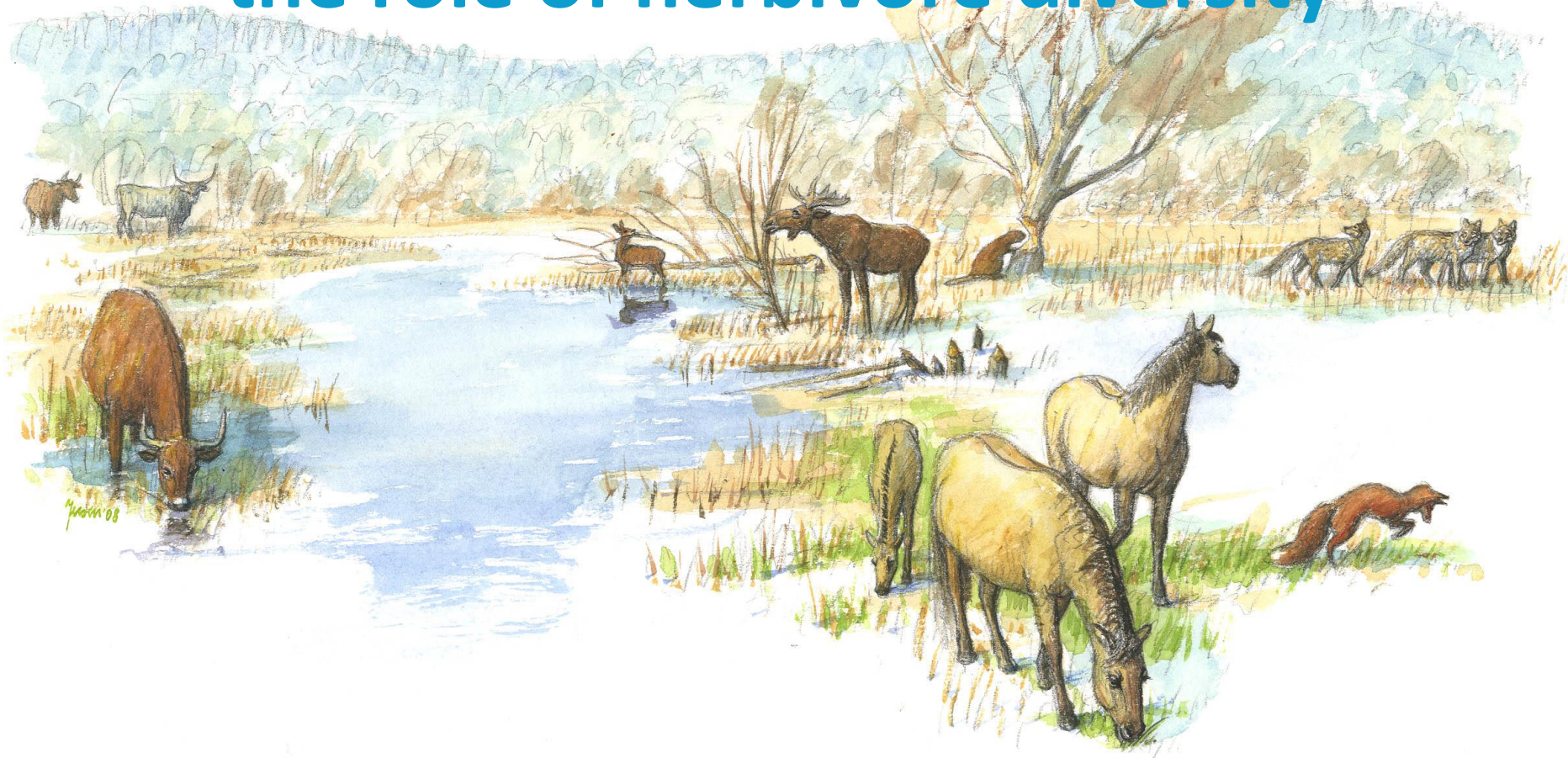




Rewilding in practice: the role of herbivore diversity



Rewilding is not about restoring tradition or cultural heritage














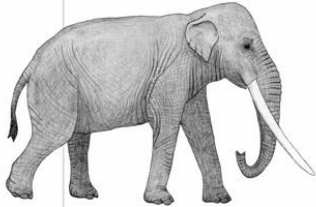








**Rewilding is restoring once lost herbivores
(and predators) that belong here**

Restoring the co-evolution of landscape, plants and animals



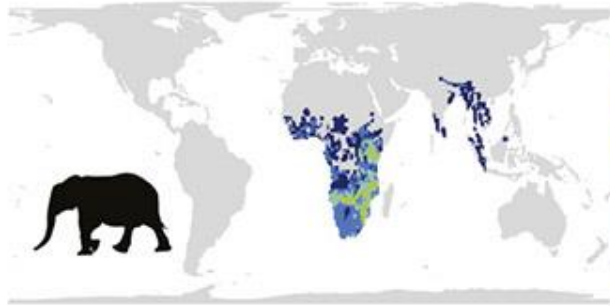
	BROWSERS AND OMNIVORES	INTERMEDIATE FEEDERS	GRAZERS
RUMINANTS	 	     	
NON-RUMINANTS	   	 	  

Once Europe
housed a huge
diversity of large
herbivores

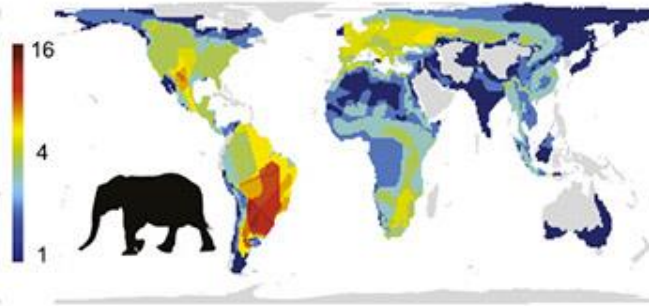
Predators were omnipresent



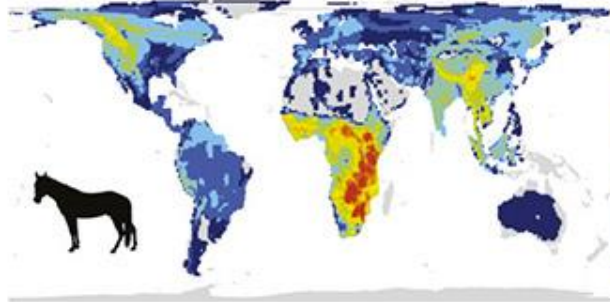
A Herbivores ≥ 1000 kg (actual)



