ATTAINING IDEAL RESPIRATION
Case Study: Sichuan Province, China

Urmila Mallick, Ryan Peters, Angelos Makras, Dieter Teirlinck
Professor Bakermans (BBT) and Professor Spanagel (HUA)
PLAs: Kaitlyn Valla, Dylan Felty, Kristen Chan

WPI — Worcester Polytechnic Institute 1865

A.I.R.

OBJECTIVE

To construct a recommendation that reduces the loss of biodiversity of fauna and flora in Sichuan province, China by decreasing the amount of CO_2 and PM in Chengdu, the capital city.
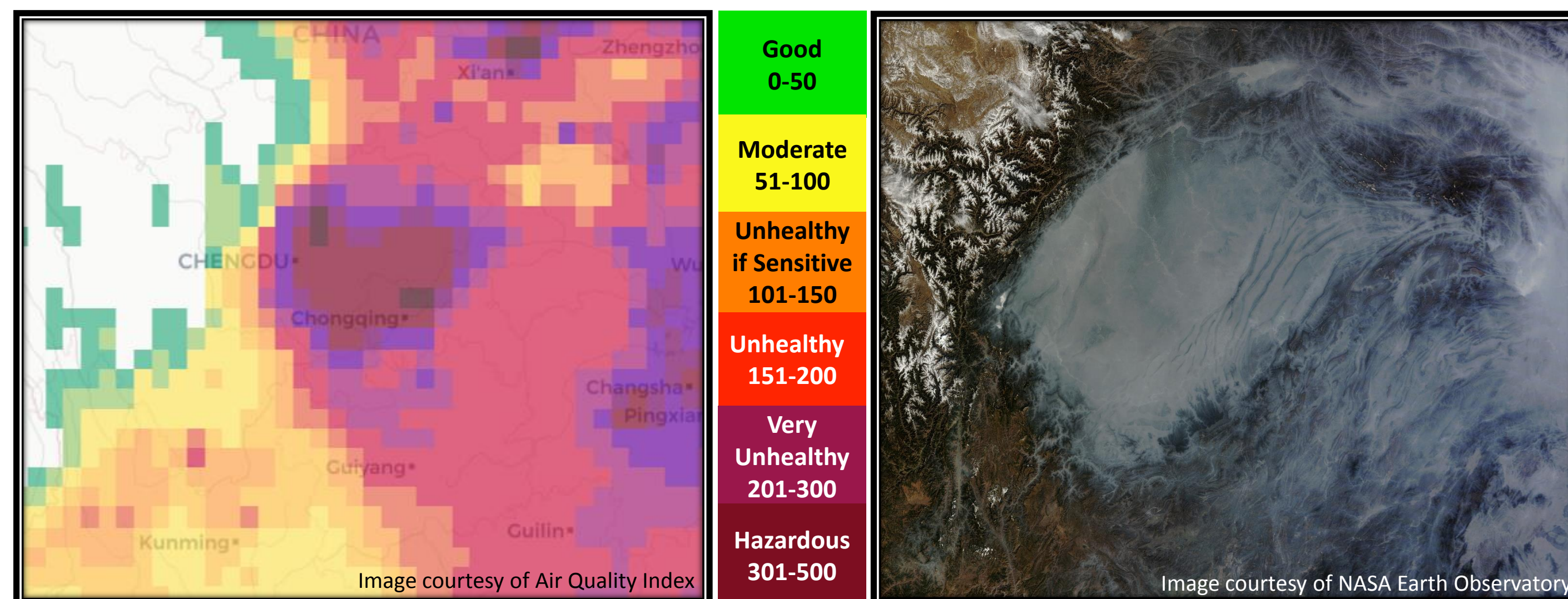
BACKGROUND MATERIAL

Sichuan Province
"Land of Abundance", home to over 80 million people, over 13,000 species, and one of 34 biodiversity hotspots in the world.

