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THE HISTORICAL CITY AS THE SUSTAINABLE COMPACT CITY MODEL

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Objectives: The objective of this paper is the presentation of the idea that the so persecuted model of the sustainable city, in one of its major models – the compact city – already exists. It is the historical city, or the historical centre of existing cities, developed over hundreds of years, which form and social relationships were shaped according to the principles of human scale, one of the major factors of sustainability.

Introduction: The theme of this 6th International Symposium of the Organisation of the World Heritage Cities, "Risk Preparedness and Emergency Response in the context of the management of the World Heritage Cities", leads us to reflect about one of the major risks that menace our cities in general and the World Heritage cities in particular – the unsustainable urban environment. When we think in menacing risks it comes to our minds the natural catastrophes as the earthquakes, or the human provoked disasters as the armed conflicts, but there is a much more subtle menace that has been increasing since industrialisation – the lost of the balance between urban and natural environments which is leading to unsustainability.

Sustainability: This complex concept deals mainly with the delicate balance between inheritance and legacy.

Like in domestic economy we can not spend more than we earn. But also like in domestic economy we are spending more than we can, living on credit, hoping that someone will pay our debts in the future. That is not sustainable anymore.

The expression "World Heritage Cities" gives a clear idea of the city as heritage – something that we inherit and want to legate to the future. But inheritance is today a heavier burden, because it is not anymore just monuments, historic buildings, sites, historic gardens or even intangible heritage (like tradition and memory, that free us from the damages of globalisation), today, heritage concerns the urban ecosystem with it all as one, with its delicate balance, lost in the majority of the modern cities.

Sustainability is an emerging theme in all disciplines that deal with urban environment. We can consider that this theme gained international

recognition in 1987 through a report of the World Commission on Environment and Development (UN) – «Our Common Future», also known as the «Brundtland Report».

This report gave us the first commonly accepted definition of sustainable development – "(...) is that which meets all the needs of the present without compromising the ability of future generations to meet their own needs".

The «Green Paper on the Urban Environment» (1990), produced by the Expert Group on the Urban Environment of the European Commission, enlarged this thematic to the urban environment.

But it is the Rio Conference in 1992 that really makes a difference with the production of the «Agenda 21», a document that aims to extend sustainable development to the entire planet. From this moment sustainability becomes a popular theme.

Also in Rio de Janeiro, eight years after the Agenda 21, the conference «The Sustainable City 2000», gave us a definition of a more particular version of sustainable development, which major concerns dealt with the problems of city's environment – the urban sustainability: "The concept of sustainability as applied to a city is the ability of the urban area and its region to continue to function at levels of quality of life desired by the community without restricting the options available to the present and future generations and causing adverse impacts inside and outside the urban boundary".¹

Besides all the evolution of the concepts and the development of some successful case studies, until now we have not reached the aimed goal of the sustainable city.

The Compact City: Unlike the examples of the past, that gave us some models of the ideal city, this present model of «ideal» is not anymore a concrete and well-designed city, but an abstract and complex concept. That is why no one really knows how is the shape of this city, but everybody involved in the urban management is questing for it.

The theme of urban environment was first discussed in 1973 through the book «Compact city: a plan for a liveable urban environment». The authors, G. DANTZIG and T. SAATY, introduced

1. The Sustainable City 2000 – Conference Statement – [http://www.wessex.ac.uk/conferences/2000/scity/#the final statement](http://www.wessex.ac.uk/conferences/2000/scity/#the%20final%20statement)

the concept of the compact city as the urban model that offers more liveable conditions and improvements in the urban environment.

In the «Green Paper on the Urban Environment» (1990), the idea of compactness and subsequently the compact city model were reaffirmed as the main goals of the sustainable city.

But in truth the debate of the sustainable city is still open, and up till now it was not possible to establish without doubts that the compact city is the right model to achieve sustainability neither it was possible to clearly materialise this model in an urban shape. However, the cities of Paris and Barcelona are generally accepted as being, in certain aspects, the closest urban forms to the sustainable compact city model. In terms of World Heritage Cities we can choose the Portuguese city of Évora, a very common example of a European Mediterranean city, that represents a urban form that we can accept as being close to the compact city.

In 1996, M. JENKS et al co-ordinated a book untitled «Compact City: A Sustainable Urban Form?», where they conclude that this model was a viable mean to achieve sustainability, but not the only way. It was stressed the necessity to develop further more the investigations about urban sustainability and a correspondent city shape.

Prosecuting this line of investigation the same authors, in 2000, tried to establish the relationship between the sustainable city and it's concrete shape, in another book that follows where the previous one ended – «Achieving sustainable urban form».

From the conclusion of this last work we can stress that the "(...) compact city is most fuel efficient and has the lowest carbon dioxide emissions – savings of up to 43% in fuel are possible (...)”², and that it "(...) may be able to reduce the use of cars by up to 70% and reduce trips for non-work activities by 75% (...)”³. In the social field it is underlined that the mix of uses in the compact city promotes the social equity. In summary, we can state that the compact city is pointed as the model of the sustainable city, even if it is not the only one, it is the most proved model. Even so, we must take into account that the compact city is not a rigid dogma, but a flexible model that should help us in our quest for the sustainable and most liveable city.