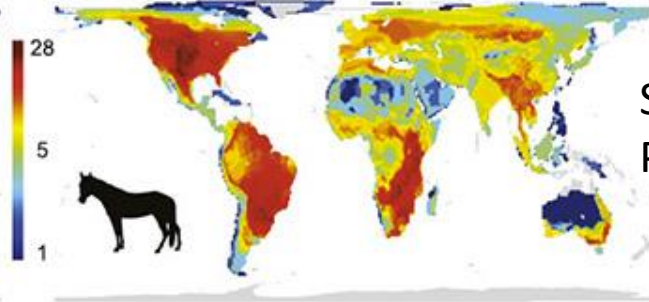
B Herbivores ≥ 1000 kg (natural)



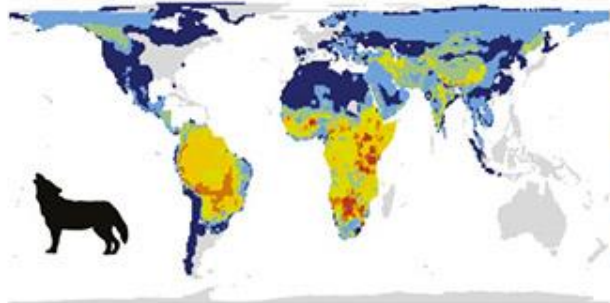
C Herbivores 45–999 kg (actual)



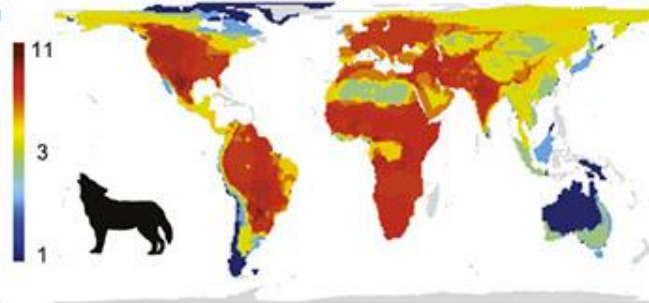
D Herbivores 45–999 kg (natural)



E Carnivores ≥ 21.5 kg (actual)



F Carnivores ≥ 21.5 kg (natural)

