Porto - an urban area on the way to happiness

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Theme: *(chose one of the following options)*

A – Planning and Environment Assessment	.....	X
B – Urban Planning and Housing	.....	
C – Transport Planning and Logistics	.....	

All available information indicates that the urban areas will continue to be the most preferred areas to live by human beings for decades to come. And why are they preferred? At a time when all the descriptions insist in the dark side of this gloomy urban *modus vivendi*, it is relevant to ask whether there is any masochism or if it is in fact a rational and logical option.
Using the example of Porto, we intend to illustrate how this preference is a logical and rational strategy for finding happiness.
Despite the multiple dimensions of happiness - health, basic needs' satisfaction, feelings, freedom, safety, time, culture, entertainment, etc. - are more likely to be met in an urban area, it is not easy to offer/plan a product that accomplish the desire of all. Happiness is a complex formula of several objective and subjective dimensions. Planners may ensure provision of employment, security, environmental quality, leisure and recreation spaces, and facilities for education, health or sports, which meet the objective dimension. However, in the field of feelings or cultural/historical skeleton or attitudes towards life, the interference of the planners is more induced than offered.
We will try to validate, using Porto's case study, some of the positive and negative impacts created by the presence or absence of a certain blend of happiness inductor factors (i.e. neighbourhoods' size, green spaces, transports, health, climate, etc.).

Keywords: Urbanization; Environmental (in)justice; Medium-size cities; Happiness Index; Porto

1. Introduction

1.1. The world and urban population projections

All population's projections show that human beings will continue to prefer living in urban areas than in rural ones. This will be particularly evident in less developed countries which may mean an enormous imbalance increase between the size and location of the available space, resources and people needs (Fig.1 e 2).

Since 2003 till 2030 (UNPD, 2007) the urban population in the world is expected to rise from 3 billion to 5 billion while the rural population is expected to decrease, in the same lag of time, from 3.3 billion to 3.2 billion (Fig.1 e 2).

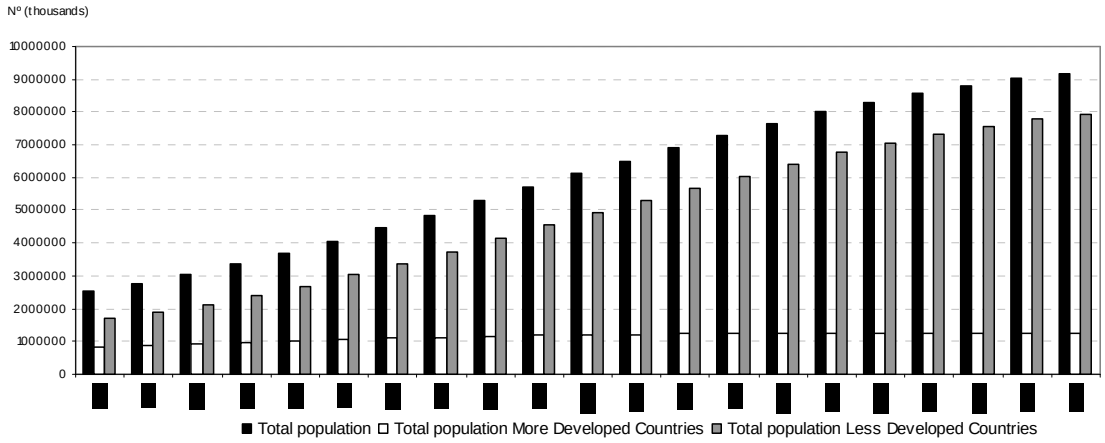

Fig. 1a – World population 1950-2050 (United Nations Population Division, 2007).

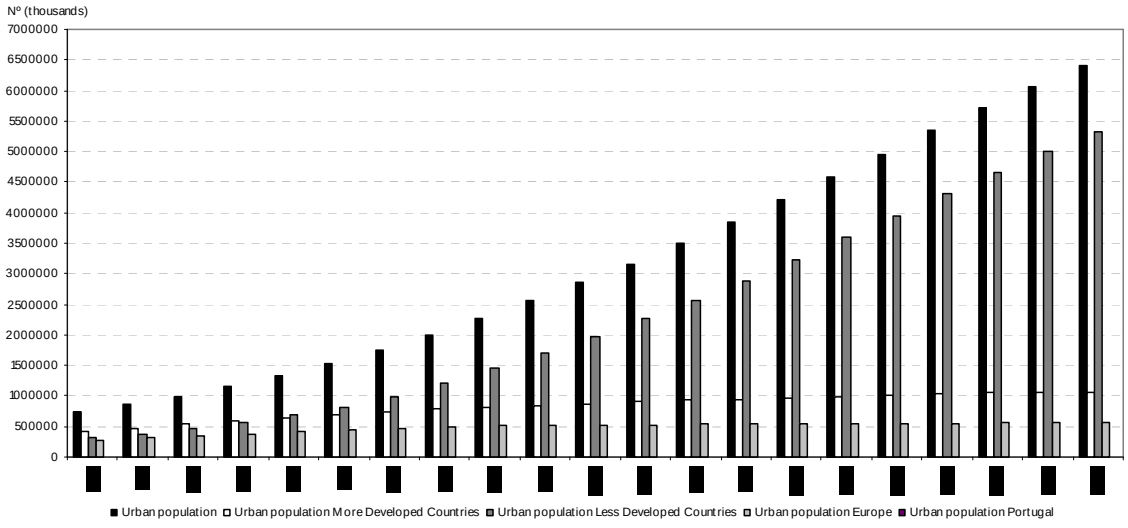

Fig.1b – World, European and Portuguese urban population 1950-2050
(United Nations Population Division, 2007).

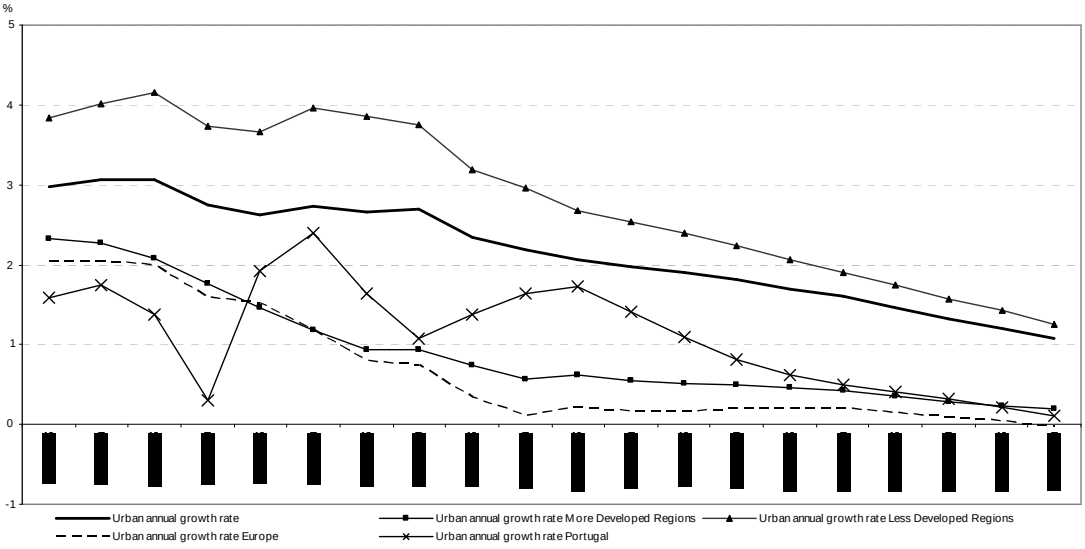

Fig. 2 - Urban growth rate of the more and less developed regions from 1950-2050 (United Nations Population Division, 2007).

Besides being very recent in our Planet history, the urbanization process since the hunter-gatherer societies, through the agricultural revolution till the creation of villages has been one of the most severe and powerful actions of man upon earth surface.

