



Evaluation of sanitary risks versus benefits of gardening in urban areas : a case study in Belgium

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LIÈGE université
Gembloux
Agro-Bio Tech

The Urban Soils project

“Urban Soil” aims at deciphering links between social, economical and environmental considerations of collective gardening in Urban/periurban areas.

Analysis of Drivers

Need to raise income.
Need for alternative way of life...

And how they influence the constitution of gardening models (WP2)

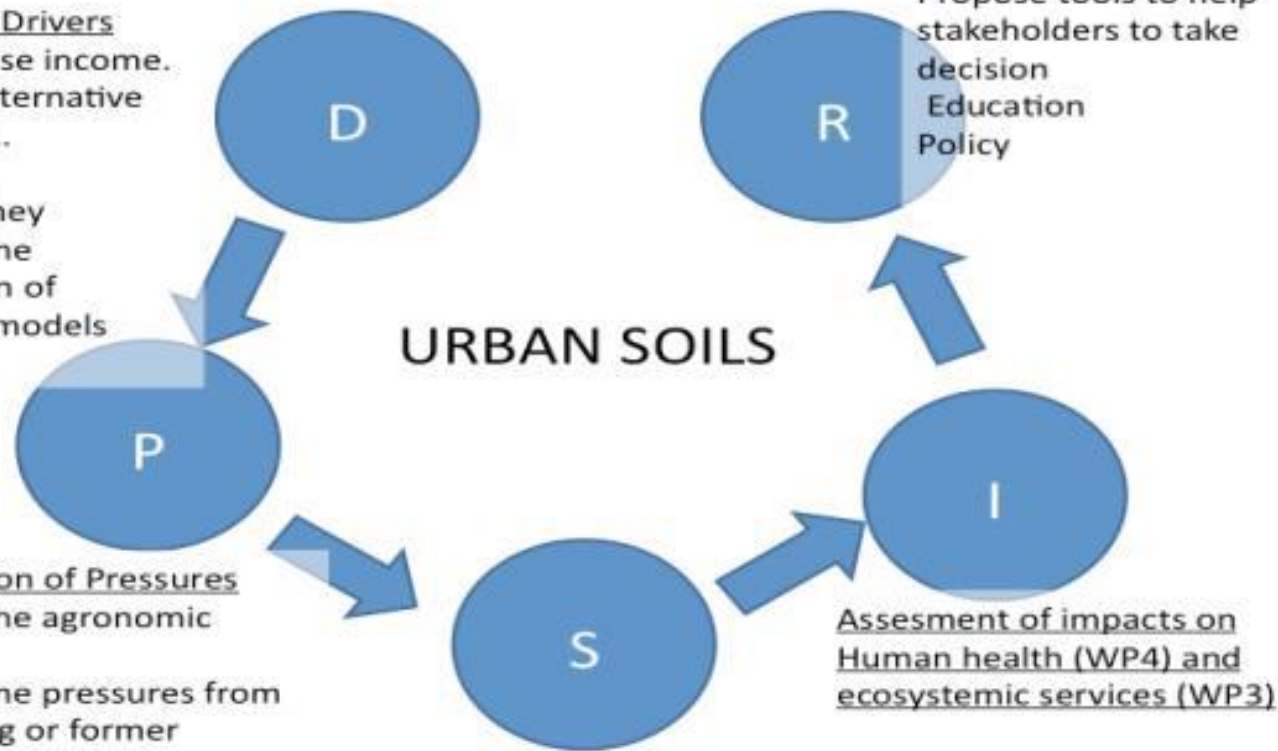
Identification of Pressures

What are the agronomic practices?
What are the pressures from surrounding or former activities? (WP3)

Evaluation of the state of Urban soils (WP3)

Responses:

Propose tools to help stakeholders to take decision
Education
Policy



The Urban Soils project : methods

14. What importance do you attribute to these functions within the project? *

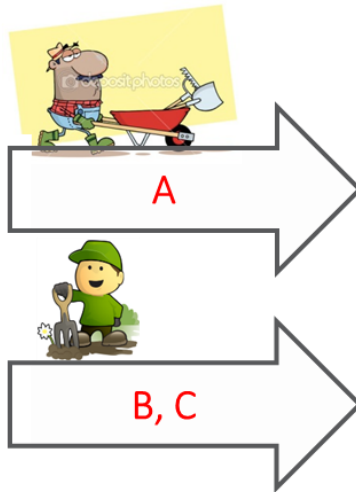
Mark only one oval per row.

