



# Air Quality and Urban Planning

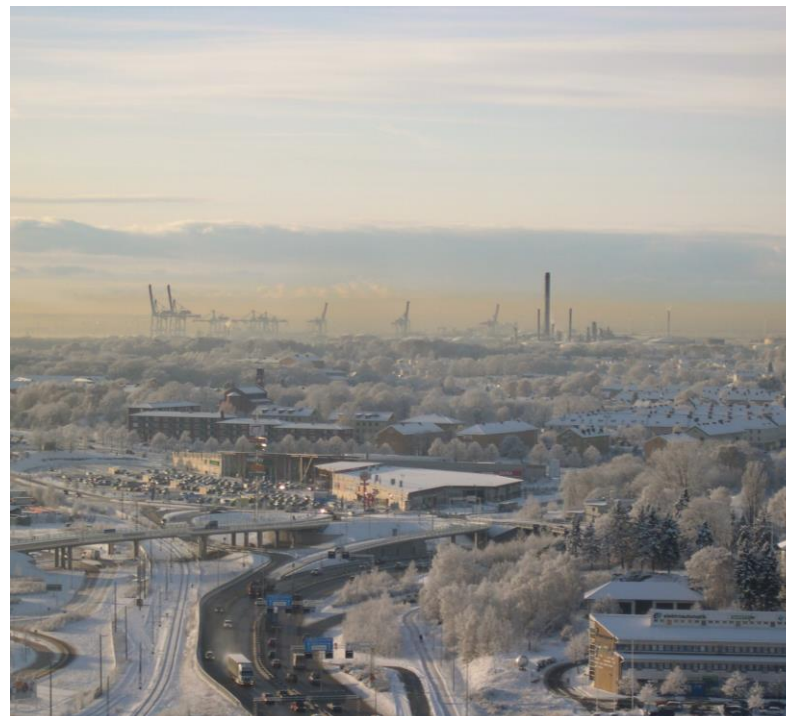
Jenny Lindén, IVL Swedish Environmental Research Institute



