COMPARISON OF AIR QUALITY LEVELS

		EPA (2024)	WHO (2021)	MEXICAN NORMATIVITY (2023)
PM 2.5 µg/m³	24 hours	35 µg/m³	15 µg/m³,	41µg/m³
	1 year	15 µg/m³	5 µg/m³	10 µg/m³,
SO_2	24 hours	-	0.0153ppm *	0.040 ppm
	1 hour	0.075 ppm*	-	-
NO_2	1 hour	0.1ppm*	-	0.106 ppm
	24 hours	-	0.013 ppm*	-
	1 year	0.053 ppm*	0.0048ppm*	0.021 ppm
CO	1 hour	35ppm	-	26 ppm
	8 hours	9 ppm	-	9 ppm
	24 hours	-	0.32ppm*	-
	1 hour	-	-	0.090 ppm
O3	8 hours	0.070 ppm	0.046 ppm*	0.065 ppm

Figure a) WHO, Mexican government, and EPA pollution levels
Source: Own formulation

NATURED BASED

SOLUTIONS

POCKET PARKS

Figure c) Toolkit community participation in pocket parks
Source: American Planning Association, n.d.
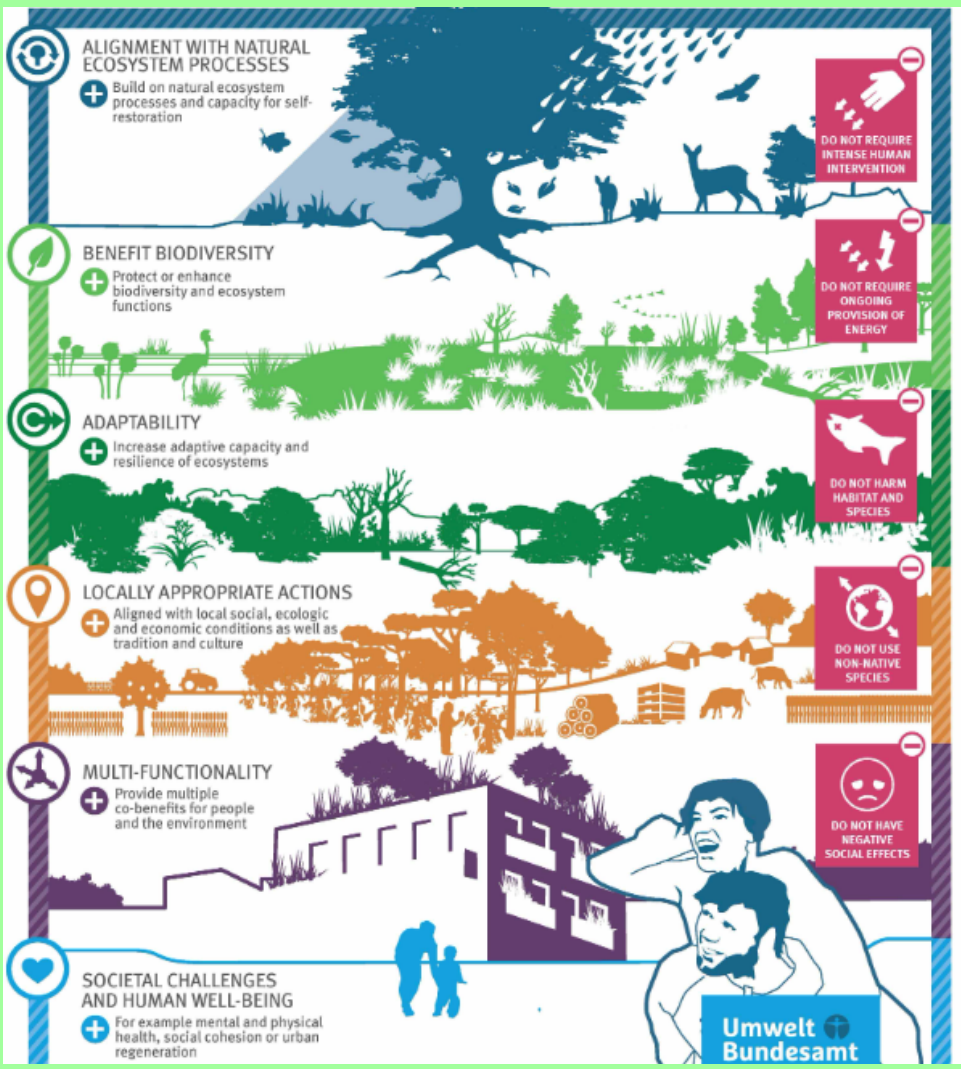

Figure a) Natured-based solutions infographic
Source: German Environment Agency, 2022.

Biomimecry
Functions like nature
(Bio- inspiration)

Ecosystem-based adaptation.
naturally adapted
(Bio replication)

Bioutilization
Uses nature
(bio-enforcement)