Also in its conclusions, and even more important in the context of the historical city, concrete city forms are shown as positive answers in the

process of sustainability. Among these are the traditional neighbourhood, stated as having "(...) the potential to reduce carbon dioxide emissions by 42%, provide transport energy savings of 57%, save 26% in energy (by designing homes to make the most of solar energy), and reduce time and distances travelled.”⁴

One of the characteristics of the historical city and traditional architecture, the adaptability, is also referred, using the studied examples of the cities of Lisbon and Edinburgh, where the perimeter block, "(...) with adequate space, offers the best form for allowing change over time, but without disrupting the original urban plan or form.”⁵

In terms of concrete solutions this book points that most of these "(...) promote compaction and mix of uses to achieve communities or neighbourhoods.”⁶ The re-use of buildings is also one of the more established solutions.

The Historical city as the sustainable model: The historical city or, most commonly, the historical centre of the city, is the urban model closest to the sustainable one. This relationship was already mentioned in the analysis we made about the conclusions of the book «Achieving sustainable urban form». Now we will take into consideration the advantages of the compact city over the diffuse city. The comparison between these two types of city models was made by Salvador Rueda (2000) in an article untitled «City models: basic indicators».⁷

From this article it was possible to compare a certain number of sustainability indicators that relate the diffuse city model with the compact city model, and also to establish the relation between the compact city and the historical city.

Looking at the consumption of materials needed to produce and maintain the urban model, the diffuse city is clearly negative in terms of sus-

2. JENKS, Mike, BURTON, Elizabeth and WILLIAMS, Katie (eds.) (2000), *Achieving Sustainable Urban Form*, E & FN Spon, London, p. 348.

3. *Ibidem*.

4. *Ibidem*.

5. *Ibidem*, p. 349.

6. *Ibidem*, p. 354.

7. RUEDA, Salvador (2000) City models: basic indicators in *Quaderns d'arquitectura i urbanisme*, 225, C. A. C., Barcelona, p. 29

tainability. This is because there is a greater dispersion of buildings and infrastructures, the built surface per inhabitant needed is higher and the development typology requires more maintenance. In the compact city model the proximity between uses and functions means less consumption of materials, smaller built surface and less maintenance needed by the development typology. In terms of the historic city not only it has the advantages of the compact city, as it overcomes these advantages. The consumption of materials indicator is largely positive in terms of sustainability in the historic city, because we are dealing in this case with a recycling process that, apart from the obvious contention in the consumption of materials, saves at the same time a material of quality – our common heritage.

The consumption of energy indicator, according to the model of mobility, services and development typologies, also favours the compact city model. This is because the diffuse city model consumes more energy in its mobility model that is based on private vehicles, in its networks of services that are dispersed and in its single-family typologies that consume more energy. The inverse situation happens in the compact city – most journeys can be made on foot, bicycle or public transportation; there is proximity of the service networks; the energy demand on apartment buildings is lower. The same situation applies to the historical city. However we must underline that to achieve a sustainable energy demand on the apartments of the historic city it is necessary to apply the principles of the ecological architecture in the rehabilitation of the houses. As an example we have the city of Catania in Italy, where the rehabilitation project of a historic quarter aimed at integrating renewable energy uses. The objective was to reduce energy consumption and air pollution levels and to improve the bioclimatic conditions and general living comfort in the area while at the same time respecting architectural traditions and aesthetic needs.

Also the consumption of water is higher in the diffuse city than in the compact and historic city, which is directly related with the development typologies of the diffuse city – the single-family buildings – that consume water in the garden, swimming pool, etc.

The indicators related to the pressure of impact on support system show us that in the diffuse city the pressure is higher. The consumption of land is greater than in the compact city, due to the urban explosion without demographic growth. The consumption of land to support the building

system also leads to the impermeabilisation of areas of infiltration and others. In general there is a loss of biodiversity because the expansion of mobility networks generates “islands” of natural and farming systems. In the compact city these natural systems are conserved due to the compactness of the building fabric. The emission of greenhouse gases and atmospheric pollution are both higher in the diffuse model due, respectively, to the increasing energy consumption and models of mobility and energy use. The lower consumption of energy and the greater accessibility in the compact model leads to a better performance regarding the pollution aspects. The historic city follows the compact city indicators in respect to the land consumption, biodiversity, infiltration of water and pollution, leading to a minor pressure of impact on the environment.

The organization of the urban system is also in deficit in the diffuse model, if we take into account several social indicators as the urban complexity, proximity between information bearers and social cohesion. The mix of uses, the greater diversity of information bearers and the mix of people and families with different economic and ethnic characteristics produces in the compact city a greater social stability because it increases the number of recurrent regulatory circuits. The historic city also possesses these social characteristics, reinforced by a social cohesion established by centuries of urban complexity and mix of uses.

The urban quality, evaluated by three indicators – atmospheric pollution, noise and public space – gives for the first time in our analysis an advantage for the diffuse city, but even so with great possibilities for the compact city to recover with adequate measures as we will see in detail. We also have to consider that these indicators are directly related with the maintenance and increase in organisation of the urban system. The atmospheric pollution is higher in the compact model due to more intense use of the urban fabric that provides higher levels of emissions. Also higher are the noise levels on this model due to the concentration of vehicles. A reduction in the number of vehicles in circulation, integrated in a policy of car restriction and promotion of public transportation, may serve to reduce urban noise and pollution (like Curitiba municipality in Brazil did). The last indicator – public space – favours again the compact city model. This is because in such city type the street and square are still the main spaces of contact and public life, promoting complexity and mix of uses that leads to social cohesion and a greater quality of life. In the historic

city this is a proven fact as is the quality of the urban spaces, reinforced by the quality of the built environment, surpassing any of the existing models, contributing in that way to the uniqueness of each urban organism.

