

## Urban Green Space as a Component of the City

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**Abstract:** The green space is an important component in urban planning but the most neglect in our cities and in the most cities all over the world. In fact is coming that component which fill the emptiness. While it constitutes a basic and multifunction element. The phenomenon of urban sprawl lead us to forget the importance of green space. This last is an important component but one of the more neglect in urban planning strategies. The proof, that often our green spaces are planned according to the vacuum remaining or according to a classic model which is repeated without reflection to the goods which can import and the comfort which can offer the inhabitants and offer the city with improving the quality of spaces.

**Key words:** Urban green space, well-being, international standard, ratio, quality, Morocco

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### INTRODUCTION

The UGS (Urban Green Space) represent an essential responsible component in the town planning which will serve both environment and citizens. The presence of this urban component is associated to different positive effects.

Green spaces promote the retention of rainwater through infiltration and absorption. As a result, they participate in the recharge of groundwater while limiting the risk of flooding and soil erosion. Consequently, It reduce the need for installation of underground rainwater networks and treatment which is costly for municipalities.

Presence of vegetal regulates climate of the city and make it more livable. It ensures better humidification of the air and thus reduces the effects of urban heat island. In fact, the water contained in soils and vegetation absorbs excess heat which then evaporates and ensure a thermal comfort especially during a summer.

However, we find that the most cities are characterized by a higher temperature if we compare it to the countryside (3°C more higher than the countryside). The same phenomenon come into sight also when it concern the rainfall which is more abundante with 5-15%. On the other hand, the winds are slowed down by 20-30% which reduces the renewal of the air.

Also, we found that the urban green space and a vegetation in general purifies the air of the city. Adding to that, it clean the air by recycling carbon dioxide into oxygen. Large areas of woodland and wetland contribute to store carbon, limit atmospheric concentrations of greenhouse effect, reduce allergenic factors and respiratory diseases by attaching dust, heavy metals and

pollen to plants than they are recycled. In the other hand, we find that the most flowers act as a reducer of olfactory nuisances.

Indeed, the green urban space complet other component of the city and create a good environment for inhabitants. In other words, district, allotment, are more then assembly of volumes and materials, they are space of living.

While, a good conception of these spaces based on real data and scientific studies bring with it many advantages for the city, the inhabitants and the building as our third skin.

Unfortunately, if we search about urban green space in the cities all over the world, we found that the most of them neglect the importance of this component. In front of this situation between the advantages offered by the nature and our negligence, a real problematic is presented: is there any scientific studies has fixed a suitable ratio of urban green space? Is thus, ratio valid for all sites? Can this ratio ensure a thermal comfort?

### MATERIALS AND METHODS

We have chosen the subject of this study through several steps: observation, reflection, research and analysis. At first, we began by observing our surroundings and the detection of major problems experienced in our cities.

Then, we conducted research based on urban documents and theses on the causes to move towards to urban green space. And as a final step, our research also focused on Moroccan cities as well as foreign cities that are suffering from that same problem or which have been to cope with this same challenge.

The purpose of this research was to compare the ratio of UGS between cities and the international standard validated by the WHO.

**Definitions:** Urban Green Space (UGS) in this study defined as all public and semi-public spaces and publicly accessible open space cover by vegetation: parks, squares, gardens, woodlands and other green spaces.

World Health Organisation (WHO) is an international organisation, that have as goal to ensure the highest attainable level of health for all people.

This organisation was cited as the the only organisation which interested to the urban green space as one of the most important component to acheive the comfort in the city.

## RESULTS AND DISCUSSION

**International standard of urban green space:** As a matter of fact, the World Health Organization (WHO) has defined 10 m<sup>2</sup> of green space per citizen like a ratio of comfort (Hugh and Catherine, 2004).

Certainly, this ratio doesn't arise from the void but the question is: How they demonstrate it? Then, is it valid for all countries? And which way can we use it to achieve the thermal comfort? About that, OMS has collaborate with experts, city councilors, researchers, urban planners and health specialists to processed a project called "Ville-Sante". So, it designed several European cities to respond to challenges that put health policy and meet requirement. This project was aplicated following three phases:

The first one has focalised on 35 cities; It concerned the spread of the concept of health in cities and the creation of new organizational structures that help to developped a collaboration between differents structures, sectors and population and to be a factor of change.

The second step has concerned 38 cities (including 13 new cities on the project). This step focused on elaboration of global plans of health. The objective was to enhance social justice and sustainable development.

The third and last step has included 41 cities, (12 new cities have integrated this experience). this phase was concerned with the development of international politic of program Sante 21 and Agenda 21 considering previous experiences in ordre to arrive to a genuine intersectoral health approach (Hugh and Catherine, 2004).

