

THE EMERGENCE OF SLUMS IN CARACAS:

HISTORICAL BACKGROUND, GROWTH PATTERNS, AND COUNTERMEASURES

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1. INTRODUCTION

This paper aims to discuss, in an impartial and facts-based manner, the elements and causes for the emergence of spontaneous settlements in the Venezuelan capital of Caracas, their historical and social background, political interventions, as well as the aftereffects of their anarchic expansion from an urban and human perspective. Economic inequity is one of the primary problems that has led Caracas to become a 'dual city', meaning that the reality of the living conditions within the city greatly differs between formal and informal settlements – an issue that is highly linked to the country's complex political and classicist background. "How are slum areas in Caracas growing and why?" became fundamental questions throughout the execution of this research – so in order to understand the problem, as well as the root causes of their emergence, it became vital to thoroughly study their socioeconomic and historical background (the why). To comprehend the physical growth patterns of the sprawl phenomenon, it was decided to examine the driving forces that influence their further development (the how). Having a clearer idea of both intangible and physical factors that have led to uncontrolled expansion and a series of social complications made us wonder "What countermeasures could be implemented to subside their impact, and improve the residents' quality of life?", where Participatory Development came into play as a potential solution.

Keywords: *Informal settlements, urban expansion, social inequity, urban poverty, remote sensing data, slum countermeasures, participatory development.*

2. METHODOLOGY

As this thesis comprises three individual, yet strongly interrelated papers, different methodologies were applied to each study. Chapter II involves a critical review and evaluation of bibliographic material concerning historical events and causes that led to the emergence and expansion of slums. For Chapter III we used a method of image classification of remote sensing data, and conducted an analysis of logistic regression to study driving forces that influence informal expansion, where we resorted to remote sensing data to study the growth of such areas in a period of 27 years, from which we were able to generate data-bearing slum expansion maps, as well as potential growth simulations for the future so as to devise appropriate planning. After having compiled supporting qualitative and quantitative data, in Chapter IV we performed a comparative analysis of selected case studies so as to critically evaluate the potentials and aftereffects of different slum countermeasures in the social and geographical setting of Caracas.

3. THE CONTEXT OF CARACAS

The urban area of Caracas is contained entirely within a relatively small valley of irregular surface [fig.1]. By 1772, the full extension of said valley was already completely covered, and in spite of the lack of urban expansion, its population had increased from 19 to 40 thousand inhabitants by 1806.

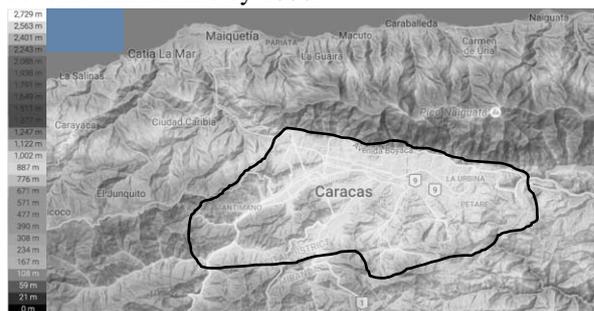


Fig.1: Altitude / Topographic Map of Caracas

Being surrounded by mountains, Caracas was restricted from further planned expansion, encouraging planners to build vertically to accommodate the growing population. This feature became the main geographical reason why the uncontrolled informal development of the capital took place on the hills that surround it, creating a ring of poverty that, given the topographic characteristics, is not only present but also perceptible from all points of the city.



Fig. 2: Slums of Caracas covering the city's hillsides.

