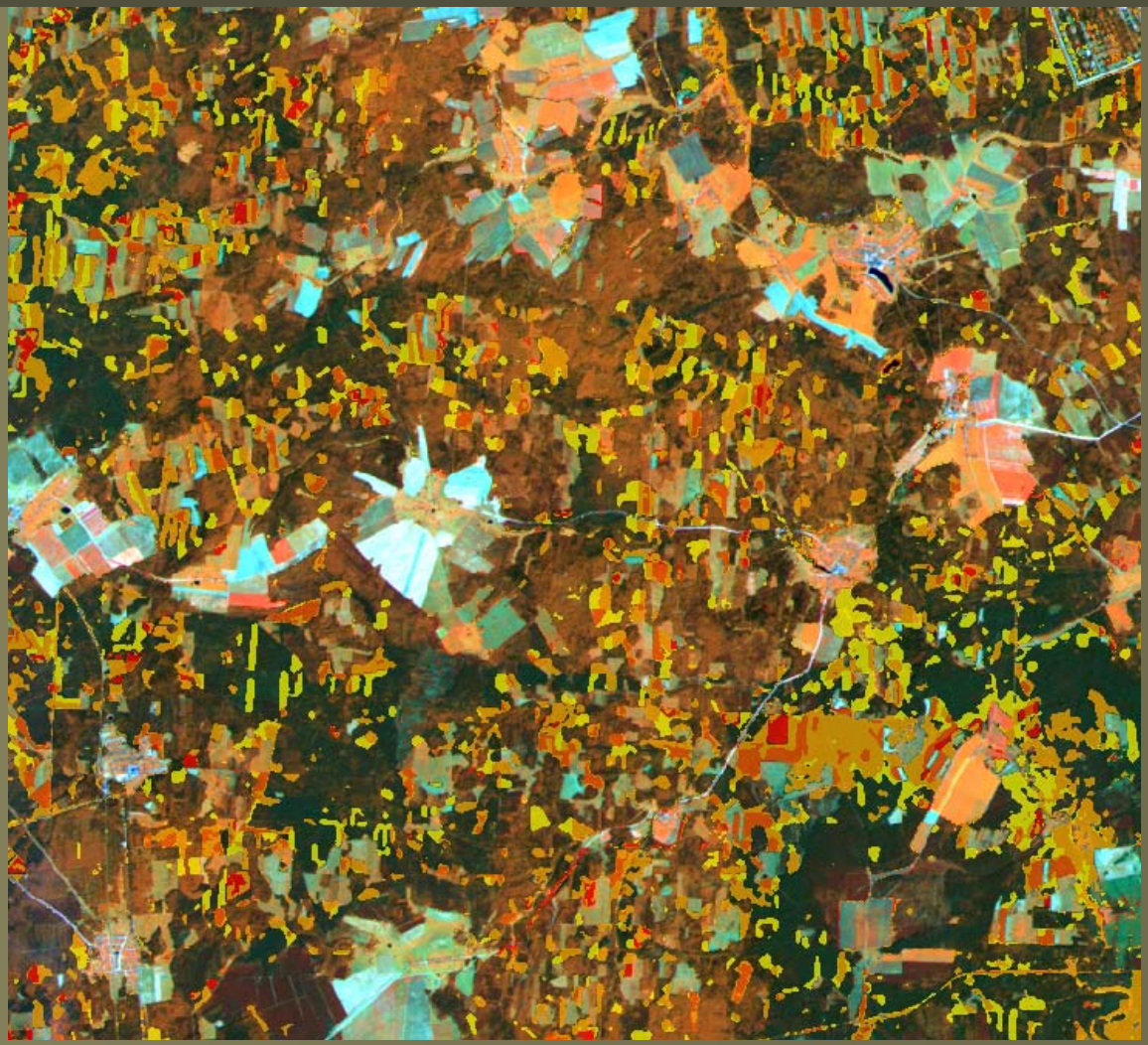
Logging



Baumann et al., *see poster*

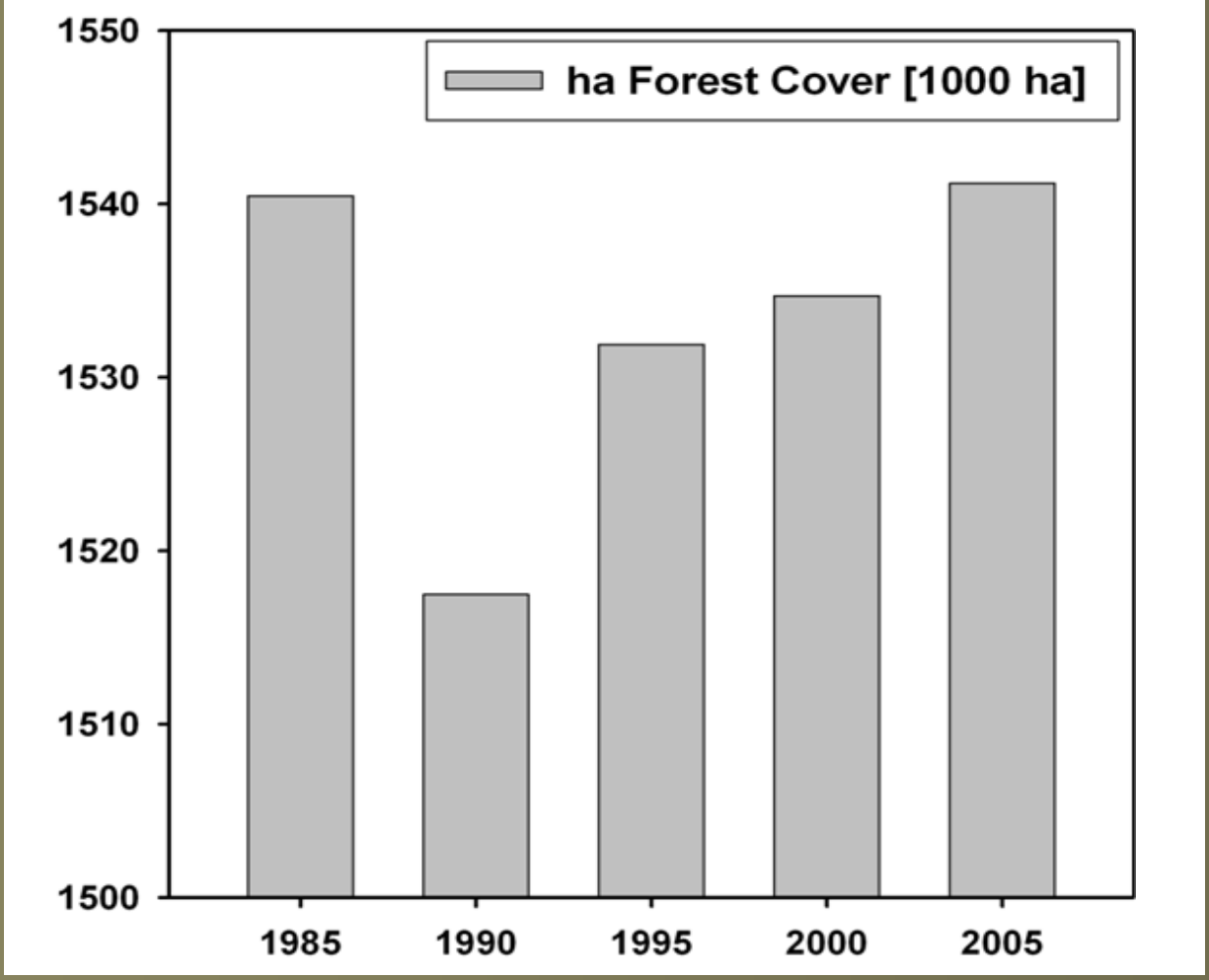
Logging





