

## **HYBRID METROPOLITAN ARCHIPELAGO (VENEZUELA)** **Innovative planning-evaluation strategy (IPES) for a low carbon future**

### **INTRODUCTION**

The financial and environmental global crisis creates a unique opportunity for a new deal in the 21<sup>st</sup> century, focused on low-carbon growth (Tuck in De la Torre 2009). A “green recovery” - virtuous interaction between environmental revival, job creation, growth re-assumption and low carbon-*hydrogen economy*, oriented public investments and policy actions, is the coherent option for the world community, and demands a creative shared leadership, renovated political systems and global democratic governance. On the other hand, the expectation that a relative low price of fossil fuels is here to stay might not only deter investment in low-carbon technology, it could also induce consumption in favor of cheaper but dirtier energy. Low gasoline prices could deflate the momentum toward low carbon policies and actions and in Venezuela, to change towards a low carbon-sustainable urban planning and management culture. With lower economic growth worldwide, greenhouse gas (GHG) emissions could experience a *cyclical* decline; this might create political incentives to postpone policy efforts to bring down the emissions *trend* and might induce a shift toward a more carbon-intensive growth path (Ibid 2009).

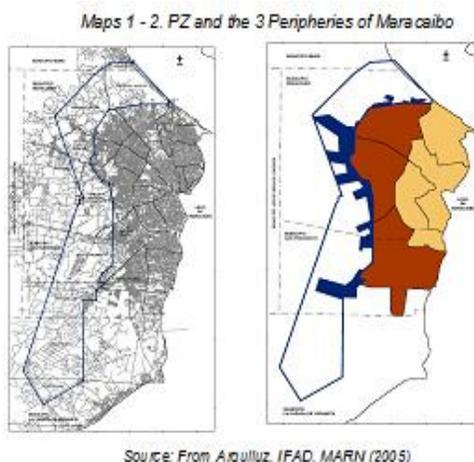
The International Energy Agency (IEA) predicts that Latin America and the Caribbean, LAC's energy-related emissions per capita will grow by 10 percent between 2005 and 2015, and by 33 percent during 2005-30. These projections are much lower than those made for other developing countries -for example, energy emissions in China and India are expected to grow by more than 100 percent on a per capita basis between 2005 and 2030. However, LAC emissions are predicted to grow by more than the world average after 2015 (De La Torre *et al* 2009).

LAC is the most urbanized region in the developing world (UNCHS-Habitat, 2001); with 519 million inhabitants, 75% or 391 million live in cities. It has an urban/rural ratio similar to that of the highly industrialized countries. The proportion of urban population is particularly high in Argentina (89.8%), the Bahamas (88.5%), Uruguay (91.3%) and Venezuela (86.9 %). In LAC and Venezuela, together with a modern sector, connected with the world market, a marginal sector coexists that grows continuously. This double face of the LA cities (dual city) characterized as “one-two city” by Cilento (2005), highlights the existing socioeconomic inequalities and the spatial-territorial segregation, clear expression of a restricted citizenship, where (super) populated neighborhoods with important deficits of services, basic infrastructure and quality of life coexist together with more established-consolidated urban fragments (hybrid city urban genome). This ambivalent-hybrid phenomena “modernization-marginalization” and the ruptures-fragmentation of the urban space - which we conceptualized and recognized as *hybrid city* - are issues that threaten the cities sustainability-low carbon future, the political stability and governance in the medium and long term. The main challenges of the Latin-American and Venezuelan cities are the acknowledgment-acceptance of the *hybrid condition* of its urban fabric, governance and low *carbon-sustainable* urban development and management.

The main pressures on the environment and natural resources are: absence of sustainability-low carbon culture and practices, poverty, increasing inequality of incomes and spatial distribution of life quality, informal urbanization, limited planning and management especially in urban areas, high dependence of many economies on natural resources exploitation and urban sprawl which is linked to changing land uses, deforestation, loss of green-agricultural areas and an increase in distance travelled, which means higher energy consumption with a consequent increase in CO<sub>2</sub> emissions. Venezuela emits 0.7% of global emissions of CO<sub>2</sub>, so is able to sell its rights in the international market for emissions. In Maracaibo (capital of the Zulia state) the CO<sub>2</sub> emissions come mainly from transportation and the energy-oil

sector. This reality impacts the urban environment and therefore to achieve a low carbon future, needs to be evaluated through scenarios and urban sustainable indicators (USI). Urban sprawl and the consequent land use changes in Latin-American and Venezuelan cities derives from uncontrolled urban expansion of the periphery, through planned and spontaneous urban occupation (*hybrid urbanization*) due to the absence or infringement of geographical and legal restrictions (urban limits). These in turn results from rural migration, the transfer of rural land use patterns to the urban periphery; territorial *laissez faire*; limited urban management capacity and inexistence of low carbon-sustainability culture and practice in public-private institutions and communities, although they perceived and inhabit a precarious environment and frequently protest demanding services, security and houses. This illegal ways of habitat production are based on low density and extensive typologies - high energy-consuming-; an urban pattern that generates strong pressures on the environment (increase transport requirements) against which there is no institutional capacity or will to respond due to political or ideological reasons (Sempere 2005).