4. THE SLUMS' HISTORICAL BACKGROUND

The emergence of slums in Caracas is a phenomenon that has been originated from a complex series of social, economic, and political problems throughout Venezuelan history. The unprecedented emanations and ongoing expansion of such developments are the aftermath of an urban-focused stance adopted by the governments at the time, which proved an unbalanced distribution of the development of infrastructure and services between the urban and rural areas of the country. This level of disregard to provincial citizens ultimately compelled them to abandon their lands, and, with insignificant amounts of money, move into the city and illicitly settle on available land in order to survive – this uncontrollable migration process is known as 'rural exodus'. [1]

Table 1: Causes of Slum Evolution – Timeline. [2]

| | |
|---------------|---|
| 1500s | Colonization creates a strong ethnic and socioeconomic divide, as power and wealth are unequally distributed among the population: white European descendants become far more privileged in both education and economic stability than those of African or Indigenous origins |
| 1830s – 1960s | Waves of international immigration attracted by the prospects of life in country help build the economy, but also generate more socioeconomic divide as wealthier newcomers obtain better jobs and settle in well-developed areas that rural workers have no access to. |
| 1940s | Centralist stance adopted by the government disregards the needs and desires of country-siders, which spawns a rural exodus, i.e. waves of migration towards the cities. The poverty-stricken lower classes then resort to illegally settle in spontaneous structures in some vacant urban areas and on the hillsides that surround the capital in order to acquire the benefits and services that only the city-life could provide. |
| 1950s | Former president Pérez Jiménez' New National Ideal policy aims to completely eradicate slums from the urban scene of Caracas, some slum areas are demolished to make way for "L'Unité d'Habitation" inspired superblocks in order to accommodate the masses in vertical structures. Pérez Jiménez' astray countermeasures reveal that his real concerns are of an aesthetic character, and not of the people's well-being, eventually leading to a coup d'état that brings his policies to an end, causing slum areas to re-emerge. |
| 1960s – 1990s | Following governments implement populist Emergency Plans at the sight of unmanageable slum growth, which seek to provide slum areas with basic services and infrastructure. These policies, although perhaps well-intentioned, are poorly planned, and eventually result in more episodes of mass migration towards the capital as rural workers attempt to create a better life in the city based on political promises, which are in time abandoned, only to conclude in a more detrimental state than before. |
| 2000s | Slum areas become prominent entities in a process known as the "consolidation of slums". With the rise of socialist Hugo Chávez as the new president, the conception of the slum shifts. With his vision of the slums as the "truest" representation of Venezuela, these stop being considered as negligible sectors as they embody his new form of paternalist government, i.e. one that would "benefit" them in a way that would form a strong co-dependent relationship between them and the State (fanaticism). |

Over half of the capital's population is currently residing in informal settlements, where housing density is 3 to 4 times greater than that of planned areas. This is due to the rapid urbanisation process that takes place in slums, which doubles that of formal segments of the city.



Fig. 3, 4: Distribution by Population (left) and by Land Area (right)

At present, citizens of Caracas witness a scene of crime, desperation, and inequality, as the city is remarkably divided between the formal and the informal. Slum densification has generated consequences on the region's ecosystem, deteriorating the air quality, and annually increasing the area's temperature due to an urban heat island effect – worsening public and social health. Slums represent a puzzling challenge for architects and planners, yet looking for a feasible solution does not entirely rest on better infrastructure. This paper seeks to emphasise the fact that these problems must be considered from both a social and an engineering approach. As learnt from their history, eradicating structures or proposing vague upgrading policies do not, in any way, help resolve the intricate and deep-seated social complexities that are so strongly interconnected with the slum dwellers' upsetting reality.

5. SPATIOTEMPORAL VARIATION ANALYSIS

As a consequence of unplanned growth, Caracas lacks a huge amount of planning material that could be used to study and analyse the city's urban expansion through time. So in order to examine the patterns of land use and land cover change, we have decided to implement a data retrieval method of remote sensing, given that it is able to explain the processes of variation quantitatively by utilising GIS to establish an urban information system in a way that is cost-effective and reliable. [3]

To process such data, we applied a technique known as Image Classification in a geospatial modelling system (Terrset). This is the process of sorting pixels into a finite number of individual classes or categories of data, based on their pixel values – this is done by selecting a set of two Landsat (satellite) imagery composed of bands. In this study, one image of the year 1991 and one of 2015 were employed, these two will be subjected to a procedure of ISO-clustering and classification.[fig.5] This helps us generate clusters of pixels, which can be reclassified into different land uses with the purpose of quantifying urban changes, and in this case, informal sprawl, which will ultimately calculate the expansion transition of slum settlements and create data-bearing growth maps that aid us at visualising where said growth is taking place.