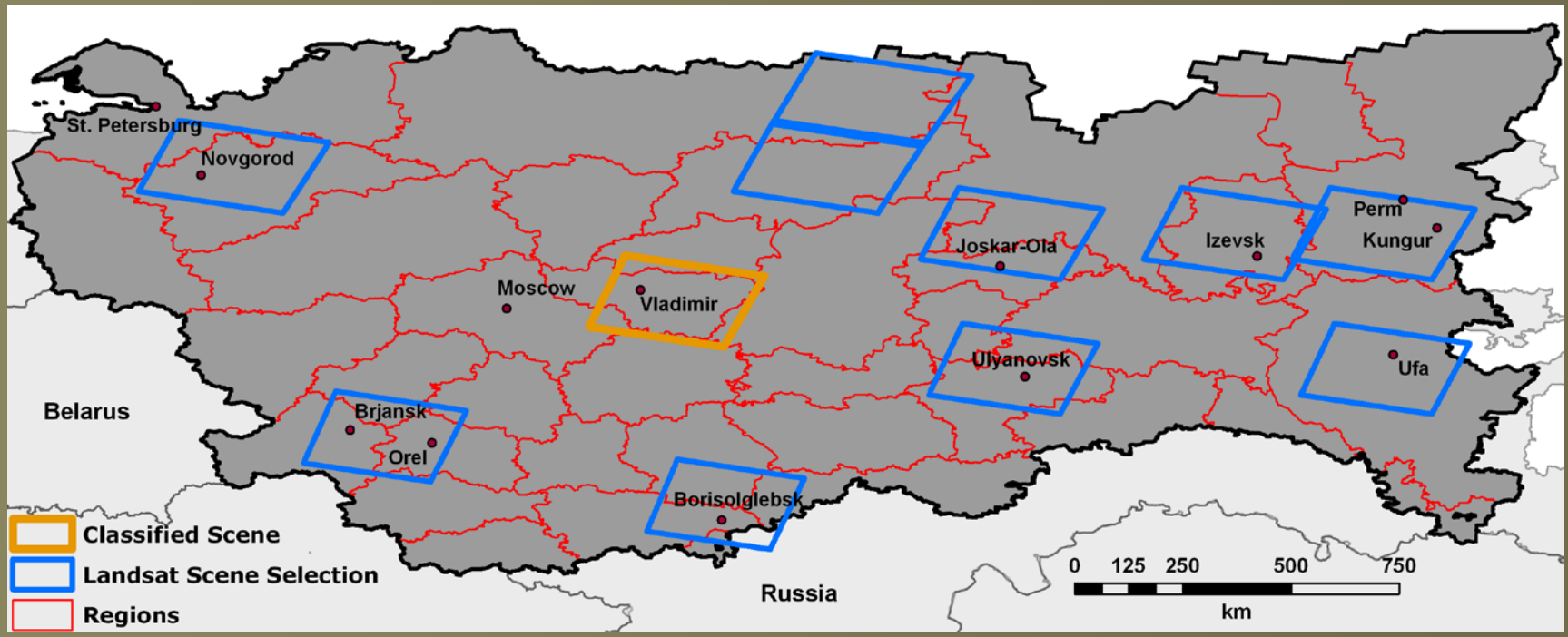
Baumann et al., *see poster*

Logging



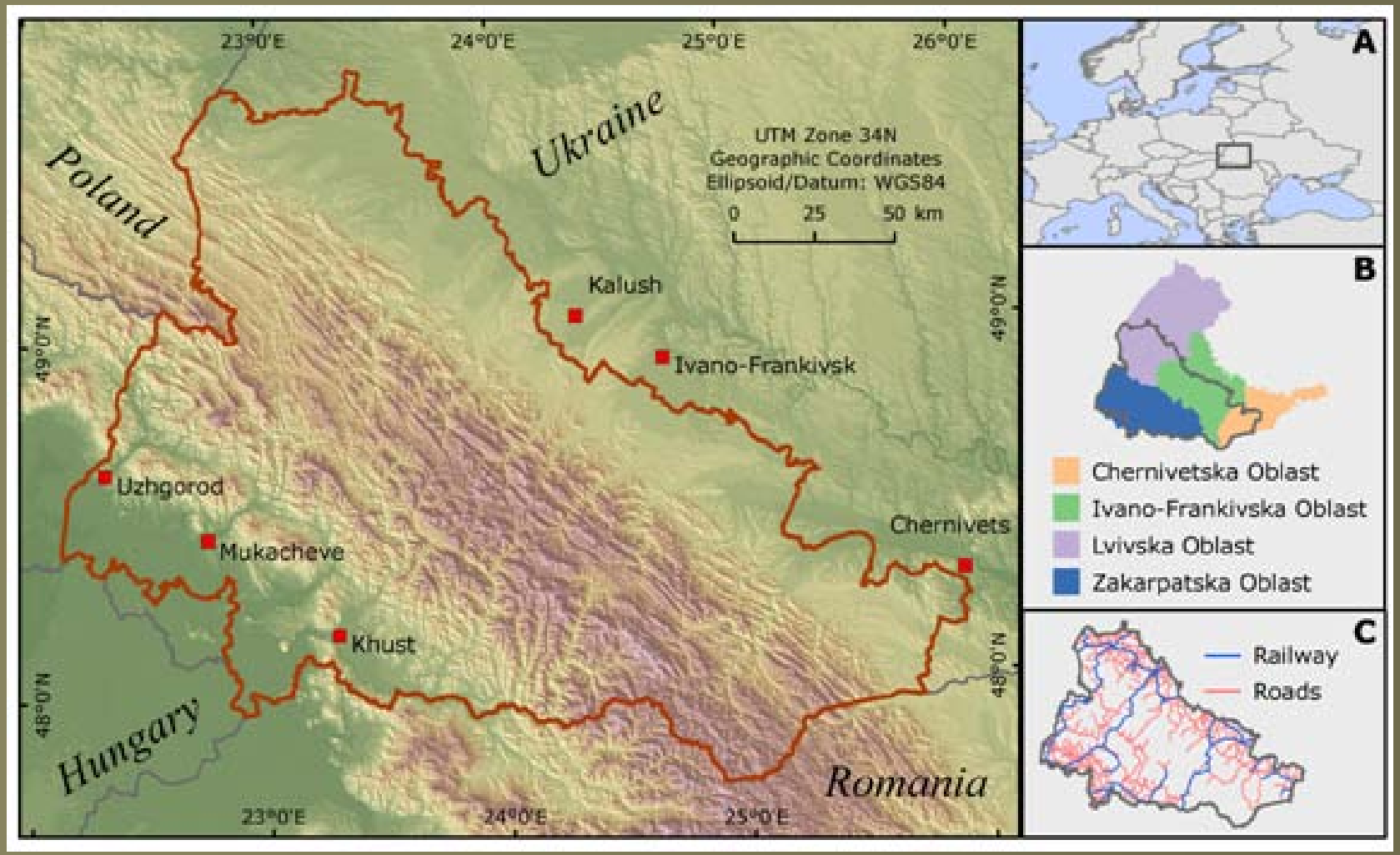
Baumann et al., *see poster*