In summary the comparison between the several city models shows that the compact city is still validated by these indicators as is by the most recent literature. The historic city follows and some times surpasses the compact city model becoming in that way a materialisation of such abstract model. The same literature also points some characteristics of the historic city and its re-use as some of the paths of sustainability.

Conclusions: It may seem a paradox but the historic city, a model from the past, is now the future. This is a fact even for the most up to date theories and practices of urban planning in the years to come, because not only the historic city has a sustainable urban form, but also possesses the potential to achieve sustainability in its plenitude.

As we saw the historic city is the urban form with most potential to achieve sustainability giving a material and concrete form to a so persecuted theoretical and abstract model.

We have to consider sustainability not as a goal, but as a continuous process.

To start this process we need to recover the **balance** in the city between development and conservation, giving priority to the rehabilitation of the existing structures in the truth spirit of recycling, so dear to the ecological movement. Balance is not just a matter of mathematics but also a real question of the city survival.

Another crucial goal to achieve in this process is the recovery of the **human scale**. This means that we need to search for the human element in the urban planning process, approaching the technicians to the inhabitants of the city, looking at the same time for the cities in the city, in the formal and social points of view.

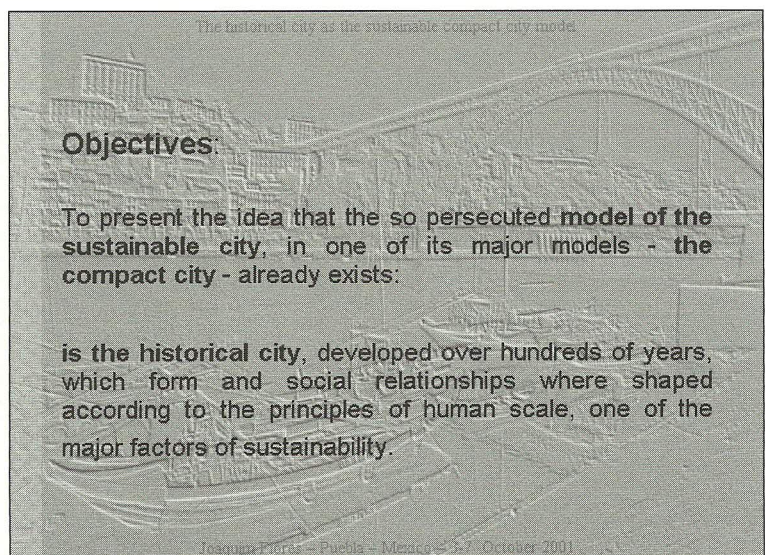
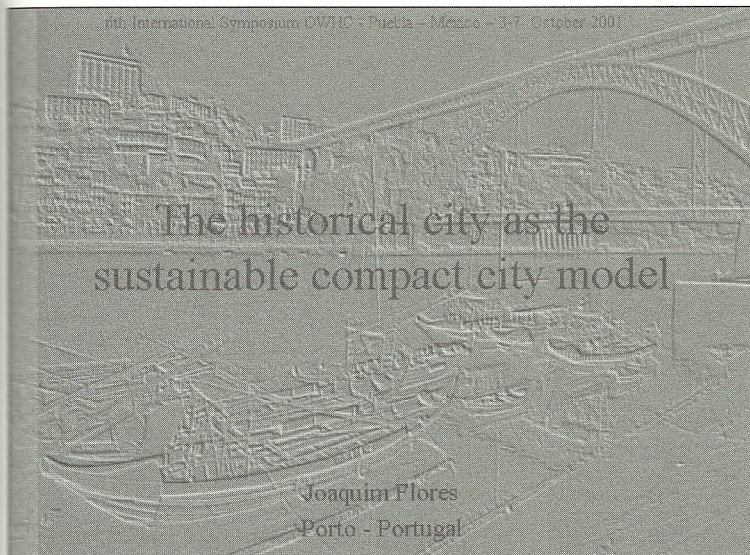
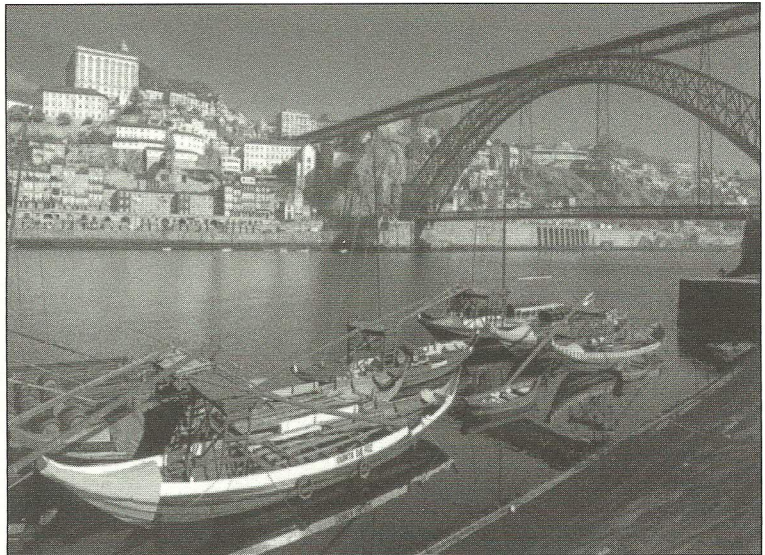
The third fundamental point is the **recycling** strategy, because we have to take into account that the historic city is an existing built heritage that can not be lost, not only for its intrinsic economic and artistic values, but also for its memorial value that characterises each place and saves it from the dangers of globalisation.

