

## Developing a More Sustainable Urban Residential Area – Genesis Project

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### Abstract

The traditional approach for urbanization of a land plot begins with the removal of all vegetation that is legally allowed to be removed; planted new trees usually replace a small fraction of the removed vegetation. The assumption is that larger area available for sale, higher financial return; consequently, preservation - or green areas - are deemed to be less interesting profitwise.

Such paradigm destroys the local biota, thus resulting in a built environment where the population has little contact with nature, heat islands increase thermal discomfort outdoors and energy demand for air-conditioning, water becomes scarce, and storm waters periodically flood some areas of the city.

This paper presents guidelines on developing a more sustainable urbanization practice, based on a case study of a 3.6 million square meter private development. Among other measures, plots take only 15.9% of the total area, and the total Atlantic forest green area was increased by 24.8%, reaching 73.4% of the total area. At the same time, adequate financial return to investors was obtained.

### Keywords

Sustainable development, urban residential, plotting, civil engineering, genesis.

### Introduction

This paper presents guidelines for a more sustainable urbanization practice, based on the experience of the urban development called "Genesis Project", by Y. Takaoka. It contains data and comments on the environmental and social benefits from the adoption of a sustainability-based paradigm, in conceiving, planning, building and deploying urban areas for residential use, in comparison with the results from other real estate developments located in the same region and focused on the same market. The project combines the social concept of housing with the concept of environmental preservation, and concomitantly, satisfies man's yearning for good dwelling, with positive economical results for ventures and suppliers, and last but not least, generates new jobs and more income for the region.

To illustrate this practice the cases Genesis I and Genesis II are shown, which consider the several stages of an urban development that totals over 360ha, with 270ha destined to environmental preservation areas and only 16% for residential plots.

### Characterization of the market practices

The table below shows the exclusively residential plot developments located in the region of Alphaville, in the municipalities of Barueri and Santana do Parnaíba, west of São Paulo city, in Brazil, launched at a time when Law 6.766<sup>1</sup> was in force. The following percentage figures are noteworthy: plotting area in relation to the total area: near 60%; green area/total area: 15% in average; green area per plot: an average of 120 m<sup>2</sup>/plot or 30m<sup>2</sup>/inhabitant (considering 4 inhabitants/plot, in the region of Alphaville, according to figures from IBGE – the Brazilian Institute for Geography and Statistics).

Table 1 – Plotting Developments Implemented in the Region of Alphaville above Law 6.766

Apr – 79 Aug – 90	Total Area (m <sup>2</sup> )	Plotting Area (m <sup>2</sup> )	Green & Leisure (m <sup>2</sup> )	Total Plots	Average area of the plots (m <sup>2</sup> )	Plotting Area/ Total (%)	Green Area /Plot (m <sup>2</sup> )	Green Area/ Total (%)
Totals	5,317,058	3,226,239	814,558	6,694	482	60.7%	121.68	15.3%

Source: RP Architecture

### Introducing sustainability in real estate developments

According to CHAFFIN apud WILSON (1998, p. vii/ix), there is a need to seek for urban development solutions that result both in better communities for the population and [not only] in less waste of the natural resources, but also in a better accommodation of the natural systems. “Emerging psychographic, sociographic, and cultural trends indicate that the market is most receptive to products that are the result of responsible ecological stewardship.” “There is a preoccupation with quality of life, with an emphasis on health over wealth, and a focus on well-being as opposed to being well-off.” ... “... people have a natural predisposition to feel better, perform better, and actually exhibit healthier physiological signs when looking at water, green vegetables, or flowers, versus ‘built’ structures of glass and concrete. It is ironic that we often use our human creativity to destroy that which we truly need to live healthy, satisfied lives. If the natural landscape is indeed such a tonic, then we as developers must be sensitive to a greater sense of community – the web of life that links nature and humanity.”

As more people and businesses place greater strain on living systems, limits to prosperity are coming to be determined by natural capital rather than industrial prowess - HAWKEN et al (2000, p. 2). On the other hand, NASH (1994), in his work on the Game Theory for which he was awarded the 1994 Nobel Prize in Economics, concluded that the equilibrium points in decisions involving individual and collective interests of the group are reached when all the participants maximize not only their own pay-offs but the group’s as well.