Till 1800 the urban/rural balance was always negative. The ratio started to modify just after the *Industrial Revolution* especially in UK where, along the 19th century, the cities with more than 100000 increased from 10% to 40%. Meanwhile, in Europe only 2,2% of the population lived in cities with more than 100000 inhabitants UNPD, 2007).

Since 2007, the world had, for the first time in history, more urban than rural inhabitants and according to UNPD projections the annual rate will raise 1.8% what means an expected doubling in a 40 years period.

For the time being one of the major apprehensions comes precisely from the manner this way of life have spread at an extremely high rate in developing countries. In developing countries the growth of urbanization started in 1970 with a population increase rate that was the double of the rural. In Africa, for instance, the rate overpasses the 4.5% per year - a doubling in an interval of 15 years.

This urban growth process changed completely the social, economic and man-environment relationships. The complexity and intensity of the territorial and social multidimensional sculpture created by this way of life generated an imbalance between people needs and available natural resources that carried entirely new faces on earth.

2. Cities as unique milieus

2.1. Impact Assessment

At the same time that it attracts more and more people, cities became the supreme and preferred laboratories to implement technological innovation. This unique combination – people amount and diversity motivated by a strong scientific knowledge nest dynamic - provoked huge changes in the role of man on earth and in the type of performance of each individual in family, in demography, in education and cultural needs, in the nature of work, in labour relationships, in social classes and

cultural interactions, in consumption behaviour, in diet, in health, in well being expectations, in happiness patterns, etc.

The powerful appeal to man's manipulation ability of this new lifestyle exerts a redefinition of a lot of previous concepts like: freedom, family, social responsibility, job, health, wellbeing or happiness. At the same time nourished a more distant and highly sectioned relationship with ecosystem and an ever-increasing consumption desire.

The advantages of urban *modus vivendi* are clear and undeniable. The size makes possible a greater and more diversified offer as well as it allows more individual freedom and less society monitoring and control. Wealth and material comfort were, with opportunities, the advantages that suffered a major unprecedented augmentation.

Besides being a very recent phenomenon, cities are one of the most impressive types of artificial spatial organization. The fact of containing approximately half of the world's population but occupying only 2,8% of planet land area, generate a lot of opportunities but also many threats.

2.2. The bright and the gloomy side of the urban *modus vivendi*

As the territory skills and the natural and financial resources are not infinite combined with the urban areas need of accommodate in a small space several facilities may diminished the initial attractiveness because sometimes doesn't match all people' desires and especially do not answer equally to every citizen. The great investments in public infrastructures like sewage, waste disposal, accessibility, housing, schools, public water supply, etc., and the huge food and energy inputs produce severe inequalities and injustices among very close areas.

More, the combination in a quite small area of a complex mixture of people of diverse nature, with different tastes and expectations, hinder the chances of a bid that might meet all. Furthermore, the speed rate of wellbeing patterns' change nowadays increase so much that planners do not have an easy task when they try to (re)define sustainable development in urban areas.

This difficulty in suiting everybody's needs is social and spatially translated in a double faced picture - the dark and the bright side of the urban *modus vivendi* - that may be seen either in demography, or social-economic performance, or housing, or health, or even in environmental quality.

The higher fertility rates among poor and deprived ones than in privileged social classes, the easier milieu to spread contagious diseases, the high costs to maintain an health service answer, the needs of sewage, waste disposals and water supply networks everywhere, the natural resources depletion due to the soil impermeabilization required to built infrastructures, the deforestation, the destruction and split of natural fauna and flora, the greater water and energy consumption, the air, soil and water pollution rise, the greater food demand, the housing shortage, the segregated arrangement of social classes, the loss of vicinity relationships, the loneliness, the family node structure weakness, the absence of time, the violence and crime increase, etc., generate some gloomy patterns inside almost all cities.

That's why it is important, during the planning process, to analyze the positive and the negative picture of each city. Health and happiness are two effective indicators of these both sides of an urban area: front and backyard.

3. Porto case study

3.1. Location and size

Porto is the second most important town in Portugal and is situated inside a metropolitan area (GAMP - Porto Metropolitan Area) with 1 281 424 inhabitants, located in the NW coast of Iberian Peninsula (Fig. 3 e 4). In 2005, Porto had 233 465 inhabitants. Porto is a city with a daily flux of more than 500 000 persons. It concentrates mainly services – administrative, educational and

cultural – and offers more than 218 000 jobs. 50% of the employees come from nearby municipalities.

Porto's population evolution was, until the 80's, very similar to the rhythm of its metropolitan areas (GAMP). After this decade, while Porto's population decreases, its metropolitan area experienced a population increment (Fig. 5). The demographic regression of Porto along the last decade of the 20th century happened mainly because of the huge housing decentralization, as well as it was due to an enormous fall on the birth rates (Fig. 6).

Porto's population drainage process, mostly towards the nearby municipalities of AMP, and the births drop was accompanied by structural changes in family type and in the age pyramid distribution. The average family size diminished and the number of single parent families augmented as well as the number of lonely elderly people increased.

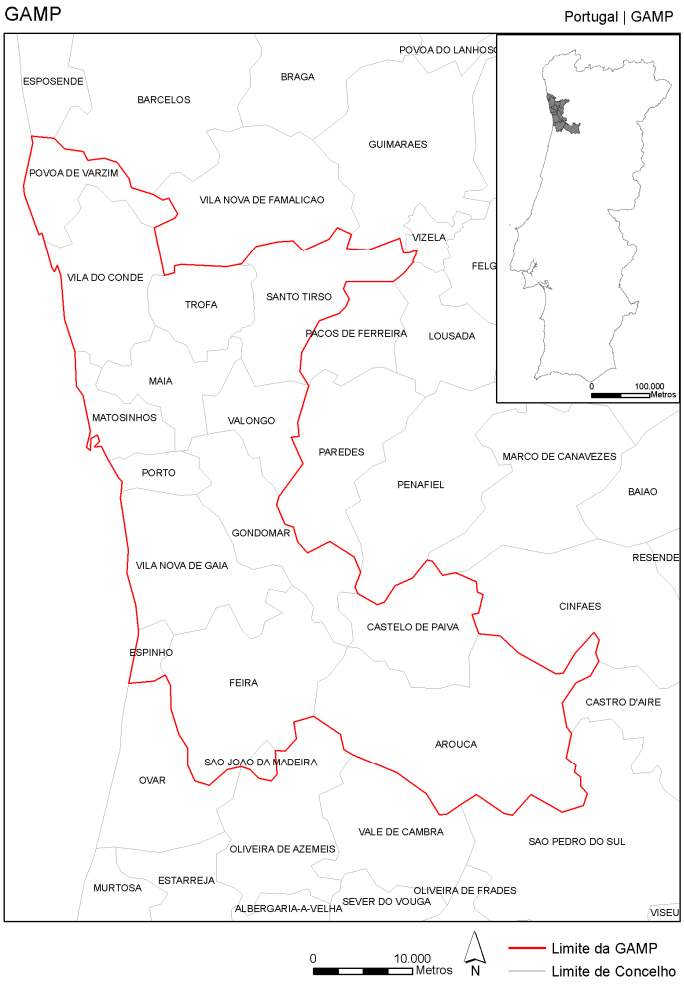

Fig. 3-Geographical location of Porto Metropolitan Area (GAMP).

Fig. 4 – Geographical location of Porto.