These three crucial strategic vectors – **balance**, **human scale** and **recycling** – can be concretised in several specific actions:

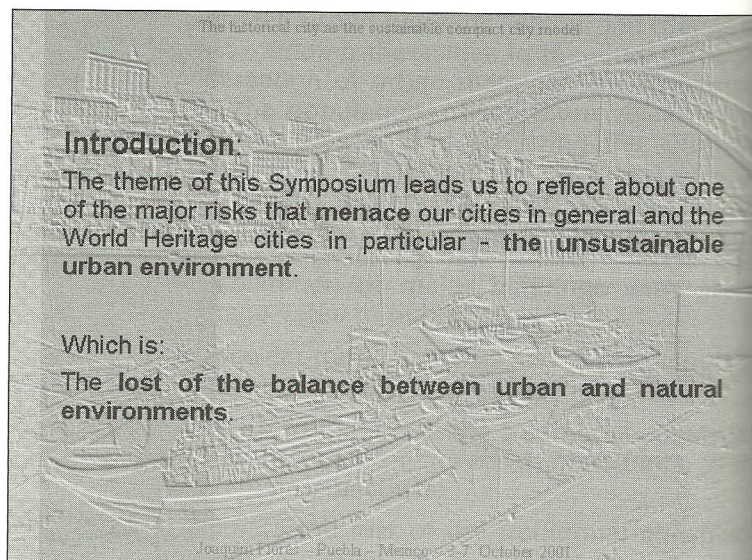
- Approach urban planning with urban management – finding the «cities in the city» through the creation of urban management structures near the population, giving them voice in the planning process and achieving the «human scale».
- Control the urban growth, giving priority to the re-use of the existing buildings.
- Rehabilitation of major buildings with great heritage value to public uses.
- Reduce car traffic in towns and promote public transports, bicycles and pedestrian mobility.
- Promote formation in the traditional construction techniques for the local inhabitants, with three main objectives:
 - Obviate the lost of the traditional construction techniques.
 - Promote employment among the inhabitants of the historic city.
 - Lower the price of building rehabilitation, promoting urban conservation.
- Promote the ecological rehabilitation, applying the concepts of passive solar energy and recycling materials, with the objectives of reducing the consumption of energy, consequently reducing the levels of pollution, and minimising the consumption of construction materials.

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The historical city as the sustainable compact city model



Introduction:

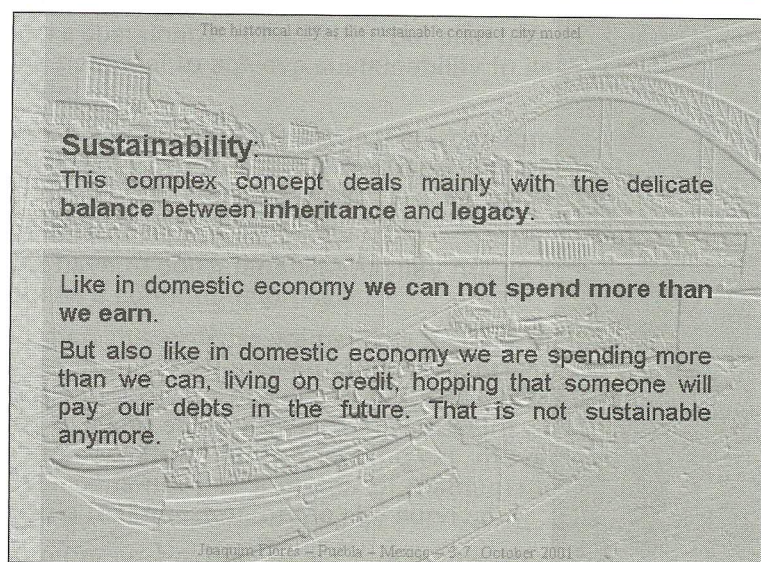
The theme of this Symposium leads us to reflect about one of the major risks that **menace** our cities in general and the World Heritage cities in particular - **the unsustainable urban environment**.

Which is:

The lost of the balance between urban and natural environments.

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The historical city as the sustainable compact city model



Sustainability:

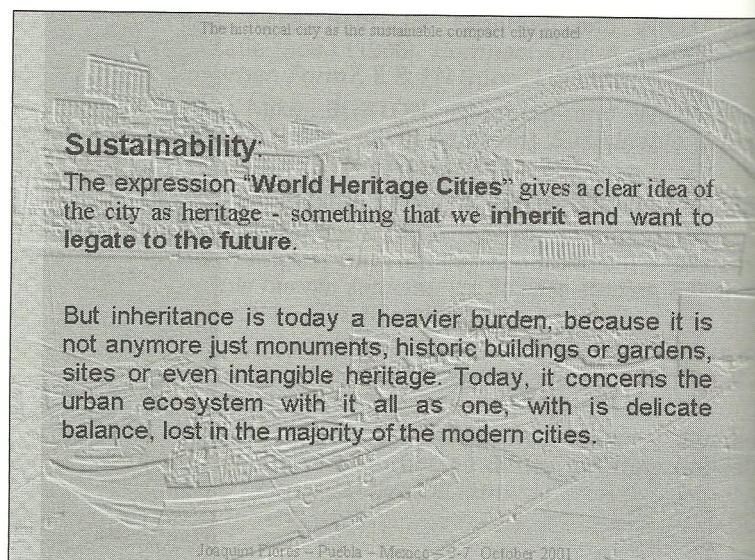
This complex concept deals mainly with the delicate **balance between inheritance and legacy**.