Logging



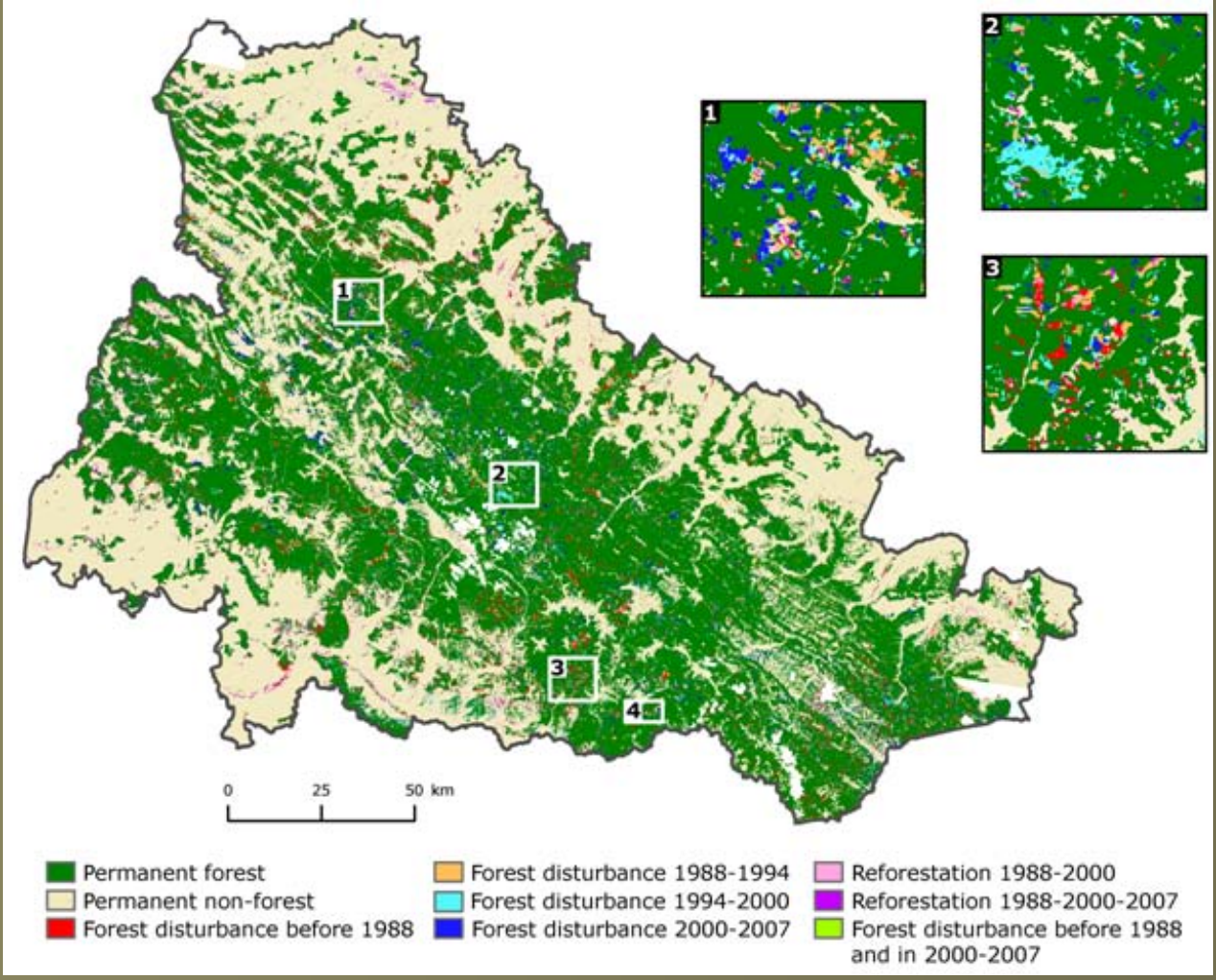
Baumann et al., *see poster*

Logging



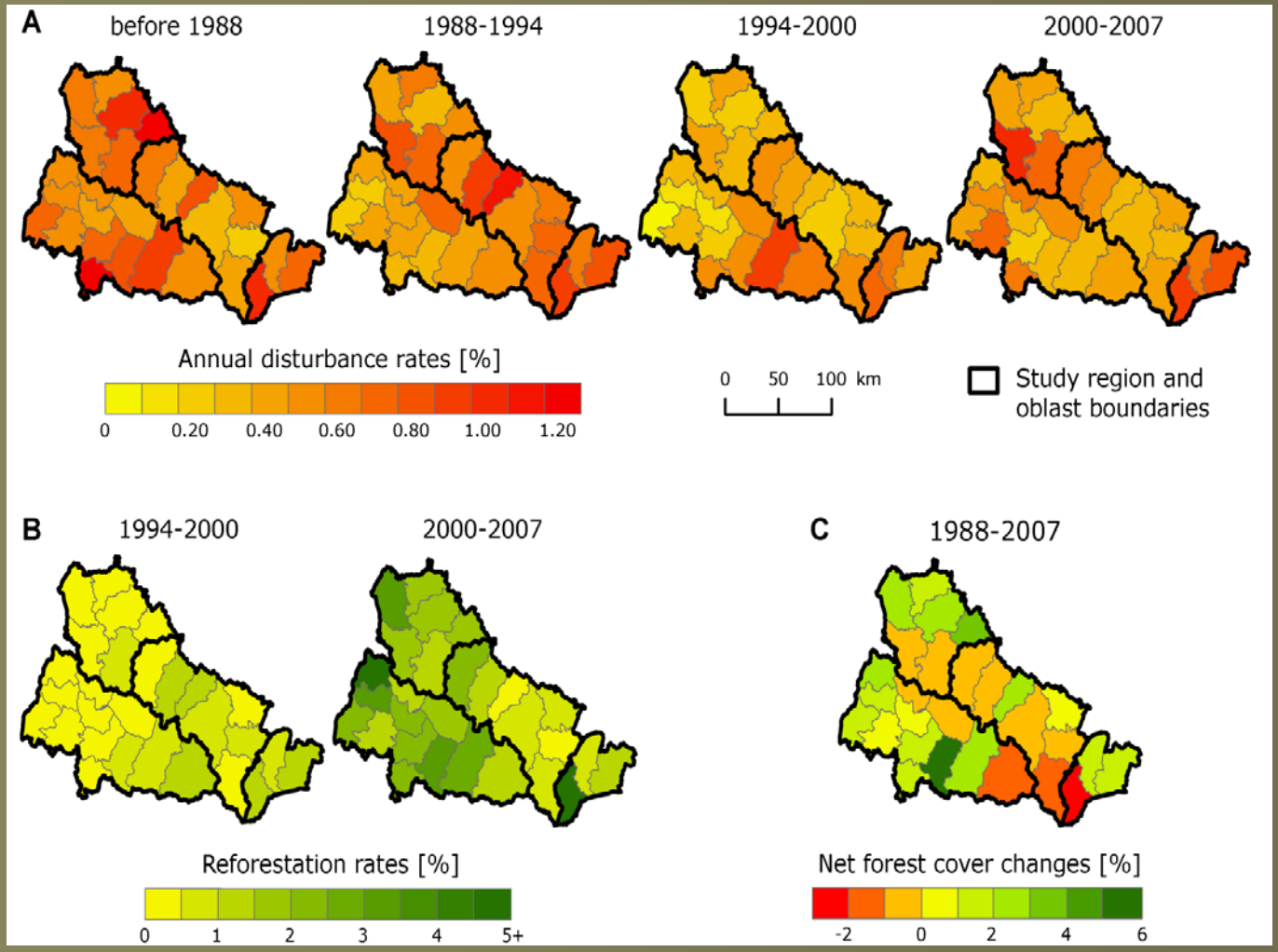