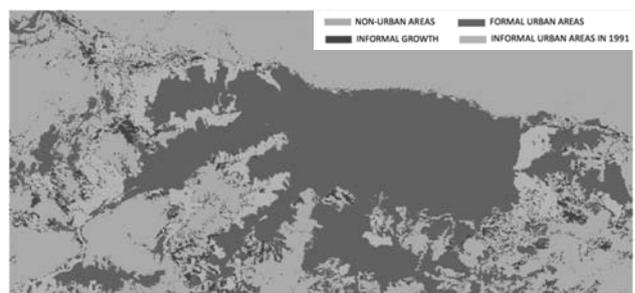


Fig. 5: Urban Growth Map of Informal Areas in Caracas 1991-2015

Results suggest that informal settlements have taken up about 1,140.00 hectares from non-urban areas since 1991, revealing an increase from 3,378.47 has, to a total of 4,518.47 hectares of spontaneous development as of 2015. This indicates a total growth of 33.74% since 1991, and an average annual growth of 1.4%, which translates to roughly 47.5 hectares of new spontaneous development each year. [tab.2]

Table 2: Cross Tabulation of Land Change by Area (has)

| CROSS-TABULATION (has) | | | | |
|------------------------|---------------|---------------|---------------|---------------|
| CATEGORY | NONURBAN 1991 | FORMAL 1991 | INFORMAL 1991 | TOTAL 2015 |
| NONURBAN 2015 | 22,409.34 has | 0 | 0 | 22,409.34 has |
| FORMAL 2015 | 0 | 13,149.01 has | 0 | 13,149.01 has |
| INFORMAL 2015 | 1,140.00 has | 0 | 3,378.47 has | 4,518.47 has |
| TOTAL 1991 | 23,549.34 has | 13,149.01 has | 3,378.47 has | 40,076.82 has |

On the generated map of Urban Growth, it may be observed that most of the recent informal developments are taking place towards the west side of Caracas, where, despite the steep topographic features, new occupants continue to build their way up the mountain. It was found that the current distribution of formal and informal urban areas resembles the following map, where coloured areas represent individual slum neighbourhoods:[fig.6]

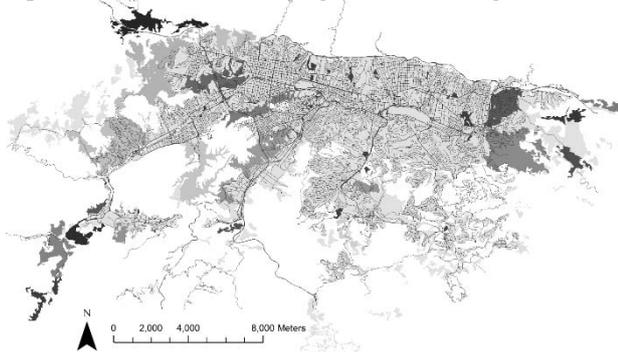


Fig. 6: Formal and Informal Urban Areas of Caracas in 2015

6. ANALYSIS OF DRIVING FORCES

Driving forces are the forces that cause observable landscape changes, i.e. they are influential processes in the evolutionary trajectory of the landscape [4]. To study these, we adopted a Logistic Regression Model, which assumes a linear interconnection among dependent and independent variables, which will allow us to immediately visualise potential projections of sprawl. The goal of this is to find the best fitting model to describe the relationship between the dichotomous characteristics of interest and a set of independent variables with the purpose of generating coefficients of a formula to predict a logit transformation of their probability of presence. This is done implementing the following mathematical formula:

$$\bullet \text{logit}(p) = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3, \dots, + b_k X_k$$

Necessary data for this model is divided in Dependent and Independent Variables, the former serve as the foundations of the project to work on, the latter serve as additional elements or information that are believed to affect the former. This model uses two maps of the binary land use of informal urban sprawl between 1991-2015 as dependent variables. These maps had only two land use classes: non-urban land (0), and 'informal' urban land (1). This model assumed that land-use change occurs from non-urban land to informal urban land-uses, so a constraints mask was applied to formal areas in order to make sure that the model does not predict growth towards them.

