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LANDSCAPE PLANNING PROGRAMME



TRANSFORMATION DESIGN OF EL ALMAZÉN SQUARE, ARRECIFE

MASTER THESIS

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Environmental Sciences

DIPLOMA THESIS ASSIGNMENT

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Landscape Planning

Thesis title

Transformaton design of El Almazén square, Arreciffe

Objectives of thesis

The aim of the diploma thesis is to analyse the current environmental and socio-economic conditions at El Almazén square, Arreciffe, and to propose an innovative modern solution for the transformation of currently neglected place into dynamic poly-functional area of social encounter. The new design will aim to secure and strengthen the local values and to enhance local economy and ecosystem services. The thesis will include a development proposal for El Amazén square, including the zoning of the area, its circulation dynamics and vegetation distribution. The proposed solution aims to serve as a visionary indicator of a possible sustainable redevelopment of the city.

Methodology

The author will perform a detailed analysis of the current situatio in the area, based on available literature and the author's observations. The analysis will be based on natural and cultural conditions of the area, accessibility of individual sites within the area, the quantity and quality of public space and green infras-
tructure.

Based on the analysis, the author will propose and compare two scenarios of redevelopment of the area. One of these scenarios will tehn be developed into a development proposal for the area, including visuali-
sations, sections and schematic maps representing the zoning, circulation and spatial organisation.

The proposed extent of the thesis

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Keywords

Revitalisation, public space, Canary Islands, rainwater

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Zimmermann, A. 2015. Constructing landscape – materials, techniques, structural components. Birkhauser Verlag, Basel, Switzerland.
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AUTHOR'S DECLARATION

I, Tomáš Mikuláš Chroustovský, declare that this master thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification.

Prague, 7th December 2018

Tomáš Mikuláš Chroustovský

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*Et maintenant il ne faut pas,
quitter la nature d'un pas.*

Molière

ABSTRACT

The ever increasing pace of urbanisation in the last decades poses an ever more pressing question as the living space is getting smaller. People living in cities are more numerous than those living in rural areas. With such a trend within already dense urban environment it is impelling to re-question and review the obsolete developing practices on scale of neighbourhoods as well as whole cities. Assessment of already existing space not only to invent more sustainable future development, but, maybe more importantly, also redevelopment of already existing built-up space.

This diploma paper delivers a proposal for revitalisation of El Almazén square, Arrecife, which interprets public initiative of city re-structuralisation and redevelopment towards more sustainable and livable environment. An essential part of this project is composed of diverse analysis assessing existing condition of the site and the area, which are followed by concept proposal. Based on these analysis and literature review, a new design is developed. This proposal delivers a case study of potential sustainable solution and suggests future direction of neighbourhood, respectively city redevelopment.

KEYWORDS

Revitalisation, Canary Islands, rainwater, public space

ABSTRAKT

Stále se zvyšující tempo urbanizace v posledních desetiletích vyvolává tím urgentnější obavy, čím více se zmenšuje životní prostor. Populace žijící ve městech poprvé v historii převýšila populaci žijící na venkově. S takovouto tendencí v již zalidněných městech je nevyhnutelné abychom přehodnotili a přetvořili zastaralé postupy územního plánování jednak na úrovni čtvrtí a zejména měst. K dosažení udržitelného rozvoje bychom měli hledat možnosti městské expanze nejen vně, ale zejména uvnitř zastavených oblastí, a poohlédnout se po nevyužitě a zanedbané zástavbě vhodné k přetvoření.

Tato diplomová práce je návrhem na konkurz revitalizace náměstí El Almazén, Arrecife, kterýžto je reakcí na veřejnou iniciativu pro městskou restrukturalizaci a přestavbu vstříc udržitelnějšímu a příjemnějšímu životnímu prostředí. Součástí této práce je několik analýz hodnotících stávající podmínky studijní oblasti a stanoviště. Na základě těchto analýz a literární rešerše byl vyhotoven nový design. Tento návrh zosobňuje příkladovou studii pro potencionálně udržitelné řešení studijní oblasti, a naznačuje budoucí směr rozvoje čtvrtě, respektive města.

KLÍČOVÁ SLOVA

Revitalizace, Kanárské ostrovy, dešťová voda, veřejný prostor

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1 INTRODUCTION

The first part of the project is focused on open space definition together with an elaboration on the importance of open spaces and particularly those in urban environment. This section furtherly describes the values, impacts and history of open spaces, and elaborates on the current trends of open space and its place in future city development.