This dispersed-unsustainable model generates higher mobility and energy consumption in Maracaibo (capital of the Zulia State, located at the western extreme of Venezuela). With an average residential density of 75 inhabit. / hect, the urban expansion has led to the explosion of the city boundaries and the occupation of the edges of the metropolitan urban corridors, which run from the city across the Protective Zone (PZ). The PZ is a green belt of 20.800 Hectares, decreed in 1989 to act as a policy-container of Maracaibo's urban growth and urban limit, in process of mutation by urban rituals in expansion (Maps 1 and 2). It is the territorial expression of the contemporary forms of building city which result from the urban practice of the visible management government (VMG) in the hybrid cities that comprise the metropolitan archipelago referred by the authors as Maracaibo's hybrid metropolitan archipelago (HMAM). The VMG builds city for citizens to inhabit comfortably the hybrid archipelago. In this process the VMG is legitimized by performance and through the improvement of citizen's life quality, creates confidence, social capital, citizen's empowerment and local governance.

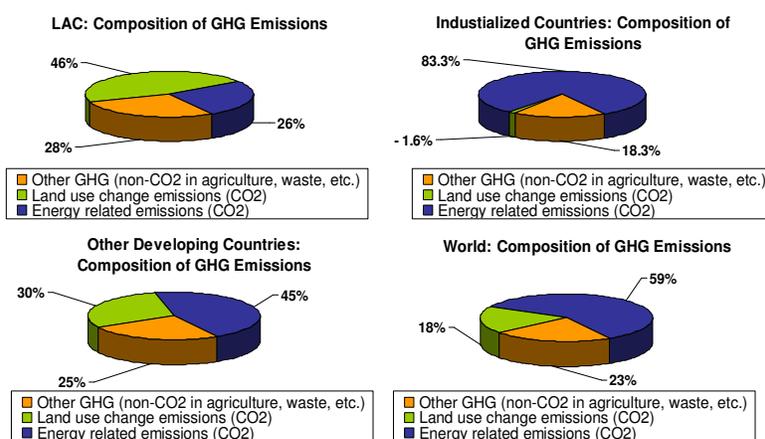


The paper describes the method, *innovative planning-evaluation strategy* (IPES) and results of a study that adopts a new mindset-an innovative approach to *manage sprawl towards a low carbon city* by re-structuring and controlling the -urban occupation of the Protective Zone (PZ)-, to overcome the impact of urban expansion in the LC-sustainability of Maracaibo's - hybrid metropolitan archipelago- (HMA).

## 1. LAC'S GHG EMISSIONS: COMPOSITION, LEVELS AND TRENDS

According to De La Torre *et al* (2009) LAC has historically made a substantial contribution to keeping levels of atmospheric CO<sub>2</sub> low. First, LAC hosts about one-third of the world's forest biomass, and two-thirds of the biomass existing in tropical forests. Were the large amounts of carbon stored in LAC's forests to be released to the atmosphere, current GHG concentrations would already be much higher; Second, LAC has enjoyed many decades of growth with very clean power. In particular, thanks to its low use of coal-fired plants and its large use of hydroelectricity, LAC's power sector generates 40 percent less CO<sub>2</sub> emissions per unit of energy than the world as a whole—74 percent less than China and India, and 50 percent less than the average for developing countries. The composition of LAC's flow of GHG is dominated by CO<sub>2</sub> emissions from land use change, which constitutes 46 percent of LAC's emissions, versus 17% for the world (figure 1). In contrast, the share of CO<sub>2</sub> energy emissions in LAC's total GHG emissions (26%) is smaller than at the global level (59 percent). The remainder of LAC emissions (about 28 percent compared to 23 percent for the world as a whole) is other GHG generated mainly in the agricultural sector -70 percent in the case of LAC vs. 55 percent for the world - but also as a result of waste disposal as well as industrial and extractive activities (Ibid 2009). LAC has an enormous mitigation potential associated with reducing *land use change emissions*, which implies looking in detail at the potential for avoiding deforestation and implementing a forestation and reforestation projects. Second, it would be critical to maintain and reduce LAC's relatively low ratio of emissions to energy, including emissions from power generation, transport, industrial activities and commercial and residential buildings.

**Figure 1. Composition of GHG Emissions, LAC, and Other Regions of the World**



Source: From De La Torre *et al* (2009, CAIT, WRI).

Of particular concern is the recent trend toward increasing the carbon intensity of power supply due to the shift away from hydroelectricity and toward natural gas and coal, a trend that is exacerbated in future projections of the sector. To maintain the past relatively low level of energy-related emissions, the Region and Venezuela, would have to invest further in energy efficiency, renewable and cleaner transport (De La Torre *et al* 2009).