	Main	Second	Auxiliary	Not relevant
Education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employment creation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recreation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health (as therapy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food sovereignty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental management and conservation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social cohesion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. Community activities? *

Tick all that apply.

- Forbidden
- Allowed but not frequent
- Allowed and frequent
- Officially organized
- Open doors
- Other: _____

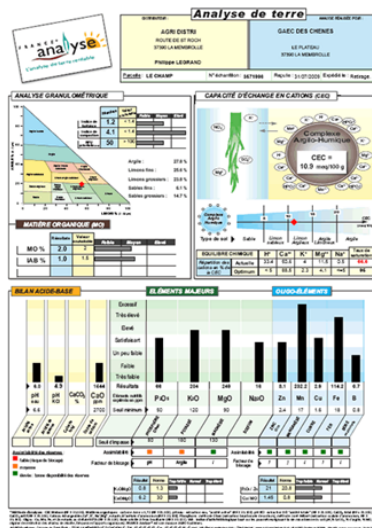


Questionnaire survey:

- What is the collective project?
 - Aims, history and description of the project
 - Description of the garden
- Who are the gardeners?
 - What do they do on the plots?
 - Why do they cultivate and how do they consider environment?

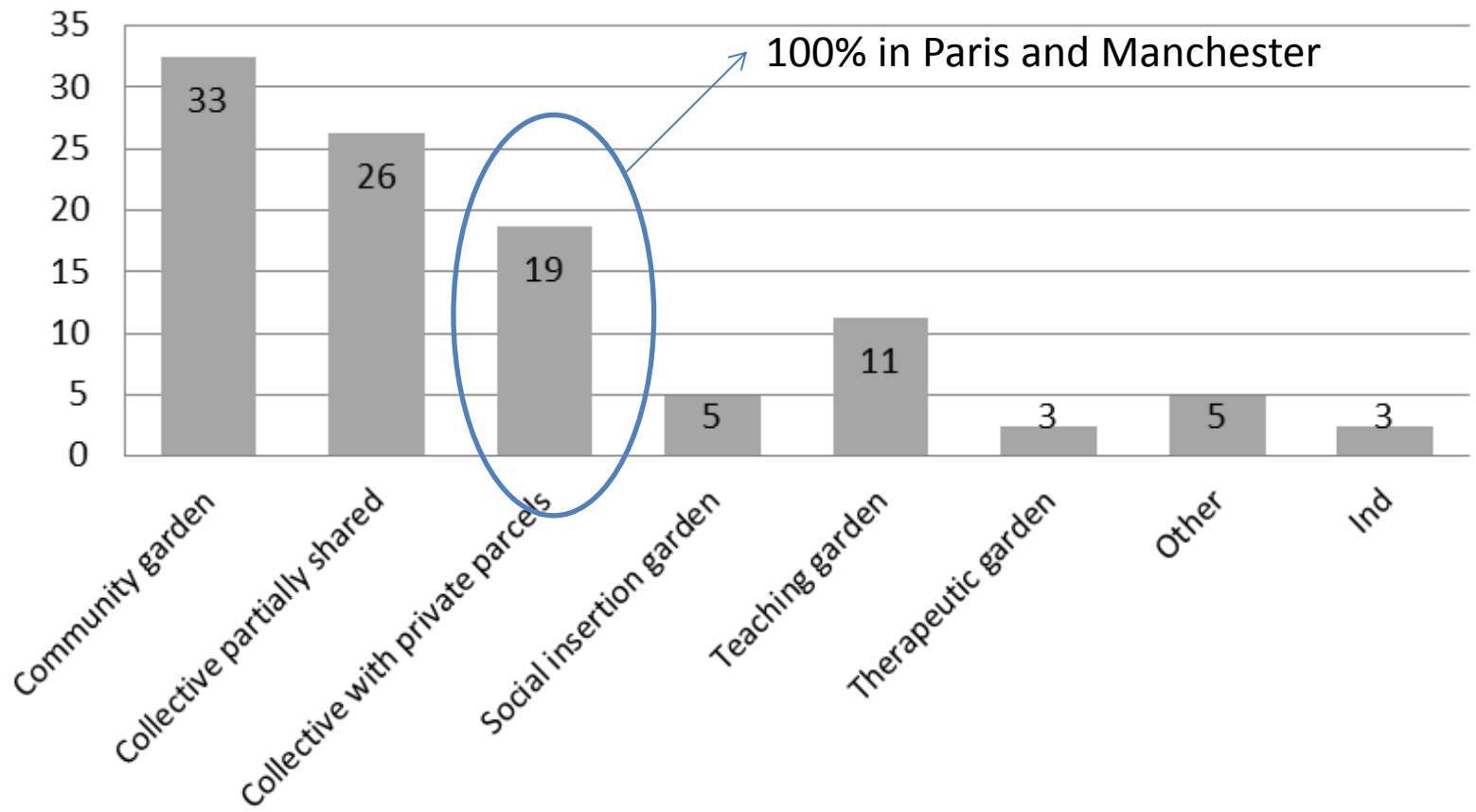
Soil quality assesment :