The second part is composed of area and site analysis, which is based on previous literature review and derived from acquired data assessment. The following aspects were analysed as a part of area analysis: accessibility, public space quantity and quality and green infrastructure. Following the assessment, two scenarios of redevelopment are drawn. These analysis are accompanied by numerous schematic maps and diagrams.

The third part consists of the design proposal for El Almazén square, which is derived from previous assessment and delivers one environmentally favourable solution and an economy-boosting one for the case study area. The design is described by a complex

masterplan, visualisations, sections and schematic maps representing the zoning, circulation and spatial organisation.

2 AIMS

The aim of this study is to analyse the existing environmental and socioeconomic conditions, and to deliver an innovative modern solution for the transformation of currently neglected place into dynamic poly-functional area of social encounter that secures and strengthens the local values and enhance the local economy and ecosystem services. A coherent masterplan, which proposes zoning of the area, its circulation dynamics and greenery distribution, contemplates the study. The proposed solution is meant to serve as a visionary indicator of a possible sustainable redevelopment of the city.

3 METHODOLOGY

This thesis is divided in three parts. The first compose of literature review of urban open space. The description of the significance of an open space together with the values, impacts and the position and importance of open space throughout the history is demonstrated through stated examples. The evolution of the planning techniques, methods and examples is enclosed in the same chapter.

The second chapter assess the existing conditions of the study area (spatial analysis, green mosaic, circulation), and the study site (SWOT). To evaluate present setting on the site, several methods has been used. Firstly, extensive literature review of local documents allowed for better comprehension of the existing situation and gave an insight on the mentality of local population. Secondly, analysis of empirical data series yielded statistical description of present conditions and the tendencies of local society. Thirdly, SWOT analysis based on the United Nation Habitat II. Agenda was used to assess the seven primary categories (physical,

economic, ecologic, organisational, social, cultural and aesthetic), allowing for the evaluation of sustainability, illustrating the positive and negative aspects of the area the capacity and threats (Berg & Nycander, 1997). Lastly, remote sensing using satellite images was used for acquisition of spatial information of the study area and site, allowing for maps creation.

The third part consists of proposal creation, based on previously assessed conditions and acquired analysis. Rough estimates of soil water saturation was made on the mean saturation in tephra mulched andisols (Tejedor, et al., 2011). Planting palette was constructed in a way to consider criteria such conservation status, the origin, blooming period and water demand of each species. The creation of graphic contents, such as maps and visualisations, were based on spatial data and photographs provided by local authorities.

4 LITERATURE REVIEW

4.1 IMPORTANCE OF URBAN OPEN SPACE

Considerable variety of terminology is used to refer to green areas, in urban planning and design its notably urban open space, urban green space and public open space (James, et al., 2009; Ignatieva, et al., 2011; Zimmermann, 2015).

The significance of open spaces due to their multiple positive impacts is gradually getting better understood, and accordingly to that does increase the role of green space in urban planning (Kabisch, et al., 2016). The land use planning, and particularly urban planning systems are therefore aiming to answer the challenge of developmental needs and, at the same time, protect cultural and natural resources (Maruani & Amit-Cohen, 2007). Therefore, the urban green space is becoming recognised as a conjoint part of urban matrix, ensuring multiple services to society, and wildlife respectively (James, et al., 2009).

Kabisch et al. (2016) further emphasized the importance of planning, design, management

and maintenance of open space in a way that ensures its availability to all citizens, so that the whole demographic spectrum of residents might profit of the multivariate benefits that they stand for. Natural ecosystems are therefore also an indispensable source of immaterial welfare and an essential condition for sustainability of society (de Groot, et al., 2002).

Furthermore, since the climatic condition are constantly changing, urban open spaces may represent a principal means in reduction of city impact on climate, and render cities more climate-proof. Although in cities, the impact of green areas in carbon-sequestering process is relatively minor, compared to the actual emission of carbon dioxide. Green spaces, through by micro-climate regulation, may diminish energy consumption and consequently reduce carbon dioxide emissions (James, et al., 2009).

It would seem that nowadays the importance of open space in developed world is not negligible and that the potential loss of quantity and quality of it is shaping number of decision making, consequently its

preservation is being integrated into many public land use policies.

