

Cities and biodiversity can benefit from each other

**SSCS 2020
Lucerne
Manfred Niekisch**



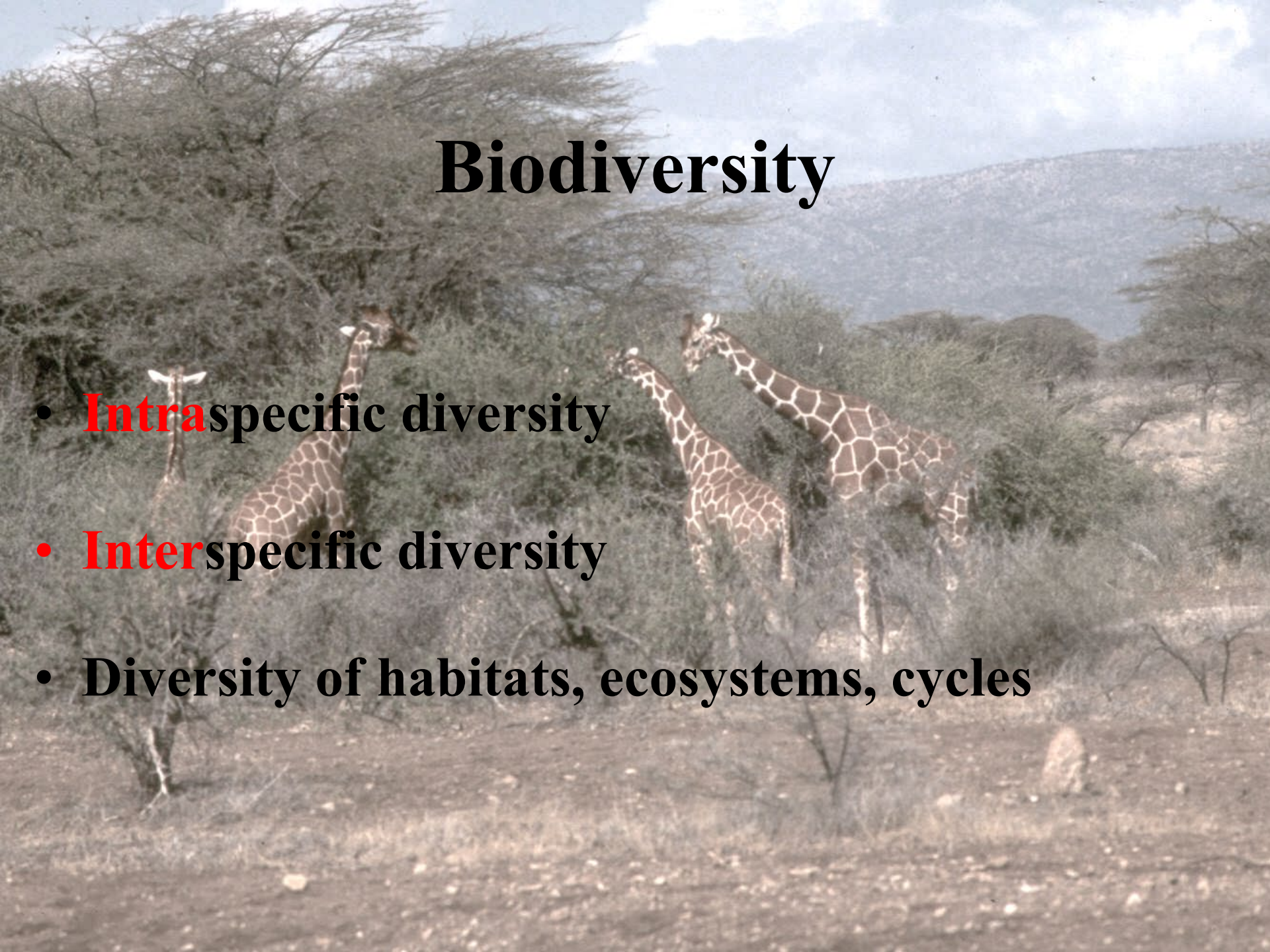
Biodiversity

is **not** equal to species