- Soil fertility
 - pH, TOC, available nutrients (Ca, Mg, K, P)
 - Texture, CEC (in progress)
- Soil contamination
 - As, Cd, Cr, Co, Cu, Hg, Ni, Pb, Zn (Total Aqua Regia)
 - Cd, Cu, Pb, Zn (Available $\text{CH}_3\text{COONH}_4$ + EDTA pH 4.65)



Main results

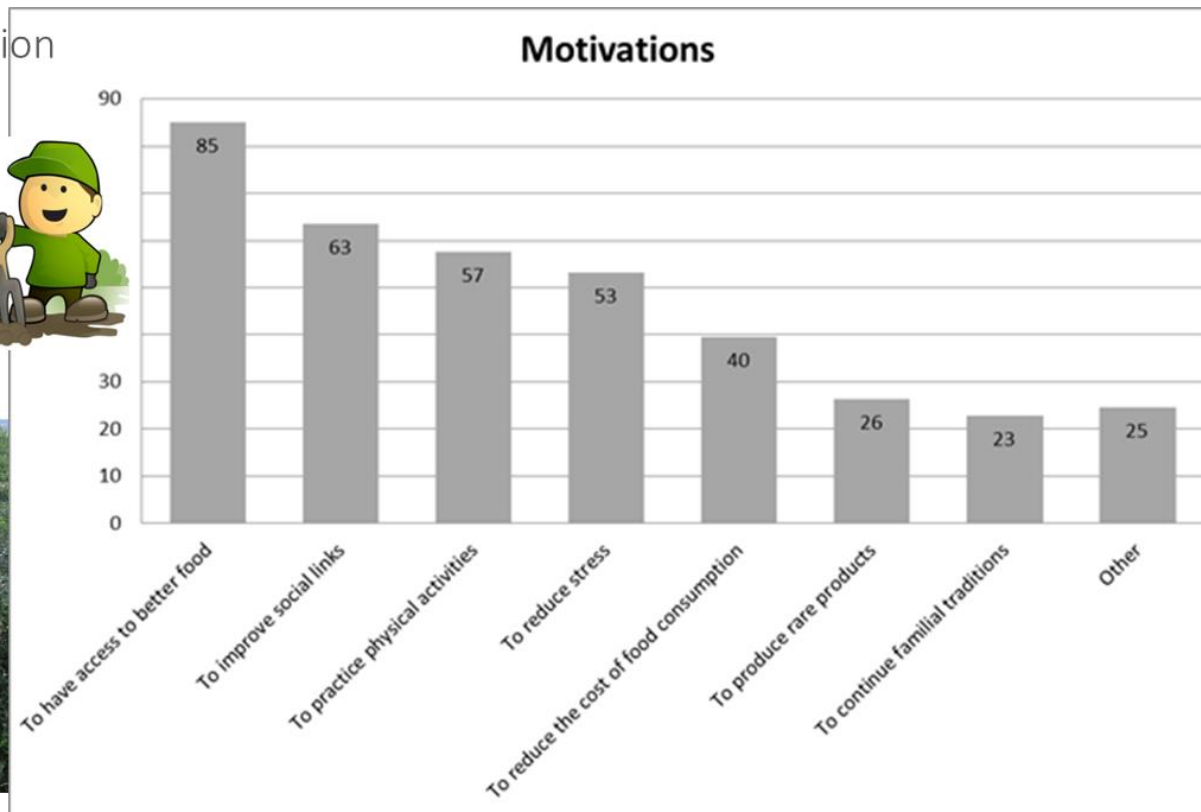
Garden organisation



Main results

The motivations of gardeners