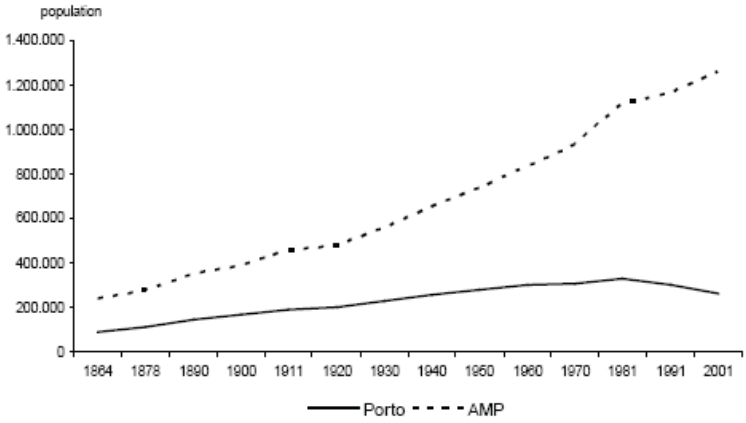

Fig. 5 – Porto inhabitants (INE, 1884-2001).

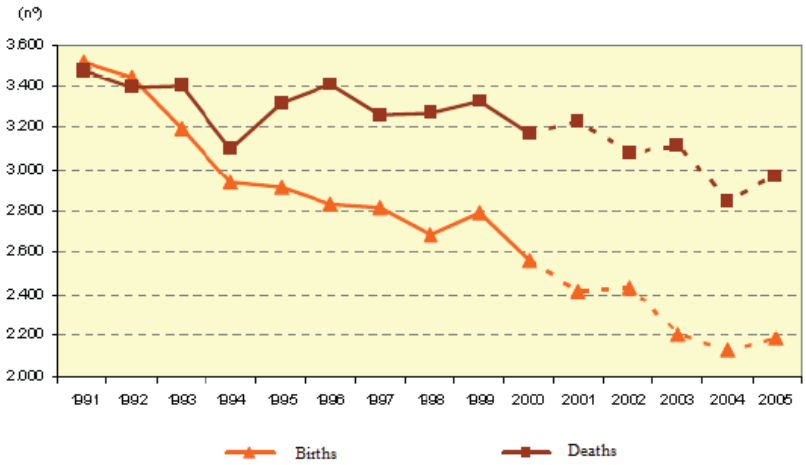

Fig. 6 – Birth and death rates at Porto (INE, 2007).

3.2. Accommodation of people in space

When we look either through the Porto's population distribution or young and elderly dependence index or family dimension or (il)literacy indexes or unemployment rate, we come to the same broad image of the city – a dark and a bright one, a dream and a nightmare, a full of vitality and a dying one (Fig. 7 to Fig 13).

Moreover, it would be enough to recover the image of the development of green spaces in the city and mix it with buildings age and housing estate distribution, to understand quite well the city's development options in recent years and to understand: why some people remained while others fled; who cannot leave the site where they still are; those who have no choice at all; and the preferred places of those that have a chance to decide where they want to live (Fig. 14 a Fig. 17).

This medium size city that overlays more than 8 centuries of history whose built environment had remarkably increase especially after 1960 (Fig.14 a Fig. 15), show already some serious symptoms of the well known threats typical of greater urban environments.

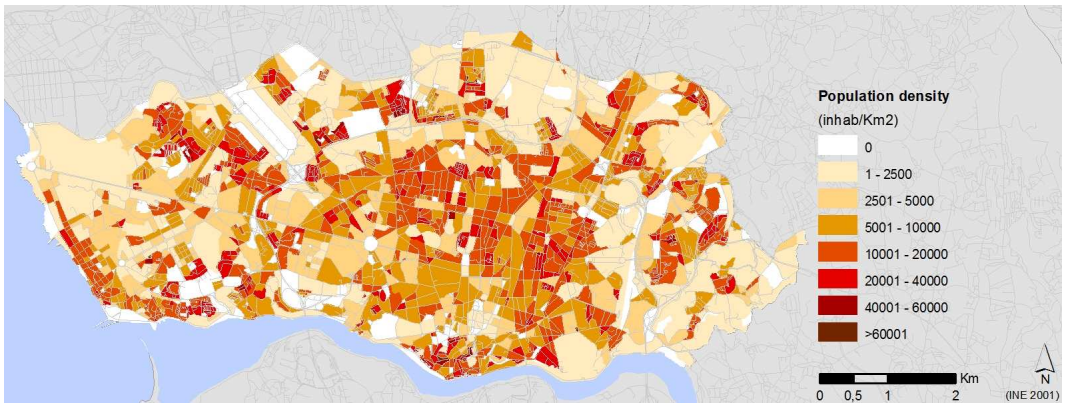

Fig. 7 – Porto's population density (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

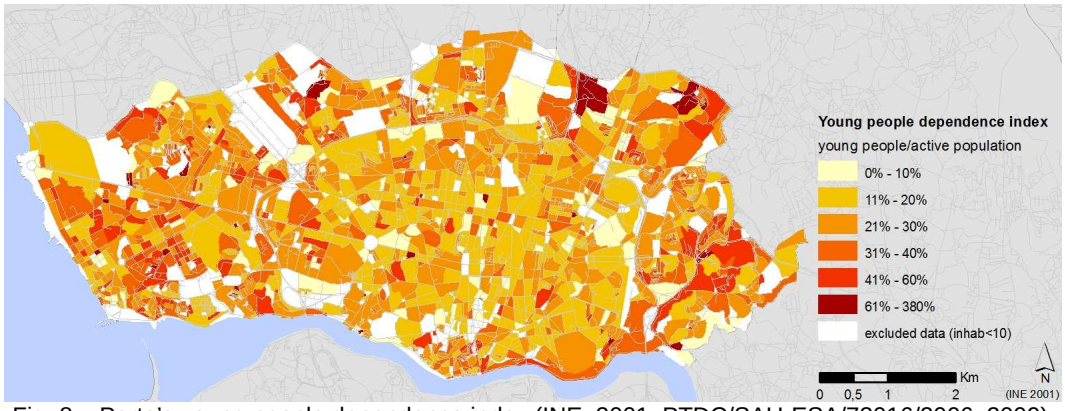

Fig. 8 – Porto's young people dependence index (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

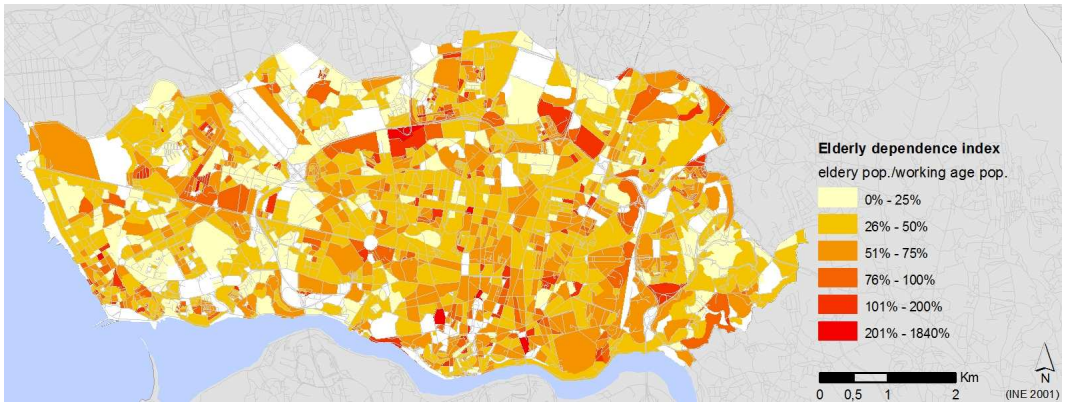

Fig. 9 – Porto's elderly dependence index (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