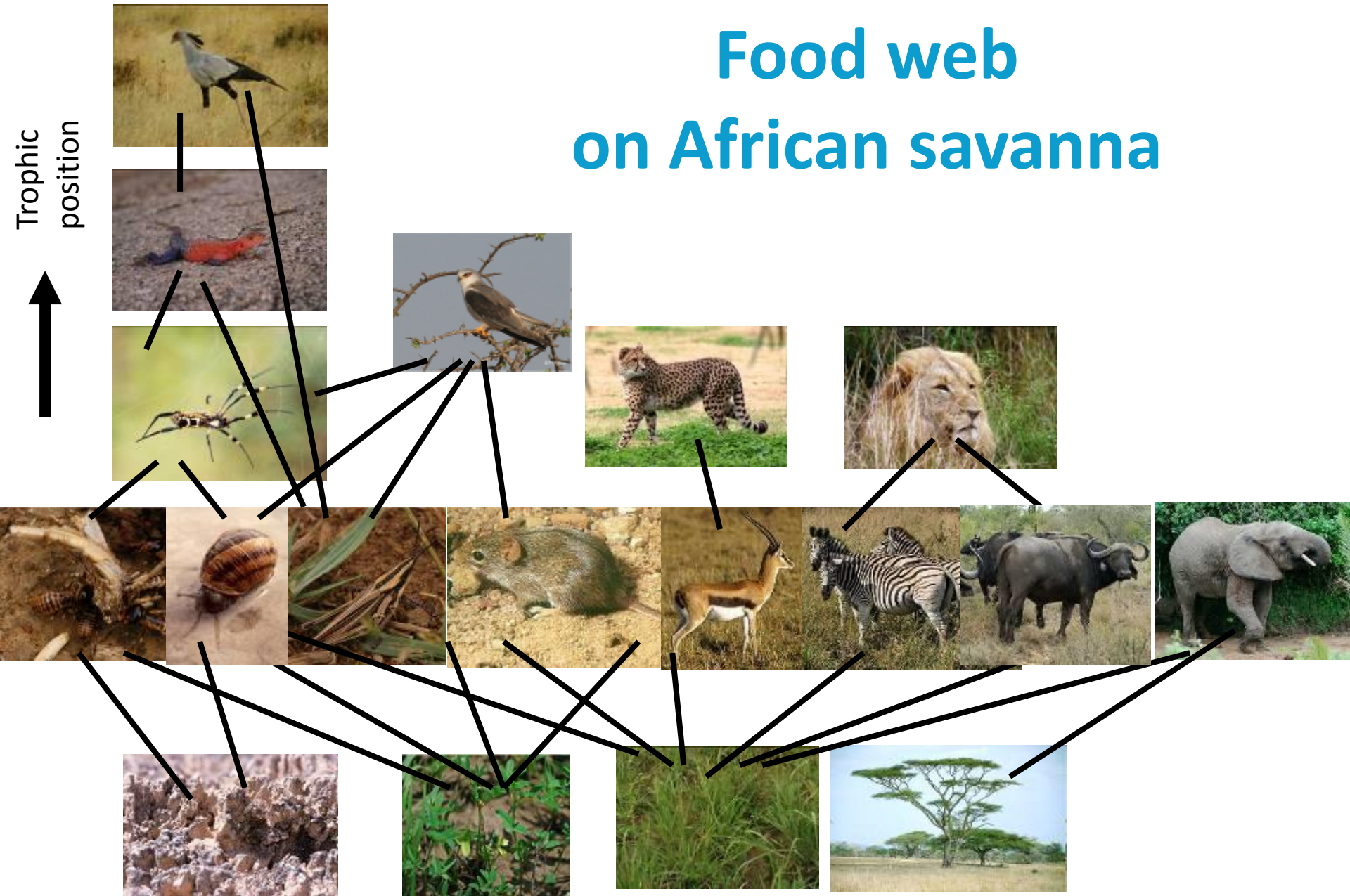


Svenning et al.
PNAS 2016

Current distribution

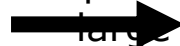
Food web on African savanna

Trophic
position



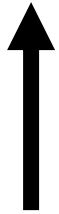
small

Landscape impact



Food web on African savanna

Trophic
position



quality \leftarrow ===== \rightarrow quantity

Selective feeders \leftarrow ===== \rightarrow bulk feeders





**Which ones do we need for
ecosystem restoration**