- Healthy vegetable production
- Social link
- Activity
- ...
- (Nature)



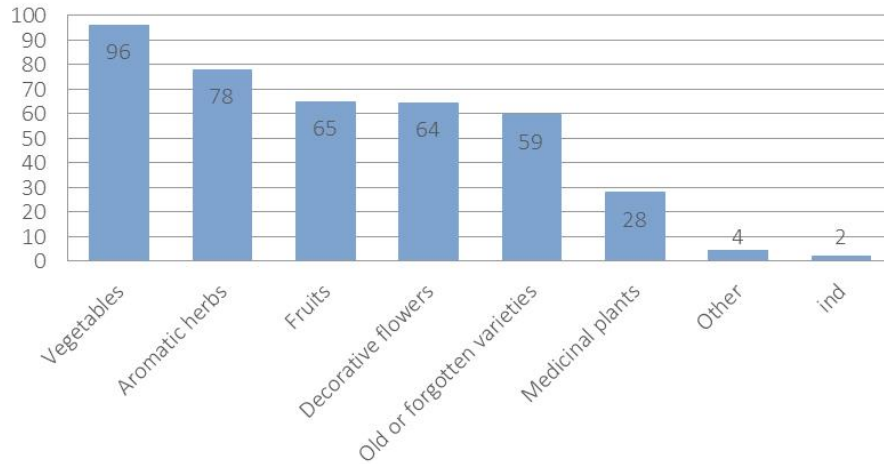
Main results

The agronomic practices of gardeners

- Organic fertilisation
- Out of control and over- fertilisation
- Chemical pesticide avoided
- Recycle rain water
- Self consumption of production or share but no commercial activity