Like in domestic economy **we can not spend more than we earn**.

But also like in domestic economy we are spending more than we can, living on credit, hoping that someone will pay our debts in the future. That is not sustainable anymore.

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Sustainability:

The expression "**World Heritage Cities**" gives a clear idea of the city as heritage - something that we **inherit** and want to **legate to the future**.

But inheritance is today a heavier burden, because it is not anymore just monuments, historic buildings or gardens, sites or even intangible heritage. Today, it concerns the urban ecosystem with it all as one, with its delicate balance, lost in the majority of the modern cities.

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The historical city as the sustainable compact city model

Sustainability:

1987 A report of the World Commission on Environment and Development (UN) - «Our Common Future», also known as the «Brundtland Report», gives international recognition to the subject.

1990 - The «Green Paper on the Urban Environment», produced by the Expert Group on the Urban Environment of the European Commission, enlarged this thematic to the urban environment.

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The historical city as the sustainable compact city model

Sustainability:

1992 - The Rio Conference really marks the difference with the production of the «**Agenda 21**», a document that aims to extend sustainable development to the entire planet.

2000 - «The Sustainable City 2000» conference, gave us a definition of the **urban sustainability**, which major concerns dealt with the problems of city's environment.

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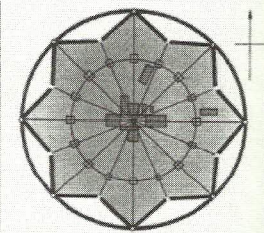
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The historical city as the sustainable compact city model

The Compact City:

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The Compact City:

