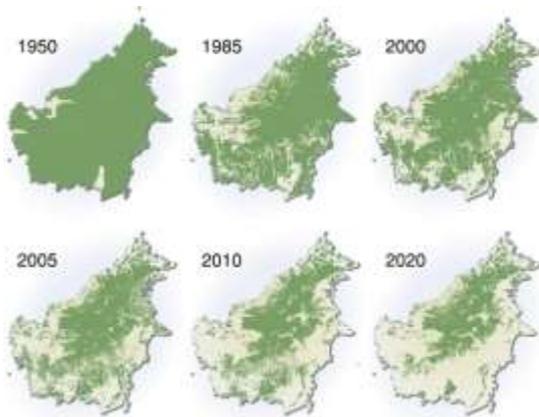
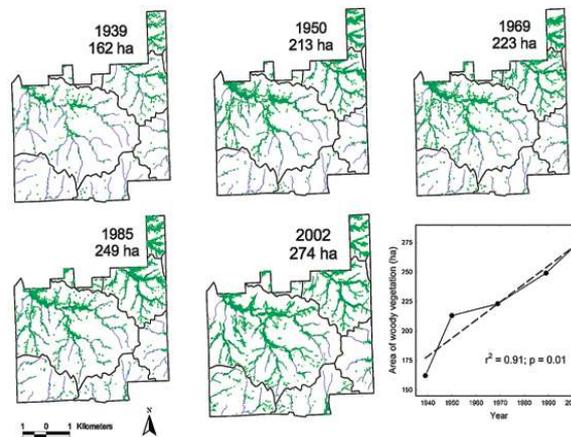


Grand Challenge for the 21st Century

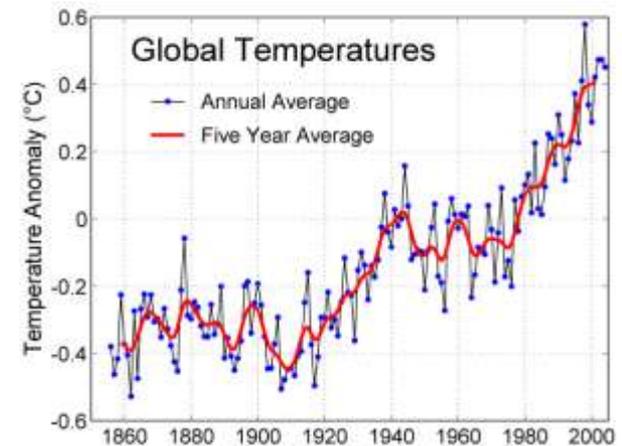
- Understanding how our environment responds to human growth and economic activities