Browsers



Intermediate feeders



Grazers



Many herbivores are still available

Herbivores facilitate each other



E.g. wisents open up dune shrubbery



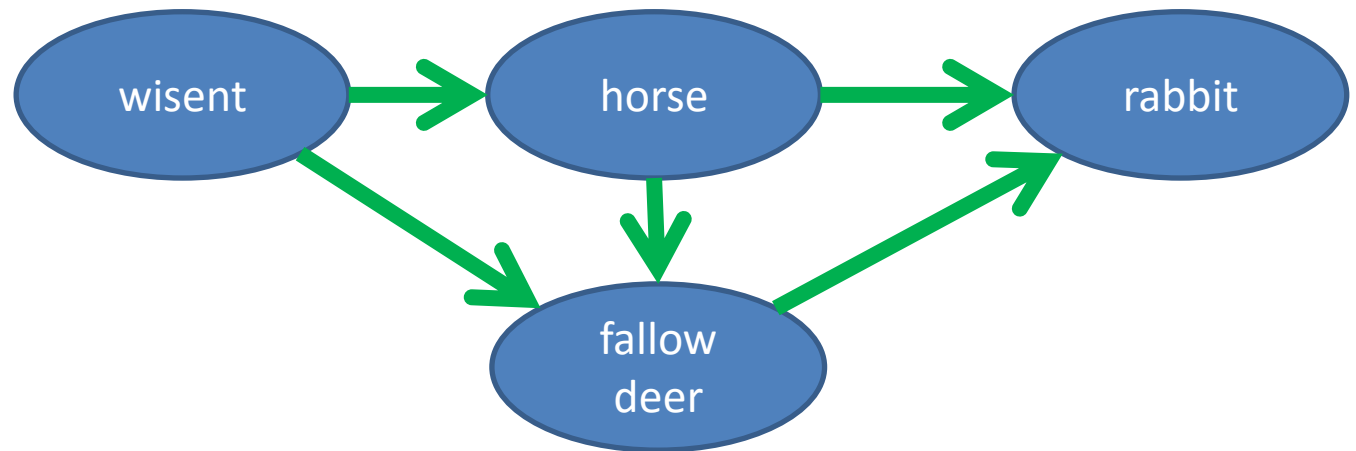
Horses shorten the grass



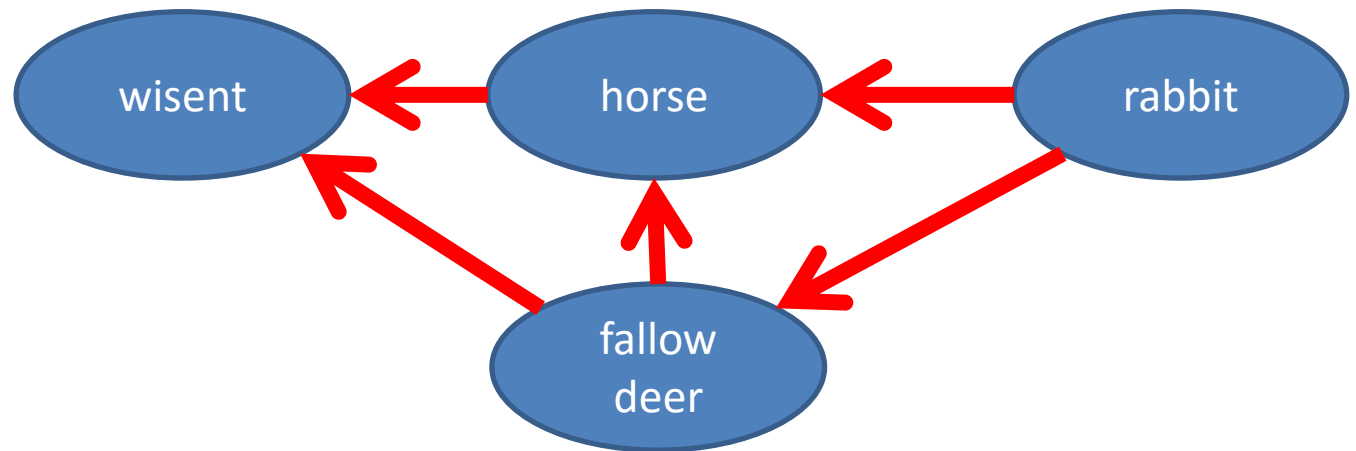
Rabbits profit

- Debark bushes and
- Shorten grass even more

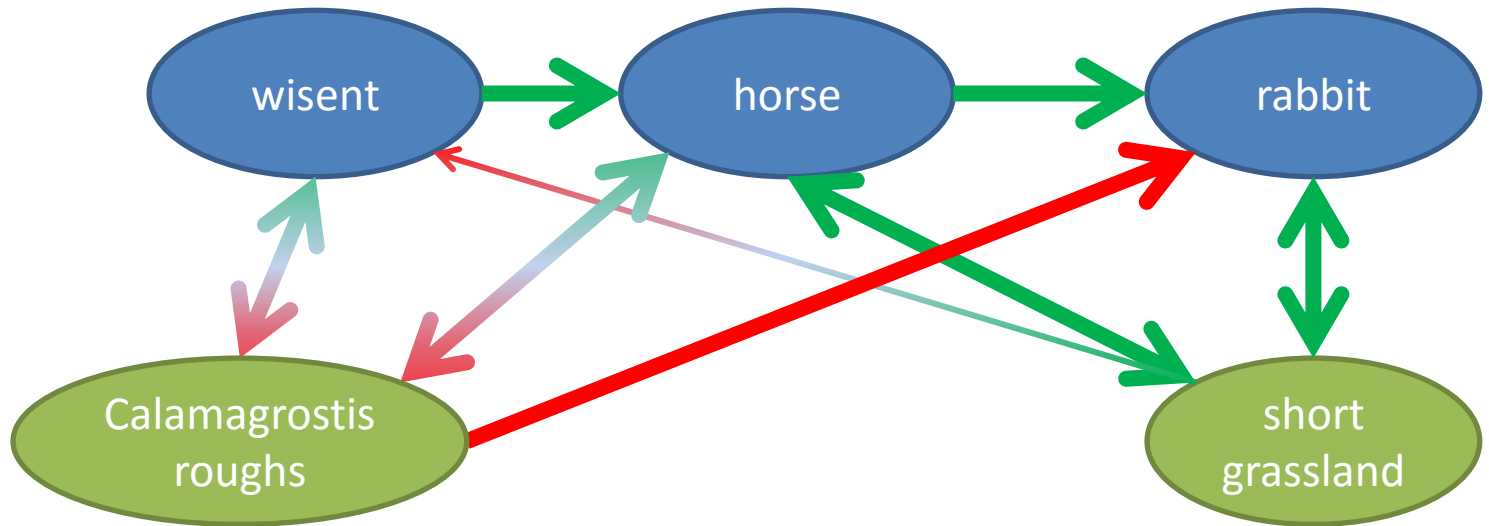




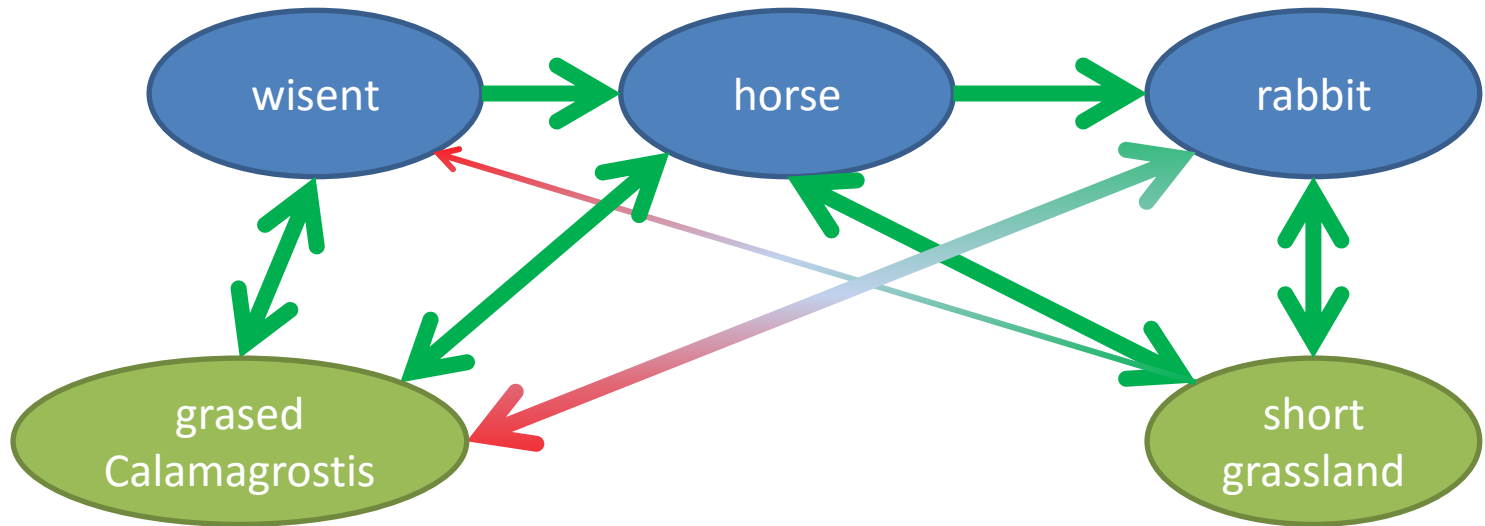