Kuemmerle et al., 2009, Remote Sensing of Environment

Logging



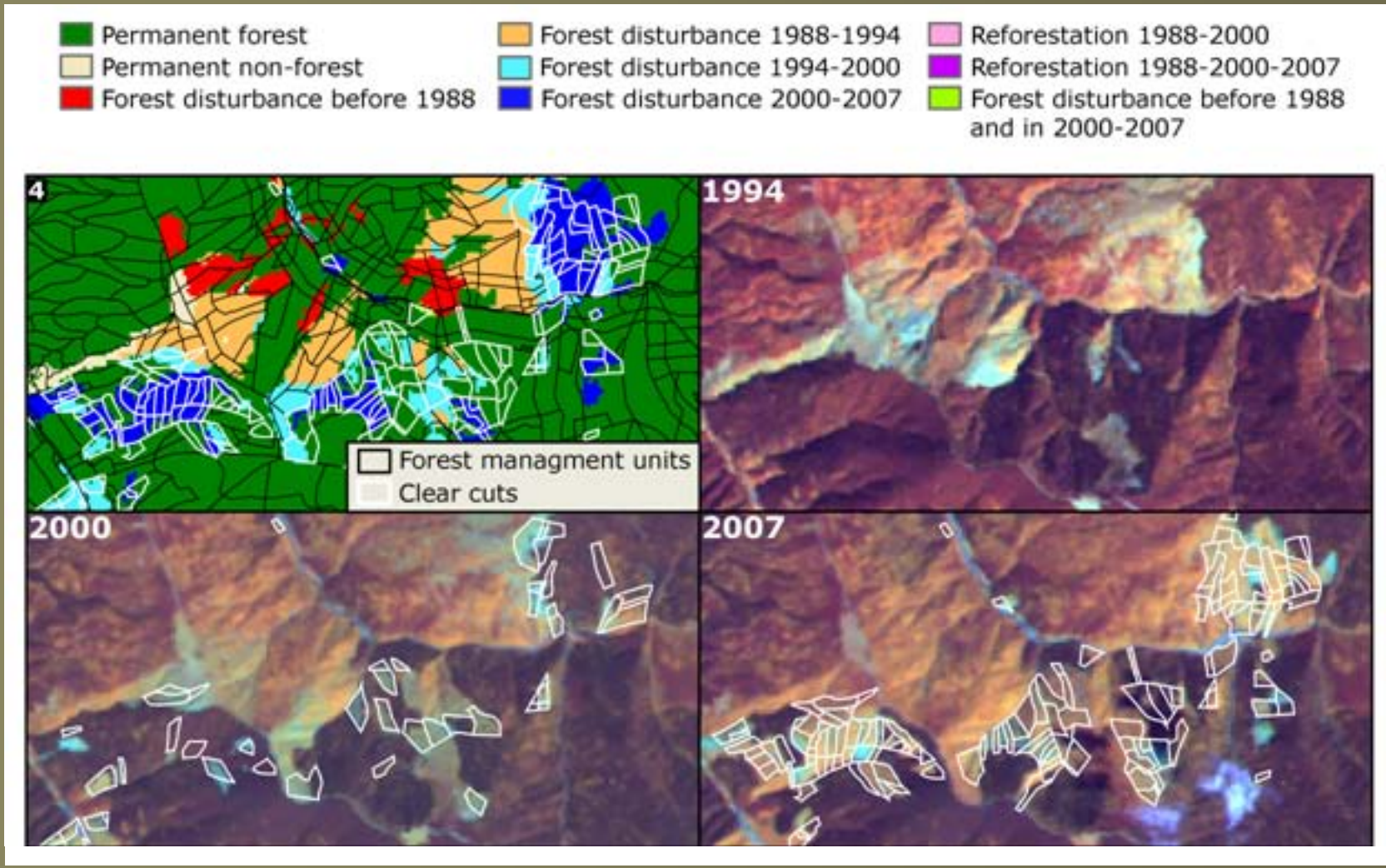
Kuemmerle et al., 2009, Remote Sensing of Environment