4.2 VALUES OF OPEN SPACE

Although, the current practise has somewhat changed, namely in developed countries. In recent past, great decrease of open space quality and quantity, caused by urbanisation and resource exploitation, has called for a public response. Citizens have come up with various economic and noneconomic arguments, which describe the benefits that the land represents or might represent, such as environmental protection, outdoor recreation and scenic attractiveness (Anderson & West, 2006; Berry, 1976; Tzoulas, et al., 2007). Recognition of open spaces' values at the land market is complicated by nature of its public ownership, and as its values are not easily interpretable in monetary terms (Luttik, 2000; Sander & Polasky, 2009).

In general, people tend to associate open space with different values, among which Berry (1976) identifies the six most important:

- Utility

- Functional
- Contemplative
- Aesthetic
- Recreational
- Ecological

All of these six values are closely mutually interdependent, and yet, not completely. It is very unlikely that one value will fully incorporate another, for example, the utility values will hardly be able to wholly describe the aesthetic values that an individual ascribe to a singular landscape. They transcend largely and supplement one another, to an extent that is described by a function of a particular open space and by the individuals assessing it (Berry, 1976).

4.2.1 UTILITY VALUES

Berry (1976) argues that the utility value of open space is determined based on what is exchanged for its acquisition or for the access to it. Therefore the utility value may be expressed as a trade-off between surface unit of open space or number of visits to it, and any commodities such as services or goods. For instance, the expression of utility value in monetary terms may be estimated from open

space benefits that cause price differences of the surrounding real-estates (Sander & Polasky, 2009). Equally, the monetary value may be derived from ecosystem services that an open space provide (Costanza, et al., 1997).

Utility values of a single open space may vary greatly if determined by visit-cost system, since multiple factors influence it - one of them being distance. People living in near vicinity will find higher utility of an open space than if they would live further away from it, as the travel costs needed to reach the place increase with a distance travelled (Berry, 1976). Additional factors, such as pertinence for outdoor activities, scenic amenities, or environmental protection, fundamentally influence the utility values that people ascribe to any open place (Maruani & Amit-Cohen, 2007).

4.2.2 FUNCTIONAL VALUES

Those values may be assigned to an open space, that serve as a medium adherent to natural processes, for instance protection of water quality, suppression of natural hazards,

public health promotion, and soil-erosion mitigation (Berry, 1976; Tzoulas, et al., 2007).

Berry (1976) further elaborates that if environmentally sensitive landscapes, considered as open spaces, are exposed in some extent to development, they might negatively impact human welfare by altering natural processes. Therefore citizens involved or potentially affected by such a development might put higher emphasis on such values of open space.

4.2.3 CONTEMPLATIVE AND AESTHETIC VALUES

Although, these values are interrelated in most cases, they are distinct one from another and may be looked at separately. They may be assigned to an open space for people interact with it and enjoy its charming scenery and at the same time they appreciate remembering previous visits, and visualise new ones (Berry, 1976).

Contemplative values may be ascribed to a peculiar area of an open space, with environmentally appealing attributes belonging to it, such as ecosystems, species,

geographical situation, or geologically interesting formations. One does not need to physically visit such an open space to assign these values to it. Merely learning about such an open space with its peculiar ecosystems or species might excite and impress. (Berry, 1976; Maruani & Amit-Cohen, 2007)

To the very same open space, to which contemplative values are associated, but not conditionally associated, may be assigned aesthetic values. However those values come from direct physical experience with such an environment. Therefore they can be associated after the very first visit, or by continuous experience of everyday contact (Berry, 1976; Vejre, et al., 2010).

4.2.4 RECREATIONAL VALUES

Open space may be associated with recreational values if such an area furnish space for outside activities, relaxation, play, relieve from urban stress, to get in contact with nature etc. (Berry, 1976; Campbell, et al., 2016; Radford & James, 2013). These areas, by provision of space and especially green one, promote human wellbeing, as performance of outdoor activities have

positive physical and psychological impact on an individual. Therefore, visiting natural environments in pursuit of moderate or intensive physical performance shows lower probability on experiencing poor mental health (Mitchell, 2012).