Facilitation on sandy soil



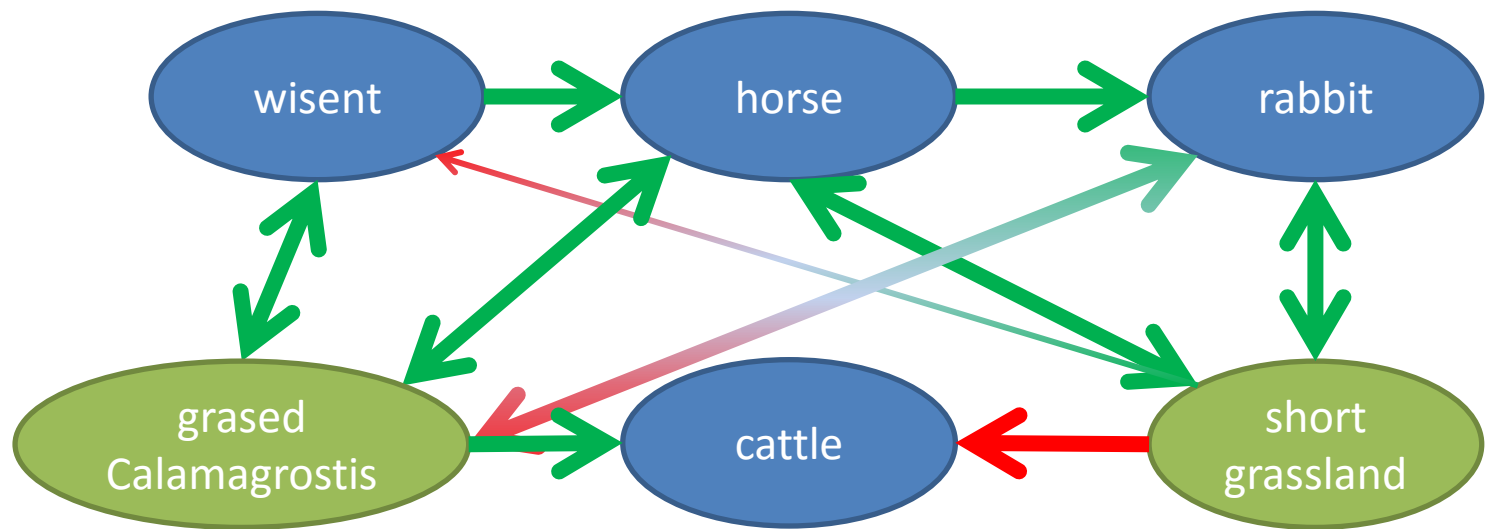
Competition on sandy soil



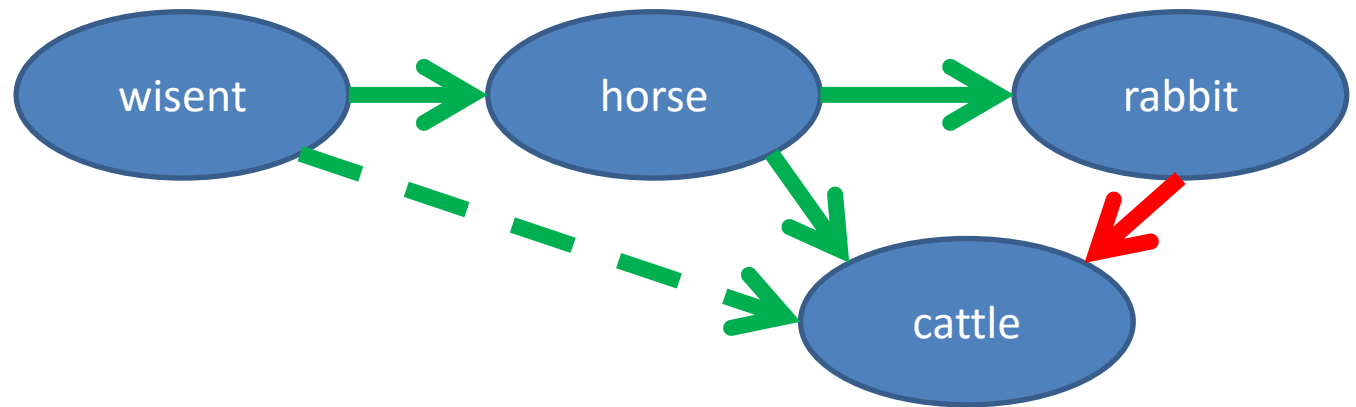
Facilitation on sandy soil



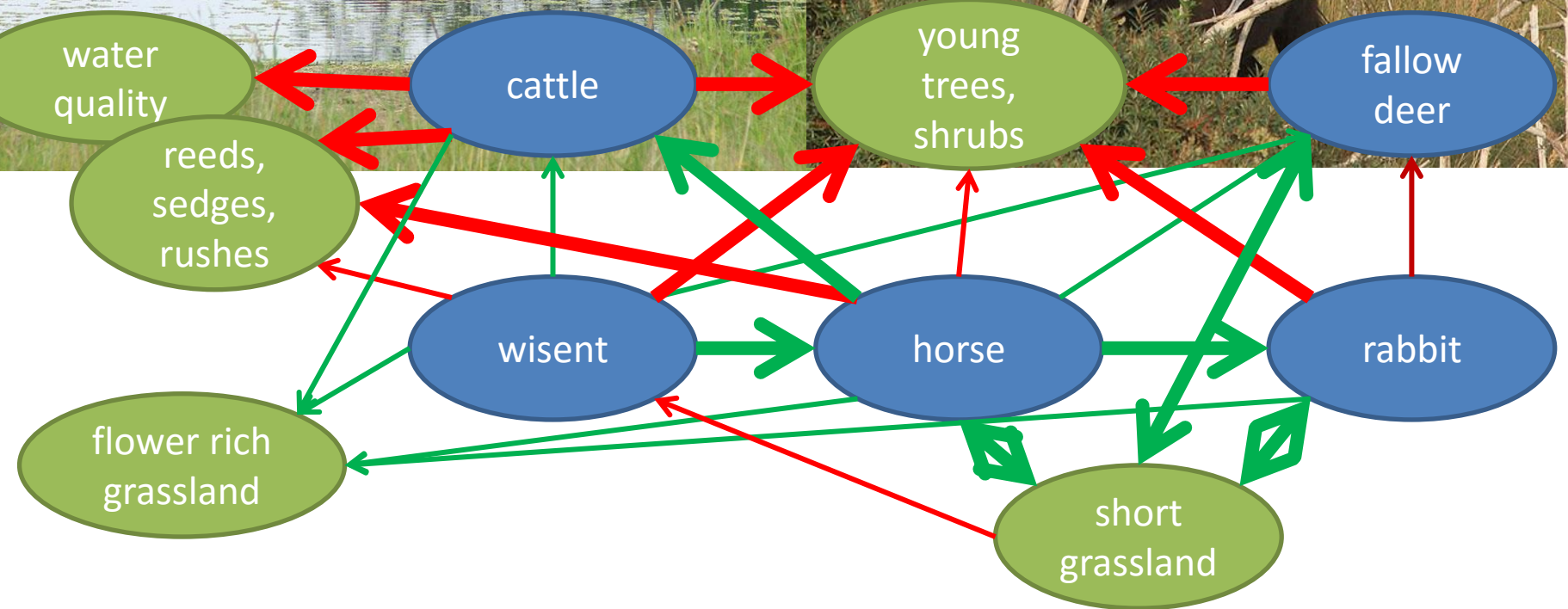
Facilitation on sandy soil



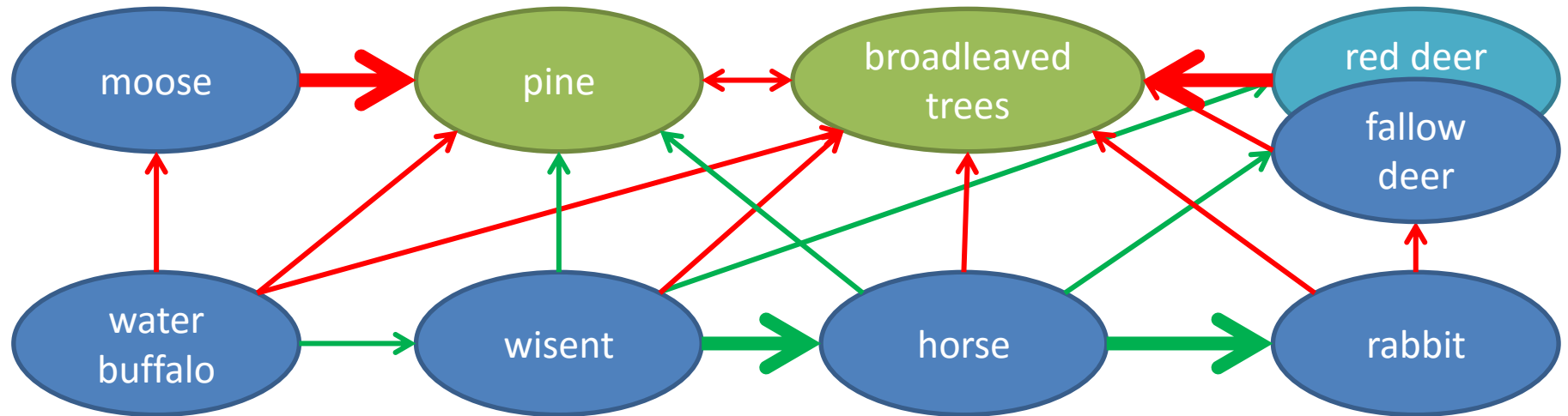
Facilitation on sandy soil



Facilitation on sandy soil



Grazing on sandy soil



Many herbivores involved



Why doesn't the forest disappear?