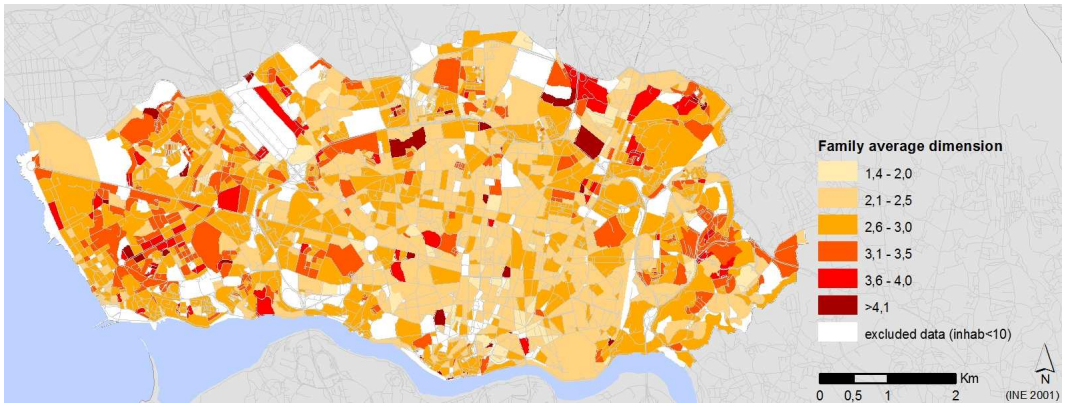

Fig. 10 – Porto's family average dimension (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

Fig. 11 – Porto's illiteracy rate (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

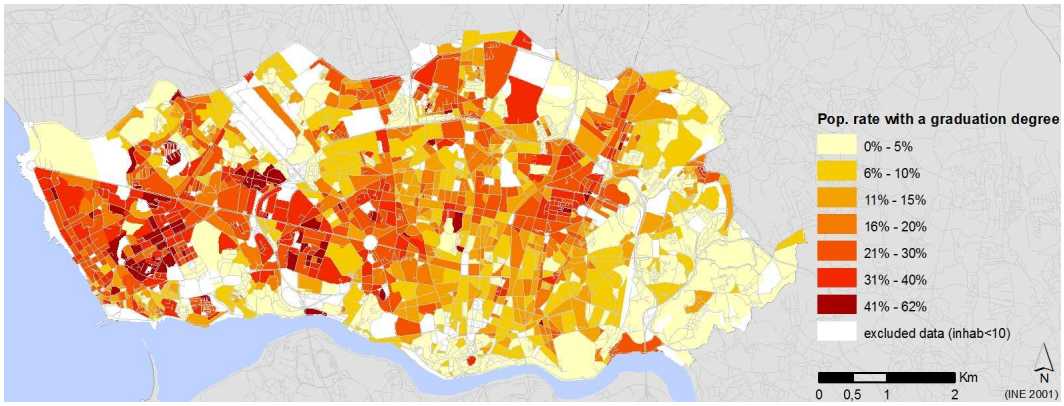

Fig. 12 – Porto's population rate with a graduation degree (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

Fig. 13 – Porto's unemployment rate (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

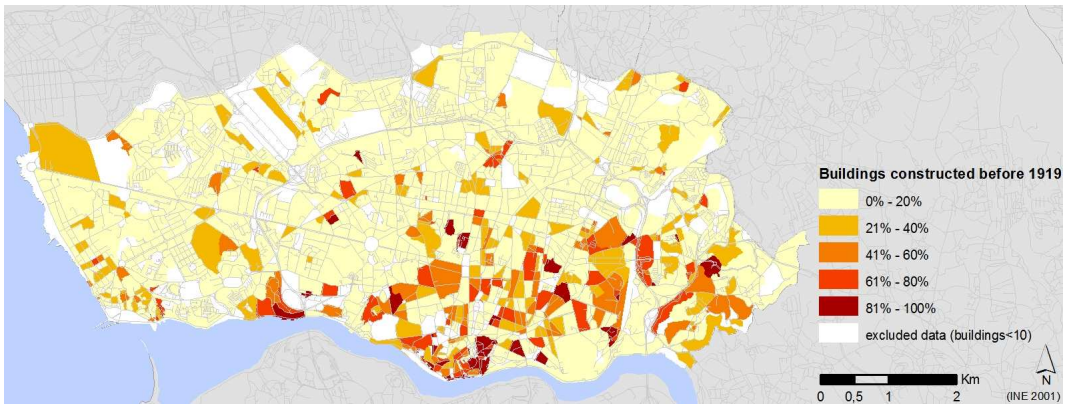

Fig. 14 – Buildings constructed before 1919 (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009)

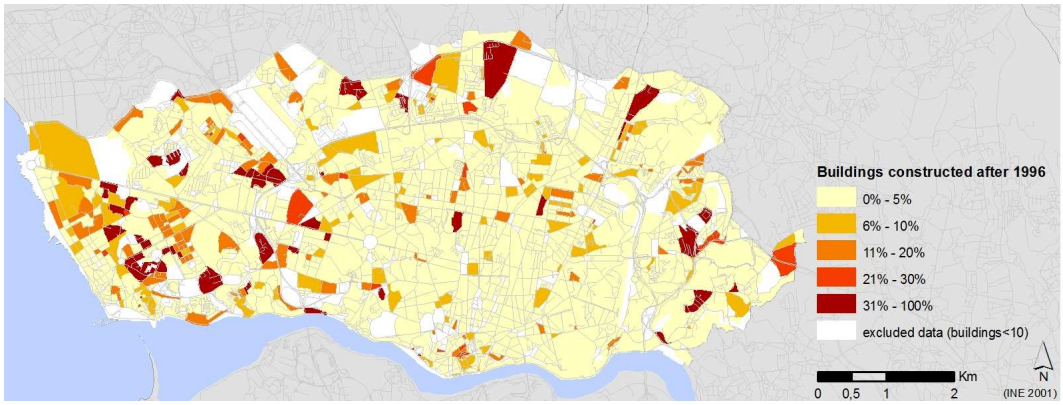

Fig. 15 – Buildings constructed after 1996 (INE, 2001; PTDC/SAU-ESA/73016/2006, 2009).

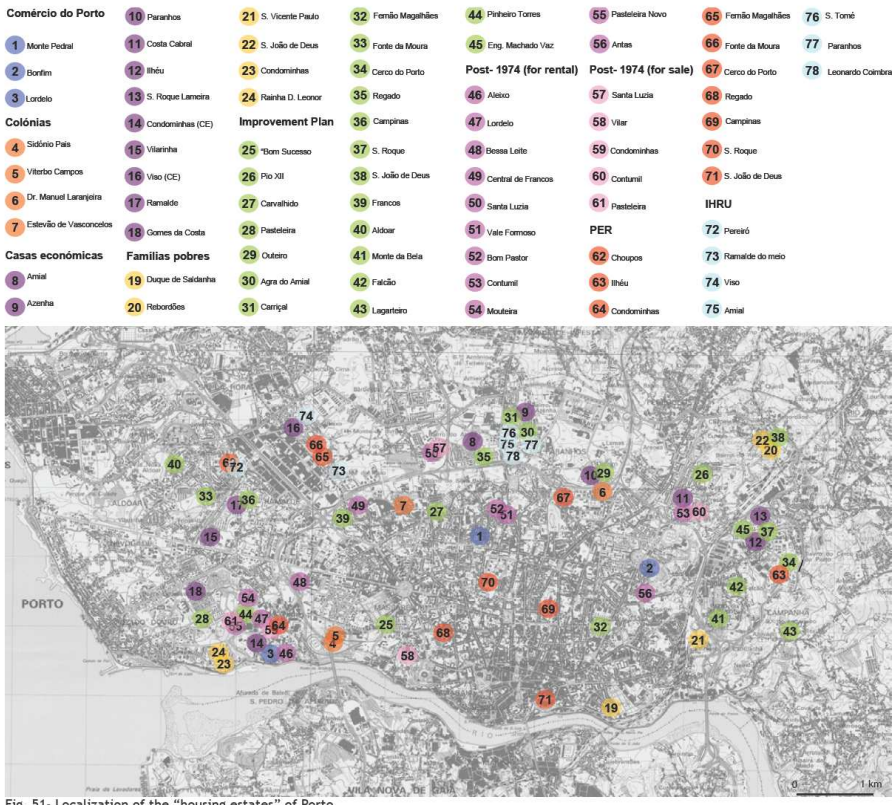

Fig. 16 - Porto's housing estates (Monteiro et al, 2009).