Deforestation in Borneo
UNEP/GRID-Arendal



Woody expansion in Flint Hills
Briggs et al. 2005



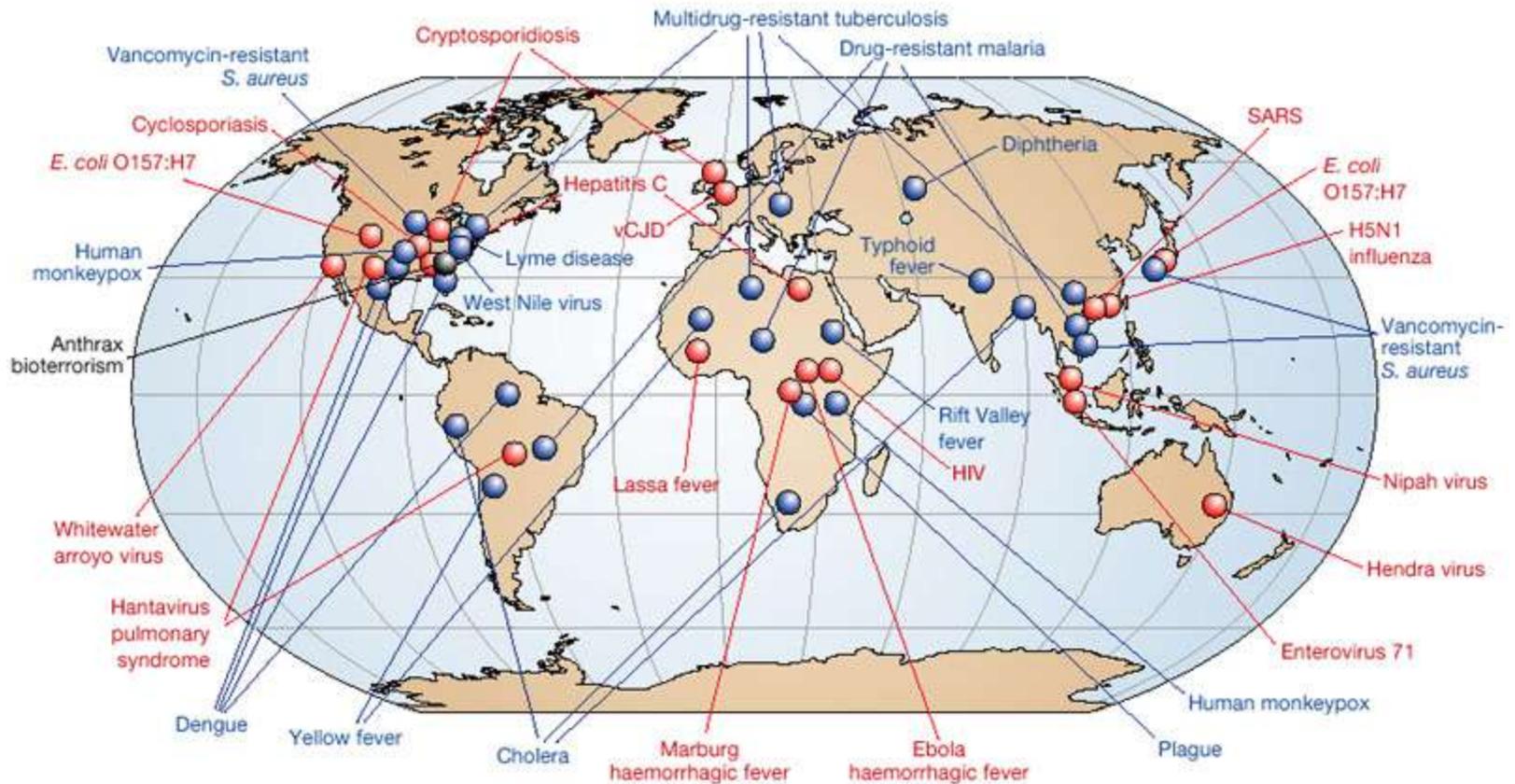
Global climate change
NOAA

Ecosystem services

- Human benefits derived from intact ecosystems
 - Intact wetlands prevent flooding
 - Intact grasslands prevent soil erosion
 - Intact habitats prevent emerging infectious diseases



Re-emerging and emerging infectious diseases



Morens et al. 2004

- Usually zoonotic
- Result from adaptation to new hosts
- Rapid increase in the past 2 decades
- Appear in areas undergoing *ecological transformation* (Daszak et al. 2001)



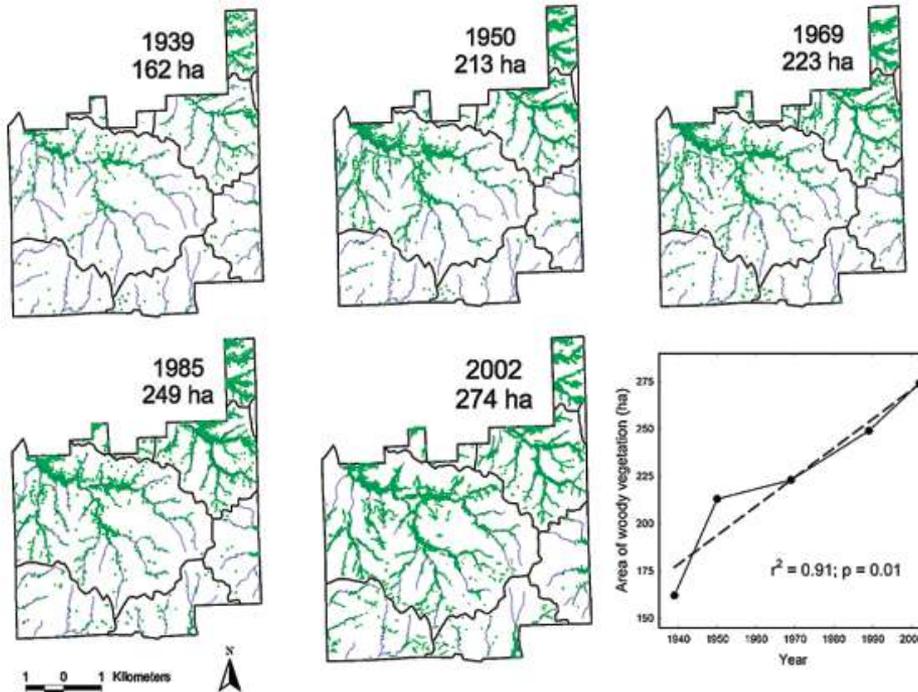
Land cover and land use change affects disease emergence