Table 3: List of Dependent Variables

| N° | DEPENDENT VARIABLE | N° | DEPENDENT VARIABLE |
|----|---------------------|----|---------------------|
| 1 | Informal Areas 1991 | 2 | Informal Areas 2015 |

Originally, a total of thirteen Independent Variables were selected since they were believed to have a substantial influence over the city's informal growth, in addition, of course, to the effects of several other socioeconomic aspects. This list included factors such as: distance from hospitals, schools, commercial areas, secondary and main roads, railway stations, and water bodies – but it was later discovered that although these must surely generate a 'pull effect' for rural migrants, they did not display a correlation with the location of newly emerged informal developments.

To process raw data from Independent Variables, we recurred to the Euclidean Distance tool to calculate and generate distance maps; the Surface tool to produce Topographic Slope Ratio maps from geo-referred DEM files; and the Filter tool to create existing Neighbourhood maps, showing the proportion of urbanisation within a 7x7 neighbourhood so as to grasp if the trend of slum growth is more commonly occurring in existing urbanised slums or isolated areas. Resulting in this list and outcomes:

Table 4: Independent Variables and their Regression Coefficient (2015)

| Intercept / Variables | Coefficient |
|---------------------------------------|-------------|
| (1) Distance from Formal Areas | -5.765E-04 |
| (2) Distance from Informal Areas | -0.0034 |
| (3) Topographic Slope Ratio | -0.0247 |
| (4) Distance from Motorways | -2.288E-05 |
| (5) Existing Slum Neighbourhoods 2015 | 0.2020 |

It was found that the factors included in the final list of Independent Variables had a significant influence on the city's unruly sprawl. In 2015, Motorways displayed the weakest level of influence, followed by Distance from Formal Areas. Distance from Informal Areas represented the strongest factor, along with Existing Slum Neighbourhoods, which in conjunction indicate that new slum settlements are not emerging in isolated clusters, but rather within already urbanised slum communities or in their proximity. The Topographic Slope coefficient has increased since 1991, which suggest that new informal expansion arises in steeper terrains than before as new residents are urged to construct their homes higher up on the mountains, further away from the city. Finally, to ratify the accuracy of the model, we employed a ROC method, which was equal to 0.97, suggesting an excellent fit.

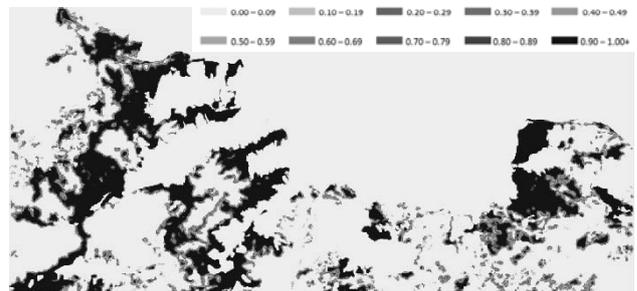


Fig. 7: Generated Map of Logistic Regression for the 2015 Model

It may be observed how there seems to be a densification process in the biggest slums, which occurs even further away from the centre. Being able to forecast the imminent negative impacts of informal growth by becoming aware of when, how, and where such phenomena shall occur, grants planners the immediate advantage of devising appropriate countermeasures, and thus better manage the situation.[fig.7]

7. SLUM COUNTERMEASURES

There is not a single answer to all the complex challenges posed by the urban conditions of slums. Not all slums possess the same characteristics and difficulties and will therefore, require different solutions. In this section of the paper we endeavoured to critically review case studies of slum countermeasures approaches to propose feasible solutions that could help subside both human and structural problems that exist in Caracas.