4.2.5 ECOLOGICAL VALUES

Those values are assigned based on species or communities of species peculiar to an open space area. Not alike other values mentioned above, those values people assign for their higher concern for wildlife population over that of a man (Berry, 1976; Sander & Polasky, 2009). Therefore, the value of an open space is derived from other life-forms welfare rather than possible provision of services, commodities and contact that are beneficial to man (Maruani & Amit-Cohen, 2007). Neither is it derived from the indirect ecosystem services, which arise from the symbolic symbiosis between society and natural processes, that allow the continuation of production and consumption (Berry, 1976; Anderson & West, 2006).

4.3 IMPACTS OF OPEN SPACE

4.3.1 ECONOMIC IMPACT

There are multiple options for estimation the economic value of open spaces, these are divided into four groups: direct market valuation, indirect market valuation, contingent valuation and group valuation (de Groot, et al., 2002).

Direct market methods are based on the exchange value which ecosystem services reflect in trade, mostly then, it includes ecosystem goods, for example food production, although functional values and recreation values may also be applied (de Groot, et al., 2002). For instance, instead of construction of costly water filtration plant, a city may obtain, by means of purchase or easements, an extensive watershed area to secure a safe water source (de Groot, et al., 2002). Therefore, for the city, the watershed area would have a value equal to the expenses connected with water plant construction, whose function it thus replaced.

Indirect market valuation consist in indirect methods of determination of the maximum

sum an individual is ready to pay (*revealed* Willingness To Pay – WTP) or the minimal sum a person would accept to sell it for (Willingness To Accept Compensation – WTA) for an open space services' availability or loss (de Groot, et al., 2002; Brown, et al., 2007). There are various methods used, for instance, Avoided Cost, Replacement Cost, Factor Income, Travel Cost, and Hedonic Pricing which is later described more thoroughly. (de Groot, et al., 2002; Zhou & Rana, 2012; Costanza, et al., 1997).

Contingent valuation is based on estimation of demand for services by developing a hypothetical scenario, which is then assessed by public through a survey questionnaire (de Groot, et al., 2002; Brown, et al., 2007). For instance, through survey questionnaire it is possible to determine an individuals' *stated* WTP to increase a specific ecosystem service, such as water quality, in order to provide them with benefits connected to higher water quality (de Groot, et al., 2002).

Group valuation is based on approach that rather than assigning a certain value by an individual, it determines such a value from a

collective deliberation. This approach is therefore derived from a hypothesis that the decision making in public domain, in today's democratic society, is an outcome of an open public debate, rather than a result of individual preferences measured apart (de Groot, et al., 2002).

4.3.1.1 HEDONIC PRICING

Each open space has measurable economic impact on their surroundings that is influenced by several factors, based on these factors a marginal value of open space can be determined. For instance it has been well established, that depending on land use and land cover, ownership, scarcity (Irwin, 2002), population density, criminality rate, proximity (Anderson & West, 2006), size, diversity, accessibility (Sander & Polasky, 2009), and other factors, an open space may have positive, negative or insignificant impact on property values in its surrounding.

Irwin (2002) identifies that positive impact of an open space, on property prices in its surroundings, proportionally increases as the scarcity of occurrence, of other open spaces in neighbourhood, grow. The author

furthermore estimates that developable open spaces are significantly less valuable than preserved ones, as she demonstrates by studying impacts of land use conversions of open spaces that negatively affect property values in their vicinity. Irwin (2002) concludes that benefits of open spaces may be expressed as a function between the scarcity of their occurrence in a region, population density in its neighbourhood and priorities of inhabitants.

Anderson and West (2006) further elaborates that property value is affected by the type of open space, either a preserved open space, such as public park or conservation area, or developable open space such as private agricultural land. In fact, the possibility of development of an open space may negatively influence the property prices in its surroundings. Irwin (2002) reaches similar conclusions and identifies that rather than having value for its environmental amenities, people tend to value the land for staying undeveloped, that appears to be true merely for suburban areas, though.

However in urban areas the premium on property value rises with its proximity to an open space. Sander and Polasky (2009) estimate that premium might reach as much as 10-20% of property price and its influence can reach as far as 500 m. Consequently population density and income may strongly influence the amenity value of open space. Moreover in neighbourhoods with higher crime rates, the proximity occurs more relevant as it diminishes the negative effects of crime on property prices (Anderson & West, 2006).