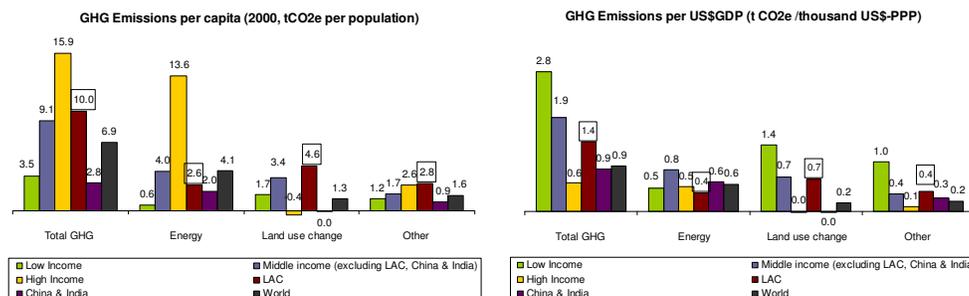
### 1.1. How large are the region's emissions?

For De La Torre *et al*, LAC emissions accounts for about 8.5 percent of the world's population and GDP, and for 12 percent of global emissions, considering all GHG. The Region's emissions are thus above the world average in terms of their ratio to both population and to GDP. While there is no agreement on how to measure responsibility and capability, those ratios could be used at least as indicative proxies for respectively the Region's *responsibility* and *potential* for reducing emissions. On both counts, as shown in

figure 2, LAC would be in an intermediate position, in between low- and high-income countries. Thus, LAC's per capita emissions would be lower than those of industrialized countries, but higher than those of low-income. Figure 2 shows that despite the large growth in GHG emissions observed in China and India during recent years, those countries still have much lower emissions per capita than LAC, and a much lower ratio of emissions to GDP. However, if the focus is placed on energy emissions, LAC is among the regions of the world with lowest emissions per unit of GDP, and its emissions per capita are more than 30 percent below the world average (Ibid 2009).

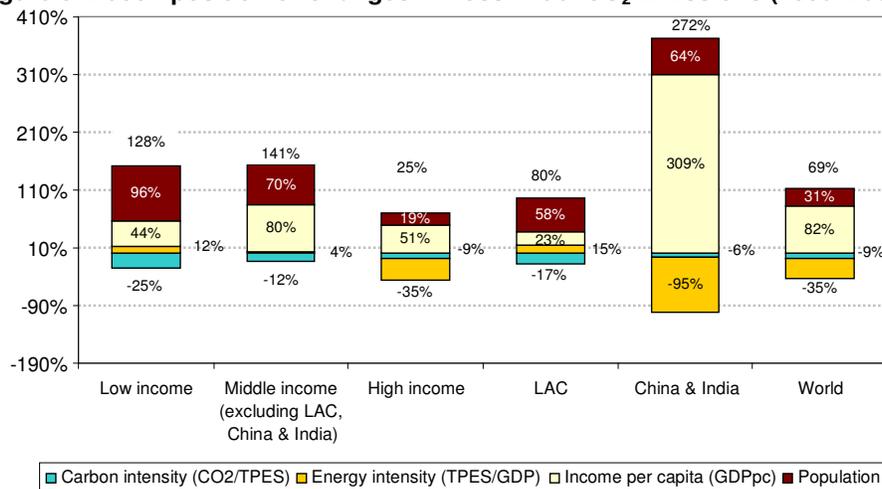
A growth pattern similar to LAC's has been observed in Africa and Central and Eastern Europe. In contrast, the countries from Centrally Planned Asia (mainly China), the Far East (including India, South Korea, and Indonesia), and the Middle East have exhibited uninterrupted and explosive rates of growth in per capita emissions. LAC's ratio of emissions to GDP has also remained relatively stable, experiencing only a 2 % increase between 1980 and 2004. In contrast, there was a 28% decline in global emissions per unit of GDP during the same period, a 33% reduction in industrialized countries, and a 48 % drop in the case of China and India.

**Figure 2. Ratios of GHG Emissions to Population and GDP (2000)**



Source: From De La Torre et al (2009, CAIT, WRI).

**Figure 3. Decomposition of Changes in Fossil Fuel CO<sub>2</sub> Emissions (1980–2005)**



Source: from De La Torre et al 2009 (Primary Energy Consumption: Energy Information Administration, International Energy Annual 2005; CO<sub>2</sub>: IEA and Marland et al. (2007); GDP (ppp adjusted) and population: WDI)

The fact that LAC's emissions per unit of output have remained relatively stable is to some extent surprising, given that the Region has achieved large reductions in the quantity of emissions per unit of energy consumed. This reduction in LAC's "carbon intensity of energy" has been almost totally compensated by a growing level of energy consumption per unit of GDP. This is a trend that has only been observed in LAC and in low-income countries

(Figure 3). During the same period other middle-income countries (including China and India), as well as high-income countries, exhibited decreasing levels of energy intensity, especially in the years immediately following the oil shocks of the 1970s (Ibid 2009).