### The concept

According to HAWKEN et al (2000, p. 87), green projects typically sell or lease faster, because they combine superior amenity and comfort with lower operating costs and more competitive terms...

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<sup>1</sup> Law 6.766 of 1979 provided for the parceling out of the urban land, and was amended by Law 9.785, in 1999. Initially, a minimum of 35% of the total area had to be public (green areas, as well as areas for leisure systems, road systems and institutional use), thereby leaving a maximum of 65% for the residential plotting.

“These improvements in turn create a key competitive advantage, and hence further improve real estate value and market performance.”

Opposite to the premise of maximizing the commercial areas (residential plots) to maximize economic results, green real estate developments are guided by the principle of making natural resources (the amount of green area per inhabitant and the amount of water available in the region to meet the needs of urban development) compatible, to comply with the social demand for habitat, thereby aggregating value to the real estate business by increasing the environmental quality of the project.

**Environmental aspects: A key link for the project’s sustainability**

The main problems found in urbanized areas concerning environmental impacts, especially large metropolitan regions such as Sao Paulo and its suburbs, are as follows: (i) removal of vegetation, with total loss of regional typical flora and, consequently, related fauna; (ii) reduction in the soil permeability by the increased surface flow of rainwater that causes flooding in lower areas during heavier rainfall, and reduction in groundwater recharge; (iii) production of “heat islands” from solar energy, with a rise in air temperature causing the population heat discomfort and increasing the demand for energy due to the necessary use of air conditioning systems; (iv) contamination of surface and underground water resources by pollution, especially urban sewage and, in many cases, industrial effluents; (v) contamination of water resources by floodwaters that drag different kinds of waste from the course; (vi) shortage of surface and underground water due to removal of more natural water resources than is required to recharge existing aquifers; (vii) air pollution caused by air and land transportation systems, as well as industrial plants; (viii) visual pollution from urbanization, not always related to landscaped areas, and proliferation of slums; (ix) noise pollution from heavy traffic and car horns, and the constant hum of densely inhabited areas.

**Social Aspects**

The main social aspects that need to be contemplated are: (i) complying with the housing needs of man; (ii) conducting consultancy and research activities together with universities and NGO’s, aiming at perfection and replication of the project; (iii) divulging accumulated knowledge through academic, technical and entrepreneurial media, with a view to disseminating the project and its replication; (iv) upgrading the environmental and social conditions; (v) promoting environmental education among the community to make the pro-environmental and pro-social actions implemented by the developers into everlasting achievements; (vi) generating more jobs, and finally, (vii) bringing wealth to the region.

Table 2 – Human being structure and his perception of value

<b>Base</b>	<b>Body</b>	<b>Mind</b>	<b>Spirit</b>
<b>Objective</b>	necessity	desire	dreams
<b>Influence</b>	location	culture	faith
<b>Sensation</b>	comfort	well being	felicity
<b>Characteristic</b>	commodity	niche	essence
<b>Value</b>	competitive	aggregate	priceless

Based on the knowledge of qualitative and quantitative attributes of the area and of the necessities, longings and aspirations of the target-population, we can perceive environmental opportunities of the area and the local social characteristics, both of which can be positively aggregated into the project.

The successful implementation of an urban residential area implies knowing the necessities, desires and dreams of the target-population. Green urban developments attend to two major aspects of the issue: they satisfy man's yearning for a good home and they join value to the product through the uniqueness of its characteristics.

### **The economical and financial indicators**

Compliance with the third fundamental aspect of sustainability demands that cost and income be balanced to support this kind of project. Judicious analysis must be made to balance cost vs. environmental and social gains at the same time that consideration towards a target-population can never be disregarded. What are their aspirations? How much can they afford to pay? How do they appreciate the value of the product being sold?

Furthermore, economic outcomes must be compatible with market parameters for remuneration of labor and invested capital. Further still, financial resources must be sufficient to support the project's investment needs as well as for its implementation. There must be economical sustainability for the entrepreneur implementing the venture and for the dweller: the latter shall upkeep the common urban spaces and the natural riches of the place.