Figure b) NBS researched as a part of the introduction
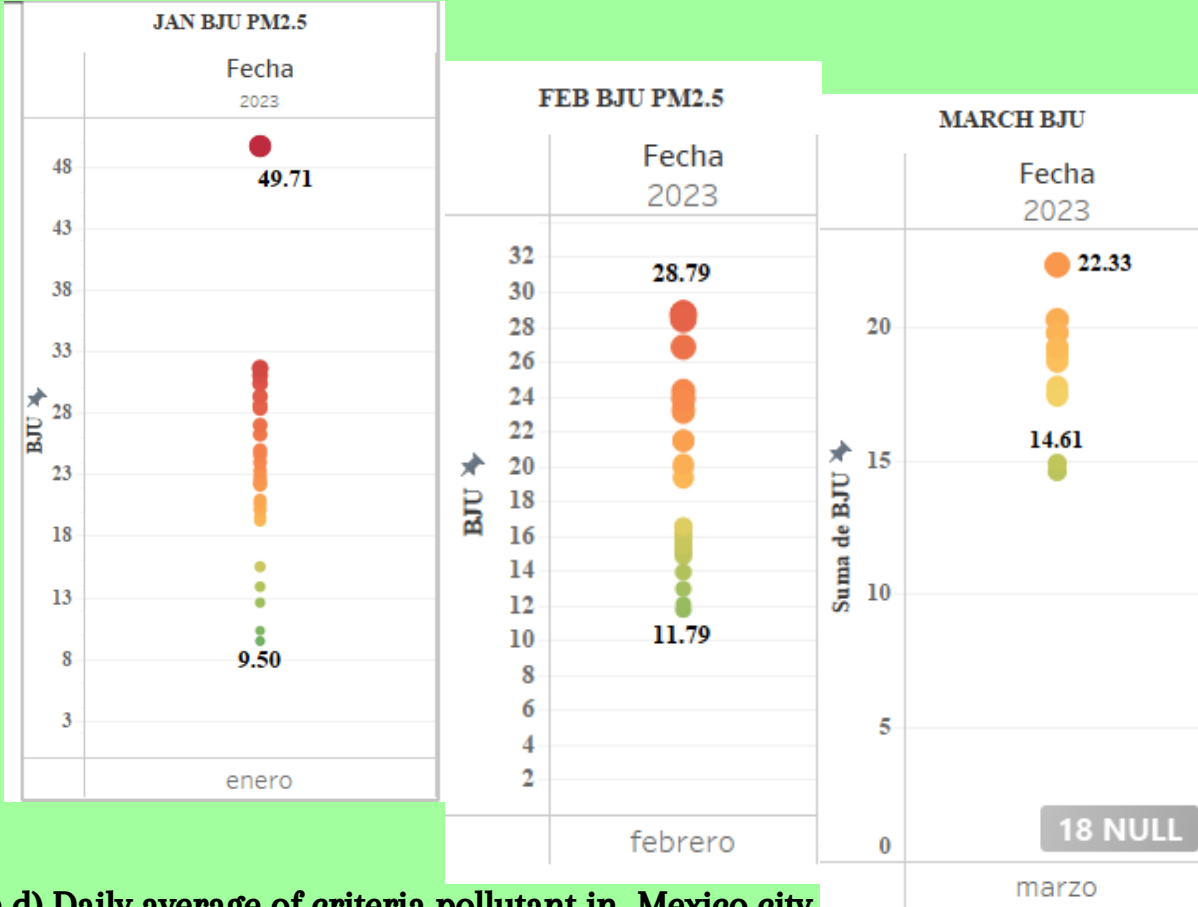Source: Own formulation

Figure d) Daily average of criteria pollutant in Mexico city
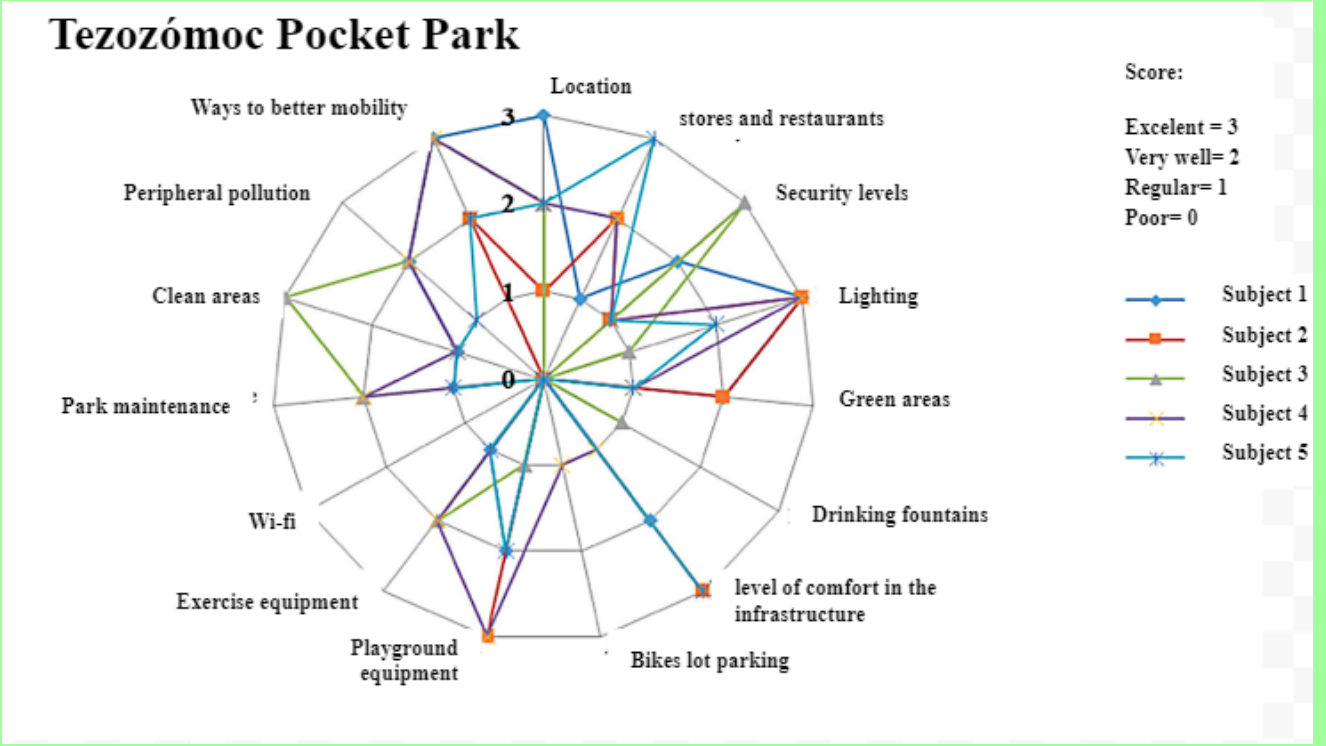Source: Own formulation

Figure e) Radial diagram
Source: Martinez, 2020.