Although, diverse trend in open space evaluation can be observed in urban and suburban areas, in general they seem to rise surrounding property values, be it due to scenic quality, amenity value, or on account of not being developed. Finally, evident inconsistencies between results of multiple studies are proving determination of economic impacts of open spaces highly variable and dependent on spatially socio-economic factors of local setting.

4.3.2 ENVIRONMENTAL IMPACT

The increase of the importance of preservation of open spaces due to their ecological functions has been well represented by the recent increase in number of studies (Hubacek & Kronenberg, 2013), focused on quantification of ecosystem services, which has been carried out mainly in order to obtain economic arguments to promote open space inclusion into land use planning policies.

Any given open space that has natural or semi-natural aspect, embodies an ecosystem. Each of those ecosystems dispose with various functions, such as habitat provision, ecosystem processes or biological properties. From these function human population may, or may not, derive benefits in terms of ecosystem goods and services. Therefore, ecosystem services are synthesis between natural capital, represented by flows of materials, energy and information, and artificial and human capital, such as buildings and individuals, primarily aimed to promote human wellbeing either directly, or indirectly (Costanza, et al., 1997; Hubacek &

Kronenberg, 2013; Scholte, et al., 2015; Campbell, et al., 2016).

One of the first attempts, to classify and describe the ecosystem functions and services on local and global scale respectively, was conducted by de Groot, et al. (2002). The author and the collective have identified four primary categories of ecosystem functions:

- Regulation
- Habitat
- Production
- Information (social impact)

4.3.2.1 REGULATION FUNCTIONS

de Groot et al. (2002) has elaborated that these functions refer to the ability of ecosystems to alter fundamental ecological processes and systems of life support, using biosphere processes. The essential processes involve energy transformation to biomass, the energy and minerals deposition and transposition in food chains, biogeochemical cycles (carbon, nitrogen cycle in biosphere), conversion of organic matter in soils into minerals and its sedimentation, and

regulation of climate system (de Groot, et al., 2002; Costanza, et al., 1997).

Therefore the main regulatory functions of ecosystems are gas regulation, climate regulation, disturbance prevention, water regulation, water supply, waste treatment, pollination, nutrient cycling, soil formation, soil retention and biological control (Bolund & Hunhammar, 1999; de Groot, et al., 2002; Vejre, et al., 2010; Wolch, et al., 2014).

Those regulation functions are essential in sustaining the ecosystem wellbeing on global and local scale and supply numerous goods and services directly and indirectly beneficial to society. Indirect benefits frequently go unrecognized and may be discovered only upon their distraction or loss (de Groot, et al., 2002). Bolund and Hunhammar (1999), and later Vejre et al. (2010) have identified several benefits that may be, among others, recognised in urban environment, for instance the air and water purification, micro-climate regulation, noise mitigation, runoff reduction and sewage water treatment.

4.3.2.2 HABITAT FUNCTIONS

These functions of ecosystems supply wildlife with a shelter and habitat for reproduction and thus promote the conservation of local biodiversity, genic diversity and evolution processes (de Groot, et al., 2002; Tzoulas, et al., 2007). It is due to these areas that majority of the benefits for society, and even the continued existence of it depends on, therefore the utmost care of such habitats should be taken to preserve them in healthy state (Tzoulas, et al., 2007).

Costanza et al. (1997) described the main refugia functions as provision of living space for resident or temporary populations (migratory species). de Groot et al. (2002) complement these findings by emphasizing the necessity of these habitats as a storage of biological and genic diversity, and compare it to a library with a genetic information from last 3,5 billion years. The collective furtherly elaborated on the nursery function of habitats, which for migratory species furnish space for breeding and nursery for unadult stage of such species. This function is especially

apparent in buffer zones between two different habitats such as coastal wetlands.

4.3.2.3 PRODUCTION FUNCTIONS

In the study de Groot, et al. (2002) described production functions as an ability of natural and semi-natural ecosystems, to deliver resources such as food, oxygen, water, medical and genic resources and energy and material sources. These resources are biotic or abiotic following the nature of their origin (Maruani & Amit-Cohen, 2007). The criteria for this division is its renewability, therefore biotic resources might be a commodity provided by animal or plant, whereas abiotic resource generally refers to minerals. Naturally, people have evolved means of acquisition of biotic resources that are even more efficient than those provided by natural ecosystems, but these production methods are mostly unsustainable and demand great resource input.