The priorities focused on preparation of tools for development and implementation of policies, development of urban planning for health, then evaluation and monitoring of different actions. In conclusion, OMS was convinced that the health of citizens is related to our urban structuration.

As result, WHO has decide to form a data-basis concerned physic environment in favour of the health and social equity (Hugh and Catherine, 2004). At another level, we can't affirm that this ratio is valid for any area while the target area is European cities.

**Case of Moroccan cities:** For Morrocan cities, it's recognized that the situation of our cities and there actual way of development can't lead us only to ruin health of citizens, as result of our politics and economics priorities. Our cities are submitted the administrative process and legislative factors which some of them are demonstrated and others are taken as evidence.

In other part, even this "invalid" ratio (ratio defined by WHO is not respected in Morocco. We found that, there is no official documents or scientific studies done to fix a ratio adapted to our conditions: air quality, the allocation granted to the zone, the public green space of proximity, the meteorological data of the area, materials, design, density of building, use of building, etc.

Untel these days, we define the urban evolution of moroccan cities by anarchic evolution as long as we can't control a ratio of urban green space and we suffer of lack of global vision.

Taking as an example Kenitra, this city is recognised by its diversity in terms of landscape and greenery: forest, lake, ecological reserve and river. An identity which allows to reach a ratio of 74.154 m<sup>2</sup>/ha on the intra-urban parameter. But when, we limit our city in the urban parameter and we exclude the green, the situation rocks dramatically towards a worring ratio; 1.43 m<sup>2</sup>/ha (Anonymous, 2012). This ratio is closest to reality as long as most of green spaces around the city are not easily accessible and do not serve all areas in the same way, especially with the presence of the proximity challenge, whish still persist.

Figure 1 and Table 1 show the distribution of urban green spaces within the city and the ratio of each type of public green space. Taking the model of the capital of the kingdom; Rabat and its Ribat Al anwar project, this

Table 1: Distribution of urban green spaces of Kenitra city (Anonymous, 2012)

Assignment	Area	Ratio
Trees alignment	21139.52641	0.06
Green space planned and realized	154757.2504	0.44
Existing greenn space	136306.4594	0.39
Degraded garden	19661.67525	0.06
Garden in correct state	20444.37731	0.06
Realized garden	51371.5571	0.15
Park	14891.7433	0.04
Degraded park	531.0088884	0.00
Place	84407.64722	0.24
Total	503 511.25	1.43



Fig. 1: Existing situation of green spaces excluding green belt and afforestation (Anonymous, 2012)

Table 2: Current ratios and area of each kind of UGS (Anonymous, 2010)

Assignment	Area (ha)	Ratio
Historic gardens	42	0.34
Amenaged green space	2134	17.77
Green space to redevelop	182	1.51
Green space planned	46	0.38
Total	2404	20.00

choice is not due to chance, Rabat account 2404 ha of urban green space, equivalent of 20 m<sup>2</sup> per citizen. That mean twice the international average required and 36.2 m<sup>2</sup> per citizen by integrant the green belt. These assets were worth declared “the green city” in 2010 (Anonymous, 2010) (Table 2).

Anathor city has been presented in the list of green cities, it's the town of Marrakech which count nearly 8 m<sup>2</sup> per inhabitant, it is the average rate of green space offered per inhabitant for Marrakech. A city where gardens are an example of landscape architecture. The ocher city boasts 620 ha of green space while the international standard requires 800 ha. Fifteen gardens in Gueliz, five in the palm grove, in the Menara District, a garden in Bab Ghmat and another in the douar El Khachab in Sidi Youssef Ben Ali. A city among the greenest cities of the Kingdom. At the end of 2008, Marrakech had 30 new parks and gardens open to the public (Anonymous, 2015).

On the other hand, the city of Mohammedia nicknamed “city of flowers” seems to be less equipped with public green spaces. Compared to the World Health Organization (WHO) standard of 10 m<sup>2</sup>, the ratio is <1 m<sup>2</sup> of public green space per inhabitant (Anonymous, 2009). A city where the shortage of green spaces is noticed more and more, in particular on the level of a new allotments and popular quarters.

Adding to that, the alarming the state of certain gardens in several zones which become refuge for alcaics. Single maintained green space is incontestably the park of the twin towns continu to attract the inhabitants. As result, only 35% of the objectif of development plan (PA) was realized (Fig. 2).

Concerning Casablanca as is known the most of popular borough suffer of the absence or the shortage of urban green space as an example the case of Sidi Moumen where the ratio per inhabitant don't exceed to 0.5 m<sup>2</sup>, this situation is commun to all popular districts like Mers Sultan and Hay Mohammadi. On the other hand, the inhabitants of upper California and Anfa neighborhoods are very well off with an average of 6 m<sup>2</sup> public green spaces per inhabitant (Fig. 3).