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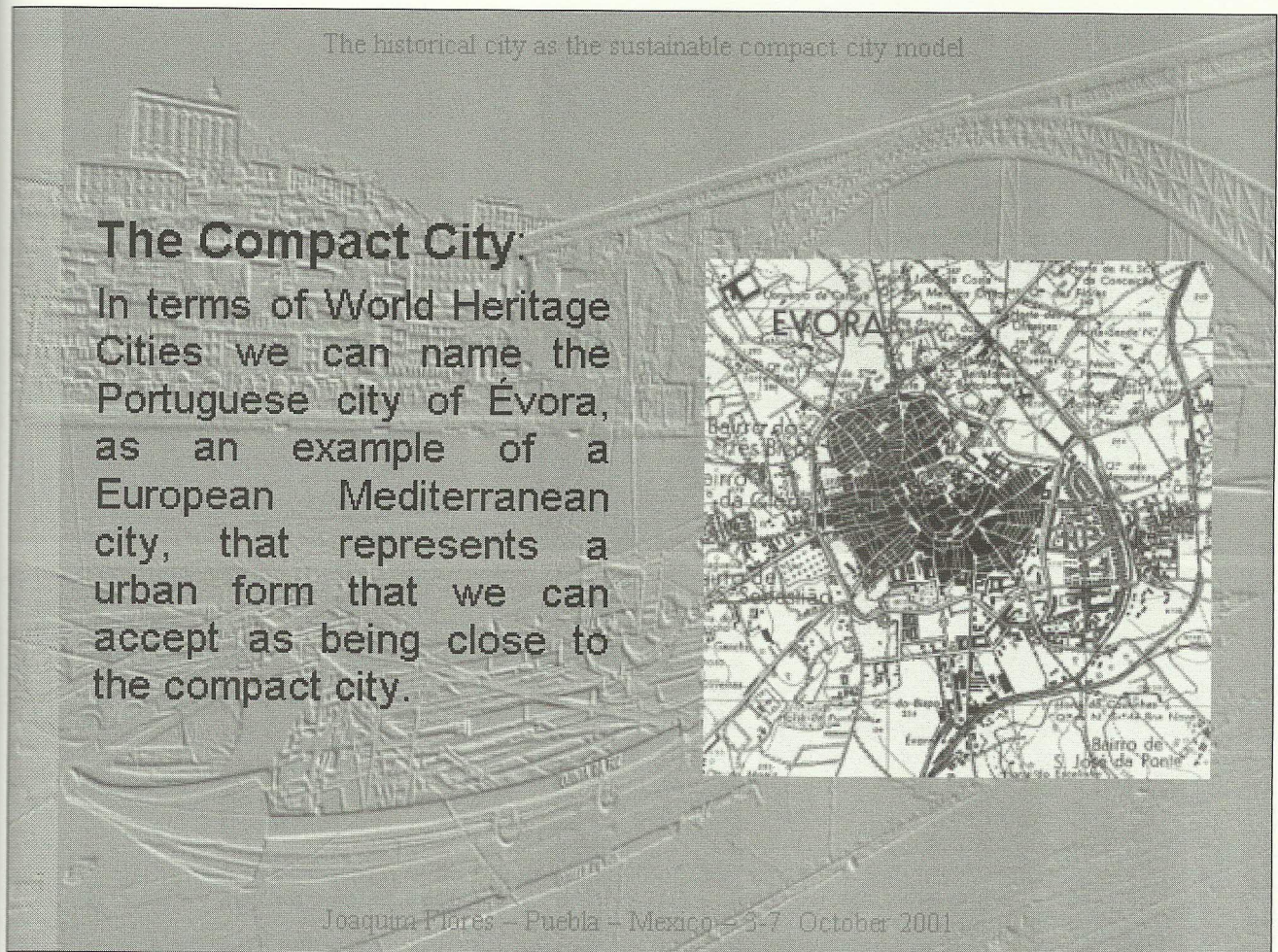
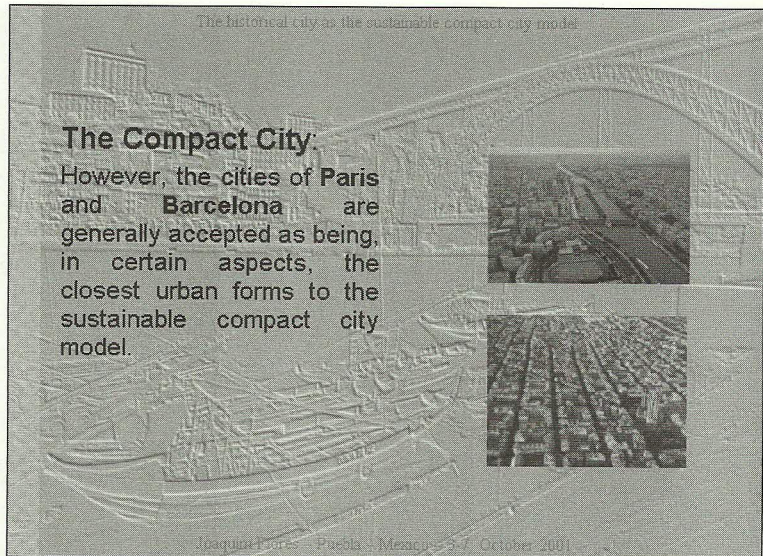
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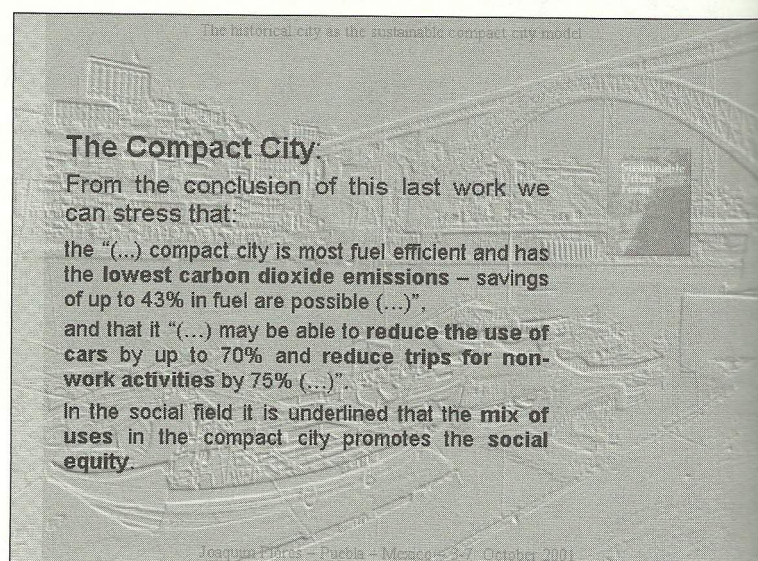
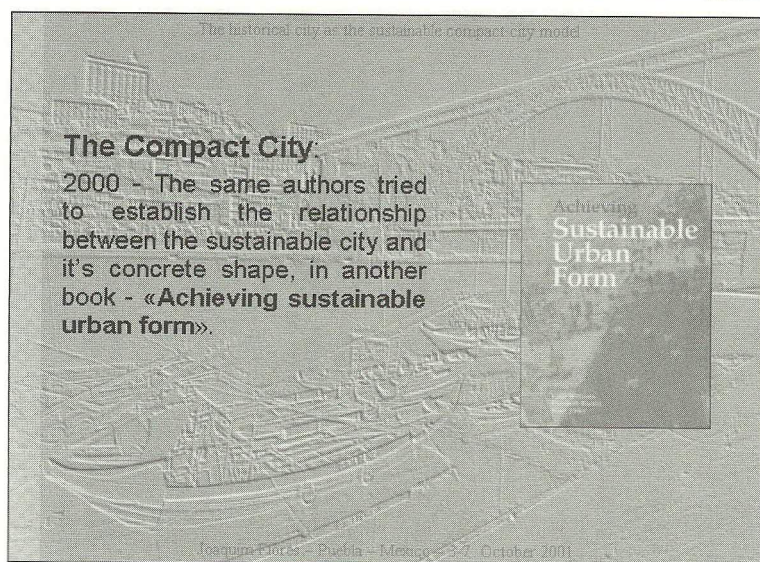
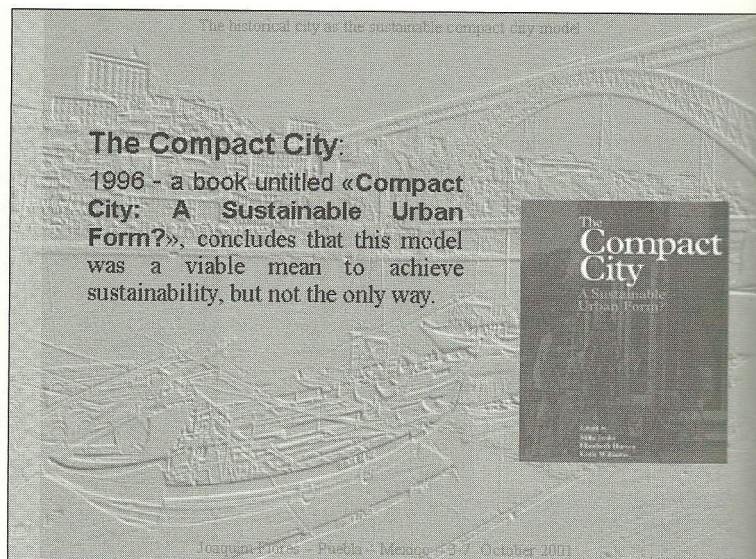
The historical city as the sustainable compact city model