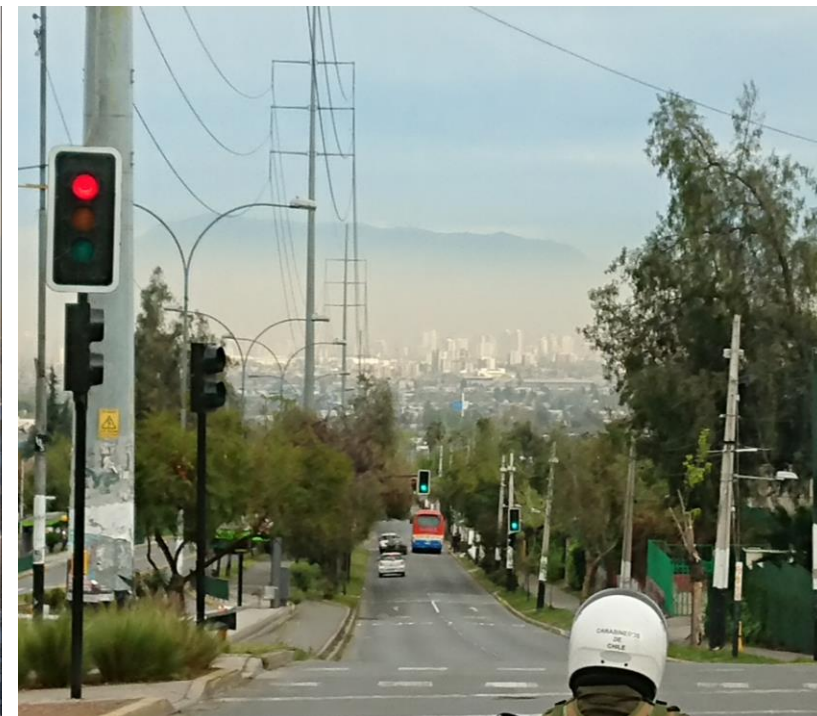




Ouagadougou, Burkina Faso



Gothenburg, Sweden



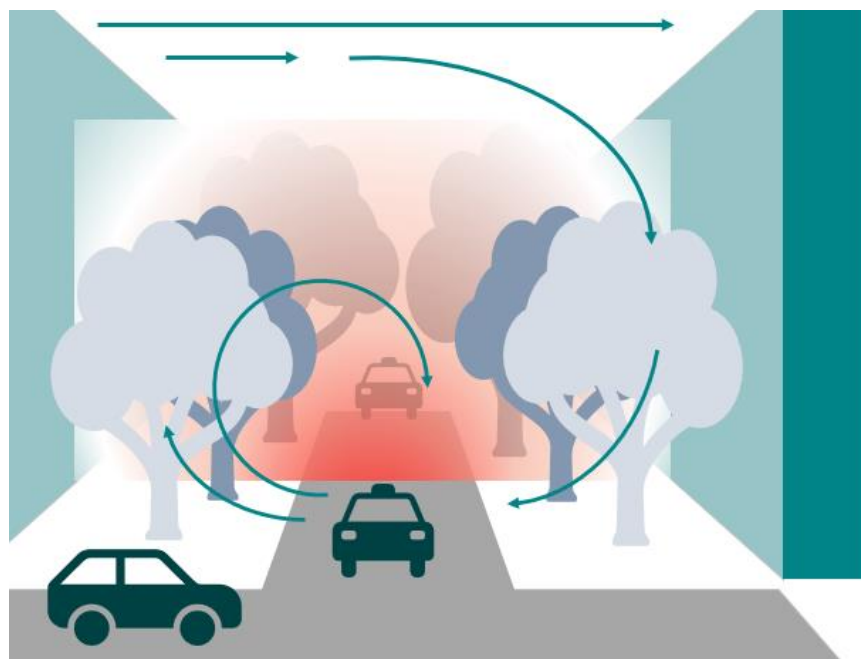
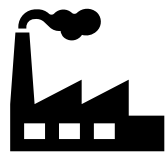
Santiago, Chile

If there are air pollution sources,  
there is a need to plan for good air quality

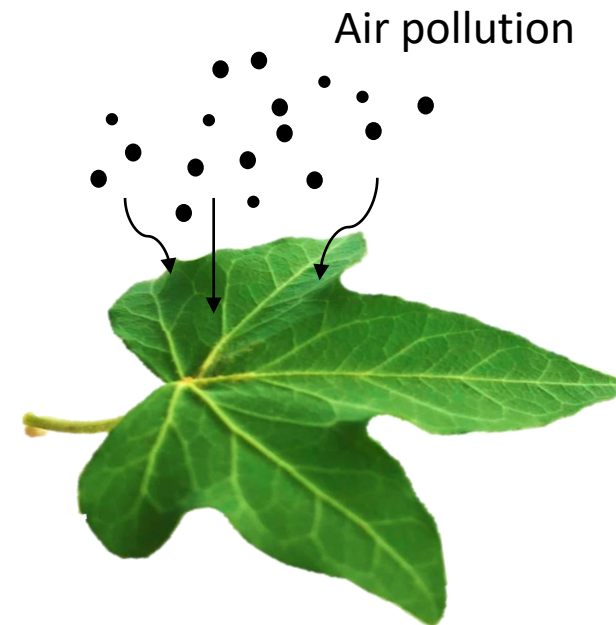
# What can we influence with urban planning?



Emissions



Ventilation



Deposition



# Planning for reducing emissions

## Allocation of space

 **Jim Harris** ✓  
@JimHarris

Space Required to Transport 60 People by Bus, #Bike or Car: Big Difference! #Transportation #Bicycle  
Översätt inlägget

**Space to Transport 60 People by Bus, Bike or Car**

 [www.cyclingpromotion.com](http://www.cyclingpromotion.com)



## Creating possibilities





Before Paris, France



After



Images from: Distilled newsletter



### NYC DOT NYC DOT Times Square Plazas

The Times Square pedestrian plaza dramatically improved street safety and local activity, even as it had no negative impact on traffic flow. (NYC DOT / Flickr)