Logging



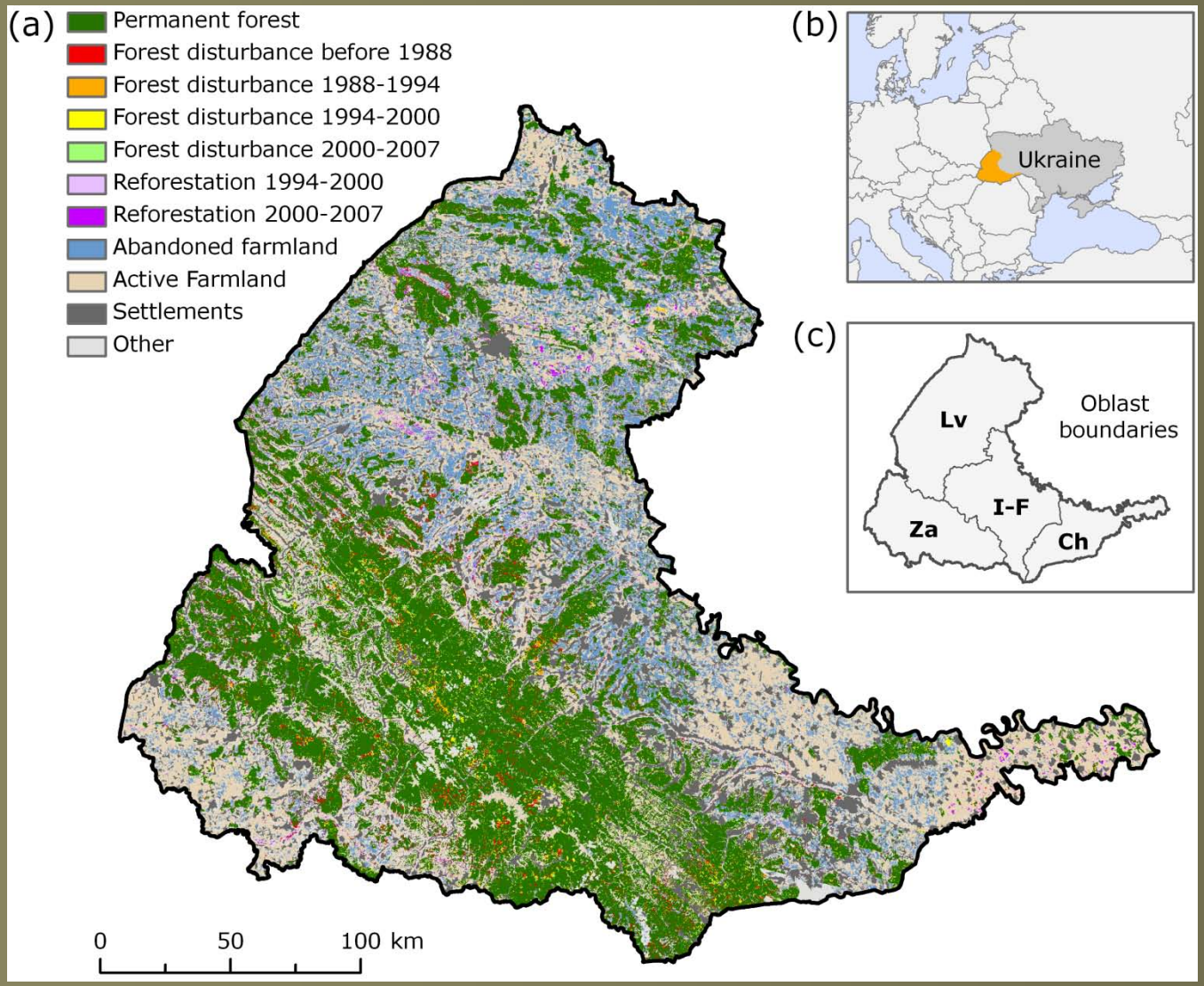
Kuemmerle et al., 2009, Remote Sensing of Environment