Biotic resources occurs through photosynthesis and various metabolic processes of autotroph organism such as transformation of energy, carbon dioxide, water and nutritive substances into large

diversity of carbohydrate structures which are subsequently converted into even more diverse living biomass by secondary producers. Such a wide variety of carbohydrate life-forms supply a number of ecosystem goods to our society, in terms of food, materials, energy sources and genetic material. (de Groot, et al., 2002)

Costanza et al. (1997) identified variety of production functions that extent from food production, of which only partial provision is secured by natural ecosystems nowadays; through biotic and abiotic raw materials such as lumber, minerals, fuels, fodder, biochemical and biodynamic substances for industrial use; to genetic resources that find its use as a genetic base for improvement of crop plant resistance against pests and pathogens. The collective of de Groot (2002) further expanded the findings of medicinal and ornamental resources, the former of which participate on human health maintenance through provision of compounds useful as medicaments, or as models for synthesizing such, and through animals that may serve as a testing medium, or as a medical tool itself.

The latter provide luxury materials or organisms that serve decorative purposes.

4.3.2.4 INFORMATION FUNCTIONS

According to de Groot et al. (2002), the majority of human evolution has happened in undomesticated ambience, when man was still subjected to the surrounding environment. Therefore natural ecosystems has preserved a fundamental *reference function* and they conduce to improvement of human psychological wellbeing through provision of occasions for reflection, cognitive development, spiritual enrichment and aesthetic experience.

4.3.3 SOCIAL IMPACT

The previous section partially introduces the social impacts of ecosystem functions, in the following part a closer view to this topic will be provided. Many various social-cultural attributes may be associated with open spaces, as every individual and every group of individuals has a singular personal point of view. Next to ecological values, de Groot et al. (2002) emphasize the important role of social values to the significance of natural forms of open spaces to mankind. Based on the

grounds of social reasons, an identification of various environmental functions was possible, extending from psychological and physical wellbeing, education, cultural variety and identity, to sense freedom (Fuller, et al., 2007; de Groot, et al., 2002).

Therefore, people may benefit from natural open space in multiple different ways, both directly and indirectly. Zhou and Rana (2012) identify six major areas of social impact that are associated with quality and quantity of open spaces:

- Recreational opportunities provision
- Esthetical enjoyment
- Physical health promotion
- Psychological wellbeing promotion
- Social ties enhancement
- Educational opportunities provision

4.3.3.1 RECREATIONAL OPPORTUNITIES PROVISION

The attractive amenity of urban green spaces, that are determined by various attributes, such as vegetation density, natural character, diversity of land-use, etc.; is defining different enjoyments that may be derived from it (Zhou

& Rana, 2012; Maruani & Amit-Cohen, 2007). Such place may therefore serve as a medium for joy, excitements and relaxation provision that can be obtained from performance of various activities, namely sports, social encounters, games, gardening, or even meditation (Campbell, et al., 2016; Wolch, et al., 2014; Radford & James, 2013).

4.3.3.2 ESTHETICAL ENJOYMENT

The sense of beauty of each open space is unique due to their peculiarity and individual nature of world perception of every person. The expressive senses of colours, forms, textures and sounds are highly variable and dependent on spatio-temporal changes of local settings, such as season, climate and even daytime (Zhou & Rana, 2012; Kaplan, 1984). Especially the physical experience, be it visual, sonic, fragrant or other; of such an environment may provide an utmost pleasure, appeasement and notion of peace for an individual (Campbell, et al., 2016; Kaplan, 1984).

4.3.3.3 PHYSICAL HEALTH PROMOTION AND PSYCHOLOGICAL WELLBEING STIMULATION

Constant increase of human population along with consequently higher rate of urbanisation and densification of urban environments permits its inhabitants limited contact with nature. And yet, the positive effects on psychological wellbeing and physiological condition of both individuals and society have been well established (Mitchell, 2012; Berman, et al., 2008; Wolch, et al., 2014; James, et al., 2009; Tzoulas, et al., 2007).

Fuller et al. (2007) argue that interaction with nature improves general health, supply space for deliberation, and relieve from stress and mental fatigue. Berman et al. (2008) enrich the findings of Fuller et al. (2007) by putting forth benefits in form of improvement of cognitive functioning, the author further complement that interaction with natural environment may also enhance memory and attention skills. Zhou and Rana (2012) identified that higher frequency of visits and their longer duration may enhance longevity of engaged individuals.