Deforestation increases human contact with wildlife

- Brazil Health Ministry reported:
 - In 1999, 35 people attacked
 - In 2005, 16334 people attacked

Land use change in the Flint Hills

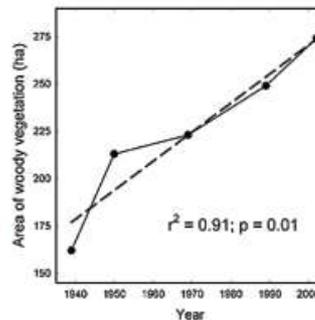
Fire suppression and woody expansion



Exurbanization



- *Increased clustering of resources*
- *Creation of disease highways*



Does land use change in the Flint Hills increase risk of exposure to rabies?

Pathogen = Rabies

South Central Skunk
Rabies Strain

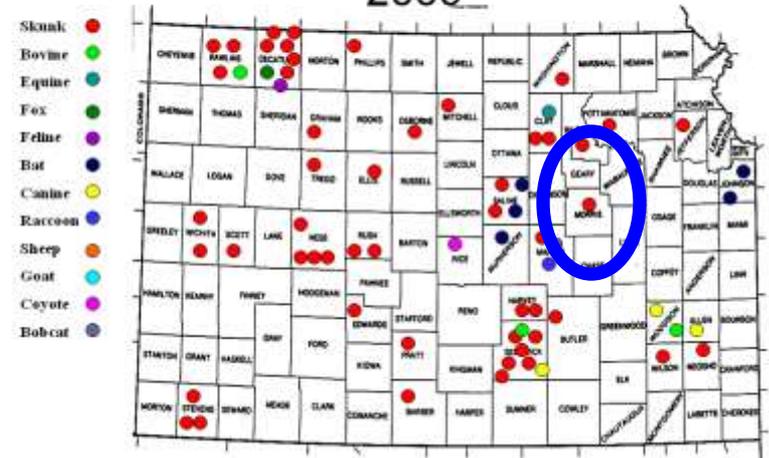
Host = Striped skunk

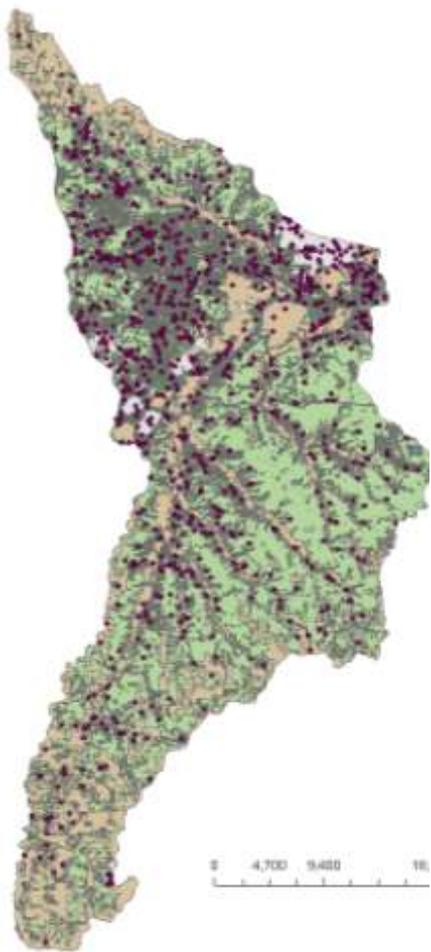
Ubiquitous, urban adapted

Environment = Grassland

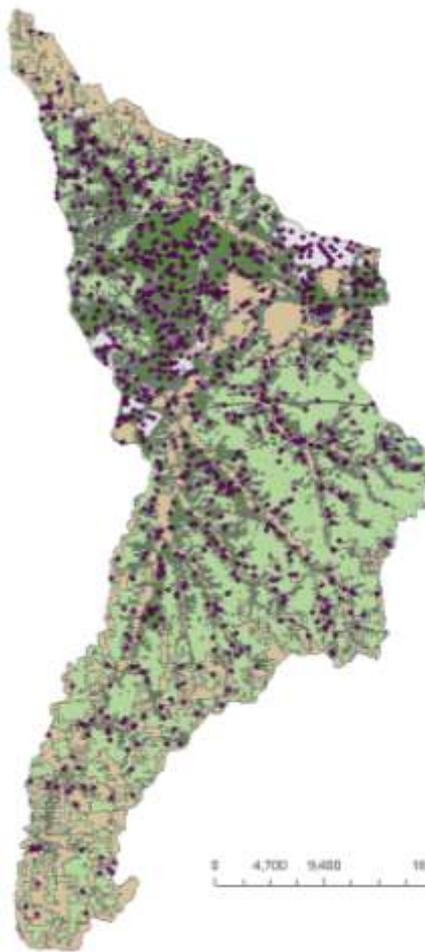
prairie ecosystem, with
increasing urban and
forest matrix