Logging

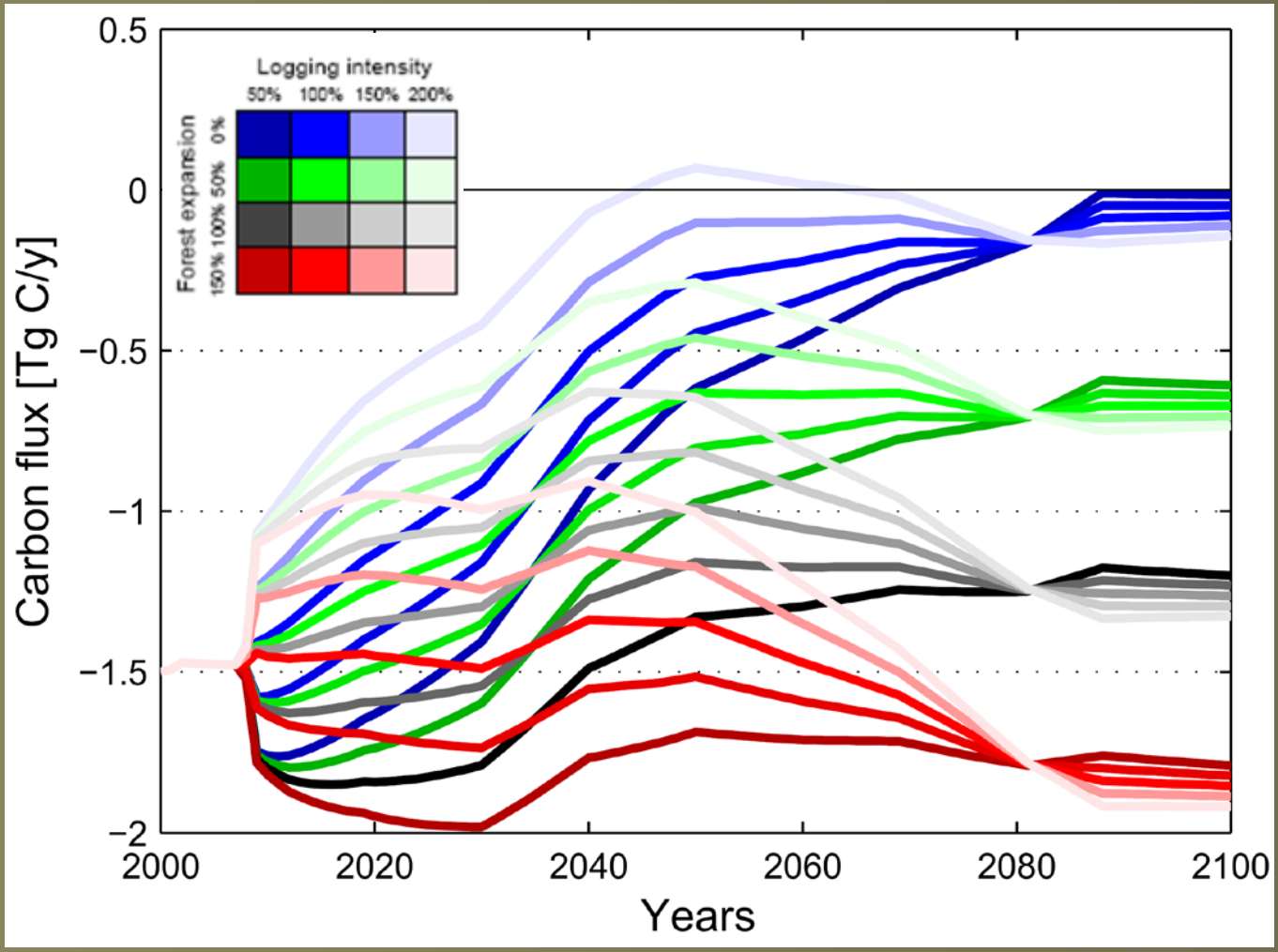


Kuemmerle et al., 2009, Remote Sensing of Environment

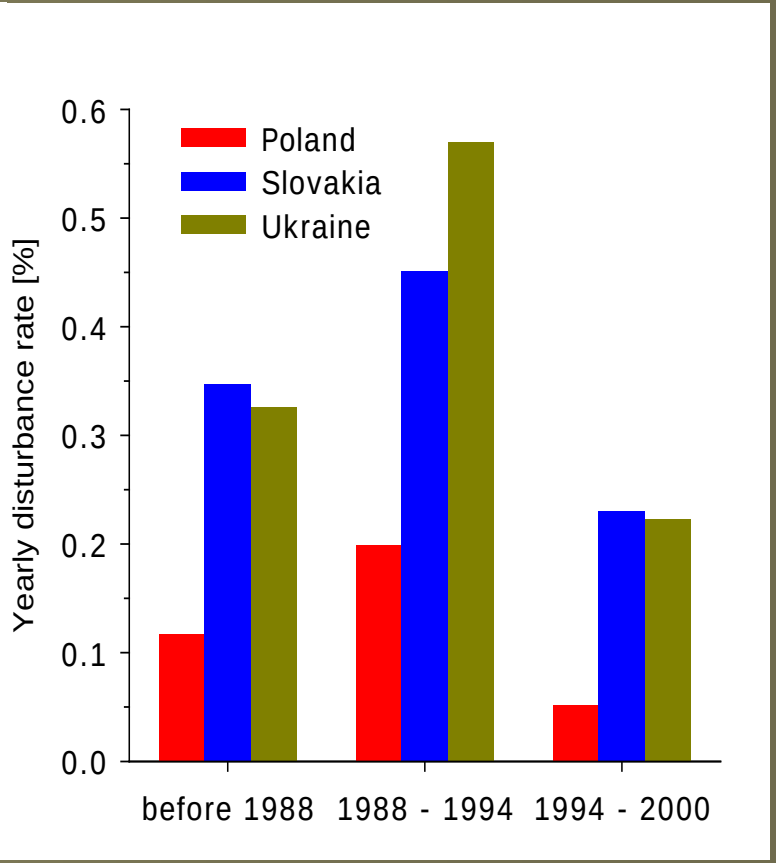
Logging


(a)
Permanent forest
Forest disturbance before 1988
Forest disturbance 1988-1994
Forest disturbance 1994-2000
Forest disturbance 2000-2007
Reforestation 1994-2000
Reforestation 2000-2007
Abandoned farmland
Active Farmland
Settlements
Other
0
50
100 km
(b)
Ukraine
(c)
Lv
Oblast boundaries
I-F
Za
Ch