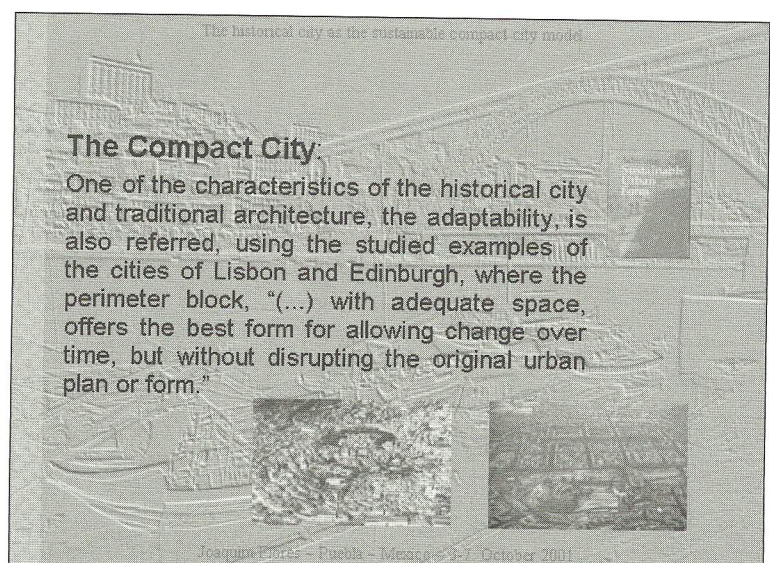
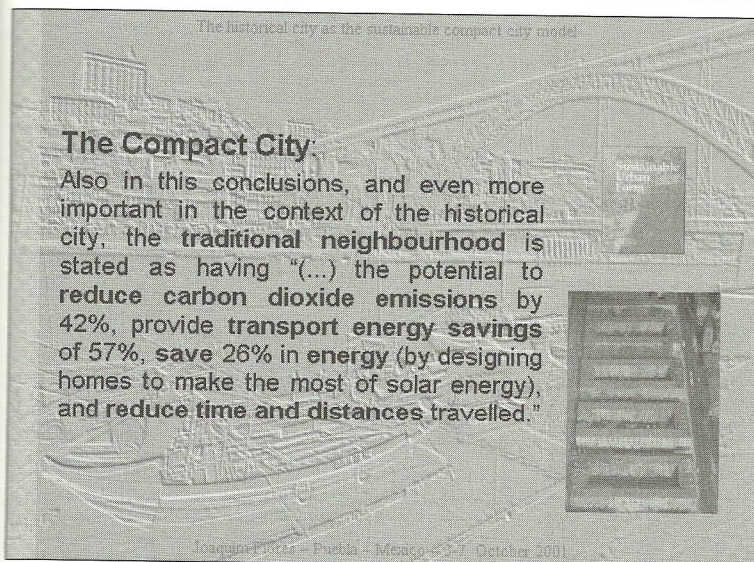
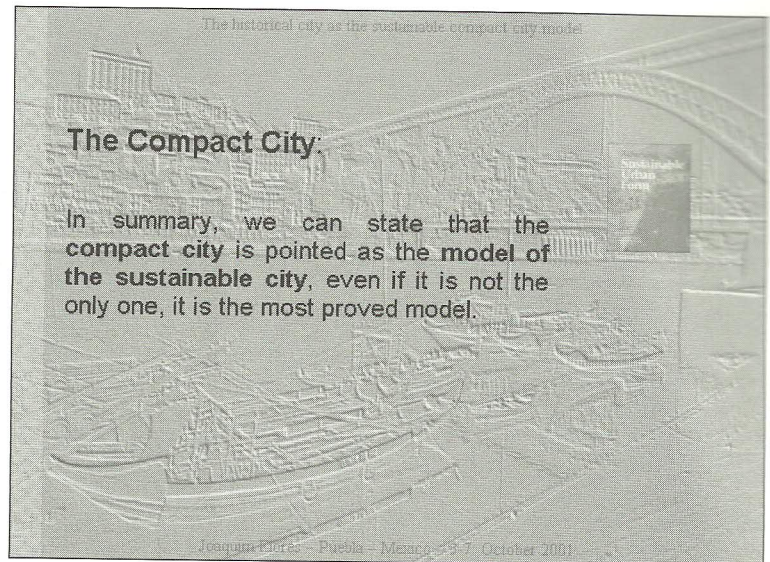
The Compact City:

But in truth the debate of the sustainable city is still open, and up till now it was not possible to establish without doubts that the compact city is the right model to achieve sustainability neither it was possible to clearly materialise this model in an urban shape.

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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

As we saw, the literature points that:
the historical city or, most commonly, the historical centre of the city, is a urban model close to the sustainable one.



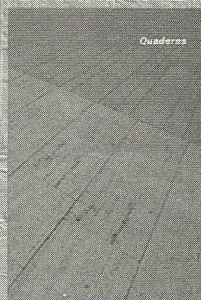
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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Now we will take into consideration the advantages of the compact city over the diffuse city.

The comparison between these two types of city models was made by Salvador Rueda (2000) in an article untitled «City models: basic indicators».



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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Consumption of materials Indicator

The **diffuse city** is clearly negative in terms of sustainability.

In the **compact city model** the proximity between uses and functions means less consumption of materials, smaller built surface and less maintenance needed by the development typology.