### 1.2. LAC cross-country differences in emissions patterns

About 85 percent of the region's emissions are concentrated in six countries. Brazil and Mexico account for almost 60 % of both the region's total GHG emissions and GDP. Another 25% of LAC's emissions and GDP comes from by Argentina, Colombia, Peru, and Venezuela. A similar ranking emerges if one excludes emissions from land-use change, with the exception of Brazil and Mexico, for which the share of LAC total emissions respectively falls from 46 to 34 percent and increases from 13 to 21% (Table 1).

**Table 1. Relative Importance of Mitigation Potential**

	Energy Emissions (CO <sub>2</sub> )	Land Use Change (CO <sub>2</sub> )	Non-CO <sub>2</sub> Emissions	Total GHG Emissions in 2000 (Mt/CO <sub>2</sub> e)
Brazil	Low	High	High	2,333
Mexico	Medium	Low	Low	682
Venezuela, R.B. de	Medium	Low	Low	384
Argentina	Medium	Low	Low	353
Colombia	Low	Low	High	274
Peru	Low	High	Medium	257
Bolivia	High	High	High	144
Chile	High	Low	Low	99
Ecuador	High	Low	Low	99
Guatemala	Medium	High	Medium	84
Nicaragua	High	High	Medium	66
Panama	Medium	High	Low	58
Paraguay	Medium	High	High	54
Guyana	Medium	High	High	39
Honduras	Medium	High	Medium	31
Dominican Republic	High	Low	Low	30
Trinidad and Tobago	Medium	Low	Medium	29
Belize	High	High	High	23
Costa Rica	Medium	Low	Low	21
Jamaica	Medium	Low	Low	16
Uruguay	Low	Low	Medium	16
El Salvador	Medium	Low	Low	15
Haiti	Low	Low	High	11
Suriname	Medium	n.a.	High	4
Antigua and Barbuda	Low	n.a.	High	2
Grenada	Medium	n.a.	n.a.	0.3
Dominica	Low	n.a.	n.a.	0.2

Source : De La Torre et al, 2009

While emissions from land use change are responsible for almost half of LAC's total GHG emissions, their share varies widely across countries in the region. In five countries -Bolivia, Brazil, Ecuador, Guatemala, and Peru- land-use change accounts for at least about 60% of total GHG emissions. In contrast, in Mexico, Chile, and Argentina, the share of land-use change emissions is close to 15%. Brazil alone is responsible for 58% of LAC emissions from land-use change, followed by Peru with 8 percent, and by Venezuela and Colombia with about 5% each (De La Torre et al 2009).

There is considerable heterogeneity across LAC countries in levels of GHG emissions, both in per capita terms and as a ratio to GDP. Total GHG emissions per capita are between 13 and 17 tCO<sub>2</sub> per capita in Bolivia, Venezuela, and Brazil and below 7 tCO<sub>2</sub> per capita in

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Chile, Colombia, and Mexico. The former three countries are also among the region's top per capita emitters even if land-use change is excluded, although in this case their emissions per capita are much closer to those of Argentina, Chile, and Mexico. In LAC, a recent analysis by the Inter-American Development Bank estimates that energy consumption could be reduced by 10 percent over the next decade by investing in energy efficiency. The cost of such measures would be US\$37 billion less than investing in new electricity generation capacity. In the case of Mexico, ongoing studies sponsored by the World Bank suggest that between 2008 and 2030 GHG emissions could be reduced by about 15 million tons (Mt) of CO<sub>2</sub>e through an increased use of cogeneration in the steel and cement industries and by means of efficiency improvements in residential and commercial lighting. In both cases the cost of achieving the corresponding emission reductions would be negative (De La Torre *et al* 2009).

## **2. HYBRID METROPOLITAN ARCHIPELAGO, SCENARIOS TO MANAGE SPRAWL FOR A LOW CARBON FUTURE**

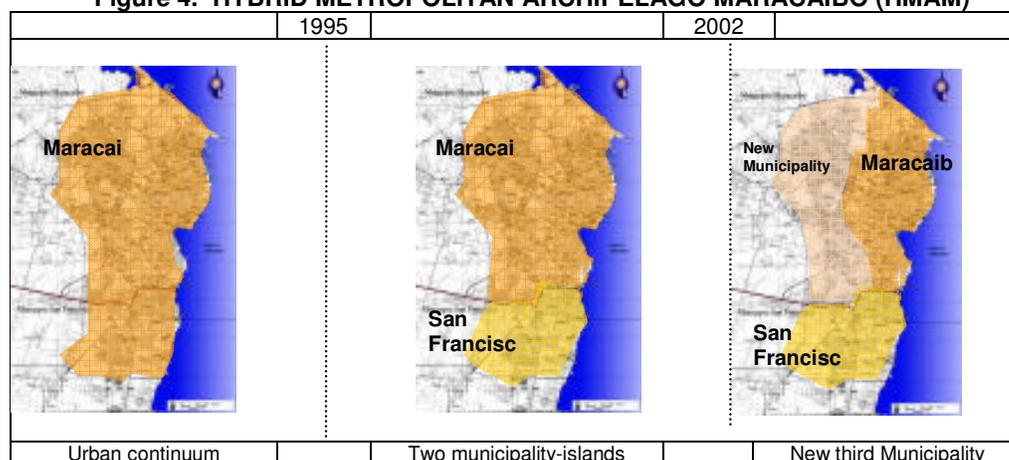
### ***2.1. Hybrid Metropolitan Archipelago (HMA)***