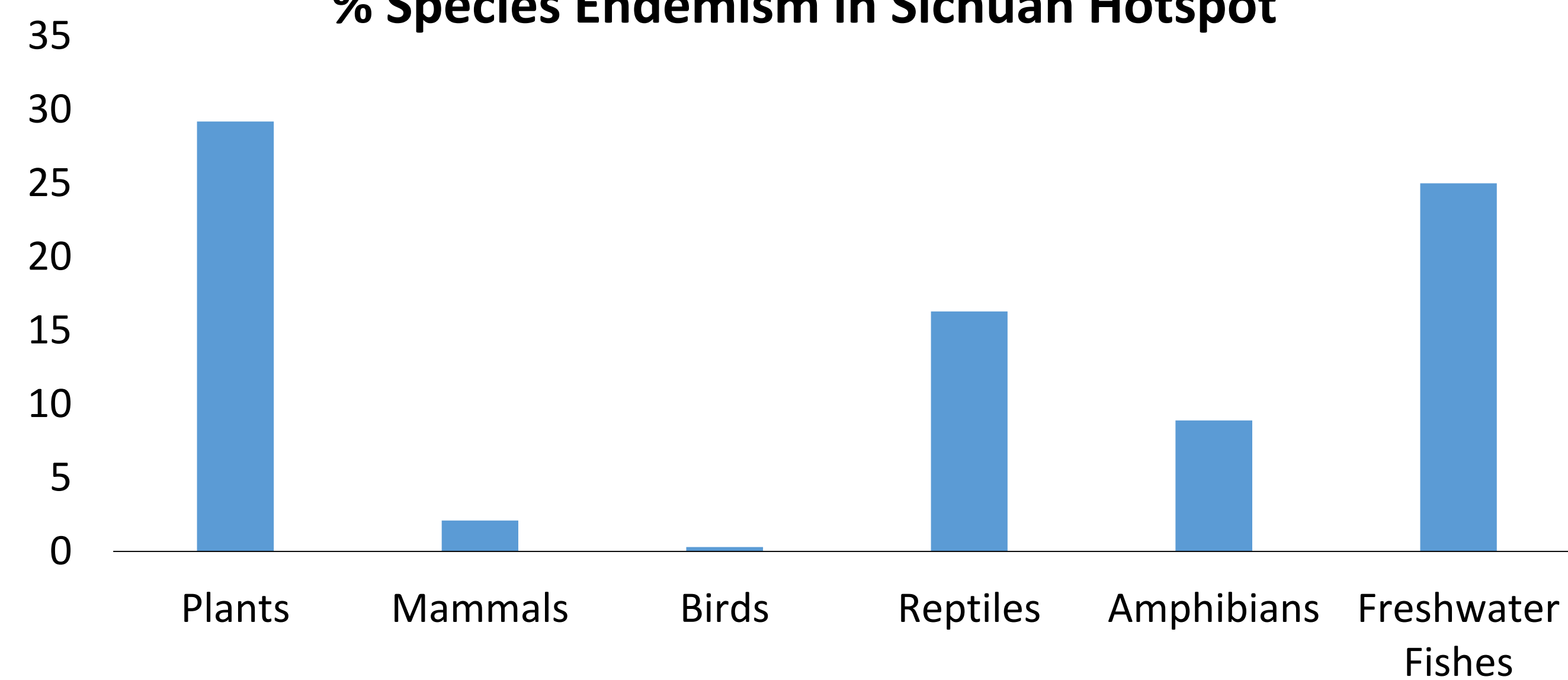Sichuan Province — Chengdu
Image courtesy of Wikipedia

Chengdu
The capital of Sichuan Province in the upper Yangtze River Valley of southwest China, with an estimated population of 14 million people.

Image courtesy of Air Quality Index

Air Quality legend:
- Good 0-50
- Moderate 51-100
- Unhealthy if Sensitive 101-150
- Unhealthy 151-200
- Very Unhealthy 201-300
- Hazardous 301-500