(SPECIFICATIONS)

NATURE-BASED SOLUTIONS TO CAPTURE ATMOSPHERIC POLLUTANTS IN URBAN ECOSYSTEMS

Angélica Montserrat Azpeitia García

Introduction

- Atmospheric pollution
- Nature Based Solutions (NBS)

Theoretical framework

- Biomimicry
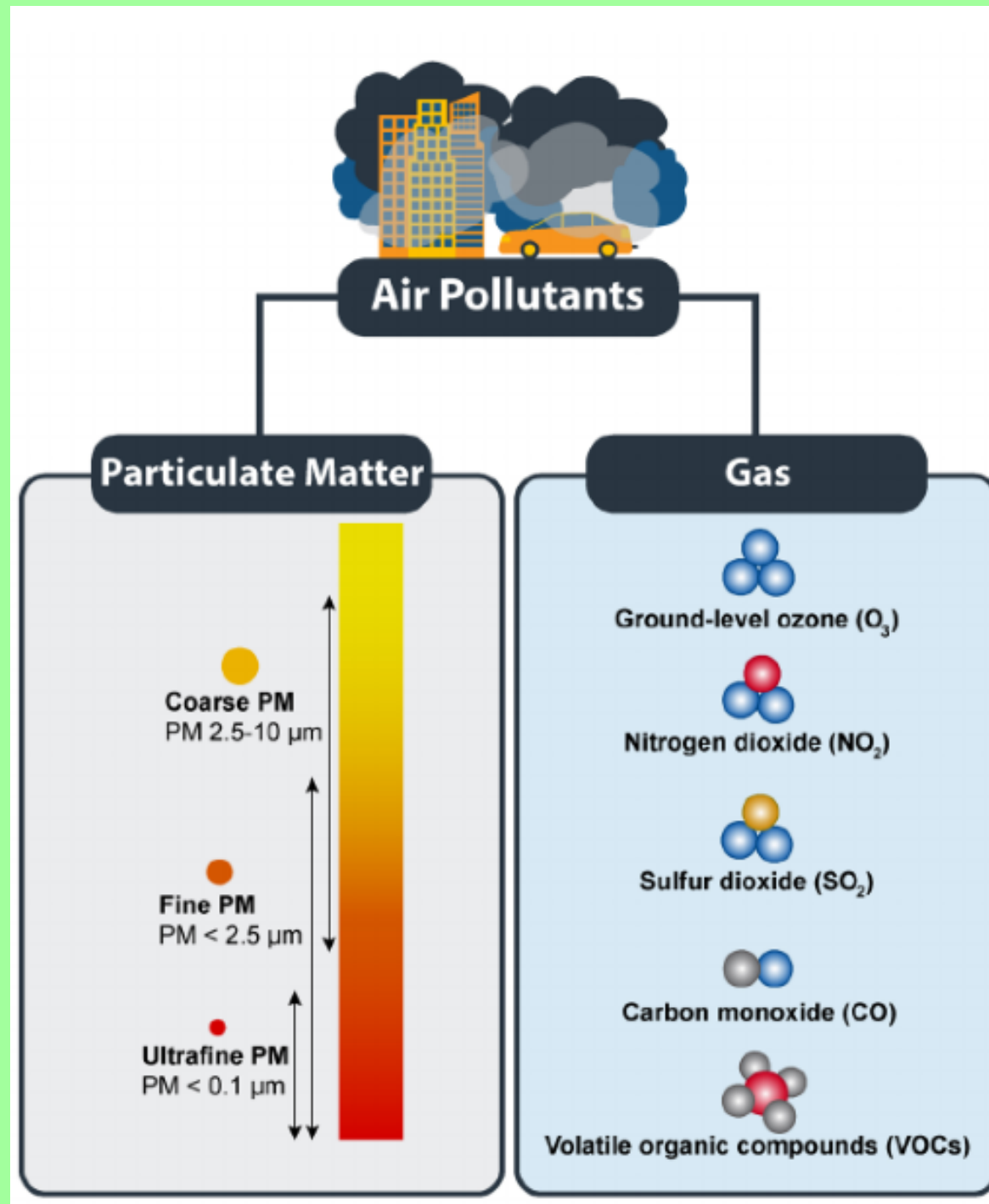- Bioutilization
- Ecosystem-based adaptation

Hypothesis

- NBS is a benefic tool for capturing atmospheric pollutants in urban areas.
- Pocket parks work as the best NBS option for capturing atmospheric pollutants

Objetives

- To propose an NBS to capture atmospheric pollutants in urban areas.
- To evaluate the functionality of the NBS selected.

INTRODUCTION

Fig f). Classification of air pollutants according to some physical properties
Source: Sompornrattanaphan, et al., 2020.