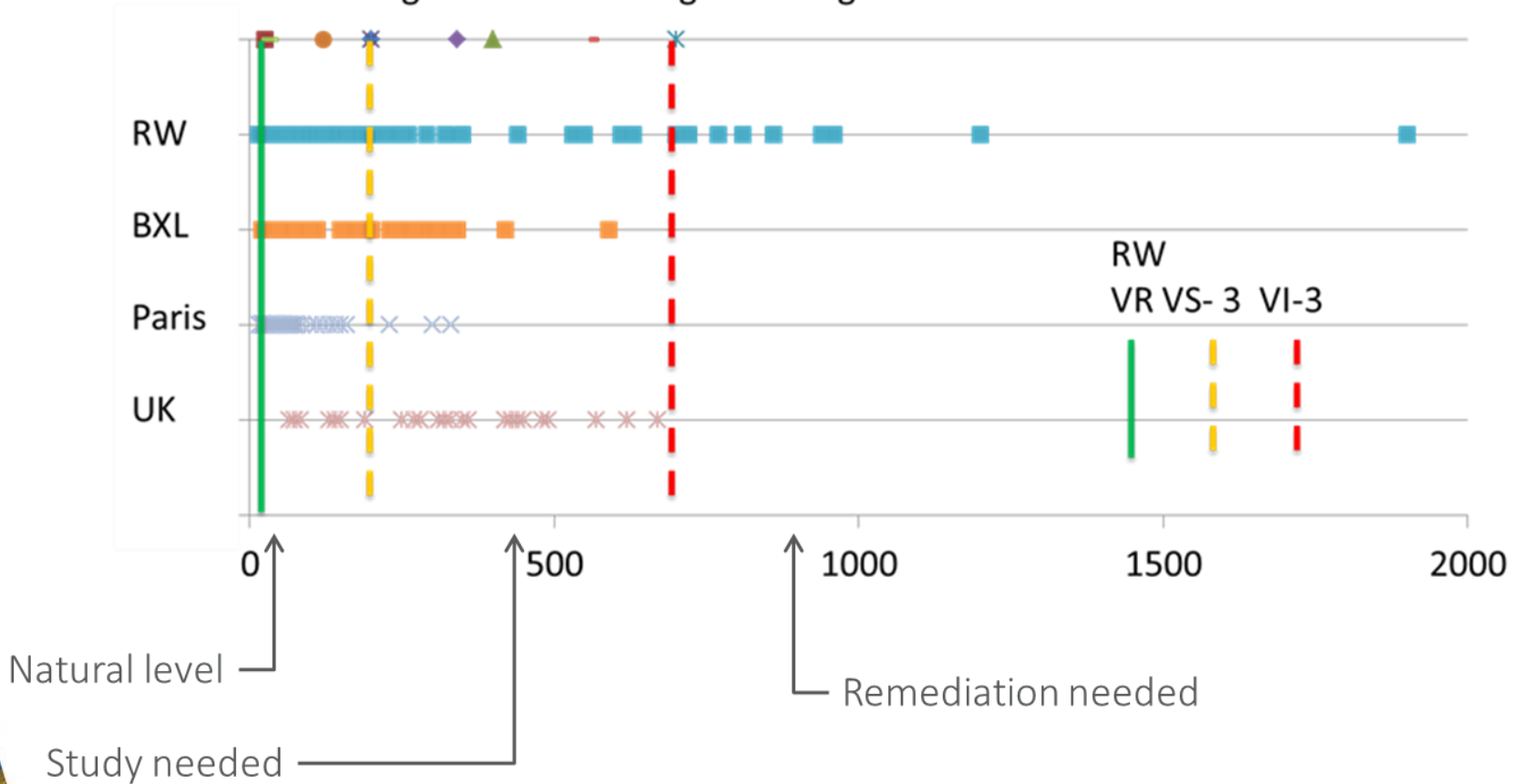
Crop production in collective gardens



Main results

Some soils are contaminated

Pb content of Topsoil ($\text{mg}\cdot\text{kg}^{-1}$) in the 4 study cases of collective gardens according to RW limits for gardening



Risk analysis

The “Bressoux” Case study in Wallonia


Multicultural and diverse social profiles / owned by the Public administration, ruled by social organism