### **Case study: The project Genesis I and II**

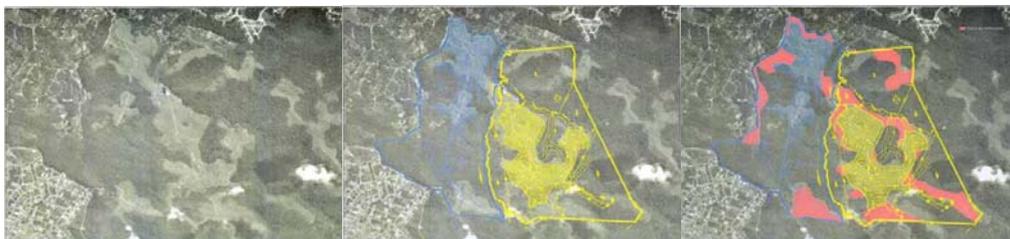
The urban residential plotting developments called Genesis I and Genesis II are located in the Municipality of Santana de Parnaíba, in the State of Sao Paulo, Brazil. Genesis II is in the urban structure implementation stage (earth works, accesses, rainwater drainage system, sewage system....) and Genesis I, with its infrastructure completely finished, was delivered to the owners in March 2004. More than forty houses are being built and six families have moved until October 2005.

Besides the urban infrastructure works, a program is being established for the recovery and preservation of the environment, coordinated by Brazilian Foundation for Sustainable Development (FBDS), which encompasses a reforestation program to expand the original woodland by more than 50ha, and specific programs for the enrichment of the biodiversity – fauna and flora.

### **Area distribution**

Over 70% of the total area is destined for environmental preservation, whereas 16% is for plotting. Also noteworthy is the fact that in Genesis I and II the forest area will be enlarged by 24.8% vis-à-vis the original green area, that is, the fauna and flora biodiversity conditions of the region shall be improved.

Figure 1 - aerial picture (1994) before the works, with the plots and with the reforestation area



Almost 50% of the total area was voluntarily donated to a not-for-profit organization composed by the future residents of the Genesis I and II residential condominiums. The social objectives of the association are: the protection, defense, preservation and restoration of the environment and of the regional biodiversity, and the resulting upgrading in the community's quality of life.

Table 3 – Data and Indicators of Genesis I e II Developments

	Genesis I	Genesis II	Sub-Total	Residential 10
Residential plots	466	598	1,064	
Green and Leisure areas (m <sup>2</sup> )	1,120,909	1,438,419	2,559,328	196,631
Green and Leisure areas/plot (m <sup>2</sup> )	2,405	2,405	2,405	
Residential plotting area (m <sup>2</sup> )	223,798	331,083	554,881	-
Green area expansion (m <sup>2</sup> )	186,035	330,515	516,549	-
Total project area, donations included (m <sup>2</sup> )	1,527,603	1,960,315	3,487,917	196,631
Original green area (Sept/89) (m <sup>2</sup> )	817,397	1,264,667	2,082,062	196,631
Green expansion/original green area	22.8%	26.1%	24.8%	
Green expansion/total area	12.2%	16.9%	14.8%	
Plotting area/total	14.7%	16.9%	15.9%	
Green & Leisure areas/total	73.4%	73.4%	73.4%	

### Market Surveys

According to KOTLER (1999, p. 47), a survey is the starting point for marketing. Without it, a company goes blindly into the market. Good marketing involves careful research of the market opportunity and the preparation of financial estimates based on the proposed strategy, which will signal if the returns would meet the financial objectives of the company.

Table 4 – Some of problems and opportunities

Perceived Problem	Consequence	Foreseen opportunity
Large expanses of woodland	Environmental Costwise	Meets the customers' longings.
Only 18% of the area made into plots for sale	Earnings reduction	Large stretches of green in the neighboring area fulfill the longings of the customers, who eventually help with the preservation.
Difficult access	Cost and Technical Problems	Privacy and the possibility of reaching home through a tunnel of green.
No water from the waterworks company ("SABESP")	Unfeasibility	Semi-artesian wells and local water springs; building a water dam.
Necessity of building up a dam to capture water	Cost	Beauty, value aggregation and help in controlling floodings downstream of the enterprise.
Sewage treatment above the required level	Cost	Acknowledgement by community; pro-environmental preservation
Ecosustainability of the Project	Cost	Aggregated value and environmental preservation.
Project to meet the longings of the community and of the customers	Cost	Aggregated value resulting in a great sales success at a price compatible with costs and risks.