COMPARISON OF AIR QUALITY LEVELS				
		EPA (2024)	WHO (2021)	MEXICAN NORMATIVITY (2023)
PM 2.5 µg/m³	24 hours	35 µg/m³	15 µg/m³,	41µg/m³
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	1 hour	-	-	0.090 ppm
O3	8 hours	0.070 ppm	0.046 ppm*	0.065 ppm

Figure a) WHO, Mexican government and EPA pollution levels
Source: Own formulation based on EPA, WHO and Mexican normativity

THEORICAL FRAMEWORK

Figure h) Captured CO2 by bioutilization with algae cultivation
Source: Wagner J, 2020

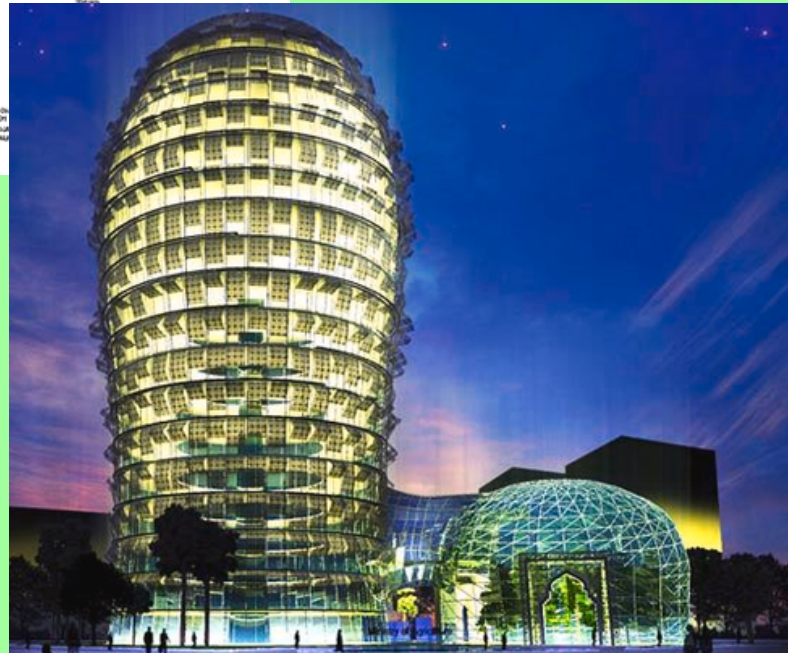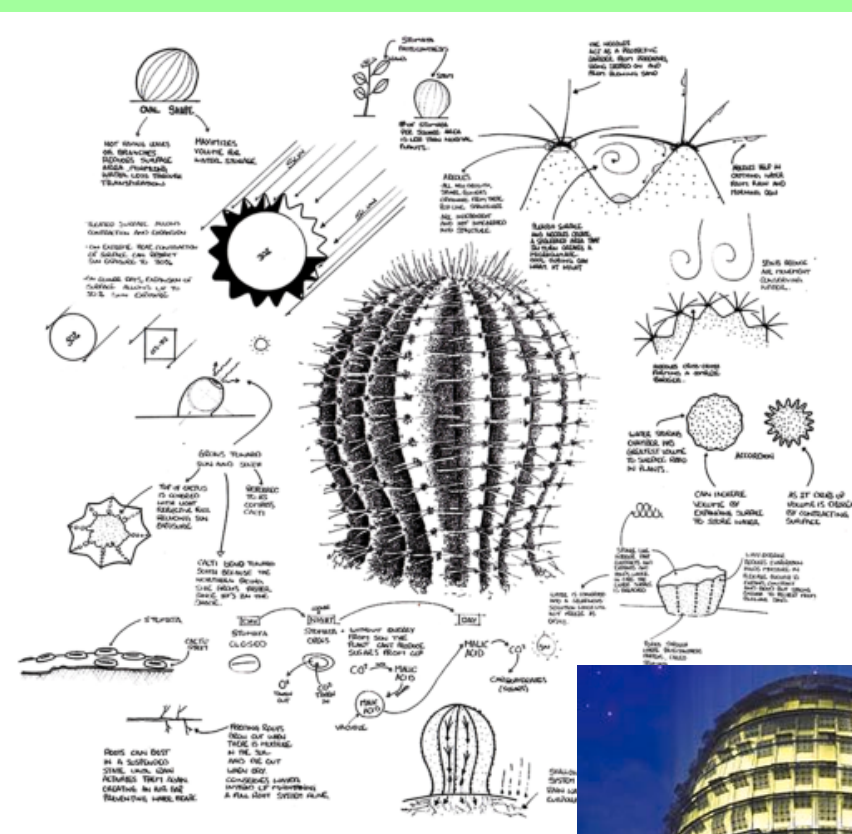Figure i) Ecosystem- based adaptation into operation
Source: IUCN, 2017

Figure 1g and 2g) Emulating water capture by cactus
Source: Felix, 2011. Baciry, 2009.

Biomimecry
Biomimicry was researched to find how to emulate the cactus development and the way it capture pollutant and decrease the temperature inside
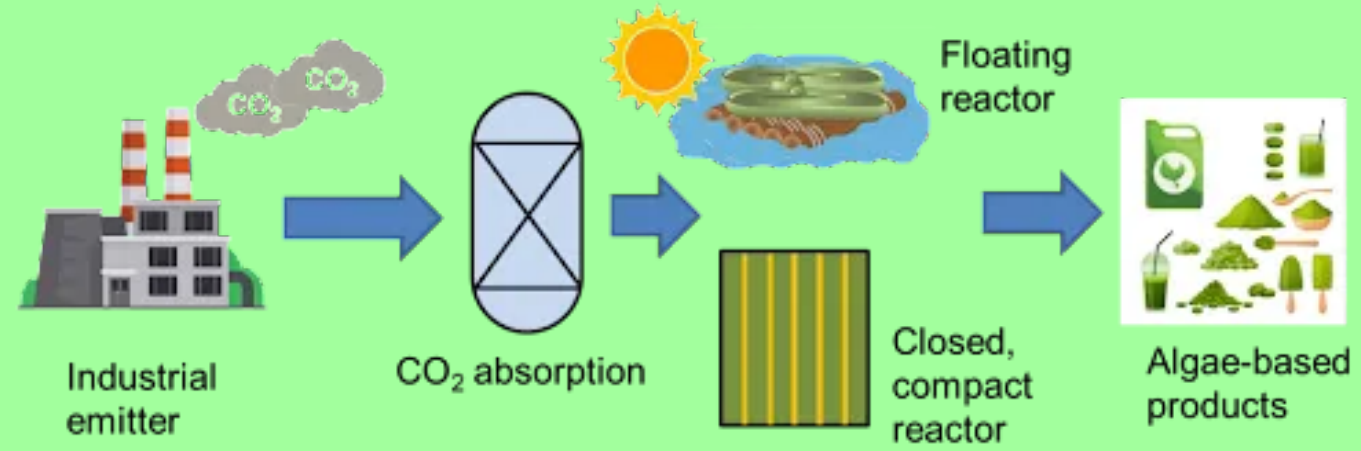
Bioutilization
Bioutilization was researched as a way to capture carbon through algae cultivation, obtaining biofuels.