Large herbivores facilitate germination of
woody species



Thorns protect

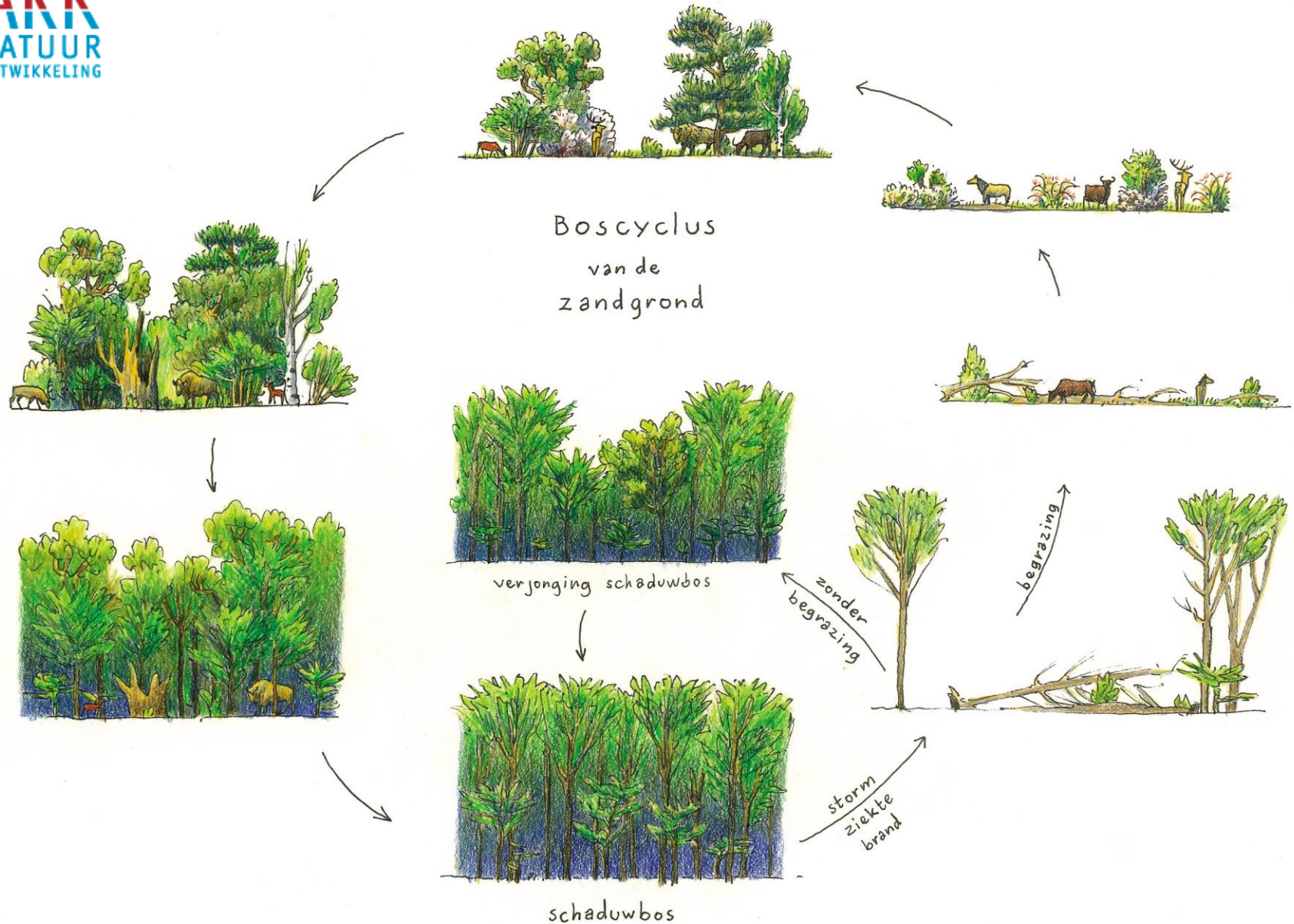
Forest rejuvenates in open land

Trees appear adapted to the presence of large herbivores



Result: Wandering open forest landscapes





Abiotic and biotic processes co-operate

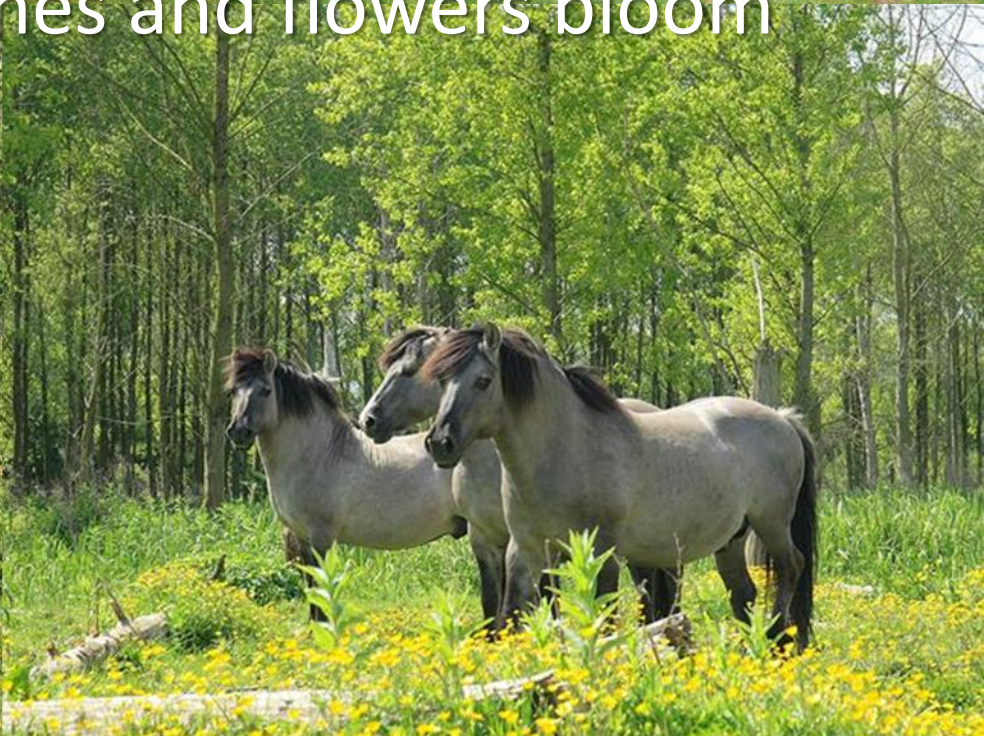
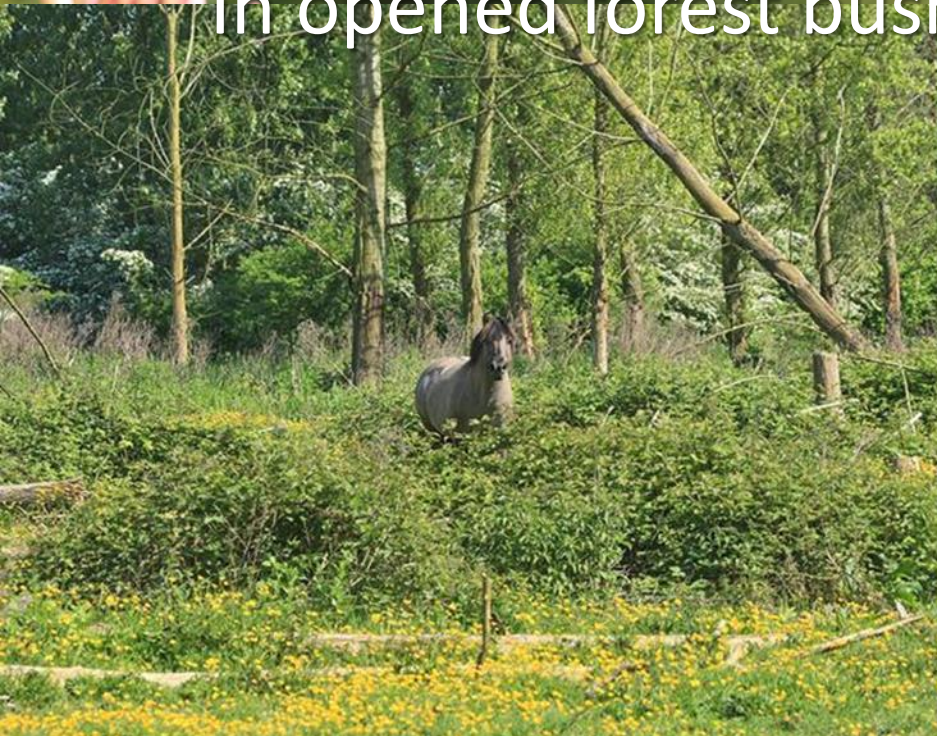