Image courtesy of NASA Earth Observatory

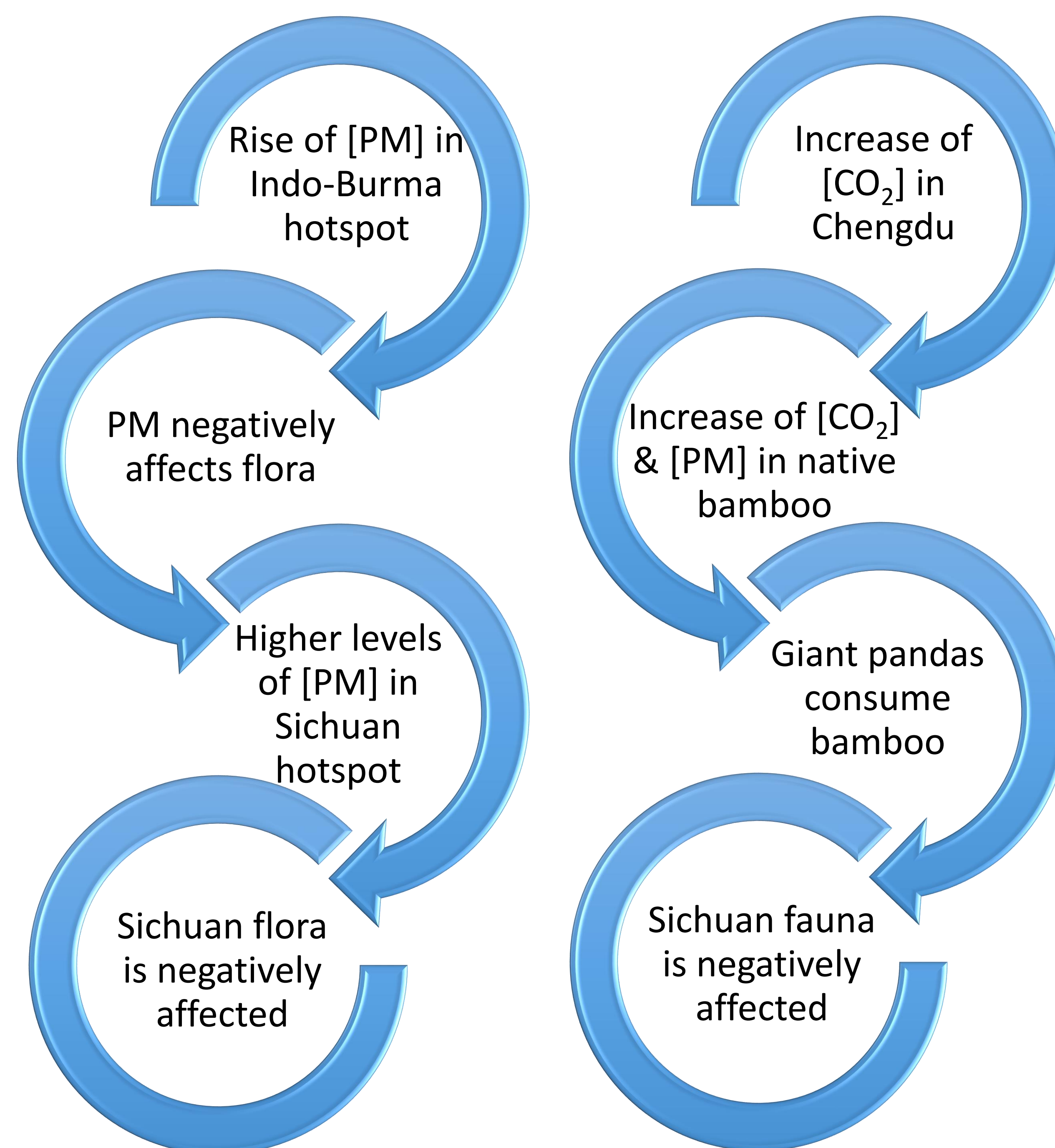**Mountains of southwest China hotspot**
- Only 8% of the original hotspot area remains untouched
- Estimate of endemic species: 3,508
- Home to the last surviving wild population of giant pandas
- Imminent threats: industrial emissions and waste, vehicular exhaust, agriculture, mining, widespread deforestation and tourism