Ecosystem- based adaptation
Ecosystem-based adaptation was selected as a way to capture pollutants in cities, implementing pocket parks as a small urban ecosystems

Methodology

- Pocket park data collection.
- Calgary 2023 Criteria Pollutants database.
- Mexico City 2023 Criteria Pollutants database.
- User surveys

Study area

- City of Calgary- Canadá
- Mexico city- Mexico

Results

- Tableau Graphs
- Radial diagrams

Discusion and conclusions

- Pocket parks as an NBS strategy with social benefits a
- To implement In a consciously way more PP in the biggest cities

Figure j) Mexican Pocket Park "Barrio Jagüey"

Figure k) Mexican Pocket Park "La michoacana"

Figure l) Mexican Pocket Park "Tezozómoc"

Figure m) Pocket Park in City of calgary "silverspring 71 avenue park"

Figure n) Pocket Park in City of Calgary "Tuscany Park"

Figure o) Pocket Park in City of Calgary "Citadel close park"
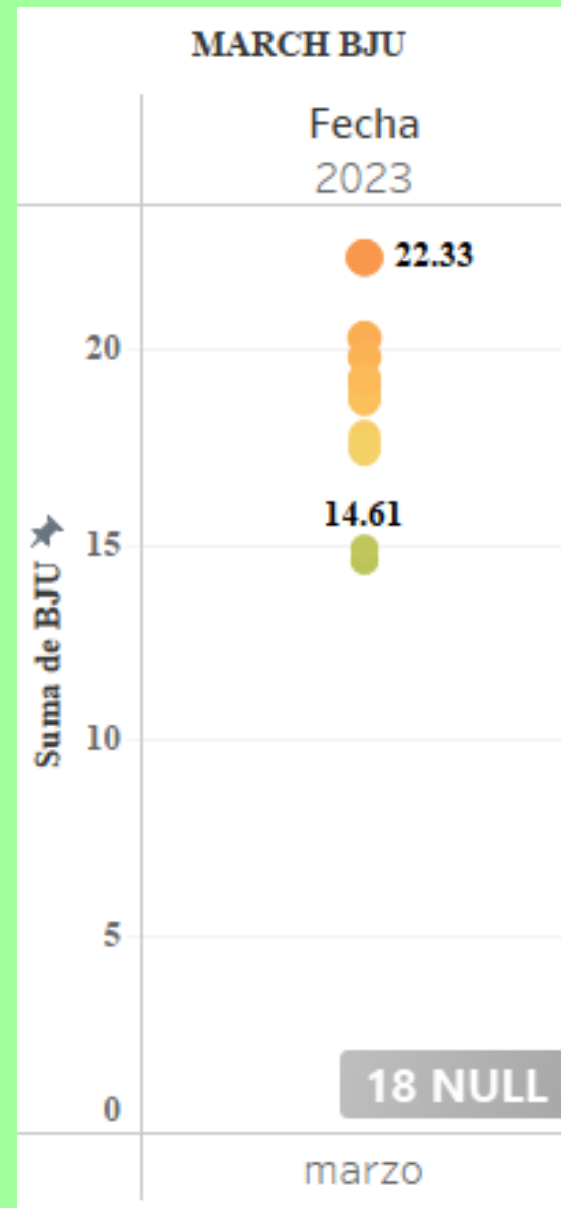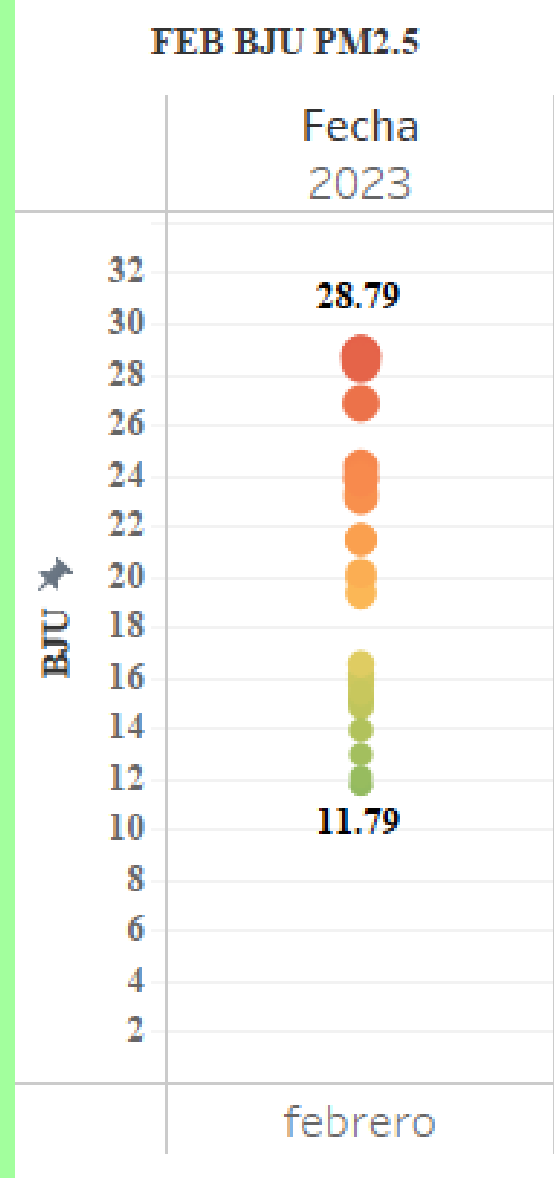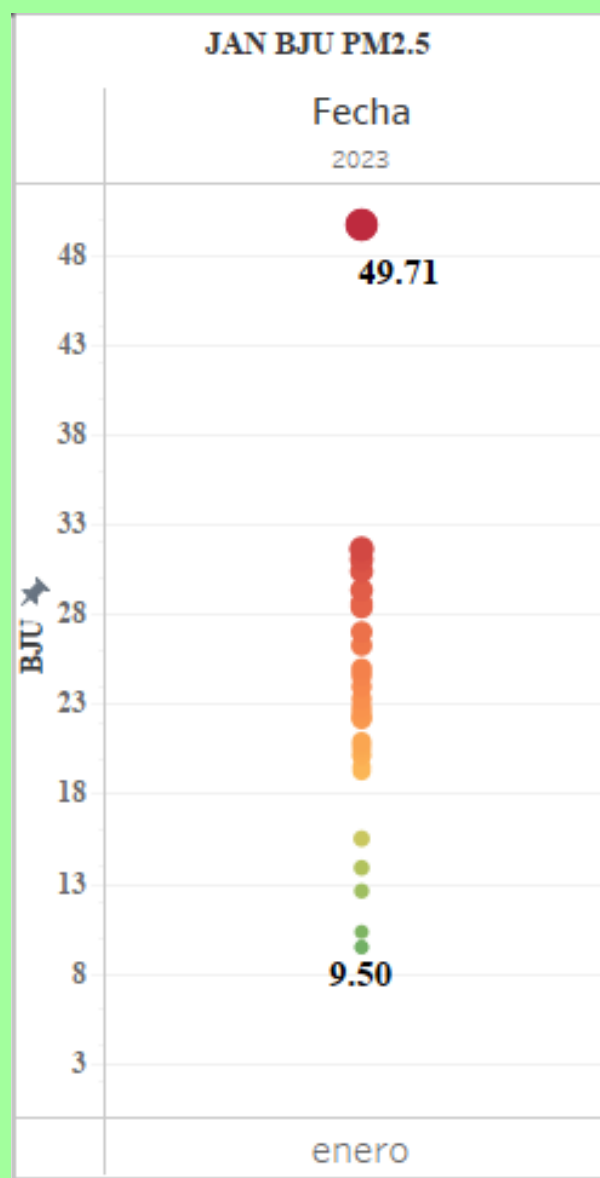
STUDY AREA