**Abiotic and biotic
processes co-operate**



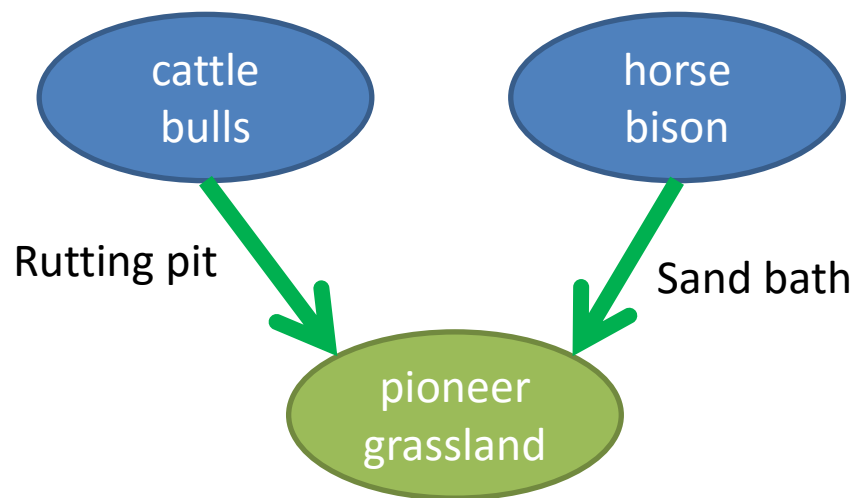


In opened forest bushes and flowers bloom





Many small animals and flowers profit from light, warm micro-climate and open structure



Not only grazing



**Small effect,
but present on a large scale**



Natural herd composition, more result



Large herbivores transport seeds

Animal trails connect heavily used area's



Pioneer species profit



Sand lizard / zandhagedis (*Lacerta agilis*)



duinviooltje (*Viola tricolor* subsp. *curtisii*)



Natural, medicine-free dung is a biodiversity hotspot



Don't treat herbivores with antibiotics!



Much more than just grazing

Large herbivores:

- Graze, browse and debark
- Facilitate other species
- Stimulate and suppress plant growth
- Suppress invasive species
- Spread seeds
- Take sand baths and make bull pits
- Rub their coat
- Concentrate dung



Much is still unknown

What is the impact of

- Water buffalo
- Moose

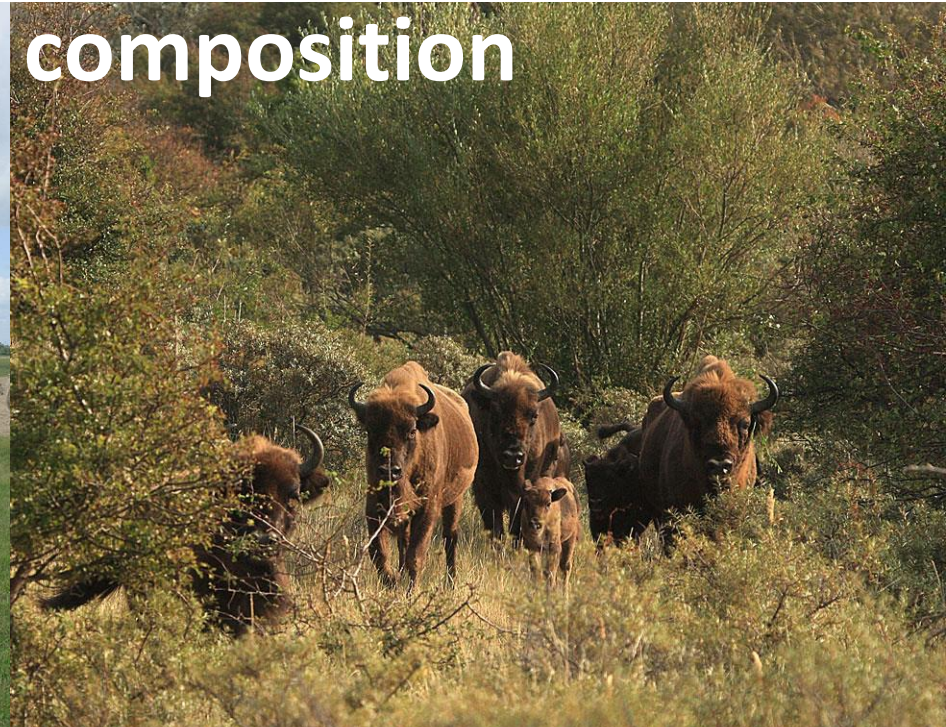
What is the effect of migration

- From flood plains to dry sandy soil
- Towards water in dry seasons
- From mountains to valleys or up into alpine meadows