Vienna, Austria



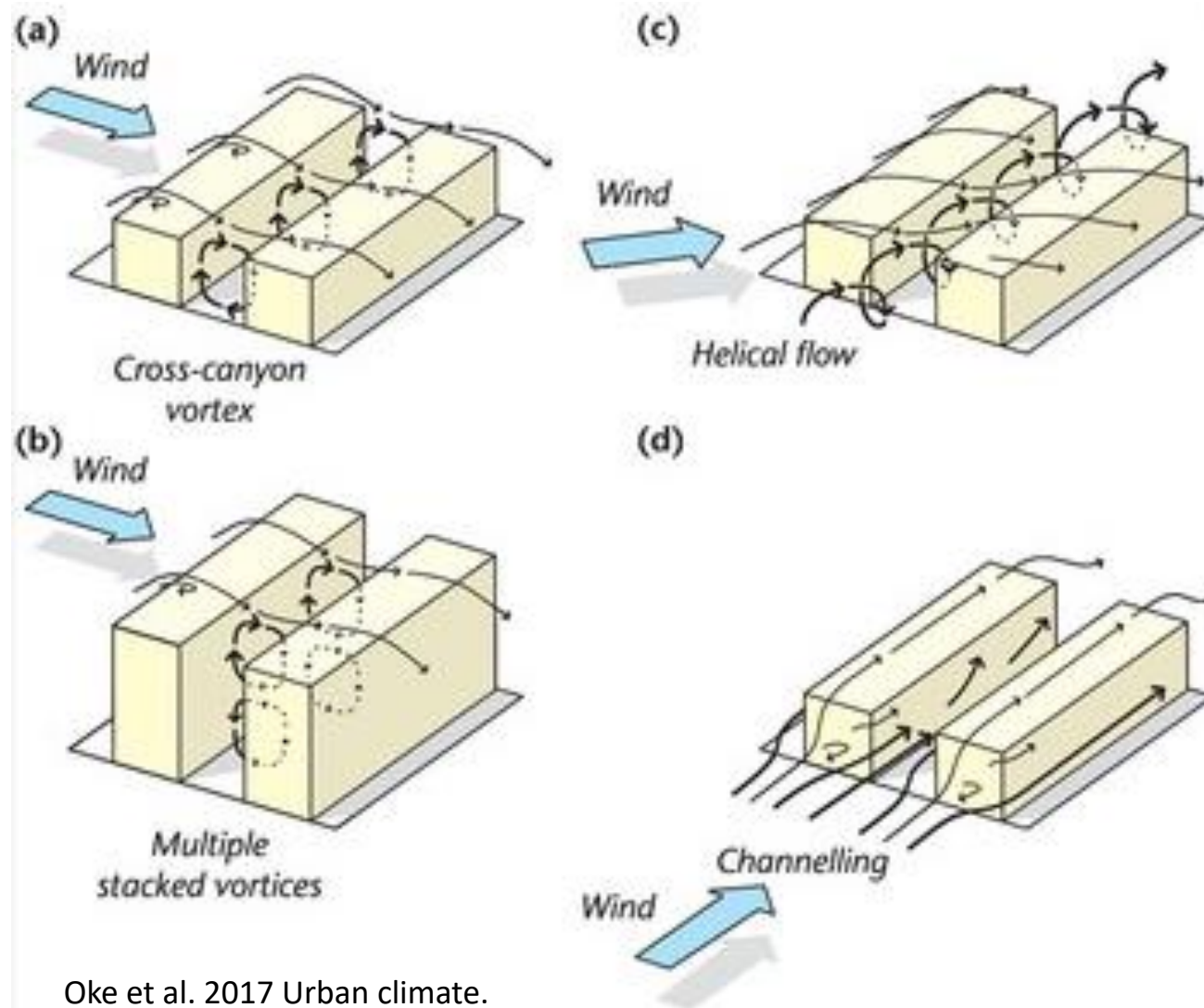
Images from: discerningcyclist.com



Images from: Urban Cycling Institute



# Planning for good ventilation



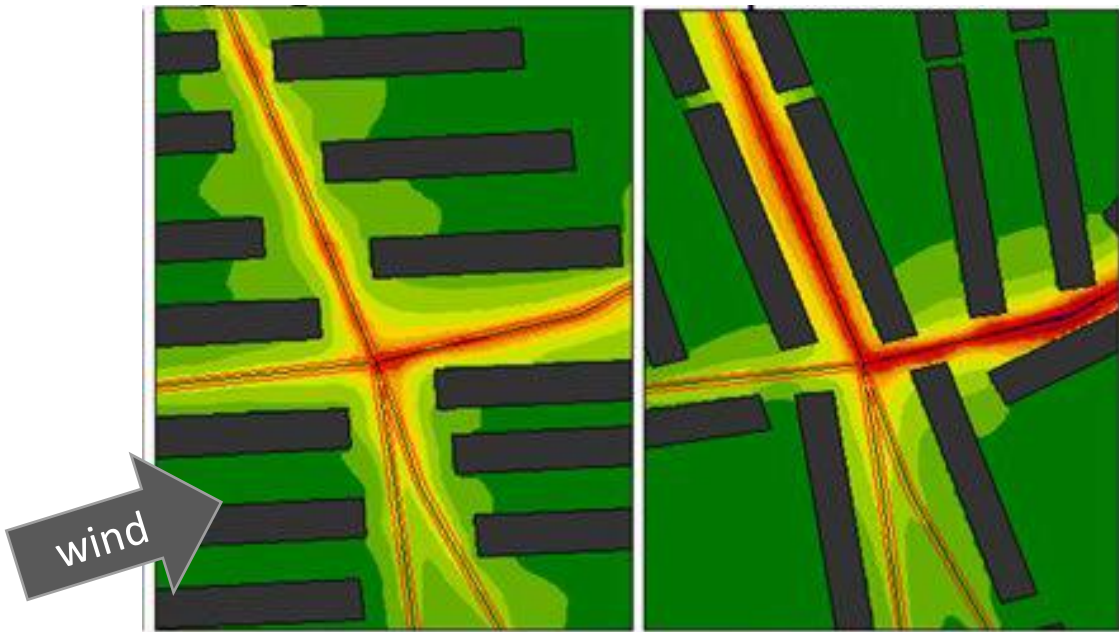
Oke et al. 2017 Urban climate.