Logging

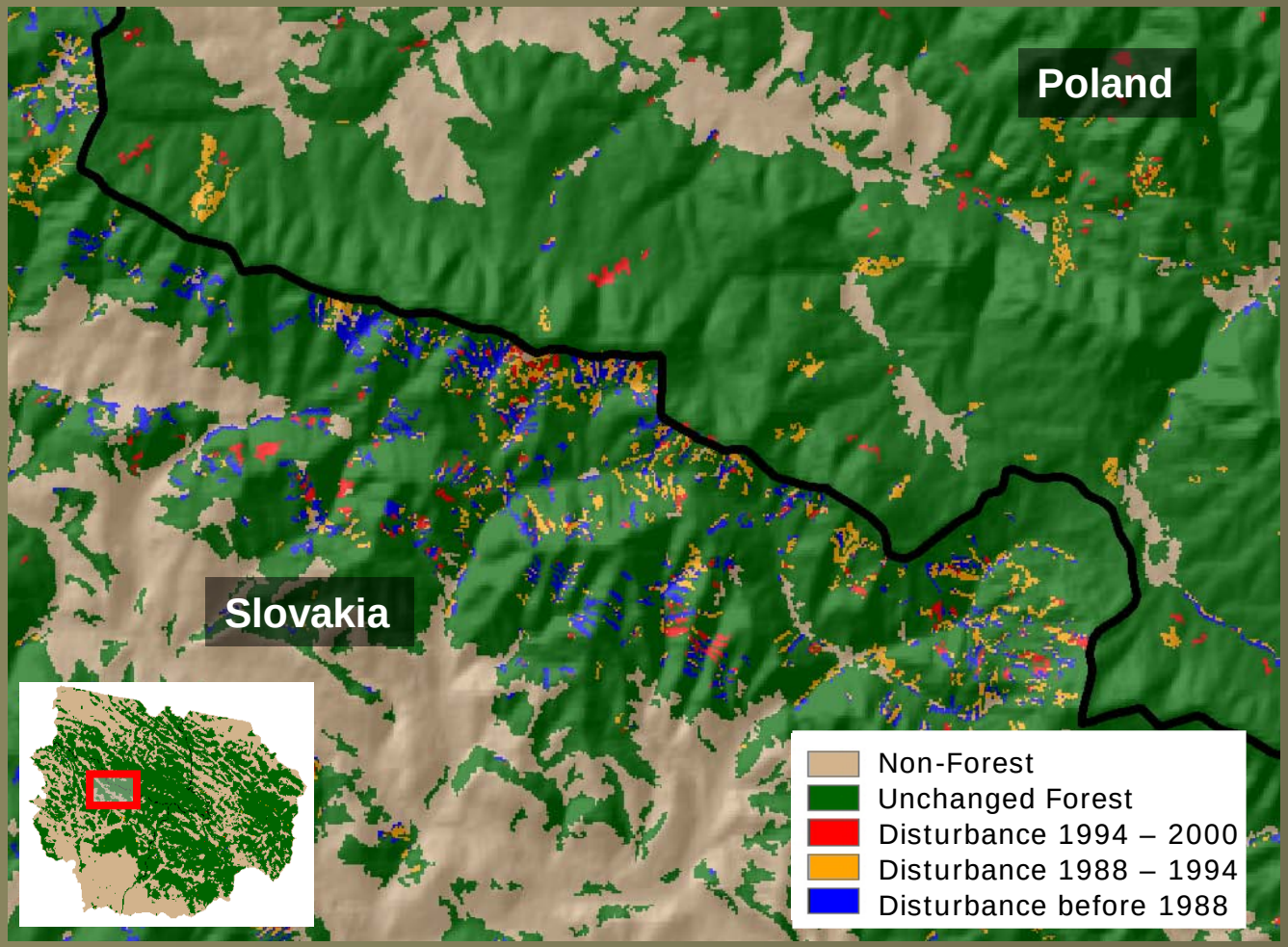

Logging intensity
50% 100% 150% 200%
Forest expansion
0%
50%
100%
150%
0.5
0
−0.5
−1
−1.5
−2
Carbon flux [Tg C/y]
2000
2020
2040
2060
2080
2100
Years

Logging



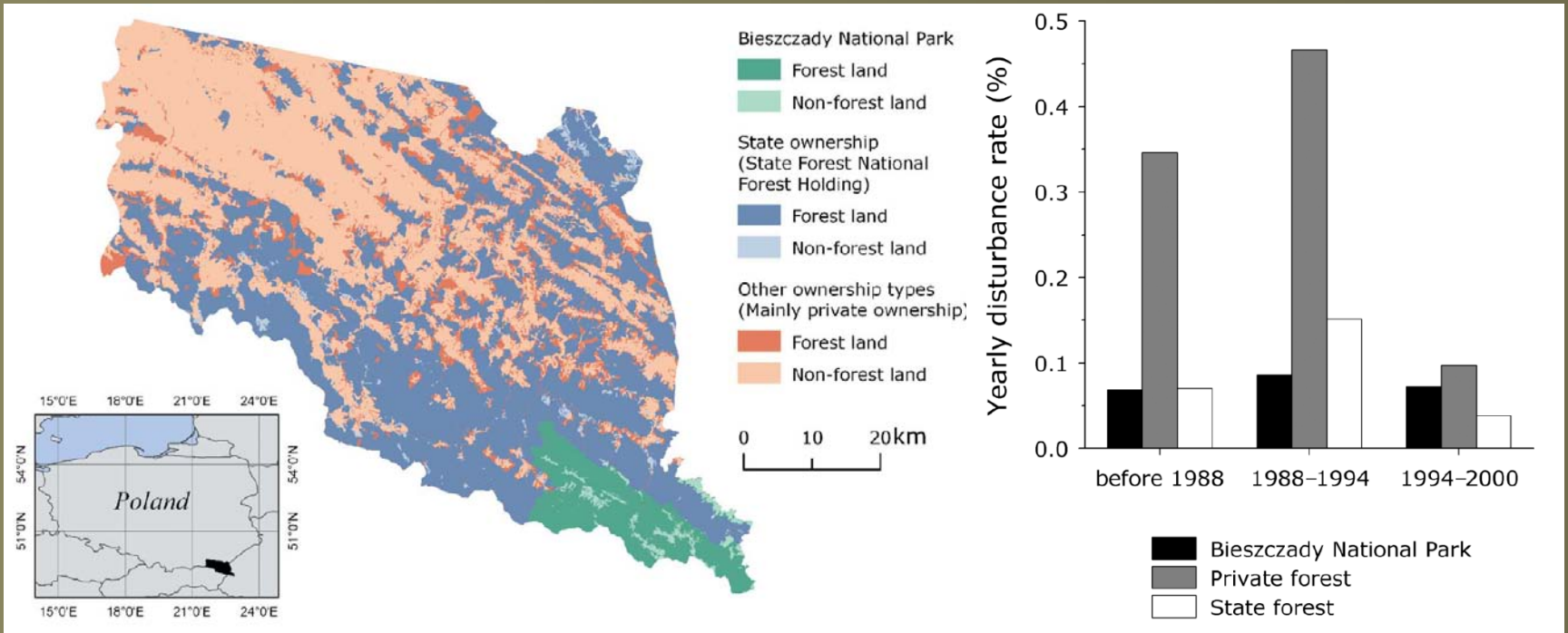
Kuemmerle et al., 2007, Ecological Applications