According to the SDAU (Urban Development Master Plan), the ratio of green spaces at the level of all the prefectures of the city is only 0.92 m<sup>2</sup>/inhabitant including the big parks and gardens (Anonymous, 2008). In other words, eleven times less than the international standard. Adding to this, a distribution of green spaces is unbalance.

Many propositions was presented in urban planning documents whose goal is to increase the ratio to 3m<sup>2</sup> per citizen then to 7 m<sup>2</sup> per citizen through creating a new large parks. Unfortunately, only 25% of the objectif has been acheived, this result is very far of the real objectif.

**When nature emerges a city; Berlin:** Berlin is a very rich city wich comport 6400 ha of parks, open garden. As a consequence these urban green spaces allow to acheive 26 m<sup>2</sup> per capita. Consequently, their parks and greenery were the reason behindranking this city as one of green European “metropolis”.

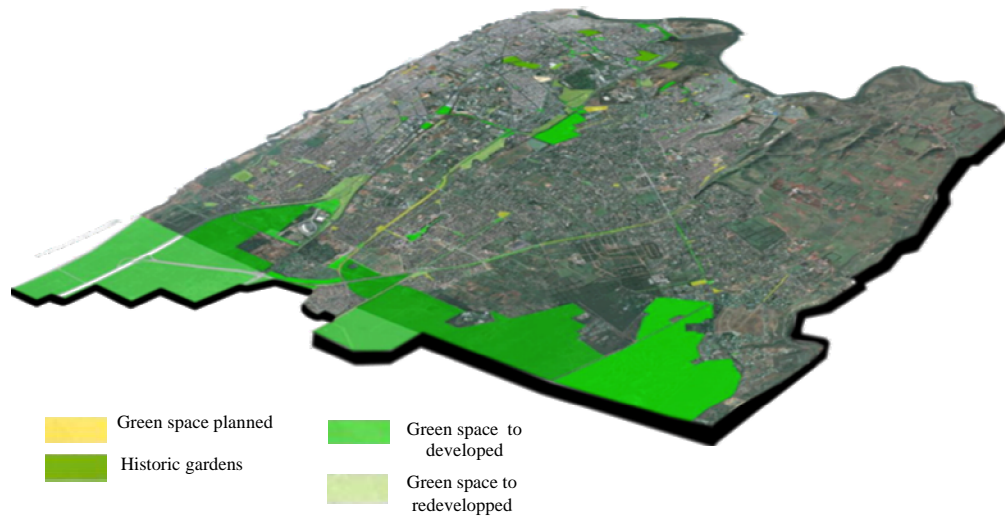


Fig. 2: Current situation of urban green space in Rabat city (Anonymous, 2010)



Fig. 3: Current situation of green spaces in the City of Mohammadia

Berlin has many hollow sites and wastelands that provide it with a lot of land reserves to green neighborhoods. After the fall of the wall, the decommissioned industrial areas, the closure of Tempelhof Airport and the abandonment of obsolete marshalling yards offer new opportunities to increase the number of green spaces: formal and informal green space.

Thus, the wide avenues of Berlin have facilitated the development of a dense network of bike paths (650 km in 2010) and public transport routes in own site (trams).

Adding to that, the creation of a new kind of urban green space between 1846 and 1848 called popular park (Volkspark Friedrichshain). The popular park was created

by Johann Heinrich Gustav Meyer, Director of the Berlin Parks and Gardens Department (Anonymous, 2012). This popular park is open to all citizens. There is no longer any question of creating new ornamental parks but the aim is to create a recreation and relaxation areas for Berliners in densely populated neighborhoods.

In the other side, the planning system in Berlin responds to an overall planning strategy. It is composed of framework documents that are both prospective and/or operational, informal and opposable, complementary to each other (Anonymous, 2012).

In addition, these documents are produced at different scales (region, city, district, plot). Brief, Berlin is

what is today thanks to the good urban planning which introduced and take consideration of all characteristics and the way of the evolution of this city.

Concerning Berlin, we must remember that (Anonymous, 2012); The greenery is very present in this city, it presents 40% of the total area. This very specific city is crossed by several rivers, the city is surrounded by a green belt of the outside (forests and lakes). From the inside, it has developed around a green belt composed of allotment gardens and historic parks.

The authorities are interested in the continuous improvement of the quality of the urban environment through the good planning of the public transport network, the network of cycle paths, the flowery paths of the gardens. Also, there are green islands scattered around the neighborhoods, only the least polluting vehicles can access them.

Rigorous and pragmatic urban planning through several evolutionary and living documents updated to the last evolutions.