Confirmed Positives in Kansas
2009





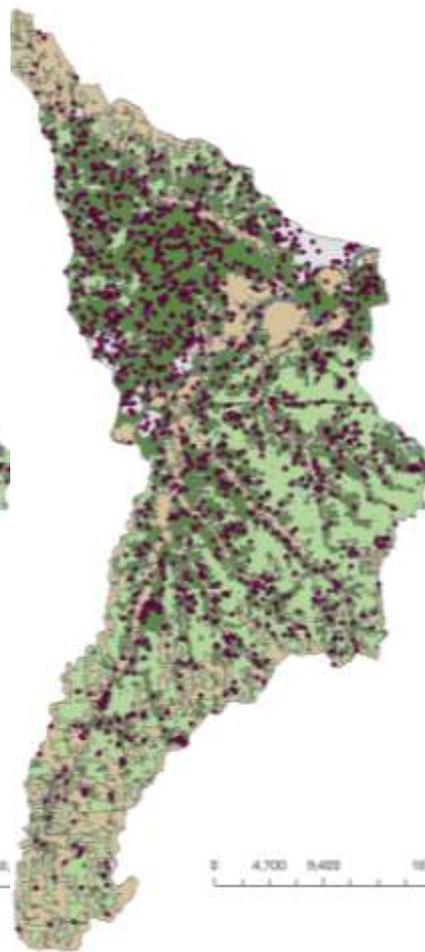
Current



Low



Medium



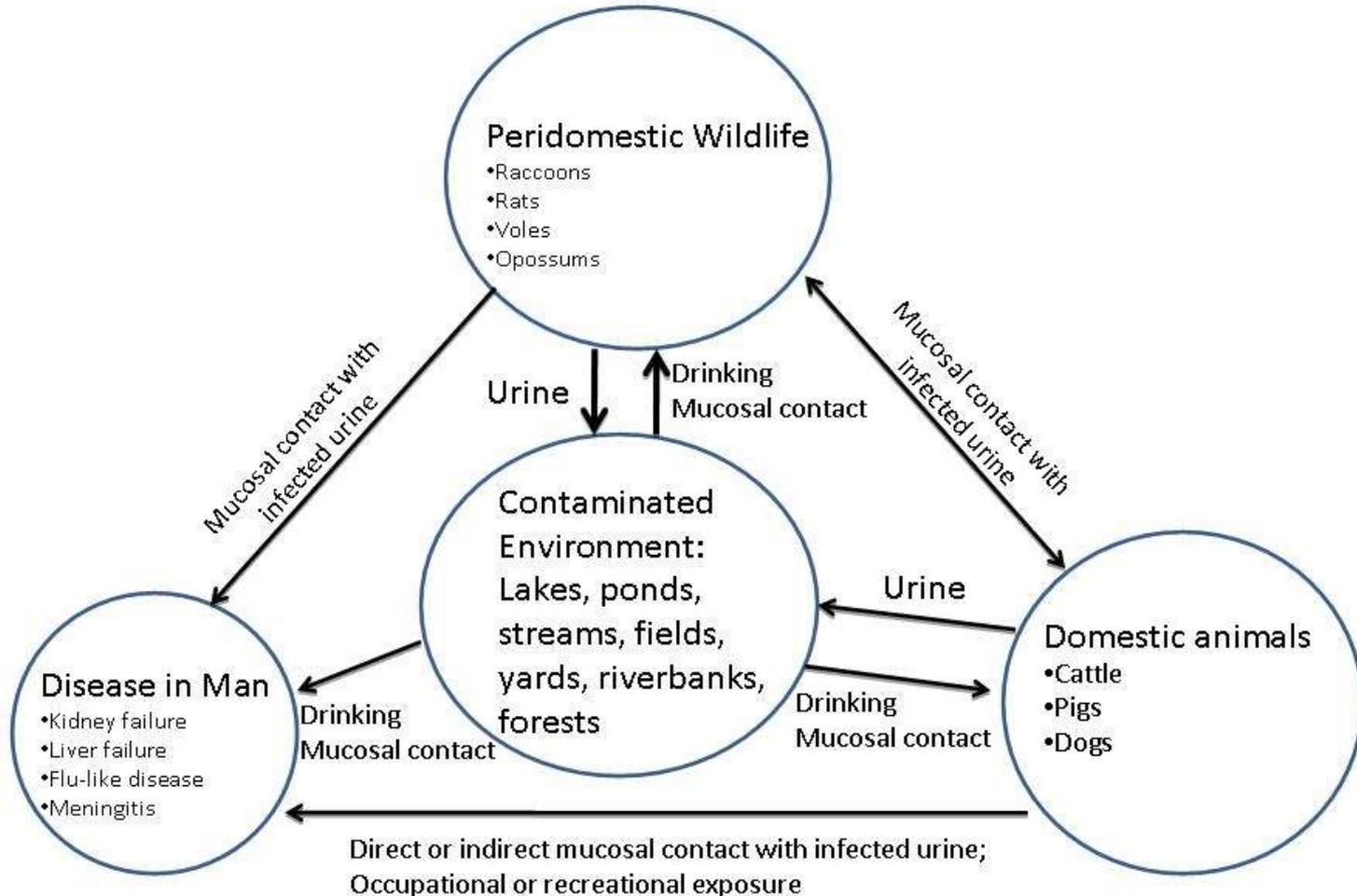
High



**25 years
in future**

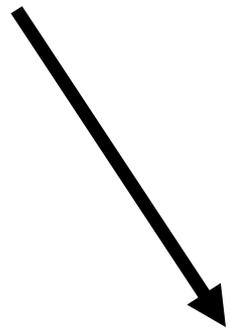
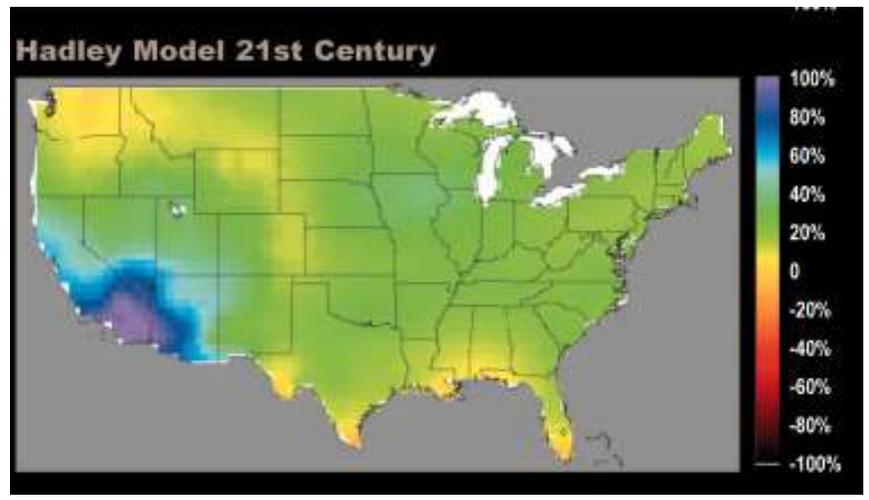
**100 years
in future**

Will projected climate change increase the risk of exposure to Leptospirosis?