Slum Clearance has been used as a strategy to transform low income settlements into another type of development or housing – destroying illegal squatting sites, and displacing inhabitants into different housing areas. The full paper discusses cases of urban renewal and slum clearance in cities like London, Melbourne, Singapore, and Beijing, where dislodged areas were turned, in time, into well-developed business districts. In some cases, this produced positive results, yet in cases like the 2008 Summer Olympics in Beijing, it was found that 1.5 million people were forcibly evicted, and dense neighbourhoods were torn down to make way for newer infrastructure.

An argument for slum eviction in Caracas in only plausible when seen from a technical point of view, as it would benefit the further improvement of the city’s infrastructure and it would facilitate the construction of better planned areas within the city, but this would be accomplished by bypassing the human value of all the slum residents in the capital – a move that would be irrefutably apathetic and distanced from these people’s reality, one that would only provide an ephemeral relief to what would become an even longer-lasting dilemma. To opt for a plan similar to that in Beijing, would only temporarily “solve” the slum issue, given that it would ignore and neglect the root causes and actual social problems that generate slums in the first place.

Slum Upgrading strategies aim to provide clean water, good pedestrian and road access, as well as basic services in order to gradually improve the conditions of slums. These cases were also discussed in length, with references such as Medellin and Busan, where strategies of combining art, music, and culture transformed scenes of poverty into ones of social coexistence and touristic attraction. Some other cases, however, display a more negative outcome - the kampungs in Jakarta and slums in Manila, for instance, were subjected to poorly managed intervention, as conflicting politics and events of corruptions caused setbacks that eventually further aggravated their living conditions. Having a good understanding of Venezuela’s current state of affairs, it could be concluded that such attempts would lead to similar results as with Indonesia and the Philippines. If governments do not focus their policies on their citizens and their prospects for improvement, neither slum removal strategies, nor upgrading ones will ever solve the persistent issues posed by urban poverty in squatter settlements, as long-term plans require full commitment, as well as proper financial support to cover a broad range of expenses incurred by this massive-scale redevelopment.

After reviewing references of **Participatory Design** as an alternative approach and solution, it was discovered that this strategy has also been successfully implemented in other Latin American countries, generating good results that go beyond a mere construction of a building. [5]

In architectural proposals PD allows for people to not only participate in the brainstorming and decision making processes, but in the construction phase of the project as well. From a psychological point of view, this grants those living in poor conditions the sense that their opinions are being taken into account. It challenges the general idea that outsiders with professional experience know better and must therefore impose their foreign ideals on already established communities. Professionals on the other hand, must serve as advisors who understand the situation and its technicalities in a general context, and who have a good grasp of the tools and methods that could be employed to better lead the development of the project.

Table 5: Comparative Table of Slum Countermeasures

| | PD | Upgrade | Relocate |
|--|----|---------|----------|
| Aims to improve infrastructure | O | O | O |
| Potential long-term solution | O | O | O |
| Respects community’s culture and heritage | O | O | X |
| Reutilises pre-existing infrastructure and materials | O | O | X |
| Allows residents to be a part of the decision-making process | O | X | X |
| Provides residents tools to further develop their community | O | X | X |
| Residents are able to pick up new skills, and foster respect | O | X | X |



Fig. 8: Collage of a PD project carried out in Bogota.

8. CONCLUSION

1) A centralist government stance compelled neglected rural workers to abandon their homes and move to the capital as a means to guarantee their own benefits and survival followed by a second wave of migration, product of failed populist policies. One must understand this background of marginalisation and hardship in order to project coherent solutions to the problem, which is both urban and social.

2) The conducted analyses allow us to visualise their patterns of growth thus far. It was discovered that new slums are mostly emerging to the west, further away from formal areas and in steeper topographic conditions, which serve as a guideline to predict their future behaviour and expansion. Only so are professionals able to counteract their upcoming impact and plan accordingly, especially if these areas are aimed to be developed in the future.

3) Based on both qualitative and quantitative materials, we believe that implementing PD to combat the issue of poverty and urban decay, would ultimately serve as a means of urban and community rehabilitation, whilst making the people the focus of our attention.

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