Good ventilation → lower pollution levels

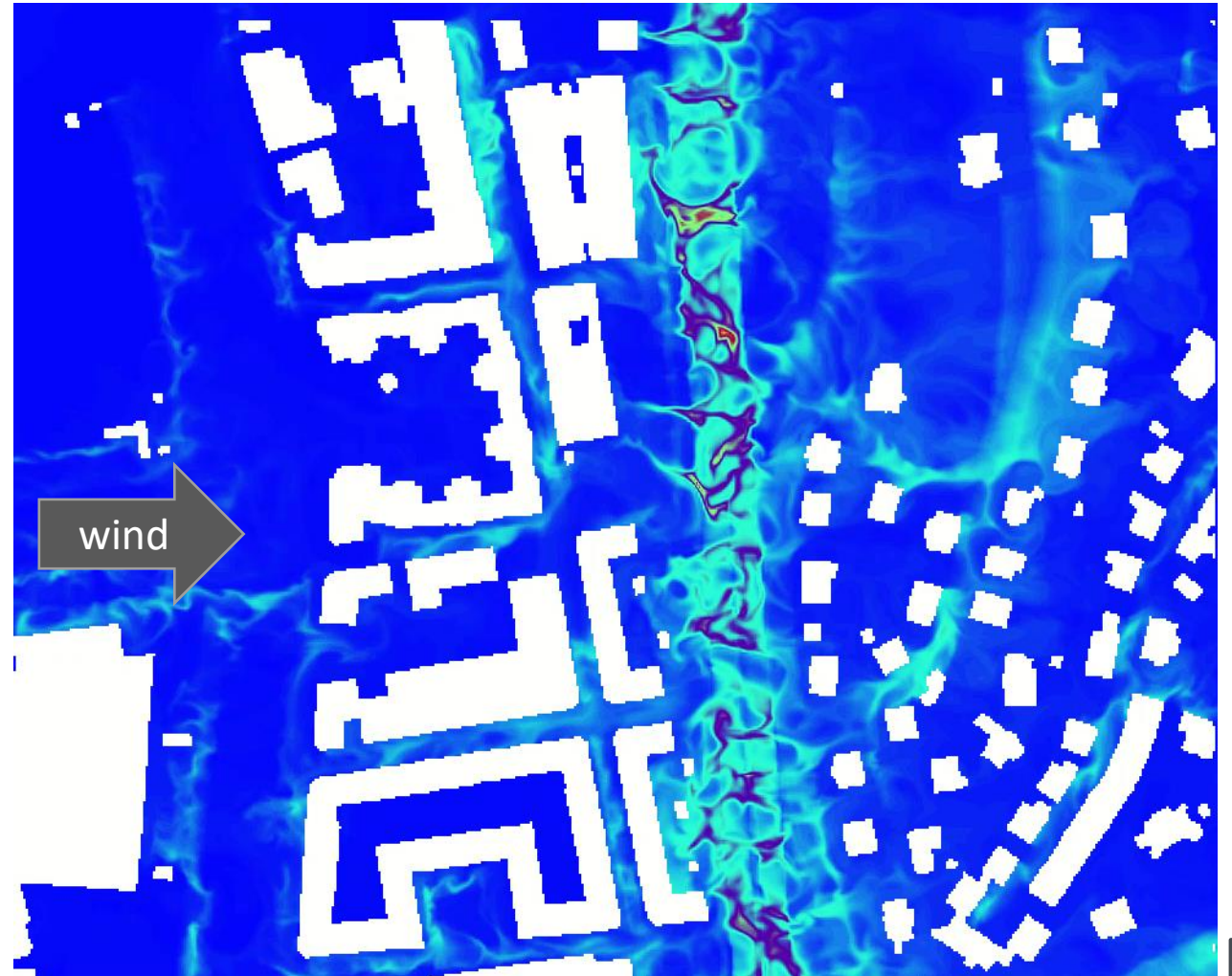
Denser cities → reduced ventilation

Ensure that winds in the main wind direction can flow freely

# Planning for good ventilation

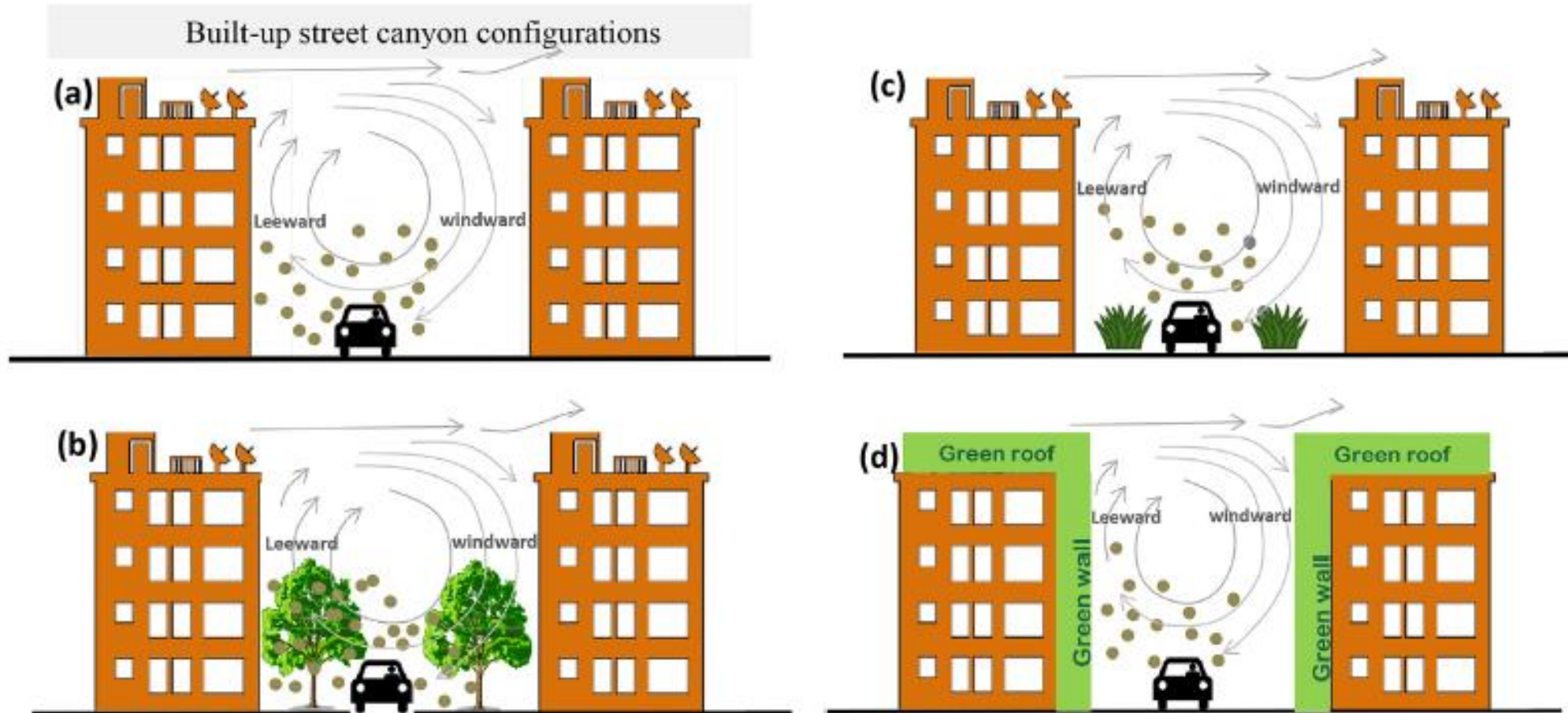


Increase ventilation by optimizing building geometry





# Street canyon ventilation

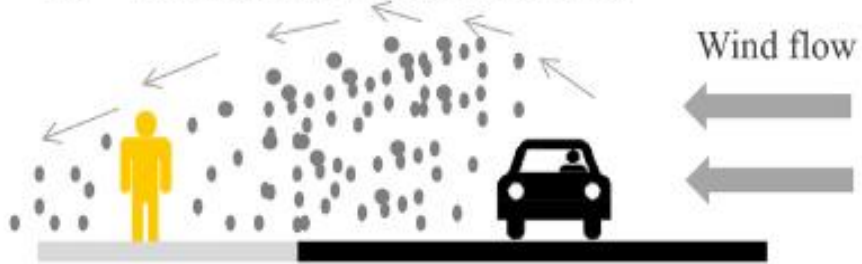


Abhijith, K. et al.(2017). "Air pollution abatement performances of green infrastructure in open road and built-up street canyon environments–A review." Atmospheric Environment 162: 71-86.



## Open road configurations

(a) Road with no vegetation barrier



(b) Road with vegetation barrier



(c) Road with green wall



Use barriers to prevent transport of polluted air to recipient

Abhijith, K. et al.(2017). "Air pollution abatement performances of green infrastructure in open road and built-up street canyon environments–A review." Atmospheric Environment 162: 71-86.

# Vegetation

Would you rather walk here? →



← Or here?