diversity



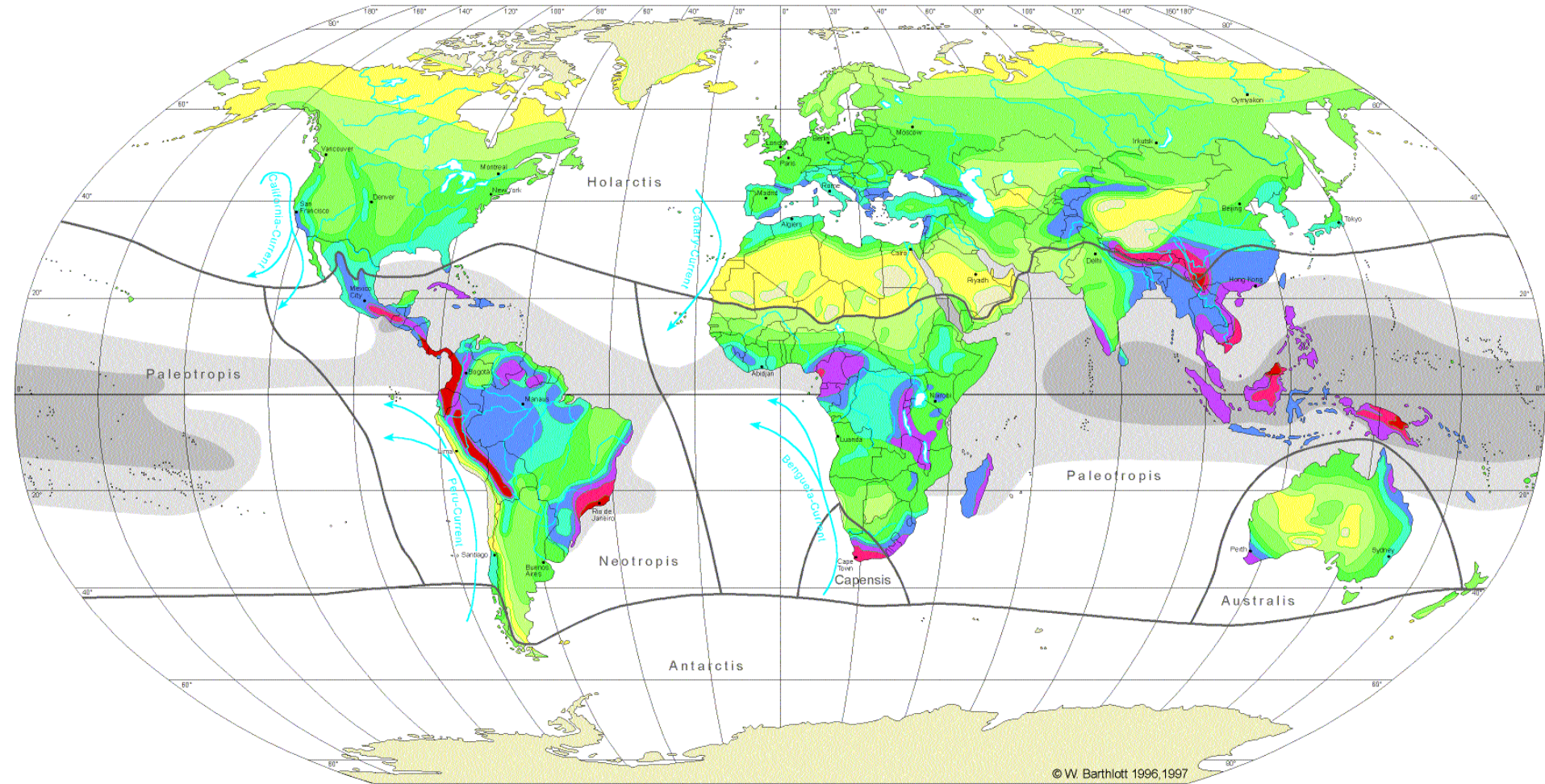
Biodiversity

- **Intra**specific diversity
- **Inter**specific diversity
- Diversity of habitats, ecosystems, cycles