59 plots / 160 soil and vegetable samples

Risk analysis

The “Bressoux” Case study in Wallonia

		
$n > 10$		
$5 \leq n \leq 10$		
$n < 5$		

According to EC regulations on Cd and Pb in vegetables

Risk analysis

The “Bressoux” Case study in Wallonia

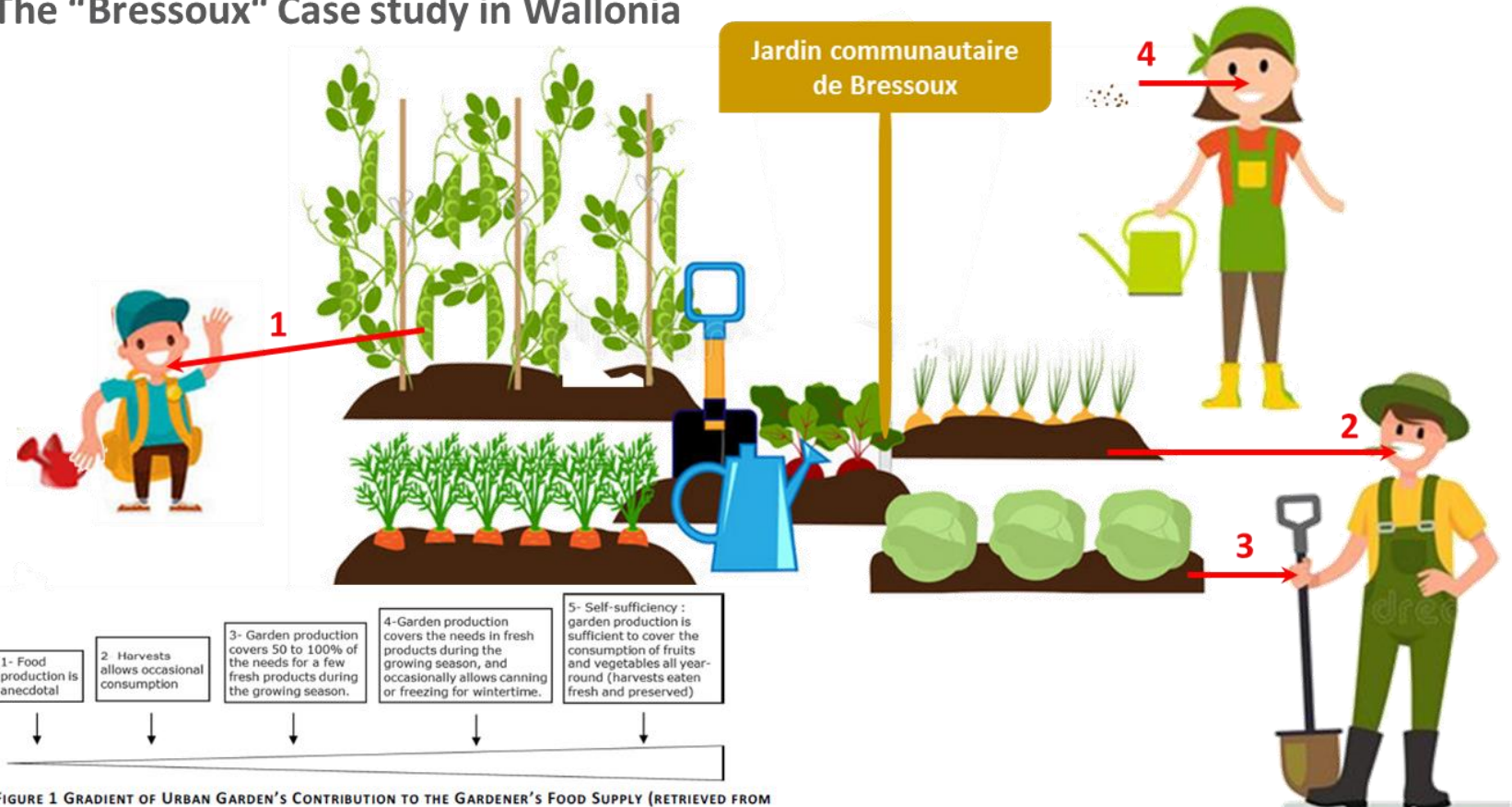


FIGURE 1 GRADIENT OF URBAN GARDEN'S CONTRIBUTION TO THE GARDENER'S FOOD SUPPLY (RETRIEVED FROM POURIAS, 2015)

Making a risk analysis based on realistic scenarios

Risk analysis






























The “Bressoux” Case study in Wallonia



Defining targets

Risk analysis

The “Bressoux” Case study in Wallonia

		Voies d'exposition			
					
Cibles					
					
					
					
					
					