## Urban adaptation in Europe: how cities and towns respond to climate change



### URBAN PATTERNS FOR A GREEN ECONOMY WORKING WITH NATURE

UN HABITAT FOR A BETTER URBAN FUTURE



Topics Analysis and data Countries Newsroom About us



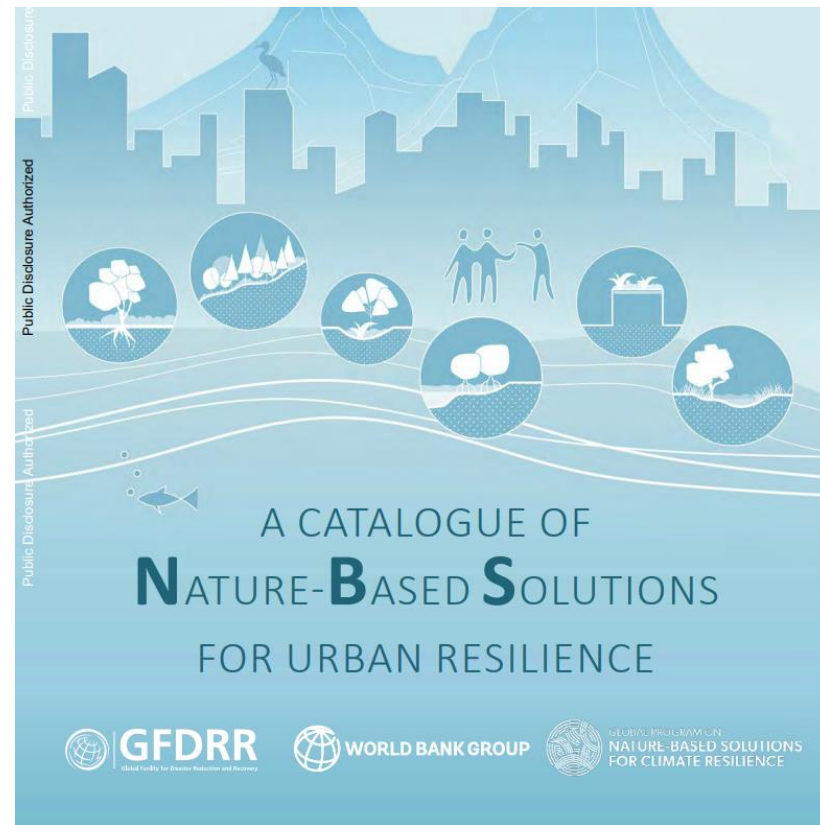
BRIEFING

### Who benefits from nature in cities? Social inequalities in access to urban green and blue spaces across Europe

# WHO global air quality guidelines

Particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide

FUTURE RESEARCH NEEDS: Study the interaction with other environmental and behavioural factors such as traffic noise, green space and allergen exposure; physical activity and diet; and high and low temperatures and other climatic conditions.