The role of predation

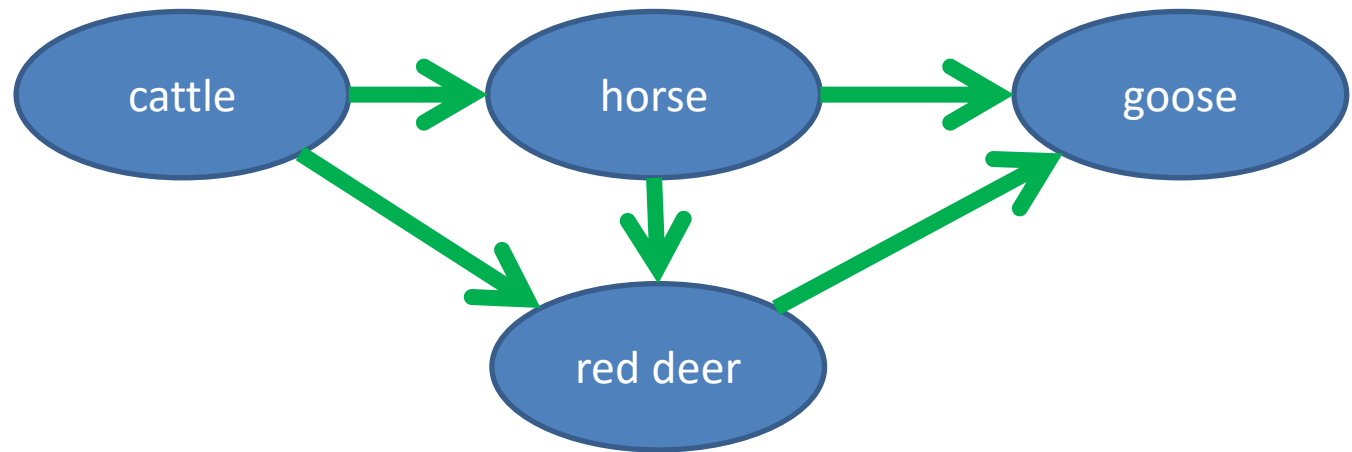


Seasonal migration enlarges carrying capacity and species composition

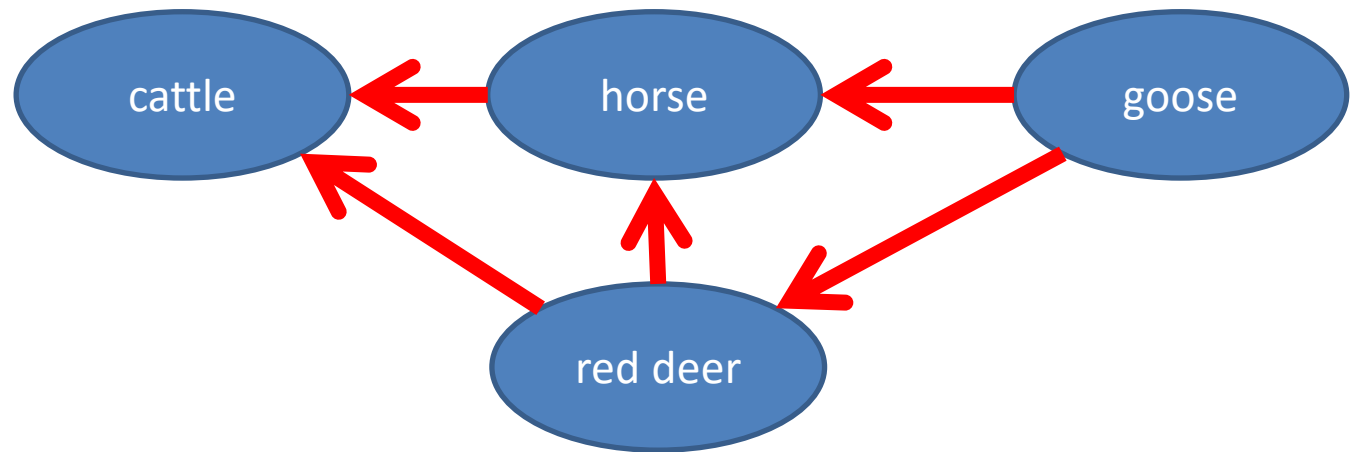


Predation balances the plant-herbivore ecosystem



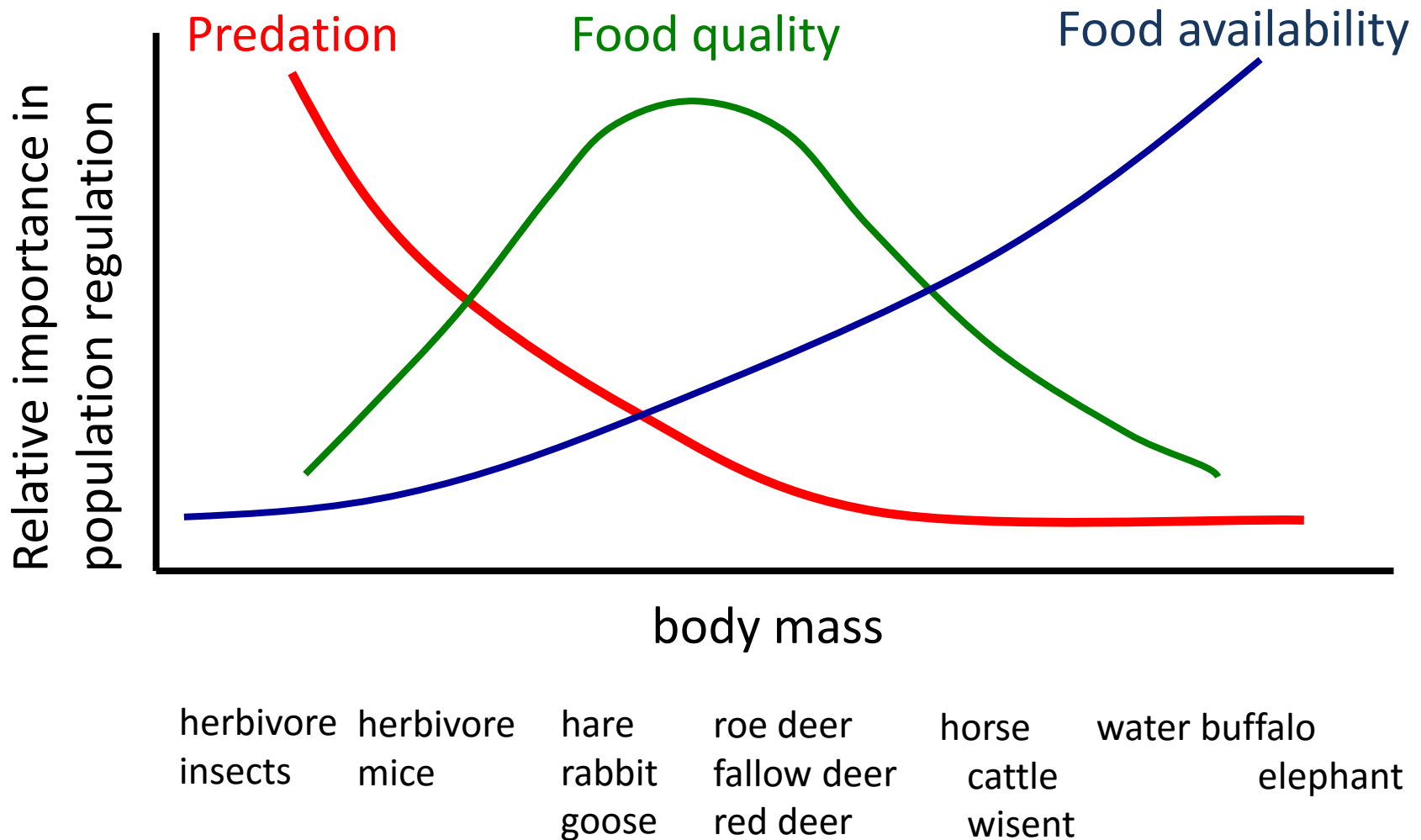


Facilitation in a nutrient rich system



And competition

Herbivore body mass determines how populations are regulated



Natural densities

Loss of biodiversity and landscape structure

Over-grazed

- High biodiversity
- Food surplus in summer
- Flowers blossom and set seeds
- In autumn dry vegetation full of seeds

Under-grazed

No visible effect,
“homeopathic”



Large predators are essential to suppress medium sized ungulates



Conclusion

Natural processes interact

- Wind, water and fire for large scale effect
- Herbivory & predation for details
- Larger herbivores have a bigger impact on landscape and biodiversity

No single species does the whole job

- They all graze, browse, wallow, rub and shit
- Their differences, competition and facilitation fuel biodiversity
- Every habitat has its own key species

Natural herd composition

- Male competition results in more diversity

There is still a lot to find out



Thanks for your attention!