Venezuela is essentially urban, with almost 28 million inhabitants, 86, 9 % live in cities and 75% of them in metropolitan areas (multi-municipal). For Oteiza (1996) the Venezuelan city shows that the greater builders of city are the citizens excluded economically, self-managers that "build the city", more quickly than the planners and Mayors, creating the "other spontaneous city" larger than the "formal" city. To plan and to think the Venezuelan city is necessary to include the "other city", a reality for the majority of the population; therefore, is necessary an alliance between the formal and informal city (hybrid-mix city), or to formalized the informality (Salas in Oteiza 1996). Hybridization, according to Garcia Canclini (2000) "is the concept that permits plural and open readings of *mixture histories*" (urban fragments with different genetic codes) "and to build consensual projects. it also contributes to identify and to explain multiple fertile alliances" (governance). Re-thinking the Venezuelan and Latin-American city as a "hybrid city" (HC), will promote its comprehension and understanding of the permanent transmutation / crossing-border process to which the citizens are all submitted, to search for *governance and, sustainable-innovative solutions* to its problems, since its perception and analysis as "one-two city", formal and informal, planned and spontaneous, has not allow further innovative thinking. Terán (in Arraiz 2001) with whom we agree, states that the disjunctive between compact and disperse is more of cultural models than spatial ones and, that the new town planning should assume the diversity, the fragmentation and "*the city as an archipelago*"; in which each fragment can have its own *genetic code*.

Following Gausa (in Arraiz 2001) Maracaibo can be conceived as an *assembly of hybrid cities inside the city* (city archipelago) and, as any global assembly that develops under the direct influence of diverse factors, results in a non planned-mixed succession of events that imply new movements and territorial concepts -hybrid metropolitan archipelago-. Maracaibo's *hybrid archipelago* is composed of municipalities-islands, sum of hybrid fragments, floating elements in an inexact magma, separated by empty spaces or discontinuities, where each one of the islands can belong to different organizational codes and have different personality (Terán in Arraiz 2001). The *hybrid metropolitan archipelago Maracaibo* (HMAM) is the case of study and territorial expression of the policy of municipal division that the Legislative Counsel of Zulia State (LCSZ) advances since 1995 in Maracaibo (capital of State Zulia, located in the western extreme of Venezuela) when it was divided into two municipalities: Maracaibo and San Francisco. This tendency has deepened with the proposal made by the LCSZ in 2002, to divide the Municipality Maracaibo into two municipalities, Maracaibo East and Maracaibo West. This fragmentation-municipalisation process has implied the transformation of "the city of Maracaibo" from an urban continuum into a Hybrid Metropolitan Archipelago, formed by municipalities-islands where the local governments through a visible

management, try to recreate new identities and urban images (Figure 4). This process derives from the need to limit the growth of Maracaibo - 1.6 million inhabitants and a hybrid-disperse urban territory of 22.807 hectares -, to approach the power to citizens, guarantee a “good government” and to overcome the economic and social exclusion and urban poverty of Maracaibo’s western periphery. The proposal is supported in the successful experience of San Francisco municipality, which transformed the south of Maracaibo -a marginal, neglected, and badly structured territory- through a new municipal synergic management model, participatory budgets and a more equitable distribution of the local public finances and services.

**Figure 4. HYBRID METROPOLITAN ARCHIPELAGO MARACAIBO (HMAM)**



Source: Ferrer *et al*, 2005.

## 2.2. Scenarios to manage sprawl towards a low carbon future

The importance of reducing the climate change impacts and the search for the best approach to cut carbon dioxide emissions have been debated and discussed at various policy and research platforms in different countries (Yip 2009). This is not the case in Venezuela, where urban sustainability and low carbon principles are not included in the political agenda or urban plans. This author strongly recommends the adoption of a “low carbon” approach to urban planning and city management in view of the existing urban challenges. The concept of “low carbon cities” is closely aligned with the overarching concept of sustainable development: *through the adoption of sustainability as the driving planning objective, and the integration of ecological and resources management principles into the urban planning decision making process, carbon emissions can strategically and effectively reduced without compromising the need of urban economic growth* (Yip 2009). The key challenges for managing sprawl and planning for a low carbon city future are: management planning in terms of carbon emission and reduction; projects guided and designed to provide “renewable energy supply” and, resource, emissions and residues sustainable management and, applying in the urban plans the concepts reduce, reuse, and recycle, (Yip 2009).