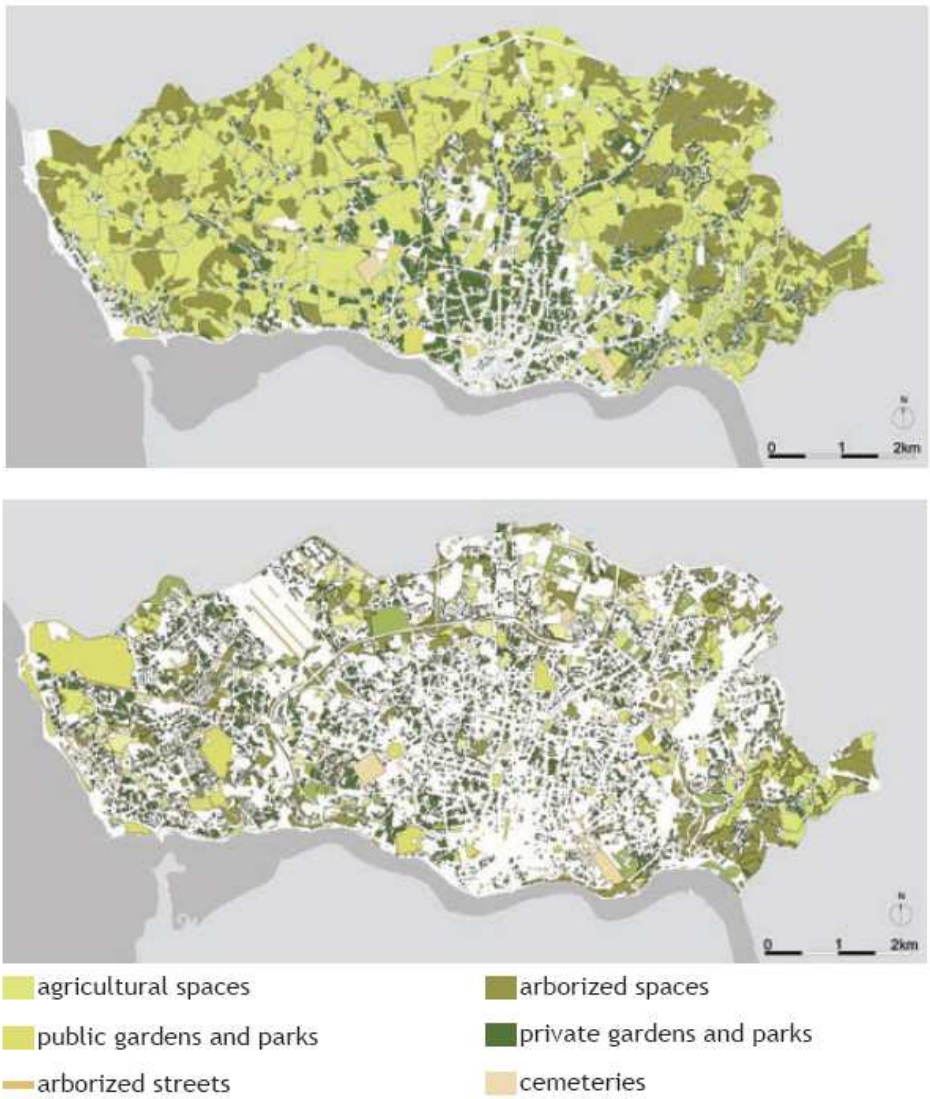

Fig. 17 – Porto's green areas in 1890 and 2000 (Madureira, 2001).

3.3. - Porto's health data as a consequence of genetics and environment

When we analyze the more recent health data at Porto, by parish, we conclude that the residents in the old city center are those who went more and stay admitted in one of the 4 hospitals of the city (Fig.18). This happens either when we analyze the total amount of admissions or only those suffering from respiratory or circulatory diseases (Fig.19 and 20).

If we compare the flux of people drainage with aggravated disease to the main hospitals (Fig. 17 to 20) with the elderly dependence index (Fig. 9) or with illiteracy index (Fig. 11) or with the unemployment rate (Fig. 13) or even with the family dimension (Fig. 10) or with the buildings age (Fig. 14 and Fig. 15) or with the green areas density (Fig. 17), we conclude that the health vulnerability seems to have a close relationship with the individual environmental condition as well as with the socio-economic and demographic context.

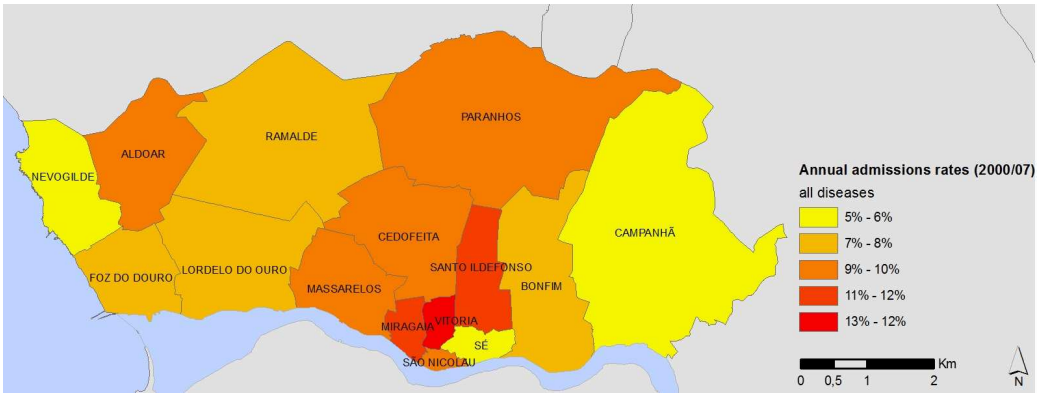

Fig. 18 – Average of admissions per year in all the hospitals of Porto (PTDC/SAU-ESA/73016/2006, 2009).

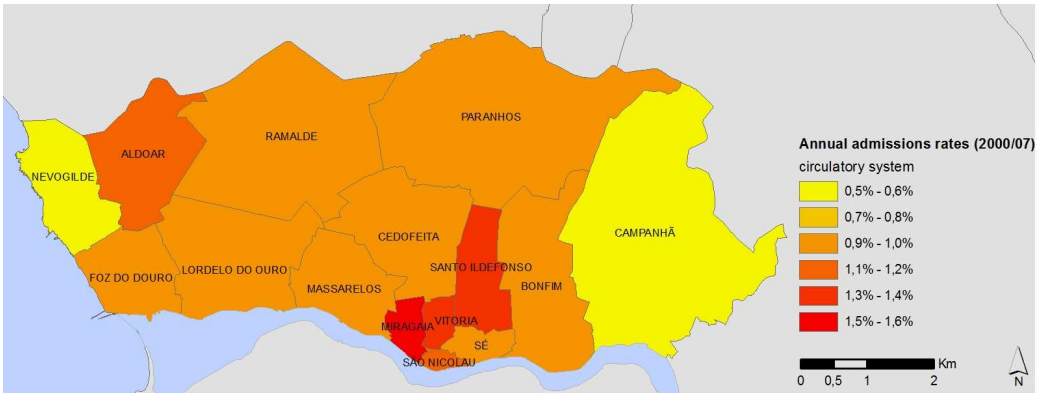

Fig. 19 – Average of admissions with circulatory disease per year in all the hospitals of Porto (PTDC/SAU-ESA/73016/2006, 2009).