GLOBAL BIODIVERSITY: SPECIES NUMBERS OF VASCULAR PLANTS



Robinson Projection
Standard Parallels 38°N und 38°S
Scale 1: 130 000 000

Diversity Zones (DZ): Number of species per 10.000km²

DZ 1 (<100)	DZ 5 (1000 - 1500)	DZ 9 (4000 - 5000)
DZ 2 (100 - 200)	DZ 6 (1500 - 2000)	DZ 10 (≥5000)
DZ 3 (200 - 500)	DZ 7 (2000 - 3000)	
DZ 4 (500 - 1000)	DZ 8 (3000 - 4000)	

Capensis floristic regions

sea surface temperature

>29°C
>27°C

cold currents

W. Barthlott, N. Biedinger, G. Braun
F. Feig, G. Kier, W. Lauer & J. Mutke 1997
modified after
W. Barthlott, W. Lauer & A. Placke 1996
Department of Botany and Geography
University of Bonn
German Aerospace Research Establishment, Cologne
Cartography: M. Gref
Department of Geography
University of Bonn





poor soils

**high species numbers,
low number of specimen**

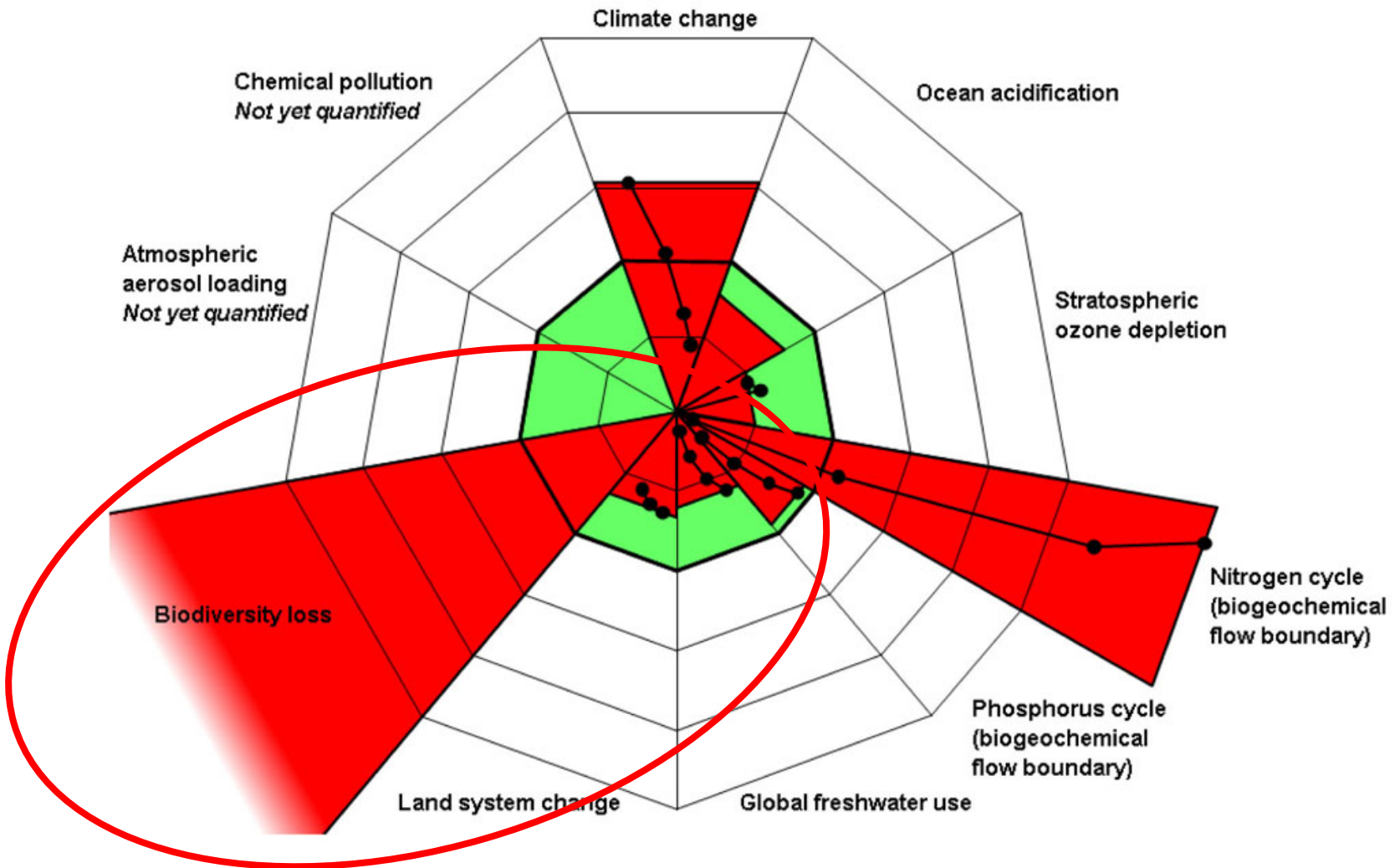
rich soils

**low species numbers,
high number of specimen**





Planetary Boundaries



Cities and Biodiversity

Cities and Biodiversity

Numbers and facts

Cities were very often founded in areas

- ❖ with diverse morphology (Manhattan),**
- ❖ with high productivity,**
- ❖ bordering rivers or lakes (Hanoi, Kuala Lumpur, Frankfurt)**

Cities and Biodiversity

Numbers and facts

- Urbanisation is one of the main reasons for the loss of global biodiversity
- Cities are an extreme form of land use with a ***total loss of nature on sealed surfaces***

BUT:

- Cities can offer mosaics of different habitats and structures (by diversity of uses):
urban habitats can be reservoirs for nature, such as **gardens, parks, cementaries, lakes, facades, roadside green, gravel sites along railways, playgrounds**