## 3. INNOVATIVE PLANING EVALUATION STRATEGY (IPES)

To **manage sprawl for a low carbon future** in the HMAM, an innovative planning-evaluation strategy (IPES) was designed and applied. The IPES fills the gap of the local urban planning by assuming the principles of sustainable-low carbon city development & management (SLCDM), by *braiding the low carbon urban planning process (LCUPP) with the Pressure-State-Response Model (PSR)* and the support of *Geographical Information Technologies (GIT)* -satellite images and GIS- to build up urban models, specific attributes and urban sustainable indicators (USI). The IPES (LCUPP+PSR+GIT) is a multilayered-relational model that braids the LCUPP with the PSR and GIS models.

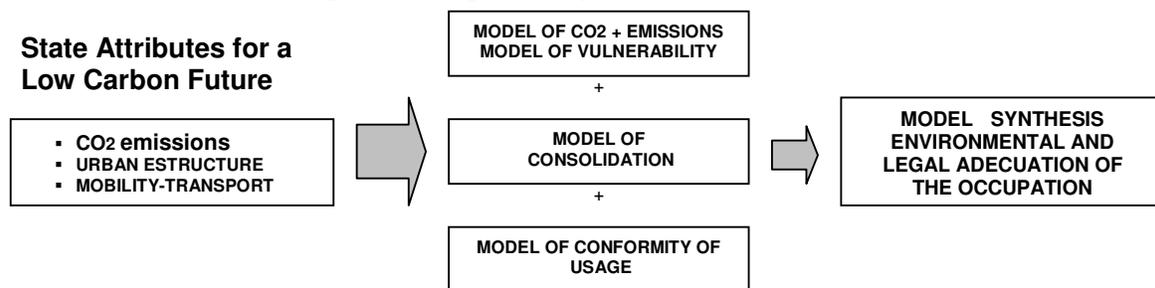
In this IPES, the causes of environmental changes, **Pressure** are correlated with the urban-spatial scenarios, their effects **State** with the diagnose synthesis and, the **Response** with the multilevel government and stakeholders, urban projects, actions and policies, proposed and undertaken to deal with these changes. To reach a concerted vision of the future scenarios and to build an integral territorial hypothesis for the PZ-HMAM, sustainability-low carbon principles and governance -stakeholders' interrelations-connectivity and participation- were the key principles of the research.

### 3.1. IPES: BRADING LC Urban Planning & Management with the PSR MODEL and GITs

Sustainable- *low carbon* (added by the authors), development for Gonzalez and De Lazaro (2005) is a philosophy with political, economic and scientific dimensions and sustainability a shared responsibility that requires a progressive learning, a change in the behaviour inertia and citizens participation. The initiatives to achieve urban LC-sustainability, according to these authors are: controlling the urban expansion, the recovery of the city, the sustainable management of resources and residues, the protection of the cultural-natural patrimony, the improvement of the accessibility, transport efficiency, within an integrated approach and participation of the stakeholders. The Pressure-State-Response model (PSR) is a widely accepted framework for the compilation of sustainability performance indicators, adopted by the OECD and referred to by the World Bank (WB).

- **Relation of USI of State – PZ Diagnosis** Synthesis is explained in Figure 5.

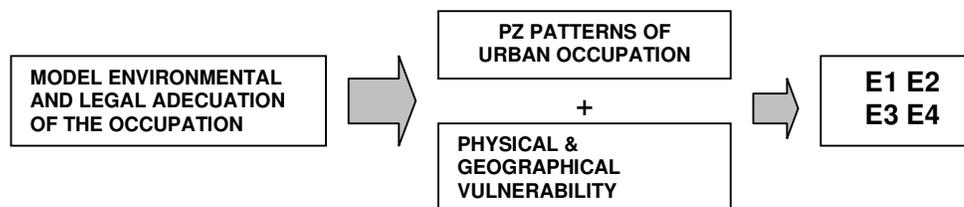
Figure 5. Diagnosis Synthesis – USI of State



Source: From Arquiluz, IFAD, MARN, 2005

- **Relation of USI of Pressure – PZ Scenarios.** The definition of the scenarios results from the combination of the existing pattern of urban occupation (Model of Consolidation) and the Model of Vulnerability (Figure 6).

Figure 6. Spatial Scenarios of PZ-USI of Pressure



Source: Arquiluz, IFAD, MARN, 2005

### 3.2. Formulation of PZ Spatial Scenarios = Attributes and USI of Pressure

The low carbon-sustainable evaluation strategy identifies the tendencies of occupation of the PZ (USI of pressure) and the different expansion alternatives of the HMAM. These options are presented as scenarios of territorial occupation and **policies for managing urban sprawl for a low carbon future**. Five scenarios were formulated (Table 2).