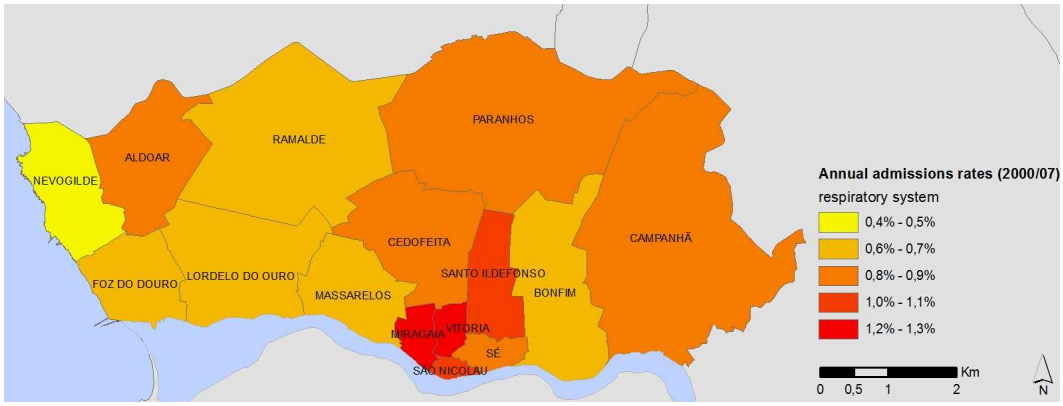

Fig. 20 – Average of admissions with respiratory disease per year in all the hospitals of Porto (PTDC/SAU-ESA/73016/2006, 2009).

3.4. The health stress geographical distribution during heat wave episodes – a symptom of (un)sustainability

When we look to the Porto's health vulnerability behavior during extreme events like heat waves (Fig. 21 to Fig 23), and we remind the average *urban heat island* magnitude and shape (Fig.24), it seems quite clear that the geographical context – human and physical – may contribute a lot to provoke many of the more acute disease situations.

In the last decades Porto's residents lived under several heat waves. The 2003 and 2006 events are recent examples of this persistent climatic impulsivity. The heat wave definition is not consensual among scientific experts. Its definition depends very much upon the purpose of the research. Anyhow, the WMO consider that a heat wave is a sequence of five days with a daily maximum 5ºC above the average maximum temperature of, at least, thirty years.

Having WMO criteria in consideration, the daily maximum temperatures of July/August of 2003 and 2006 had been quite high, above the thirty years' average, and lasted for several days throughout all the country (Fig.21 to Fig. 23).

At Porto, despite the close proximity to the Atlantic Ocean, the records show an extraordinary sequence of very high values in maximum but also in minimum temperatures. This thermal environment together with the absence of wind, created the needed conditions to affect the most vulnerable population groups especially in terms of respiratory and circulatory system - children and elderly (Fig. 25 to Fig.30).

The majority of the admissions – total, respiratory and circulatory diseases – came from the historical city center and adjacent areas, where the climatic comfort context combined with the demographic and the socio-economic character promote an health vulnerability increase. The fact of being older, living in houses with bad bioclimatic indoor without income capacity to support the use of artificial heating or cooling, are some reasons that may led people to health stress (Fig. 25 to Fig. 30).

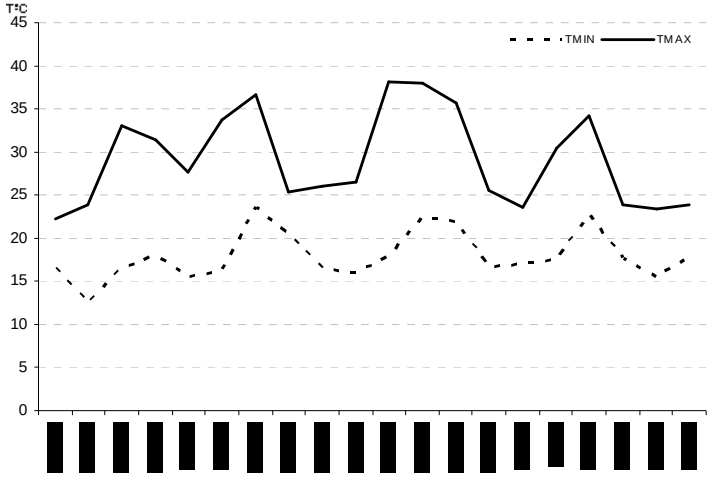

Fig. 21 - Porto's heat wave of July and August 2003 (Porto-Pedras Rubras).

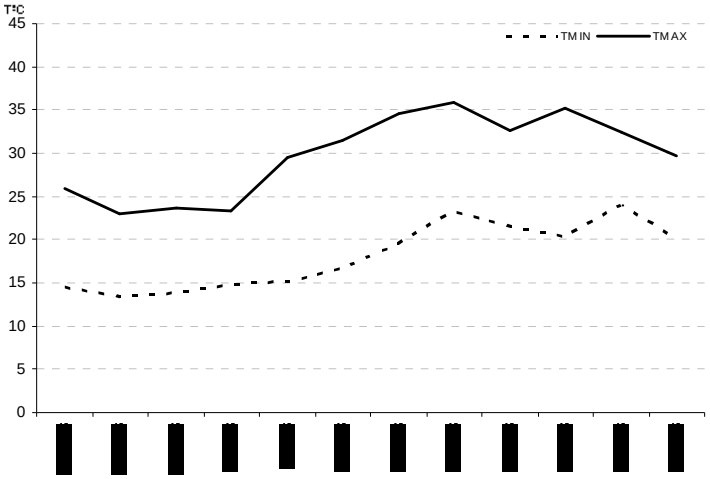

Fig.22 - Porto's heat wave of July 2006 (Porto-Pedras Rubras).

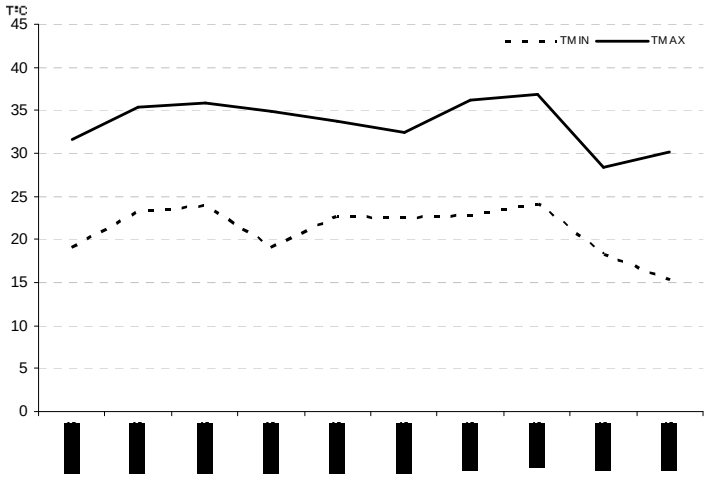

Fig.23 - Porto's heat wave of August 2006 (Porto-Pedras Rubras).

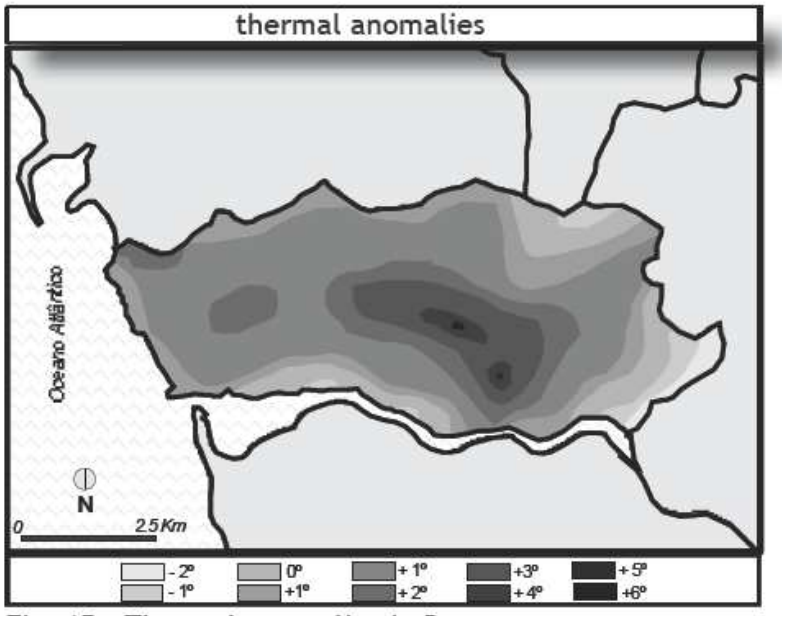

Fig. 24 – Average urban heat island at Porto (Monteiro, 1997).