Cities and Biodiversity

Numbers and facts

In cities in western Europe (area > 100 km², > 200.000 inhabitants):

- ❖ More than 1.000 higher plant species,**
- ❖ around 40% exotic species,**
- ❖ common and widespread species,**
- ❖ around 50% of the exotic plant species established in Germany are ornamental or agricultural species,**
- ❖ Fauna and flora: many generalists, very few specialists.**

Cities and Biodiversity

Numbers and facts

Selective conditions

- ❖ **Warm climate**
- ❖ **high nitrogen concentration,**
- ❖ **disturbing factors (noise, light, traffic),**
- ❖ **fragmentation**

These typically urban conditions work as „filters“:

- ❖ **Winners are thermophilic species such as Ailanthus tree, Ring necked parakeet**
- ❖ **Losers are species of poor soils and cool climate such as orchids, Lilly species**

These filters also lead to decreased intraspecific diversity







**New habitat:
The Peregrine Falcon has found new living space in
artificial rocky landscapes called sky scrapers**



Climate change:

- ❖ De-paving of sealed areas,
 - ❖ green corridors for fresh air,
 - ❖ green spaces instead of asphalt and concrete
- help to combat rising temperatures in the cities.

Water

De-sealing and improved infiltration help to protect the water resources

Green spaces in the city are
areas of recreation and can so
contribute to the reduction of
traffic

More nature in cities helps to
overcome the biodiversity crisis

More nature in cities helps to
overcome the climate crisis

The priority in cities is the well-being of their inhabitants, not biodiversity conservation