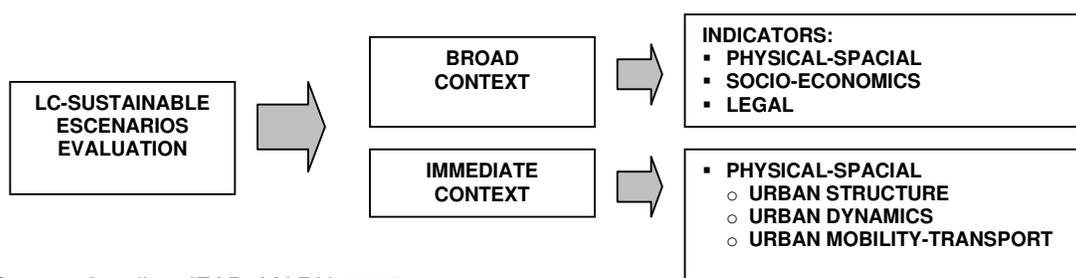
**Table 2. Scenarios Characterization**

ESCENARIOS	CHARACTERIZATION
<b>E1:</b> Incorporation of occupied areas	Recognizes the existing occupation and incorporates the compatible consolidated usages
<b>E2:</b> Corridors of tendencies expansion	Normalizes the growth tendencies produced along the metropolitan corridors. The areas between the corridors maintain the PZ usages.
<b>E3:</b> Regularization of the urban continuum	Reaffirms the urban use along the corridors proposed in the E2 and includes an adaptation of the usages of areas between corridors
<b>E4:</b> Incorporation of PZ as area of urban expansion with regularization of usages	<b>Total des-affectation of the PZ</b>
<b>E4A:</b> Occupation of the PZ	Occupation proposed by Maracaibo and San Francisco Municipalities

Source: Giusti and Ferrer, 2005

The scenarios' evaluation considered the extended and immediate context (Figure 7).

**Figure 7. Scenarios Evaluation**



Source: Arquiluz, IFAD, MARN, 2005

The matrix developed for the evaluation of the scenarios is a simple matrix of cause-effect. (Table 3).

**Table 3. Scenarios Evaluation**

ISU OF PRESSURE	SCENARIOS	E1	E2	E3	E4
<b>BROAD CONTEXT (HMAM)</b>					
Physical –Spatial Aspects					
Socio-Economic Aspects					
<b>INMEDIATE CONTEXT (PZ)</b>					
Physical –Spatial Aspects					
Socio-Economic Aspects					
Legal Aspects					
<b>TOTAL</b>		<b>-5</b>	<b>-12</b>	<b>- 33</b>	<b>- 53</b>

Source: Giusti, R. and Ferrer, M. - IFAD/LUZ (2005).

**Table 4. PZ-HMAM IPES MODEL**

PSR	ATTRIBUTES SIG models	QUALITY OF LIFE SIG variables	USI proposed
	<b>Air quality</b>	- CO2 + GH emissions	<b>E0.</b> Reduction of CO2 + GH emissions
	<b>Vulnerability</b>	- Density of Vegetation - Water courses and topography quality	<b>E1.</b> Hect. concentration. <b>E2.</b> Hect, PZ occupied

<b>STATE</b>	<b>Urban Structure</b>	- Quality of the urban space. - Accessibility: to main services, employment - Urban Equity: spatial distribution of services, public- green space.	<b>E3.</b> Inh/Hect <b>E4.</b> Hect. consolidate and not <b>E5.</b> Km. To public services <b>E6.</b> Hect. / Inh. With services
	<b>Habitability of poor neighborhoods</b>	- Consolidation of poor barrios and quality of life homologation. - State of conservation of dwellings - Urban Security: Homicides, robberies and traffic accidents reduction	<b>E7.</b> Number of barrios consolidated <b>E7.</b> Hect. of invasion (Inh/Hect) <b>E9.</b> No. dwelling improved. <b>E10.</b> Number of homicides, robberies and traffic accidents
<b>PRE SSURE</b>	<b>Urban Transportation &amp; Mobility</b>	- Urban Motorized Transportation: noise, air quality, energy consumption-saving. - Public Transport: New routes and buses - Mobility: traffic tendencies.	<b>P1.</b> Cars/inhabitant and zone. <b>P2.</b> Level of noise / zone. <b>P3.</b> Age & quality of the fleet <b>P4.</b> No. of routes.
	<b>Urbanization Pressure</b>	- Urban Growth- expansion/sprawl - Density of population. - Extension of the city: spatial segregation by the decrease of the accessibility.	<b>P5.</b> Density. <b>P6.</b> Hec. OF illegal occupation of the Protective Zone. <b>P7.</b> Hec barrios outside the city
<b>R E S P O N S E / G O V E R N A N C E</b>	<b>VMG LEGITIMACY BY RESULTS</b>	LC -Urban Planning and Management Measures	<b>R1.</b> Implantation LA 21 and LC principle <b>R2.</b> Number of land legalization <b>R3.</b> Number of new urban centralities. <b>R4.</b> Hect. of green areas in the west <b>R5.</b> Control of urban expansion..
		Measures for LC traffic (mitigation) and access to public-green spaces	<b>R7.</b> Km. new urban routes of LC Metro <b>R8.</b> Km from new centres to the periphery <b>R9.</b> M2 / inhabit. public – green areas.
		Measures for contamination reduction (CO2 +GH emissions)	<b>R10.</b> Expenses of the municipality in protection of the quality of the air and reduction of noise. <b>R11.</b> Development of noise ordinances <b>R12.</b> CO2 control transport -vehicle
		Measures of LC- sustainable education	<b>R13.</b> LCC marketing <b>R14.</b> Campaigns for LC-environmental consciousness.
		Measures for energy saving	<b>R15.</b> Efficient energy use <b>R16.</b> Mobility pattern modification
	<b>GOVERNABILITY PARTICIPATION</b>	- Opportune - efficient answer to needs of the citizens - Shared vision of the city - Citizens empowerment - Social Capital - New LC-sustainable urban culture	<b>R17.</b> Transparency -Accountability <b>R18.</b> Promotion of local identity. <b>R19.</b> Responsible participation <b>R20.</b> Number of new civil societies. <b>R20.</b> Creation of the Mancommunity of Maracaibo & San Francisco. <b>R21.</b> LC-HMAM Management Plan.