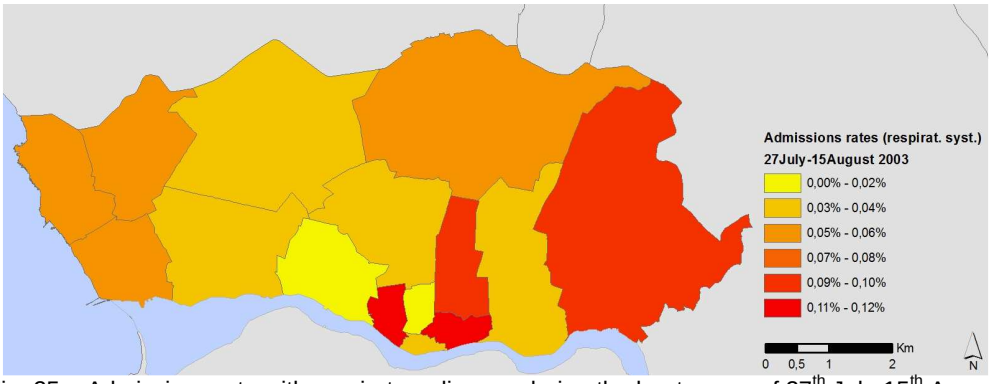

Fig. 25 – Admissions rate with respiratory disease during the heat wave of 27th July-15th August 2003

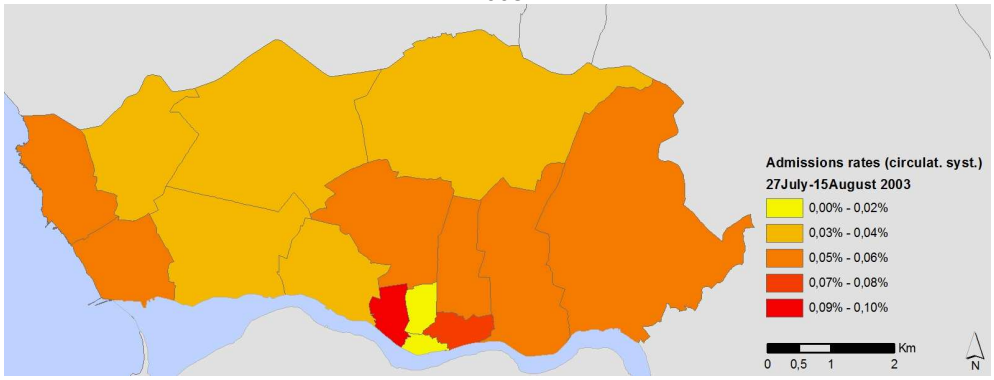

Fig. 26 – Admissions rate with circulatory disease during the heat wave of 27th July-15th August 2003

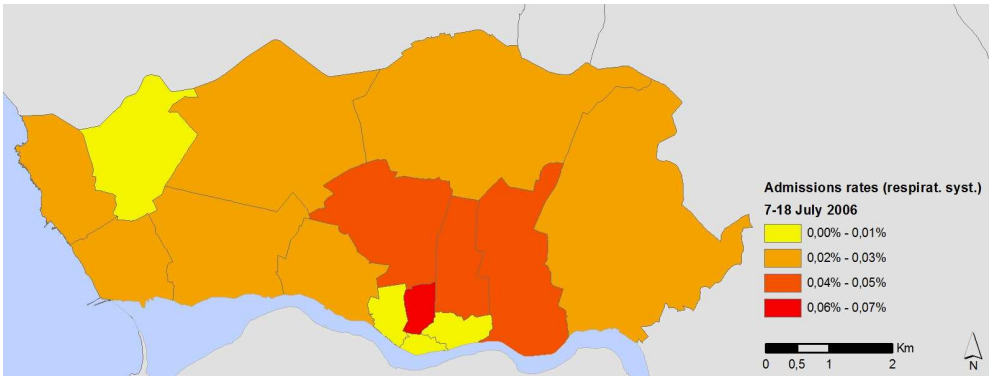

Fig. 27 – Admissions rate with respiratory disease during the heat wave of 7th – 18th July 2006.

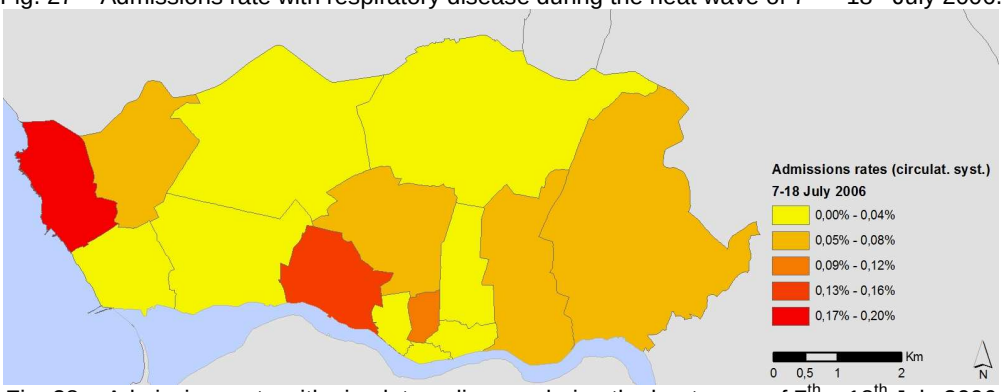

Fig. 28 – Admissions rate with circulatory disease during the heat wave of 7th – 18th July 2006

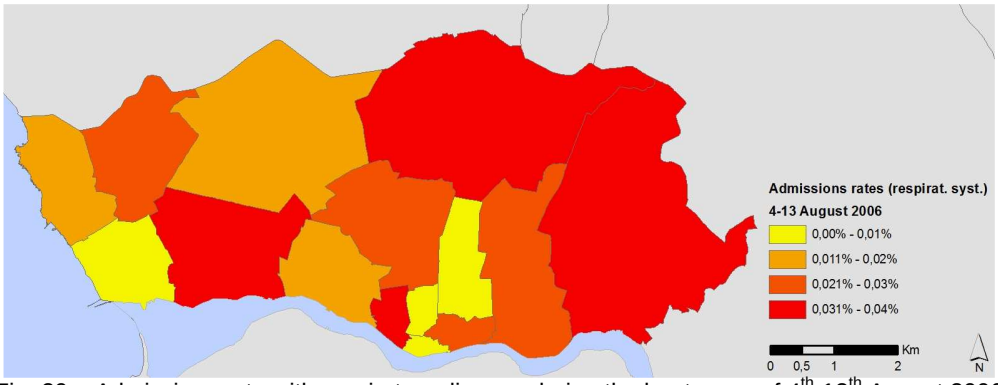

Fig. 29 – Admissions rate with respiratory disease during the heat wave of 4th-13th August 2006