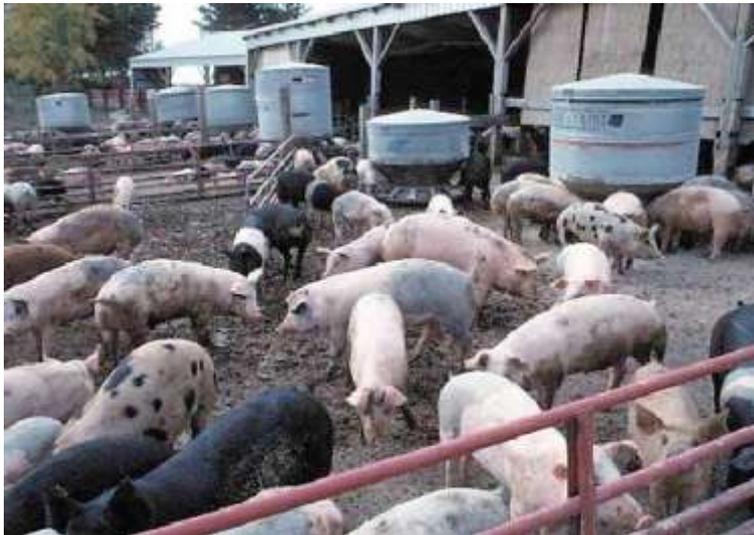
Harkin and van der Merve

Projected increase in rainfall variability



Increased contact with animal waste

Increased urban flooding



Ongoing Initiatives at KSU

- Involvement with National Ecological Observatory Network
- Networking among Long-Term Ecological Research sites
- Ecoforecasting EPSCoR