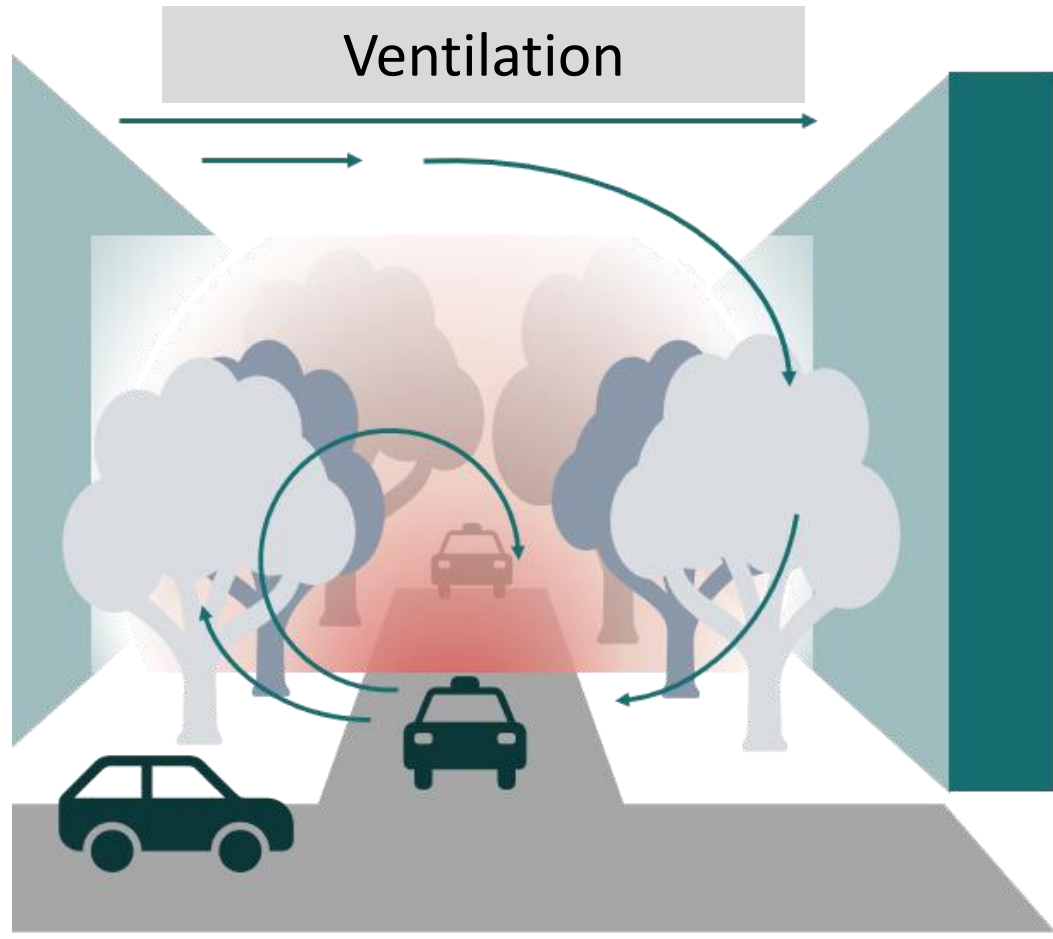


## A CATALOGUE OF NATURE-BASED SOLUTIONS FOR URBAN RESILIENCE

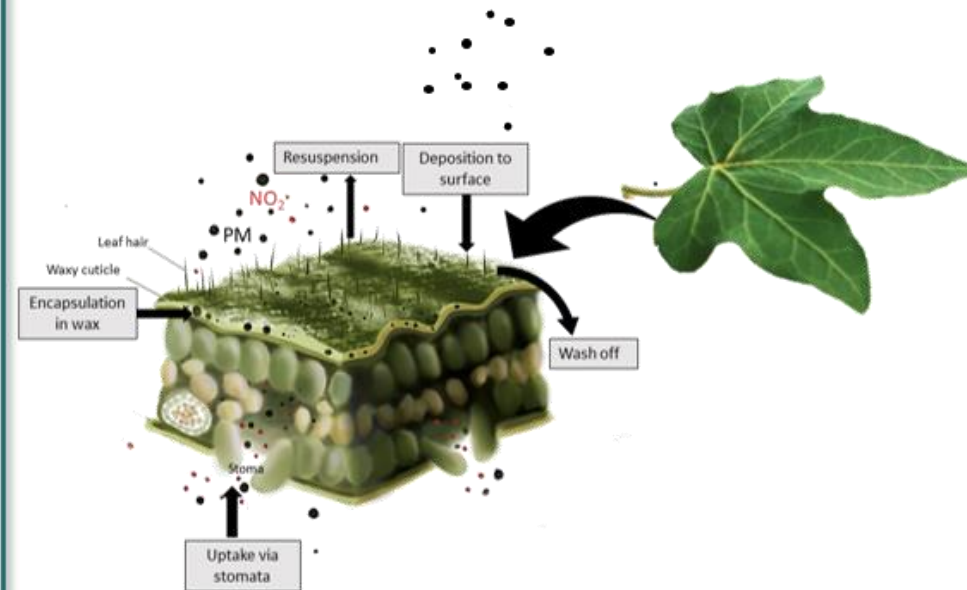
GFDRR WORLD BANK GROUP GLOBAL PROGRAM ON NATURE-BASED SOLUTIONS FOR CLIMATE RESILIENCE