METHODOLOGY AND RESULTS

Figure p) Measure of pollutant levels in Mexico City.
Source: Own formulation based on Mexican atmospheric criteria Pollutants databased.
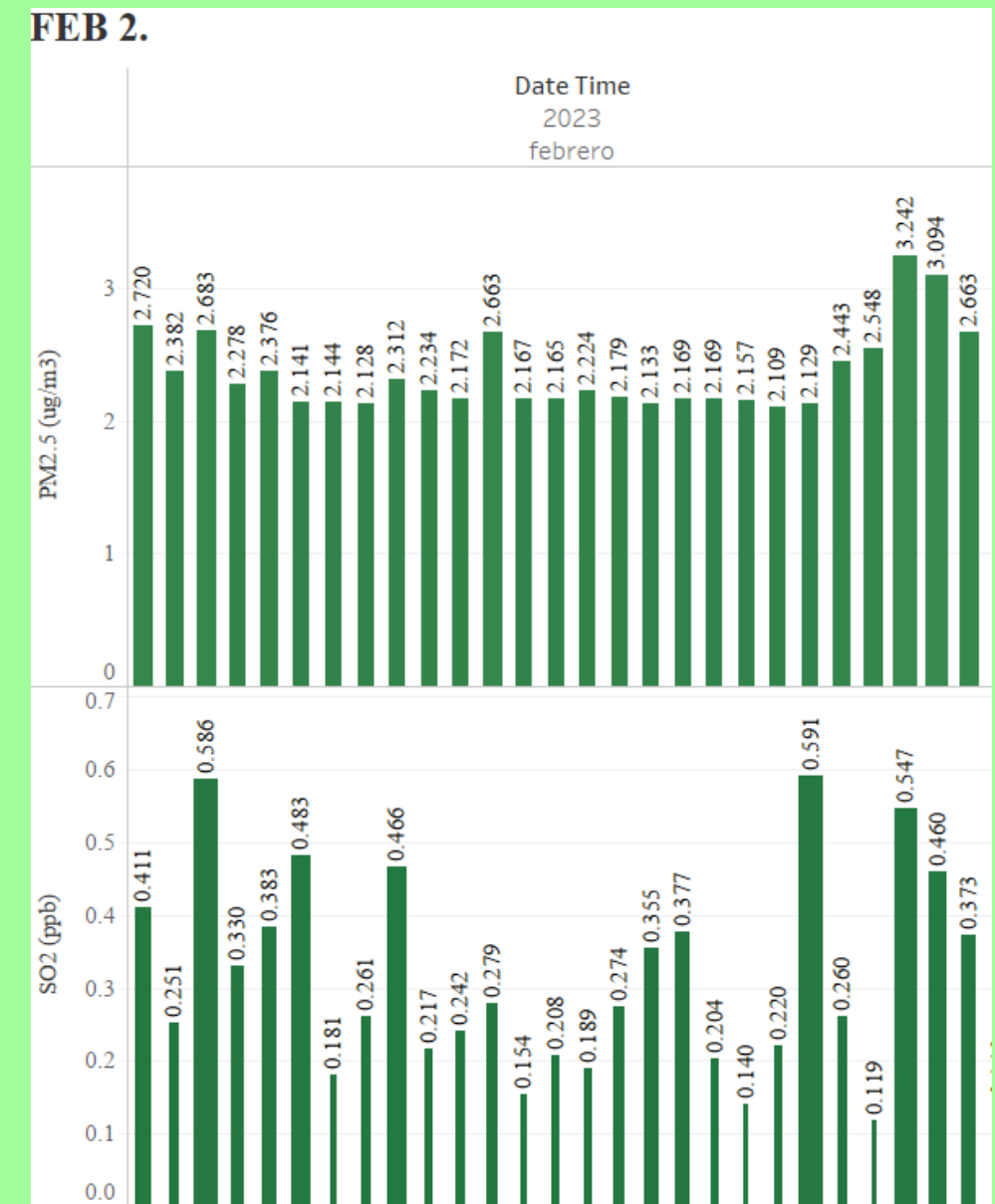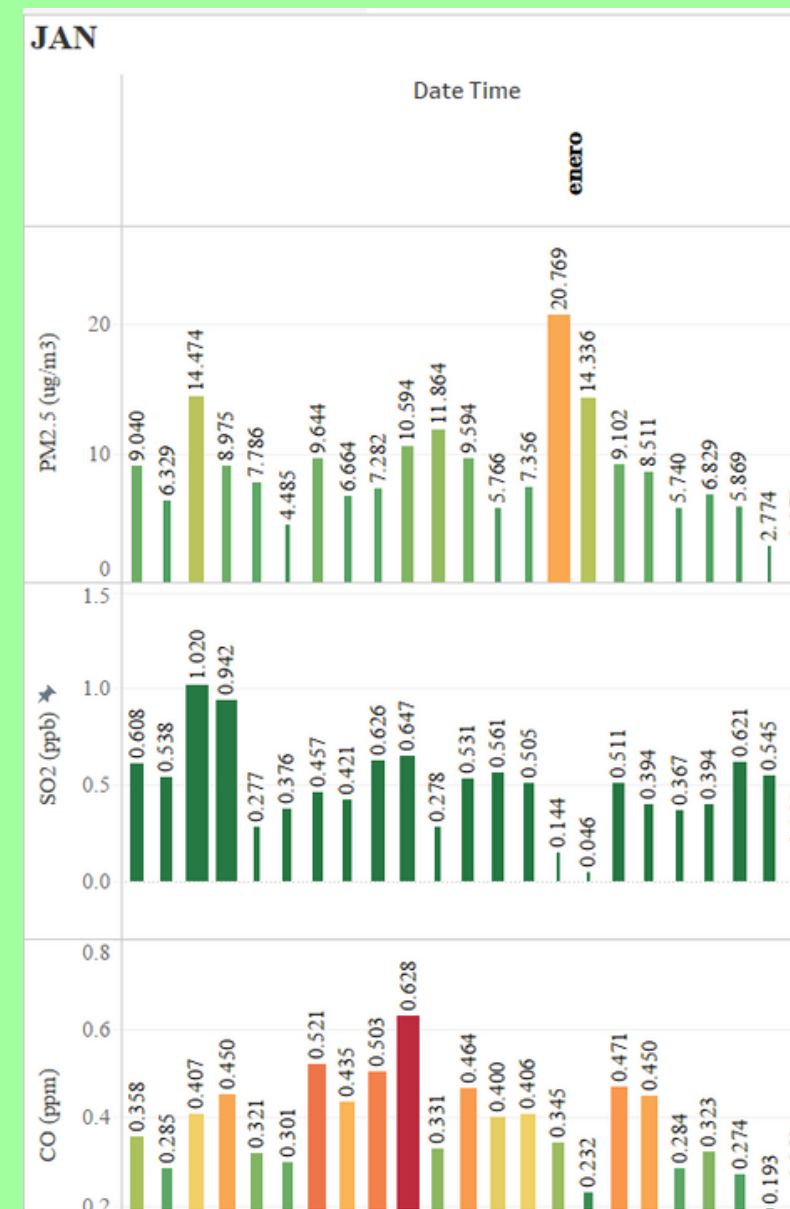
Figure q) Measure of pollutant levels in the City of Calgary.
Source: Own formulation based on Mexican atmospheric criteria Pollutants database.