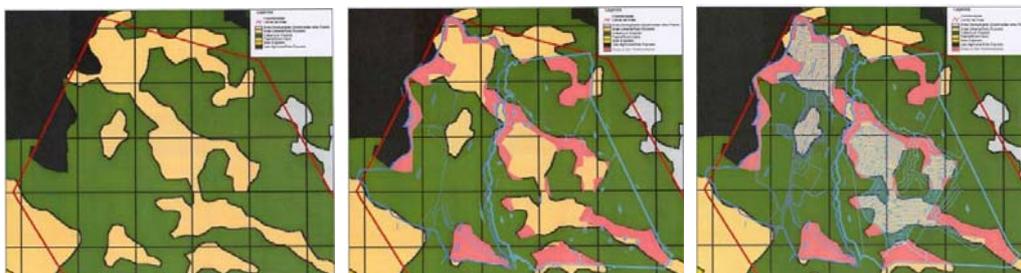
There is no way a company can be active in the market without knowing the necessities, desires and aspirations of the target-population, its financial capacity and the demographic growth, through market surveys conducted by well-qualified professionals. In the present case, the survey conducted in 1998 by Datafolha and Wilma Rocca indicated that 84% of the inhabitants of the region consider it

important to have forest reserves, and about 70% of them considered important the existence of leisure and sport facilities, while other surveys point to the financial capacity, price perception of the product, problems and opportunities.

### Environmental aspects

When planning the Genesis Project, comprehensive analyses were carried out to prevent negative environmental impacts cited above and to restore natural environment characteristics of the original Atlantic rainforest in the region.

Figure 2 – Analysis of Genesis I and II over interpretation of Terradatum image from Landsat 5



In the Figure 2, the first image is from Landsat 5 (Sept/12/88)<sup>2</sup> as interpreted by Terradatum, by request of FBDS, where the green areas represent the woodland, the creamy ones are pastureland and those for agricultural use are black. The second one shows the areas for reforestation in pink, and the third shows the implementation of Genesis I and II.

The lands chosen were predominantly botanic pastureland (areas deforested long ago) to implement urbanized areas including allotments and road systems, see **¡Error! No se encuentra el origen de la referencia.** totaling only 27% of the project area; the other 73% covers green areas with tree vegetation. Another attention-deserving aspect that was cared for, is the priority given to the formation of extensive natural forest areas instead of the many isolated fragments of green which have resulted from the governmental guidelines in several environmentally-protected areas. The biodiversity of fauna is the major beneficiary, since preserved expanses of land are of the foremost importance for their living, feeding and procreating conditions.

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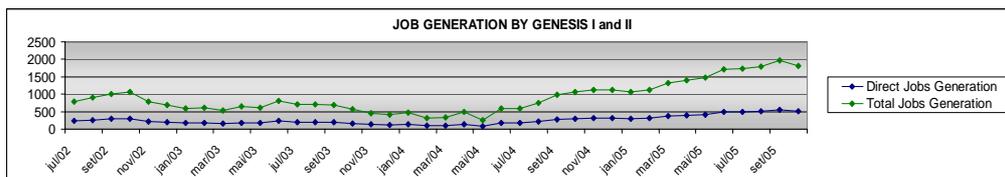
The water resources are managed in order to meet the estimated water demand of 1,328 m<sup>3</sup> per day. Of this total, 426 m<sup>3</sup> come from underground aquifers and 902 m<sup>3</sup> from a reservoir that is recharged by the spring runoff. These flows do not hinder the average stocks of water available in the drainage sub-basin where the project is planned. To maximize the use of water resources, the plan is also to reuse effluent water from the sewage treatment plant. To achieve this and prevent contamination of the water resources, a sewage treatment plant is planned with advanced technology and treatment to the tertiary level. After chlorination, the effluent water may be recycled to be used in various activities, especially irrigation of the grassy areas and in the forested areas to prevent fire hazards that might occur in years with long dry periods.

<sup>2</sup> By the Kyoto Protocol, the image must be previous to 1989.

## Social aspects

According to MUNRO & HOLDGATE (1991, p. 11), “properly mandated, empowered and informed, communities can contribute to decisions that affect them and play an indispensable part in creating a securely-based sustainable society.”