% Species Endemism in Sichuan Hotspot
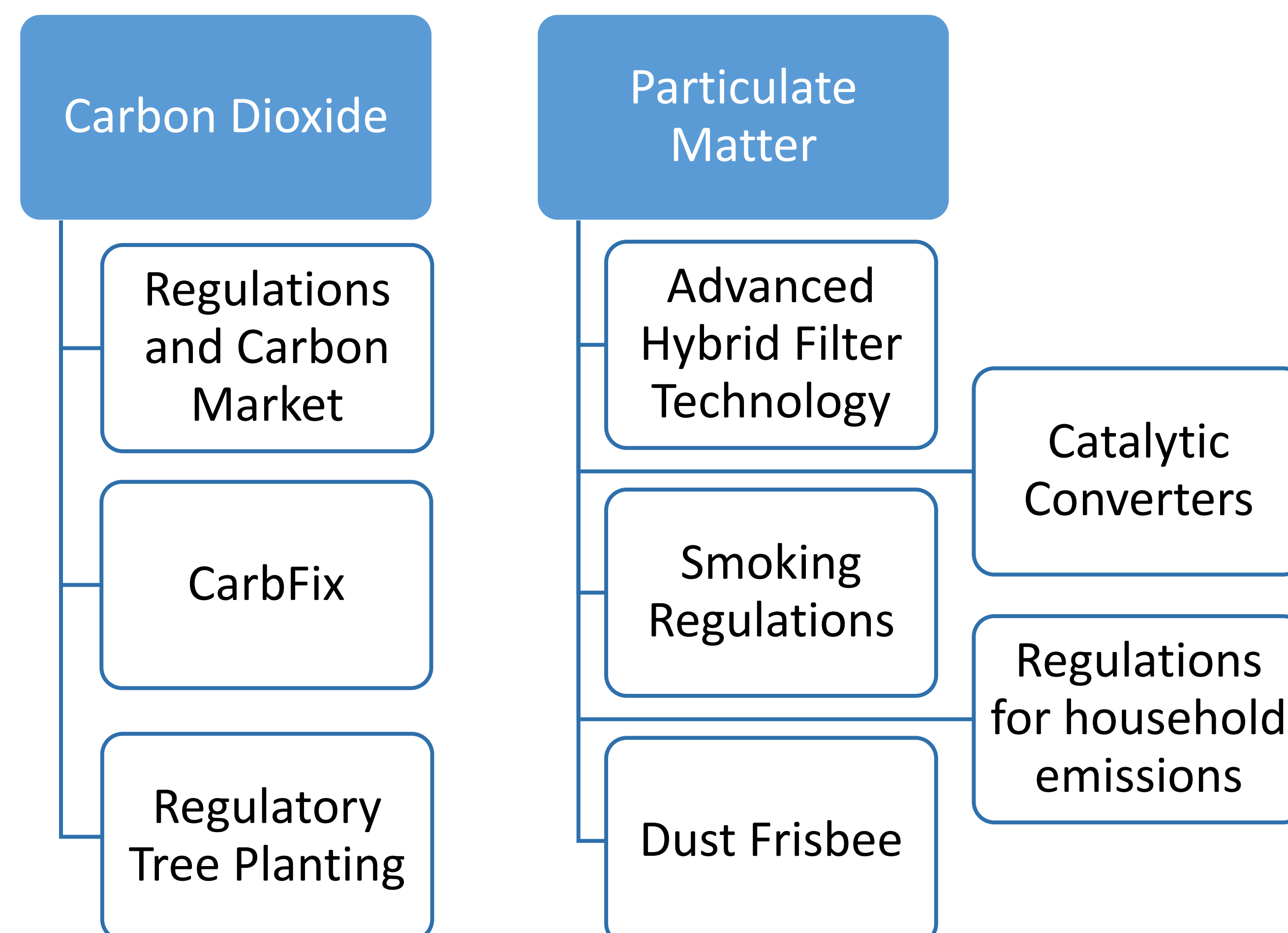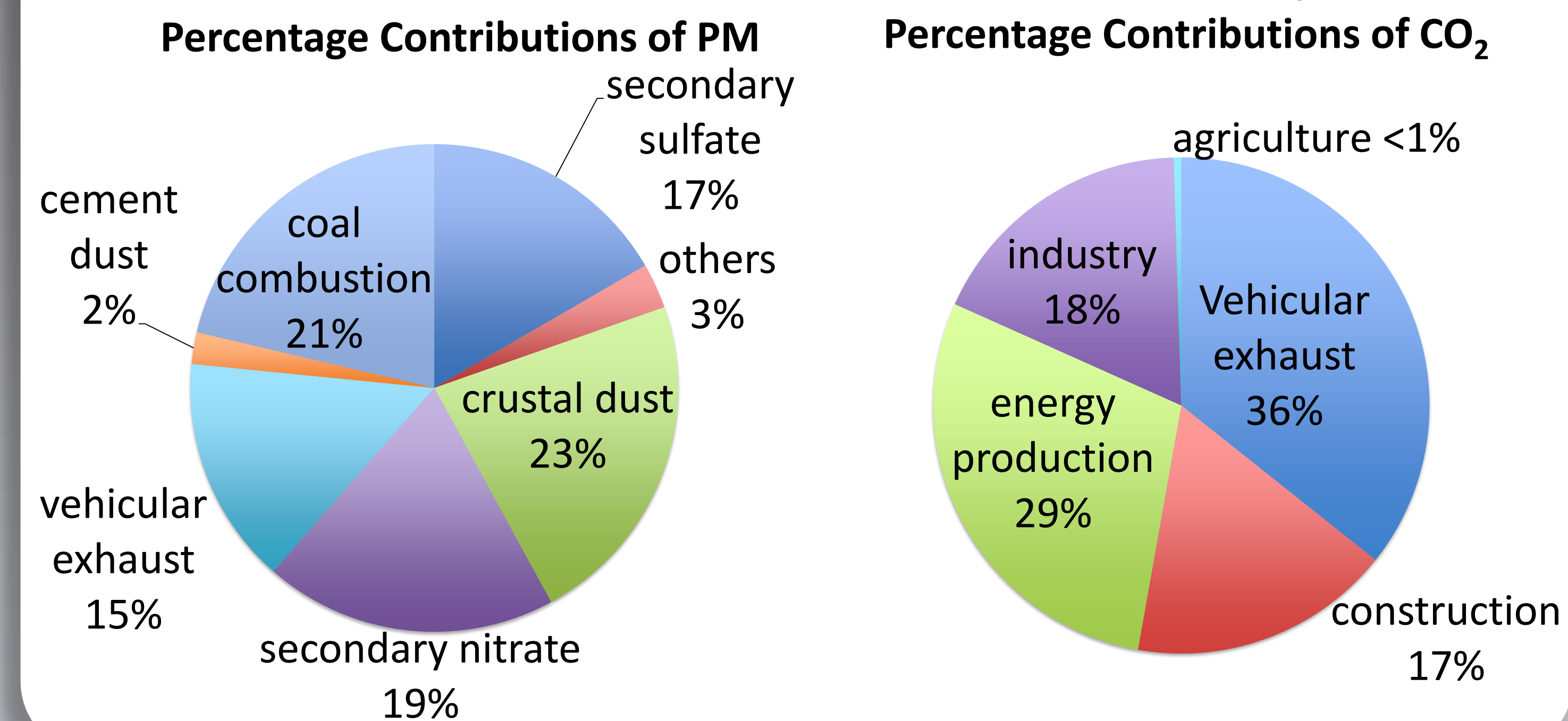