Source: Ferrer, 2009, from MIMAM (2005: 28). Note: Hectares=Hect.; LCHMAM= Low Carbon Hybrid Metropolitan Archipelago Maracaibo

## 6. CONCLUSIONS: SCENARIOS FOR MANGING SPRAWL TOWARDS A LOW CARBON FUTURE

In relation with the tendency of occupation, the research shows that only 12, 24% of the territory of the PZ is occupied by residential developments contrary to the thesis of different municipal actors. Only 38 % of the residents are located in Maracaibo's Municipality. 21% of this area has medium consolidation, 50, 42% medium-low and 17, 6% low consolidation. On the other hand, the scenarios evaluation shows that the impacts of all SCENARIOS in the sustainability of the HMAM are always negative. Because: 1<sup>st</sup> The PZ occupation reinforces the unsustainability of the PZ-HMAM-; 2<sup>nd</sup> Is contrary to the existing regulations established in the Urban Ordering Local development Plan and the Decree of the Protective Zone and 3<sup>rd</sup> the new demands on services in the PZ will accentuate the existing deficits, the low quality of life and the precariousness of Maracaibo's HMA. Nevertheless, the social and human situation in PZ requires normalizing the existing occupations. Considering the above statements the *E2 Scenario: Corridors of Tendencial Expansion* appears the most favorable towards a *low carbon future* because controls the urban sprawl, adjusting and organising the present lineal urban occupation along the metropolitan corridors and maintaining intermediate areas of protection that function as green belt (PZ). This scenario re-creates a new LC-sustainable urban landscape for the HMAN, compact, dense and polycentric-multifunctional.

### - **Prospective**

This final phase of the Study contemplated the presentation of the Diagnosis Synthesis and the Scenarios to the PZ Commission (PZC). Maracaibo's Municipality is making strong pressure to achieved total des-affectation of PZ, under the false premise that having governability over this territory will facilitate the control of the informal sprawl. This statement doesn't consider the incapacity of the municipality to manage and control the spontaneous invasions within the urban area of Maracaibo and the impact of the occupation of the PZ in the quality of life of the HMAMaracaibo, which as mention before is already precarious and unsustainable. It is a paradoxical situation. The Urban Development Plan of Maracaibo (PDUM 2005), formulated by the Municipal Office of Urban Planning -OMPU- included the future vision of the city, and was approved by the Municipal Council (the municipal legislative body) in January of 2005. A year later, the OMPU, due to political-ideological and social pressures is trying to modify it. Till today a final decision has not been reached and the debate has not transcended the communities. This situation demonstrates the validity of one of the thesis of the research. The existence of territorial *laissez faire* for political and ideological reasons; the inexistence of LC-sustainability culture in the municipalities, other levels of government and private developers and the relation between the VMG forms of building city, the increasing informal occupation of the PZ and the precariousness of Maracaibo's habitat. In this context, Maracaibo tends to configure a hybrid archipelago, assembly of municipalities-islands or "*metápolis*" according to Gausa (2001) fragmented, disarticulated and dispersed, where specialized and consolidated areas coexist with excluded and disconnected areas. The expansion of the city has resulted in the illegal and legal -hybrid occupation of the PZ-. The incorporation of the PZ as urban land will duplicate the urban area of the MAM -43.800 hectares- diminishing the density to 41% inhabitants and increasing Maracaibo's unsuitability and precariousness.

According to the results of the Study and the evaluation carried out it is clear that it is necessary an important effort to overcome the PZ-HMAM deficits of LC-sustainability. However a hybrid sustainable urban landscape can be achieved if the VMG is transformed into an intelligent and innovative government VMGI + I and through the application in the HMAM of a joint sustainable urban management. Building the LCC of the 21st century in Venezuela is to have a PROJECT OF CITY AND CITIZENSHIP assumed as "instrument of democratic governance" and to develop a new LC urban culture and praxis.

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#### ***Interview***

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