BUT

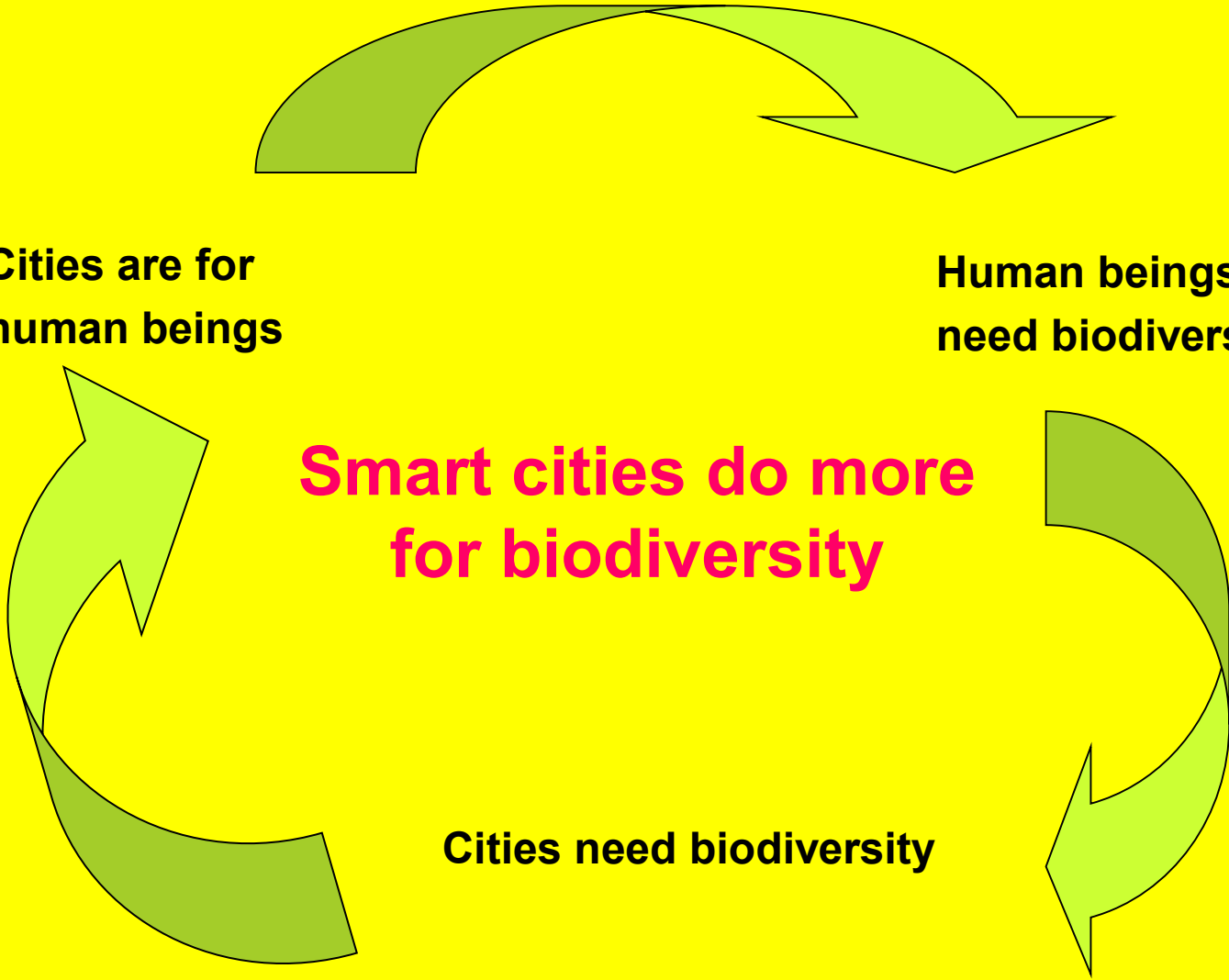
Biodiversity can increase the quality of city life

**Cities are for
human beings**

**Human beings
need biodiversity**

**Smart cities do more
for biodiversity**

Cities need biodiversity





A photograph of a well-maintained garden in front of a modern apartment building. The garden features a large tree with white blossoms, a white metal gazebo, a wooden structure with a conical roof, and various plants and flowers. A blue swing set is visible on the left. The apartment building has multiple floors with balconies and large windows.

Thank you for your attention!