(Bar chart: Plants ~29, Mammals ~2, Birds ~0.5, Reptiles ~16, Amphibians ~9, Freshwater Fishes ~25)

Data Collection
How Pollution Affects Biodiversity

- Rise of [PM] in Indo-Burma hotspot
- PM negatively affects flora
- Higher levels of [PM] in Sichuan hotspot
- Sichuan flora is negatively affected

- Increase of $[CO_2]$ in Chengdu
- Increase of $[CO_2]$ & [PM] in native bamboo
- Giant pandas consume bamboo
- Sichuan fauna is negatively affected

METHODS OF REDUCING CO_2 AND PM

Carbon Dioxide
- Regulations and Carbon Market
- CarbFix
- Regulatory Tree Planting

Particulate Matter
- Advanced Hybrid Filter Technology
- Smoking Regulations
- Dust Frisbee
- Catalytic Converters
- Regulations for household emissions

SOURCES OF AIR POLLUTION IN CHENGDU, CHINA

Percentage Contributions of PM

- coal combustion 21%
- secondary sulfate 17%
- others 3%
- crustal dust 23%
- secondary nitrate 19%
- vehicular exhaust 15%
- cement dust 2%

Percentage Contributions of CO_2

- Vehicular exhaust 36%
- construction 17%
- energy production 29%
- industry 18%
- agriculture <1%

OUR RECOMMENDATION

Method	Targeted Pollutant	Category
Carbon Markets	Carbon Dioxide	Regulation

Reasons for choice:
- Driven by economics
- Companies pay to reduce emissions
- Long-term solution, as caps can always be lowered
- Inclusion of deforestation would directly save biodiversity, and reduce emissions from logging activities

Method	Targeted Pollutant	Category
Catalytic Converter	Particulate Matter	Filter

Reasons for choice:
- Eliminates over 90% PM at source
- Regulations already exist, just needs to be increased
- Consumers pay for converters
- Can be improved in future

Method	Targeted Pollutant	Category
Advanced Hybrid Filter	Particulate Matter	Filter

Reasons for choice:
- 99.9% PM removed at source
- Companies pay for filters
- Can be improved in future

Acknowledgements

Selected References

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