METHODOLOGY AND RESULTS
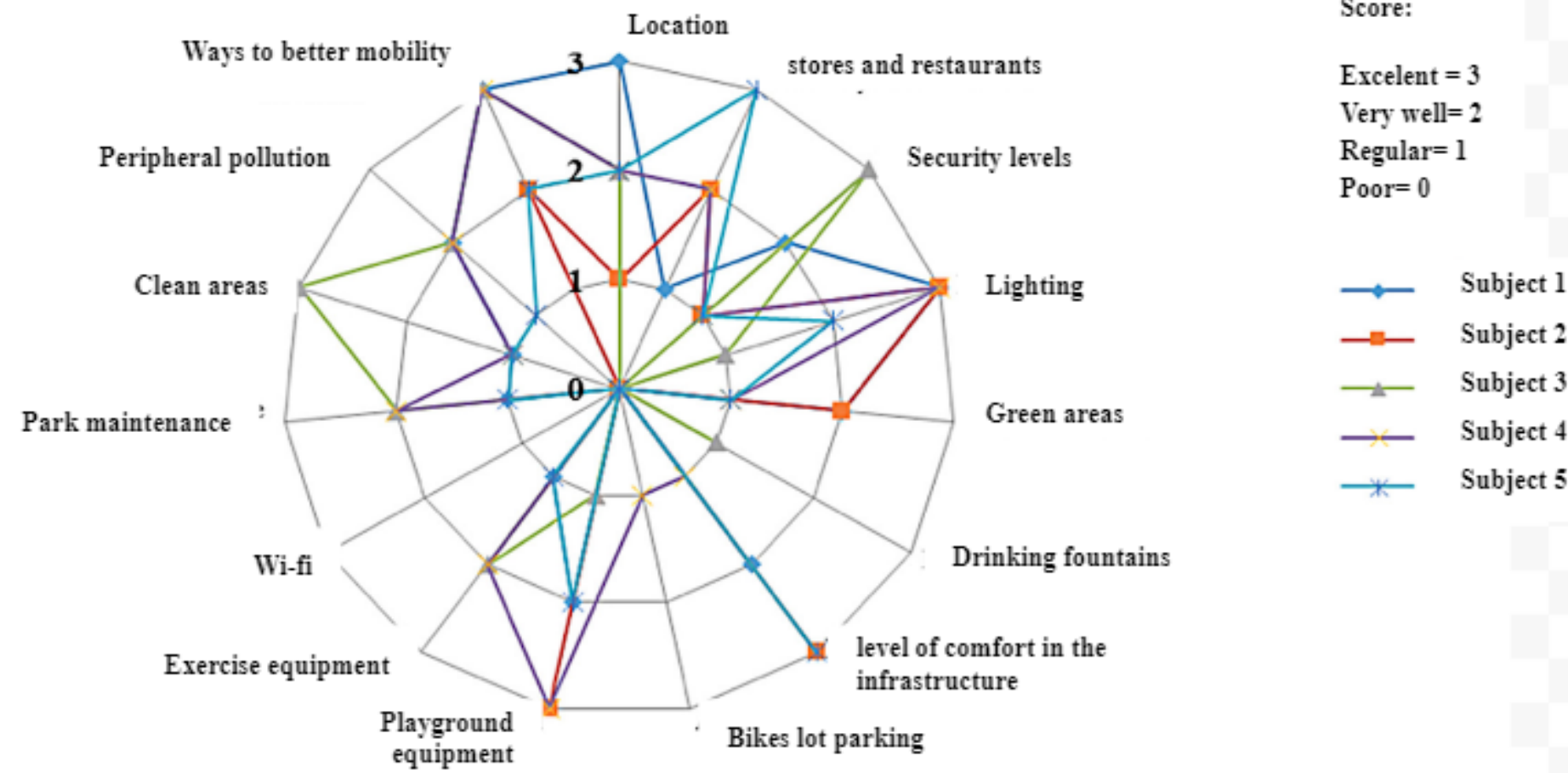
Tezozómoc Pocket Park

Score:

Excelent = 3
Very well= 2
Regular= 1
Poor= 0

- Subject 1
- Subject 2
- Subject 3
- Subject 4
- Subject 5

Figure e) Radial diagram
Source: Martinez, 2020.

Figure r) Pocket Parks database
Source: Own formulation

Park	Tree species	Scientific Name	DBH cm	Area mts	playground equipme	Cordenates (longitude, latitude)
	Poplar species	Populus	53		spining toy	
	Poplar species	Populus	51		spining toy	
	Poplar species	Populus	59		spining toy	
	Poplar species	Populus	51		multiplay complex	
	Poplar species	Populus	50		swing	
	spruce, colorado	Picea pungens	27		digging toy	
	spruce, colorado	Picea pungens	27		stationary toy	
	spruce, colorado	Picea pungens	27		stationary toy	
	Pine, mugo uncinata	Pinus mugo	5			
	Pine, yellow	Pinus ponderosa	6			
71st Ave Park	Poplar, tristis	Populus tristis	6	2369.13		51.11709, -114-20270
	Poplar, tristis	Populus tristis	6			
	Poplar, tristis	Populus tristis	6			
	Poplar, tristis	Populus tristis	6			
	Poplar, tristis	Populus tristis	6			
	Aspen quaking	populus tremuloides	5			
	Aspen quaking	Populus tremuloides	5			
	Aspen quaking	Populus tremuloides	6			
	Aspen quaking	Populus tremuloides	6			
	Aspen quaking	Populus tremuloides	5			
	Birch, paper	Betula papyrifera	5			
	Mayday	Prunus padus	14			
	Larch, siberian	Larix sibirica	5			

DISCUSSION

- Pocket parks have a low impact as a way to capture pollutants, this can change with deeper research about the main tree species used in the creation of each park.
- Pocket parks as a Nature-Based solution, have important contributions to social adaptation and decreasing micro-environmental temperatures inside these spaces.
- Pocket parks in Mexico and Calgary have as many negative as positive differences so they could benefit in certain ways in each city.
- Nature-based solutions could work to be implemented in Urban ecosystems.
- It's remarkable the differences between EPA, Who, and Mexican Normativity standards.

REFERENCES

Figure a) German Environment Agency,2022.Nature-based solutions infographic.Online

Figure c) American Planning Association. Toolkit for community participation in Pocket parks.On line

Figure e) Martinez L., Alvarado D., (2020) Pocket parks: An analysis from the perception users of México.Economía, Sociedad y Territorio, vol. xx, núm. 63.

Figure f) Sompornrattanaphan M., et al (2020) The contribution of particulate matter to respiratory allergy: A review of current evidence. Asian Pacific Journal of Allergy and Immunology.

Figure1g) Felix R., (2011) Observational Sketches and Diagrams outlining insights from the Barrel Cactus Biomimicry Methodology, Student Design Projects.

Figure 2g) Baciri D., (2009) Green architecture Qatar cacti biomimicry.

Figure h) Wagner J., (2020) Use the two-stage system for carbon capture and algae cultivation IDRIC, UK research and innovation.

Figure i) IUCN., (2017) Issues brief. Ecosystem-based adaptation. International Union for Conservation of Nature.

Outstanding Student and PhD candidate Presentation (OSPP)