# Vegetation



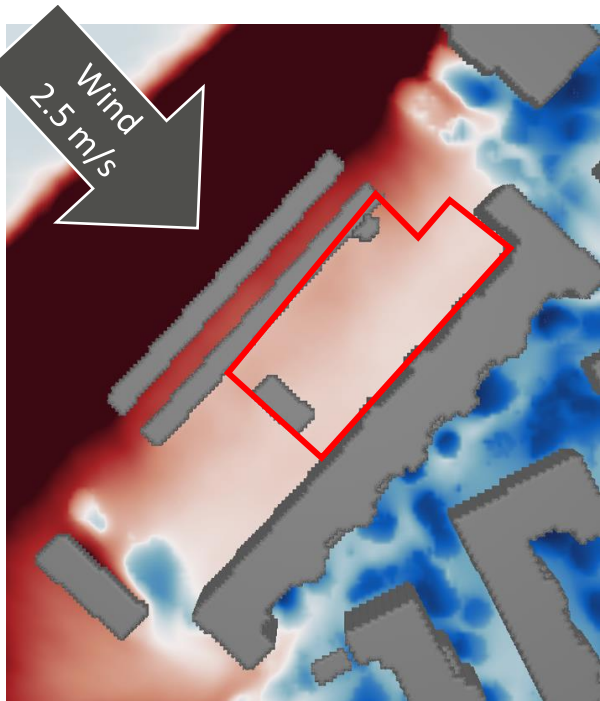
## Deposition



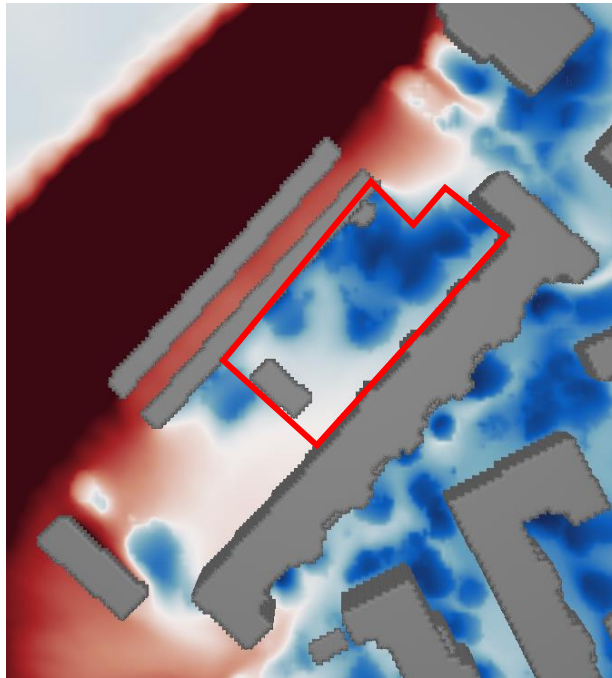
Deposition to vegetation  
→ removal of pollutants from the air



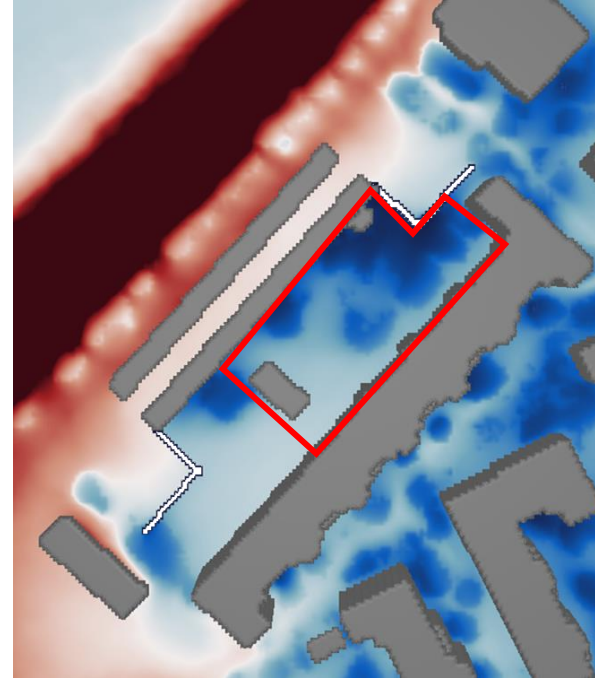
Without trees



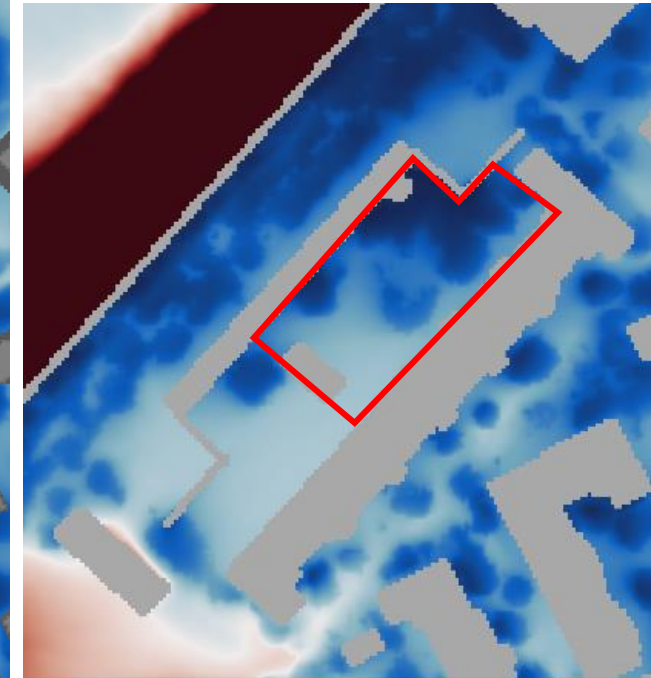
Trees in the yard



Trees in the yard and by the road



Lots of trees everywhere!



# Synergies and conflicts with urban vegetation

YES, but it also reduces:

- Air pollution
- Noise
- Temperatures
- Flood risk
- Stress
- Cardiovascular mortality
- Cancer



AND it increases:

- Biodiversity
- Thermal comfort
- CO<sub>2</sub>-uptake
- Health
- Well-being
- Building energy efficiency
- Activity



# What is "a tree" ?



It is difficult to  
grow new trees -  
preserve big trees!

# While we work on improving air quality...



24 % higher yearly average NO<sub>2</sub>-concentrations at A compared to B



11% higher yearly average NO<sub>2</sub>-concentrations at A compared to B

...locate sensitive activity away from sources!



# Future cities?

- Denser
- Greener
- Cleaner



Image from "Vision Göteborg 2070"





## Best Things To Do And See In Tirana (facebook)

"In a city dominated by cars, this tree-lined pedestrian street is like a breath of fresh air. With no cars and lots of shops and restaurants, Toptani Street, ..., is perfect for a nice walk, shopping, and for buying local souvenirs. It is shady and cool, making it an excellent hideout on a hot summer day."