Berlin had programmed ambitious, complementary, varied and adaptable environmental projects through several urban planning documents that accelerate and encourage the greening of the city.

For example, green spaces have a legal status that protects them according to the specificities of biotopes and the diversity of the landscape. These spaces are systematically reported in the urban plan of Berlin with great precision. For the sectors covered by the PRO, the technical services take compensatory measures in urban development operations, thus introducing nature into real estate (green roof, courtyards).

Berlin is equipped with a geographical information system which makes inventory and georeferentiate green spaces possible. This system is complemented by a database accessible by internet containing all types of green space in the city. As a result, it is still possible to draw up balance sheets and financial monitoring of investments and maintenance budgets for certain green spaces.

The green roads registered in the STEP (Stadtentwicklungsplan Wohnen/Urban Development Plan Housing), the LAPRO (Landschaftsprogramm/landscape program) and the BEP, these tracks are intended to reinforce the ecological continuities and to augur the cycle tracks and to encourage the soft modes.

This city is characterized by the integration of wild green spaces in the urban environment, Berlins accept it in its natural state and they consider them as performing equipment to refresh the air.

**The city of islands; Stockholm:** The authorities of Stockholm had take decision to distribute the density of the population equitably throughout the urban territory of the city, each inhabitant could live within 400 m<sup>2</sup> of a natural area. The urban territory of stockholm has 2,300 km<sup>2</sup> while the total area of green space exceeds 1300 km<sup>2</sup>, it's a larger than the urbanized area (1000 km<sup>2</sup>) (Ducas, 2000).

In stockholm, we become more aware of the importance of green space in the lives of citizens and in the decisions of the authorities concerned. If one of the best-known values among Stockholmers is: "Anyone can walk anywhere whether on private or public property as long as the person respects the environment".

The authorities take their share of responsibility through The County Council's Regional Planning and Transportation Agency (ARPT) first plays a role in studying and analyzing the state of the green network.

It accumulates the data and establishes planning guidelines. Therefore, it tries to ensure the sustainability of the network with national and municipal authorities by advising its preservation and enhancement. Its action is limited in the formulation of guidelines aimed at limiting development around the network and prohibiting the exploitation of higher value sectors. These guidelines are sent to the municipalities who are invited to integrate them into their urban plan (Ducas, 2000).

Adding to that, Stockholm authorities plans rigorous projects either on the social or urban level such; Since, 2004 and with reinforcing the social dimension, the notion of "sociotope" has enriched this schema, in order to satisfy the population and ensure biological continuities whose, industrial islands for example have been "returned to nature".

**Validity of the ratio provided by WHO:** Many factors influence the thermal comfort in the space. Therefore, influence the ratio of UGS needed to achieve the desired level of comfort. Other part, the moderators parameters still unclear. Certainly, only one ratio can't be generalized, while the data change from zone to another.

So, it's necessary to establish a well-grounded approach, to study each area according to its specificities: the specificity of the urban climate, the influence of the urban development on microclimate, the urban morphology, the aerodynamic effects, the vegetal pallet, the temperature and level of humidity, the materials, the urban layout of building, etc. (Bouyer, 2009).

**Case of Foreign and Moroccan cities:** This study has its focus on the presence of the UGS in the different cities. Many Foreign cities have been able to set such ambitious

goals and have been able to complete them through specific strategies, creation of organizations to balance the distribution of tasks and encourage the spirit of collaboration.

On the other hand, we found that the Moroccan cities suffer from a remarkable difference of UGS between cities and sometimes within the same city. Also, most cities have failed to reach the goals mentioned in the urban documents which make us thinking more real about our goals: how to fix them, then how to achieve them.

**Future research perspectives:** Based on this study, a futur studies will take place, integrating several parameters. It is envisaged to: set the list of parameters, limit the area of study. Then we will begin a statistical studies concerning various variants. Thereafter, we will establish a scientific approach to calculate the ratio of suitable UGS specific for each zone.

## CONCLUSION

Although, the ratio and procedures of urban green space change from one city to another. It can be noted that it is still possible to increase the total area of urban green space through several remedies and that it can not be present and beneficial, only if, we consider it an essential equipment in our daily life and an efficient investment.

On the other hand and before sensitizing stakeholders to this reality, it is necessary to answer several questions: the WHO has specified the comfort ratio according to a study based on European cities, is this ratio valid as an international standard, knowing that the meteorological data, the morphology of the field and its specificities change from one zone to one other? then what is the scientific approach which allows us to reach the comfort ratio according to the characteristics of the

site? and how can we achieve, control and monitor this ratio on the regulatory and operational levels? So, does the excess of green space always have an urban advantage?

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