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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Consumption of materials Indicator

In the historic city the consumption of materials indicator is largely positive because we are dealing in this case with a recycling process that, apart from the obvious contention in the consumption of materials, saves at the same time a material of quality – our common heritage.



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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Consumption of energy Indicator

This indicator favours the compact city model.

The same situation applies to the historical city. However we must underline that to achieve a sustainable energy demand on the apartments of the historic city it is necessary to apply the principles of the ecological architecture in the rehabilitation of the houses.



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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Consumption of energy Indicator

Example: the city of Catania (Italy) where the rehabilitation project of a historic quarter aimed at integrating renewable energy uses.



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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Consumption of water Indicator

Is higher in the **diffuse city** than in the **compact and historic cities**, which is directly related with the development typologies of the diffuse city – the single-family buildings – that consume water in the garden, swimming pool, etc.




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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Pressure of impact on support system Indicator

The pressure is higher in the diffuse city. The consumption of land is greater than in the compact city, due to the urban explosion without demographic growth.



In the **compact city** these natural systems are conserved due to the compactness of the building fabric. The same applies in the Historic City.

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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Emission of greenhouse gases and atmospheric pollution Indicators

Are both higher in the **diffuse model** due, respectively, to the increasing energy consumption and models of mobility and energy use.

The lower consume of energy and the greater accessibility in the **compact model** leads to a better performance regarding the pollution aspects.




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The historical city as the sustainable compact city model

The Historical city as the sustainable model

Pressure of impact on support system
Emission of greenhouse gases and atmospheric pollution indicators

The historic city follows the compact city indicators in respect to the land consumption, biodiversity, infiltration of water and pollution, leading to a minor pressure of impact on the environment.

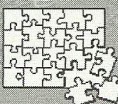


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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

The organization of the urban system is also in deficit in the diffuse model, if we take into account several social indicators as the urban complexity, proximity between information bearers and social cohesion.

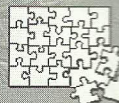
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urban complexity, proximity between information bearers and social cohesion

The mix of uses, the greater diversity of information bearers and the mix of people and families with different economic and ethnic characteristics produces in the compact city a greater social stability because it increases the number of recurrent regulatory circuits.

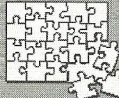
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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

urban complexity, proximity between information bearers and social cohesion

The historic city also possesses these social characteristics, reinforced by a social cohesion established by centuries of urban complexity and mix of uses.

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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

The **urban quality**, evaluated by three indicators – **atmospheric pollution, noise and public space** – gives for the first time in our analysis an advantage for the diffuse city, but even so with great possibilities for the compact city to recover with adequate measures as we will see in detail.



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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

Atmospheric pollution Indicator

Is higher in the **compact model** due to more intense use of the urban fabric that provides higher levels of emissions. Also higher are the noise levels on this model due to the concentration of vehicles.





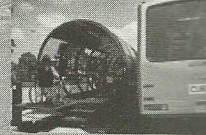
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The historical city as the sustainable compact city model

The Historical city as the sustainable model:

A reduction in the number of vehicles in circulation, integrated in a politic of car restriction and promotion of public transportation, may serve to reduce urban noise and pollution.

Example: The Transport Plan of Curitiba municipality in Brazil.

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The Historical city as the sustainable model:

Public Space Indicator

Favours again the **compact city model**. This is because in such city type the street and square are still the main spaces of contact and public life, promoting complexity and mix of uses that leads to social cohesion and a greater quality of life.

In the **historic city** this is reinforced by the quality of the built environment.




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The Historical city as the sustainable model:

In summary

the comparison between the several city models shows that the compact city is still validated by these indicators as is by the most recent literature.

The historic city follows and some times surpasses the compact city model becoming in that way a materialisation of such abstract model.

The same literature also points some characteristics of the historic city and its re-use as some of the paths of sustainability.

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Conclusions:

To achieve sustainability we need to recover the **balance** in the city between development and conservation, giving priority to the rehabilitation of the existing structures in the truth spirit of recycling, so dear to the ecological movement. Balance is not just a matter of mathematics but also a real question of the city survival.

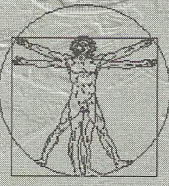


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Conclusions:

Another crucial goal to achieve in this process is the recovery of the **human scale**. This means that we need to search for the human element in the urban planning process, approaching the technicians to the inhabitants of the city, looking at the same time for the cities in the city, in the formal and social points of view.



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Conclusions:

The third fundamental point is the **recycling strategy**, because we have to take into account that the historic city is an existing built heritage that can not be lost, not only for its intrinsic economic and artistic values, but also for its memorial value that characterises each place and saves it from the dangers of globalisation.



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Conclusions:
These three crucial strategic vectors – **balance**, **human scale** and **recycling** – can be concretised in several specific actions:

- Approach urban planning with urban management - finding the «cities in the city» through the creation of urban management structures near the population, giving them voice in the planning process and achieving the «human scale».

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Conclusions:

- Control the urban growth, giving priority to the re-use of the existing buildings.
- Rehabilitation of major buildings with great heritage value to public uses.
- Reduce car traffic in towns and promote public transports, bicycles and pedestrian mobility.

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Conclusions:

- Promote formation in the traditional construction techniques for the local inhabitants, with three main objectives:
 - Obviate the lost of the traditional construction techniques.
 - Promote employment among the inhabitants of the historic city.
 - Lower the price of building rehabilitation, promoting urban conservation.

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