Logging



Kuemmerle et al., 2007, Ecological Applications

Logging



Kuemmerle et al., 2009, Journal of Land Use Science

Conclusions

1. Institutional changes

2. Farmland abandonment

3. Logging

Conclusions

1. Institutional changes

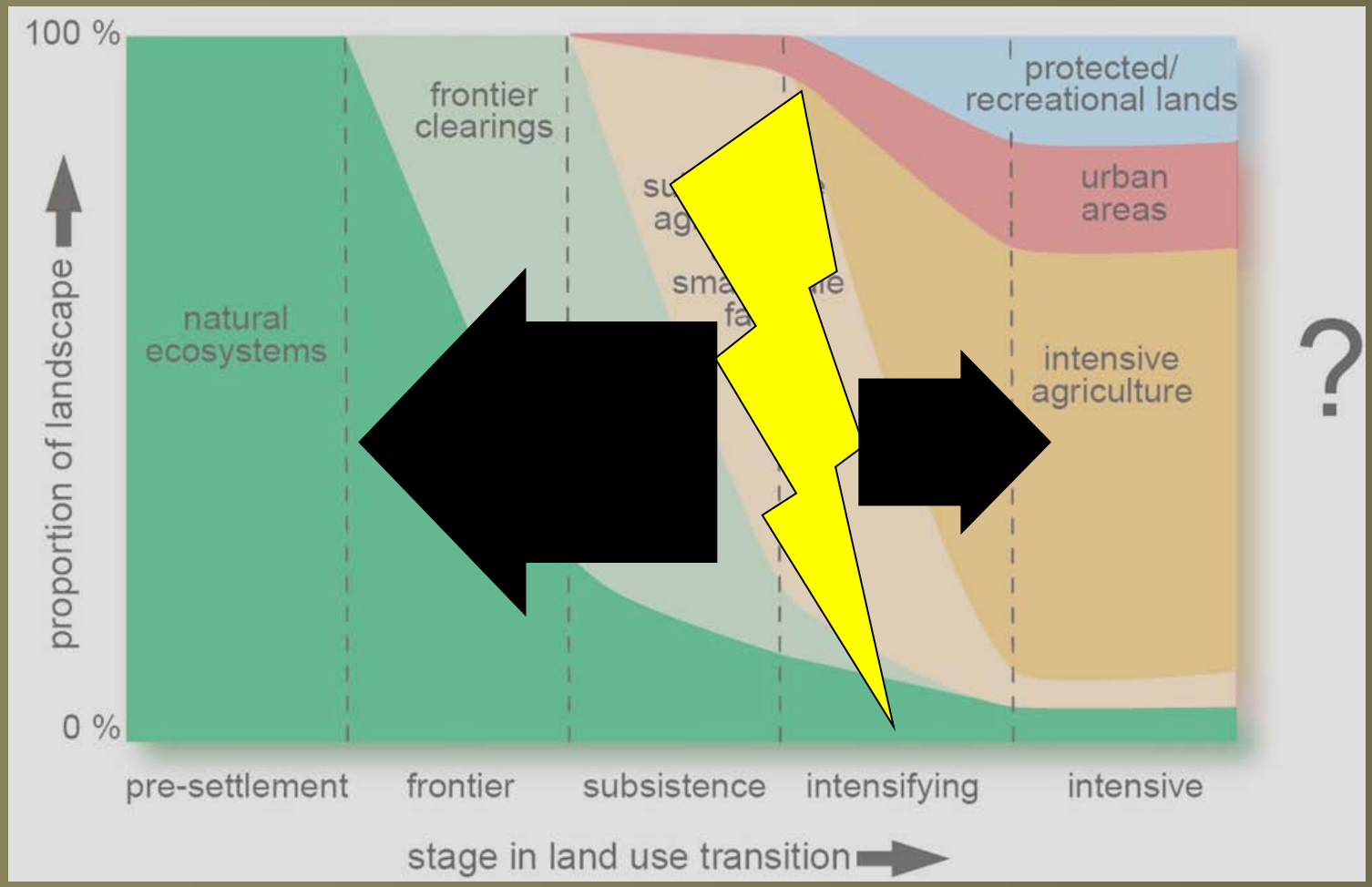
- *Major transitions*
- *Shock therapy*
  - *Open markets*
  - *Subsidies cut*
  - *Privatization*

Conclusions

1. Institutional changes

- *Strong differences among countries*
- *Rural depopulation*
- *Agricultural sector decline*

Introduction



Conclusions

2. Farmland abandonment

- *Abandonment in all countries*
- *Permanent change (at least for now)*
- *Complete abandonment*
  vs. lower intensity

Conclusions

2. Farmland abandonment

- Temporal patterns:

1. Immediate shock phase

2. Market economy phase

- Spatial patterns:

1. Strong crossborder differences

2. Mediated by local conditions

Introduction

Conclusions

3. Logging

- Logging rates changed rapidly after the collapse

- Direction of the changes varied

- Some changes permanent, some not

Conclusions

Institutions

- *No single institution ‘explained’ farmland abandonment or logging*
- *Rather, the strength of institutions mattered most*

Thanks to collaborators
and graduate students!

Thanks to
NASA LCLUC,
ESSF and NIP!!

Thank you!!!

radeloff@wisc.edu

kdebeurs@vt.edu

ozdogan@wisc.edu