Together, up to October 2005 Genesis I and II generated 515 direct jobs that resulted in 1,800 jobs according to the job generation model where each direct job generates other 2,5 (BNDES/CN99, MIP96, PNAD99, POF95/96), as shown in the graphic below.



(Source of direct jobs: Y. Takaoka and Genesis I Communities Association)

Having green areas, eg. in squares, parks, or woods around the urban site is very important to assist with the psychological cultural and health needs of man. The World Health Organization (WHO) recommends a minimum of 12 m<sup>2</sup> green area per inhabitant. Today the city of Sao Paulo offers around 4 m<sup>2</sup>/inhab and the city of Curitiba, State of Parana, considered an environmental quality benchmark, offers 40 m<sup>2</sup>/inhab. The Genesis I project lavishes around 600 m<sup>2</sup>/inhab of green area, considering an average occupation of four inhabitants per plot of land.

Besides meeting the housing needs of man, residential projects Genesis I and II demanded extensive research, exchange of knowledge and integration of various specialized groups (engineers, environmentalists, administrators, lawyers and several market and survey consultants), generating a substantial amount of jobs, as shown above, that resulted in an innovative, paradigm-setting product in the Brazilian real estate market.

## Economical Aspects

For the sustainability of the Genesis Project, it is mandatory that investors be offered profit margins at a par with those yielded by similar investments in the real estate business. From the pre-launching period through the delivery of Genesis I, the inflation rate was 40%, the “CDI”s (certificates of inter-bank deposit – reference parameter for interest rates in the Brazilian economy) yielded 48%, and the plot prices were raised by 80%, according to sales.

Also, the investment quality indicators on the Genesis I Project, as per below, constitute an attractive factor for those realtor developers interested in this kind of enterprise. The quality indicators of the Genesis I enterprise are as follows: [i] 25.2% p.a. internal domestic return rate; [ii] 25.8% result on the sales volume; [iii] 41-month primary payback; [iv] 12 million investment in “Reais”, or 13.8% VGV, which is considered low because the land was bought by the developer.

## Conclusions

Table 5 – Comparative data: Other developments vs. Genesis I e II

Development	Plotting area/Total (%)	Green area per plot (m <sup>2</sup> )	Green area/Total (%)
Others (average)	60.7%	122	15.3%
Genesis I	14.7%	2,405	73.4%
Genesis II	16.9%	2,405	73.4%
Genesis I and II (average)	15.9%		

Looking at the table above one can easily make a comparative analysis of the average indicators of Table 1 and 2. It clearly shows the inversion in the use of green areas versus those destined for plotting in the other developments of the region, vis-a-vis the figures for the allotment practiced in Genesis I and II. It can be noticed that the amount of green areas in Genesis Projects are almost five-fold superior in percentage figures and almost 20-fold larger in absolute numbers regarding the per plot green area.

Genesis Project, its concepts and principles, proceeds towards a more sustainable urban development, according to the longings of man, contributing to the improvement of environmental conditions, generating more jobs and wealth in the region in an economically attractive mode. For that, a multidisciplinary knowledge is required, involving several kinds of professionals and organizations.

Genesis Project is meant to be a dynamic one. One that learns from its own mistakes and progresses along with time, from technological breakthroughs, from the ever-present hampering setbacks which come up together with new opportunities – one in seek of higher quality of life for the community and of perpetuating the ecosystem for the generations to come. It takes great creativity and emotion to make a project like this come true. Technical expertise only is not enough: it calls for real knowledge of the feelings, sensations and anxieties of the human being, to try to adjust and incorporate all these elements, in a sustainable manner, into the project.

We need to set the eyes beyond the present, to the future of the human race and to the future of the planet. We need a holistic understanding of the social, environmental and economic demands to achieve a higher quality of life for the present and the future communities, and, at the same time, we need to warrant the life of the company by balancing the costs with the value added by the quality of the project. Mainly in developing countries, where there are so many things to do for the people and for the environment.

“Rethinking design is not only a matter of improving hardware but of looking at the context in which we live and work every day” ... “for example, clustering houses around mini-greens preserves privacy but offers shared pocket parks and gardens and fosters neighborliness.” ... “The unexpected and outstanding success of such integrated-design projects in real estate markets is starting to persuade developers to rethink many of their basic assumptions and reimagine development as a tool for restoring nature and communities.” HAWKEN et al (2000, p. 106-109)

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