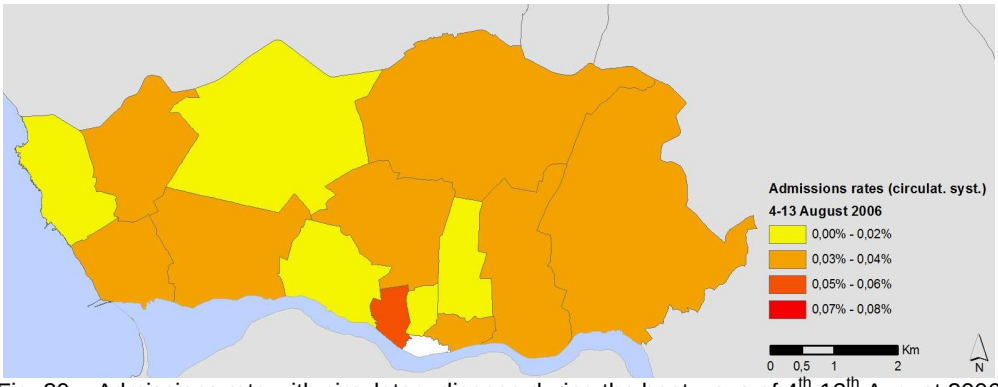

Fig. 30 – Admissions rate with circulatory disease during the heat wave of 4th-13th August 2006

When we see, anytime but in particular during extreme climatic events, the increment of admissions of people that live in the old city center and in the poorest parishes of Porto where the indoor bioclimatic comfort and atmospheric pollution live side by side with the lower levels of family incomes, we understand that a sustainable urban planning should have in mind that the city is a particularly sensible and complex milieu where an effective intervention is the one that is able to touch the multidimensional value of each piece of the global material and immaterial puzzle.

However, the most serious problems' diagnosis is a much easier task. We can choose whatever look we prefer because the social, the economic and the environmental injustice coincide in urban space.

4. Health and happiness – an alternative perspective to do urban planning

Being so, one possible alternative look to have a systemic approach in sustainable urban planning may be choosing happiness as target during the planning process.

In this context, happiness should be understood as an effective way of transforming resources through activities/technology in better wellbeing patterns to human and other ecosystem elements.

Being true that the multiple dimensions of happiness and wellbeing - health, basic needs' satisfaction, feelings, freedom, safety, time, culture, entertainment, etc. - are more likely to be meet in an urban area, the fact is that it is not easy to offer/plan a product or an idea that accomplish the desire of all (Fig. 31).

Citizen's wellbeing and happiness is a state and a process. It is a condition that results from a complex subjective assessment and a set of individual objective condition evaluation. This feeling emerges from a process in which a person held an objective assess of its mental and physical condition at the moment, compares his/her state with the other's and concludes subjectively about his/her feelings.

Health, cognitive and sensorial condition, character, individual expectations, attitude, faith and emotional relationships compete to shape our subjective assessment at a certain moment (Fig. 31).

The employment, income, education, housing, health, culture, family, security, governance and environmental quality embodies the essential ingredients to the objective conditions formatting that drives us to feel more or less happy (Fig. 32).

Fig. 31 - The determinants of health and wellbeing (Barton and Grant 2006).

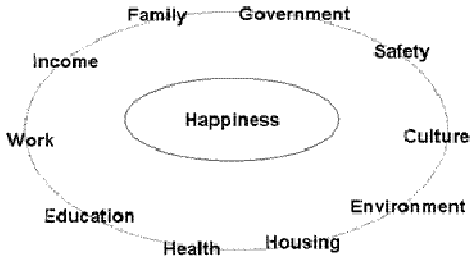

Fig. 32 – Objective conditions of happiness.

Urban planners are supposed to ensure the better conditions to provide employment, security, environmental quality, leisure and recreation spaces, facilities for education and health which assemble the needed ingredients of happiness objective dimension. Nevertheless, in the field of the subjective dimension the planners' interference is more induced than offered. Neighbourhoods' size and aesthetic, green areas, accessibility, health facilities or climate comfort are examples of happiness inductor factors that should be taken into account.

The subjective component of wellbeing and happiness is much a personal issue although in urban areas the people density makes easy a kind of patterns replication by contagious effect.

5. The Porto's front and the backyard

Mixing some objective and subjective dimensions of happiness in a GIS, after looking through a correlation matrix and a principal component analysis, and having always in mind the previous considerations of what we understand as the main components of happiness and wellbeing, we try to estimate the shape and size of what may be identified as the bright and the gloomy city of Porto (Fig. 33 and Fig. 34).

The bright and happy city was sketch combining data from graduation degree rate (>31%), unemployment rate (<2,5%) and buildings constructed after 1996 (> 21%)

The gloomy and unhappy city was considered overlaying data of elderly dependence (> 76%), illiteracy rate (> 16%), unemployment rate (> 21%), respiratory disease (> 1%).

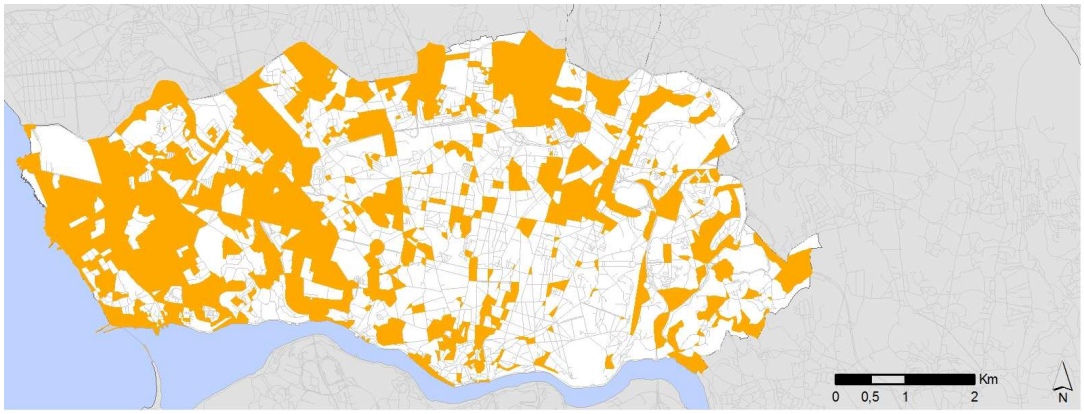

Fig. 33 – The bright and happy city.

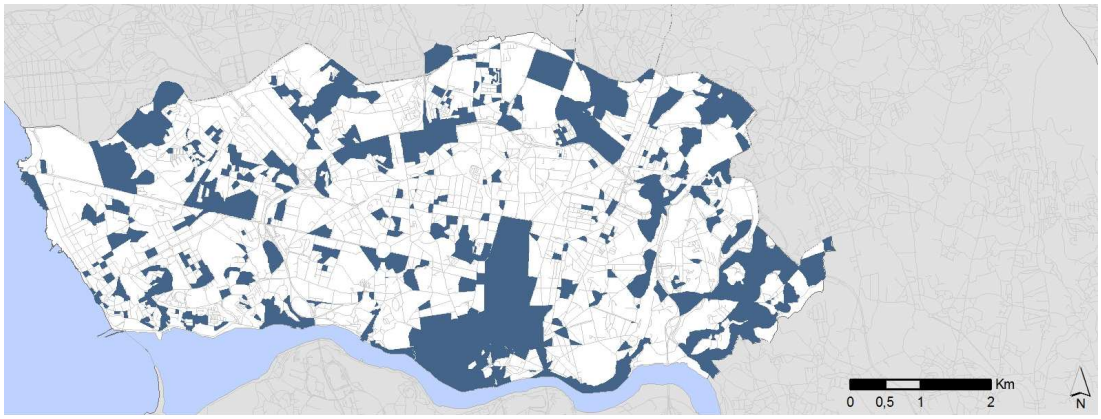

Fig. 34 – The gloomy city.

We believe that both visual expressions (Fig. 33 and Fig. 34) illustrates, with great accuracy, the mental map of social and environmental (in)justice that those who live, investigate or help decision-makers of Porto carries in their mind.

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