Adaptation of Southern Cities to Climate Change: How to compensate for the lack of urban data in local climate zone mapping?

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Introduction

In the current context of climate change, cities play a major and complex role in amplifying this phenomenon at different scales. On the one hand, they contribute to global warming, through greenhouse gas emissions from human activities (road traffic, domestic heating and cooling, industries, etc.); on the other hand, this global warming is amplified in the heart of the cities by the specific micro-climates that reign there, a well known phenomenon called an 'urban heat island'. This makes adaptation to climate change a new challenge for all cities in the world, regardless of their location and size. Many efforts are being made in northern cities to integrate climate issues into urban planning and development, such as the development of cartographic analysis tools.

What about MENA Region Cities?

Among the efforts provided by the researcher community, the WUDAPT project aims to collect urban data needed for urban climate simulation, the results of which will support climate change adaptation policies. This initiative has already mapped many cities, mostly in developed countries, based on local climate zones (LCZ).

We planned to apply this method to a panel of cities in North Africa and the Middle East (MENA) zone, proposing the necessary adjustments to overcome the lack of urban data.

In order to identify training areas, WUDAPT's protocol uses the 3D view of the city provided by Google Street View. However, for the MENA region, only Dubai and recently Tunis and Sfax have this tool but not for the whole city.

To compensate for the absence of this tool we opted for a participative approach. This method can be helpful to obtain Level 0 and even Level 1 data for MENA cities. It is part of the crowdsourcing approach of WUDAPT with some modifications to adapt it to the local population.

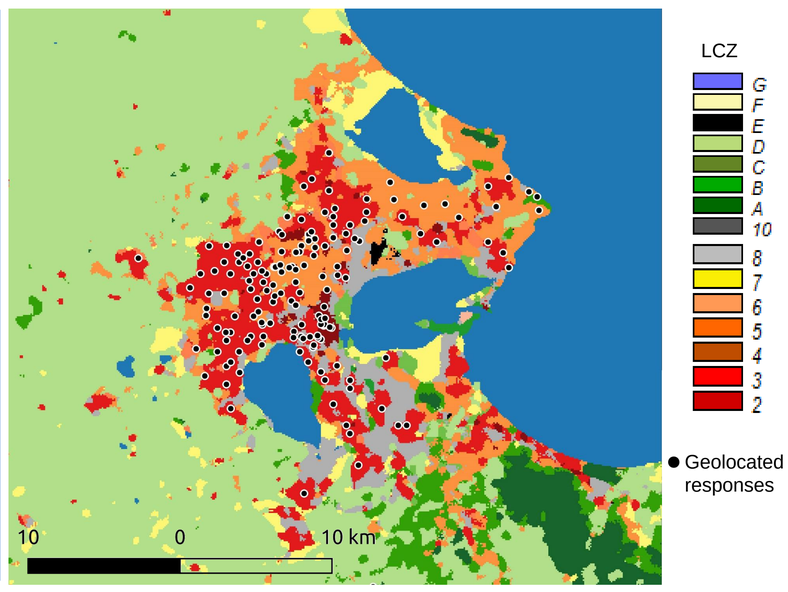
→ A social media questionnaire tested on the city of Tunis

The questionnaire

Changes compared to WUDAPT application		
Language: French	Audience: General public	Questions removed: Age of the building, roofing material

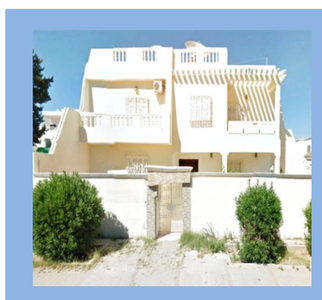
Results

- WUDAPT classification methodology
- Sentinel 2 tiles
- SAGA GIS
- The partial availability of Google Street View
- Results of our questionnaire

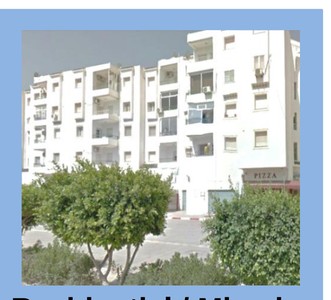


Local climate map of Tunis with questionnaire's responses

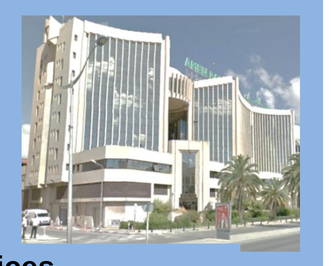
Homogeneous parameters



Residential
Few windows



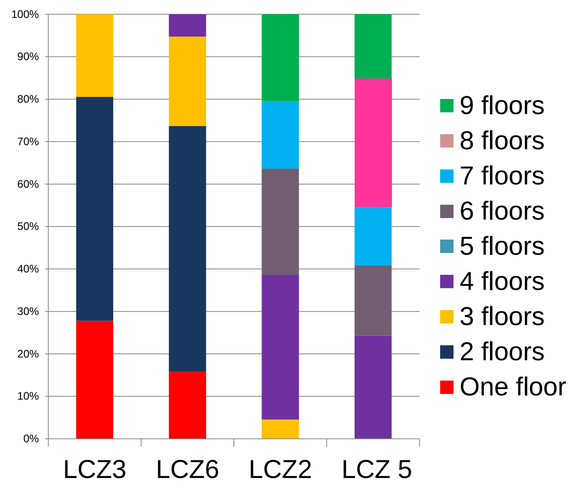
Residential / Mixed
Many regularly spaced windows



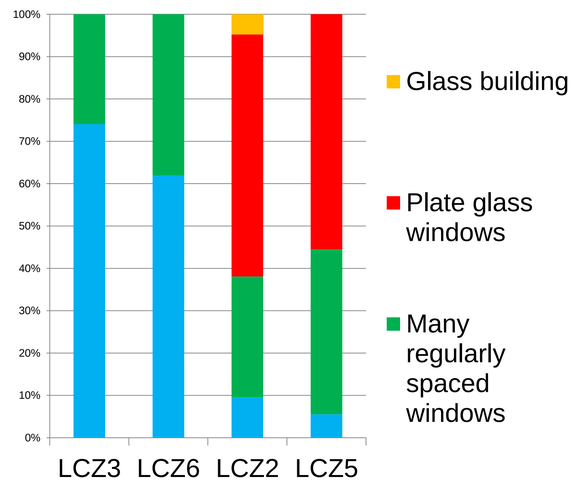
Offices
Plate glass windows

- Roof terrace mostly with concrete tiles
- Buildings have light colours mostly white
- The majority of buildings are air-conditioned

Heterogeneous parameters



Building height



Windows

Conclusions

- The social media questionnaire makes it possible to reach a wider audience in order to collect WUDAPT level 0 and level 1 data
- It is necessary to adapt certain measures and tools conceived for Northern cities to the contexts of Southern cities

Bibliography

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