Defining exposure path

Risk analysis



The “Bressoux” Case study in Wallonia
Cd - Cr – Cu – Hg - Ni – Zn – Mo – Mn



: inhalation of dust



: contact with skin



As – Pb



: ingestion of soil and dust



: ingestion of vegetables and fruits











Making a risk analysis based on realistic scenarios

Risk analysis

The "Bressoux" Case study in Wallonia

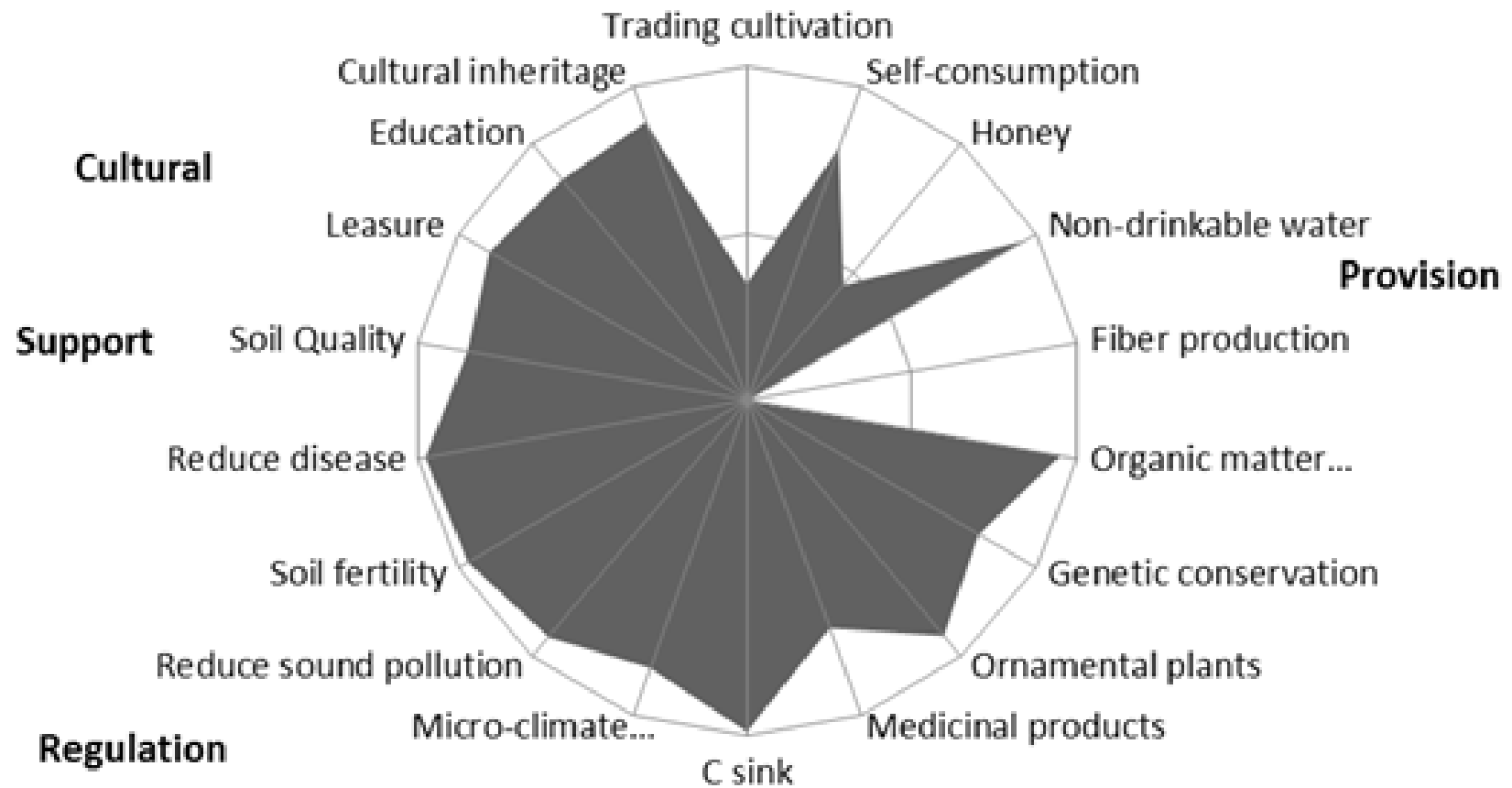


				Diete & autoconsommation	Skin surface exposed	Duration of daily activities
						
				Biomonitoring?		

Making recommendations and more studies are needed

Perceived and measured benefits

Ecosystemic services from collective gardens



Conclusion

- This study aimed at studying services and dis-services provided by collective gardens in urban areas
- Results show that soils are often chemically unsuitable for safe production of food. However, the gardening provides services and benefits for human health that are difficult to estimate quantitatively.
- Aspecially, the health issue must be considered in the long term and are complex by nature (multifactorial).
- Based on our results, decision tools should be developed not only on criteria defined upon soil measurement and transfer predictions but should integer risk analysis based on sound scenarios and moreover the gardeners should be informed about the limits of our knowledge.