Mitchell (2012) argues that research on impacts of greenspaces on human welfare often omits qualitative aspects of greenspace, while being one of the most essential factor, along with visit duration. Fuller, et al. (2007) agree and elaborate that quality, defined by biological complexity, of greenspace may play fundamental role in affecting psychological welfare of an individual and society respectively. The author further emphasize that, increase of biodiversity is positively correlated with improvement of human wellbeing in urban environment.

4.3.3.4 SOCIAL TIES ENHANCEMENT

Urban open space enhance social exchange, as it provides interactive environment that creates numerous external stimuli for social contact, while granting relative anonymity to its users, and thus increasing the feeling of inclusion (Peters, et al., 2010; Zhou & Rana, 2012; James, et al., 2009). Peters et al. (2010) further elaborated that social cohesion is defined by to what extent a singular locality can attain a community feeling expressed by means of mutual values, collaboration and interaction. In the same study, the authors

subsequently assumed that social cohesion may be enhanced as people tend to create strong relations with surrounding environment through subjective experience of it, for instance place attachment and identity. Social cohesion may be also facilitated by performance of leisure activities, to which open spaces casually invite the visitors, namely then collective sports, pet walking or children play, resulting in eventful atmosphere, providing numerous stimuli for interaction (Peters, et al., 2010; Campbell, et al., 2016; Kabisch, et al., 2016; Pilgrim, et al., 2009).

4.3.3.5 EDUCATIONAL OPPORTUNITIES PROVISION

In the study de Groot et al. (2002) the authors presupposed the capacity of green spaces to positively influence the learning ability of man, and especially children, which strongly corresponds to the fact that major part of human evolution took place in natural environment. Zhou and Rana (2012) contemplate their findings by expanding the area of positive effects of green spaces on children, by observing improved self-

discipline, decrease of predisposition for truancy, stimulation of imagination and ingenuity and increase of attention performance. Furthermore natural environment may serve as an inexhaustible source of scientific studies, be it zoology, botanic or ecology (de Groot, et al., 2002; Zhou & Rana, 2012; Campbell, et al., 2016).

4.4 HISTORY, CURRENT TRENDS AND THE FUTURE OF URBAN OPEN SPACE

4.4.1 THE VISION EVOLUTION

During the major part of the human history, the open space defined the matrix, its landscape character posed barriers for human settlements and therefore their development was strictly delimited by natural features, such as rocky, wet or steep ground (Ignatieva, et al., 2011).

The dominance of man over nature has begun in the age of Industrial Revolution, where population and technologic growth has reached a breaking point, allowing society to expand and define the new matrix formulated by industrial, commercial and urban textures,

where only the most unyielding natural structures endeavoured (Ignatieva, et al., 2011; Maruani & Amit-Cohen, 2007). The remnants of nature were enclosed by urban sprawl, thus, for the first time, creating what we nowadays refer to as urban green space.

The nineteenth century was also the age of Enlightenment though, with science advancing towards human wellbeing comprehension, and consequently green spaces interpretation as a benefactor to public health and social order (Maruani & Amit-Cohen, 2007). Therefore, it was the era of first green space development, and the vision behind the design of urban open spaces was, a place of social exchange and rencontre where all social classes blend on the grounds of complete equality that embodied the philanthropic yet condescending approach in urban planning of that time (Thompson, 2002). Ignatieva et al. (2011) further elaborated that next to the positive social and sanitation implications of open space, the role was in particular to “beautify” the urban landscape.

Notably in the beginning of the last century there was a vivid progression all over the

world, in conception of new generation of design and assessment of urban fabric, to which design of greenbelts and rings of green space was particular (Maruani & Amit-Cohen, 2007). These concepts often showed rather socialist approach towards future cities development, with one of the most well-known being Howard’s Garden City concept, which, through ecological network, attempts to connect urban, rural and natural environment, while at the same time focusing on social benefits provision (Ignatieva, et al., 2011; Girot, 2016).

Another imaginary milestone is represented by period along the Second World War, after which the necessity of city redevelopment enhanced by technologic development defined city landscapes by rapid urban sprawl and reorganisation of urban cores. Consequently, such accelerated technological progress led to environmental crisis, decrease in air, water and soil quality, loss of natural ecosystems, and soil sealing (Ignatieva, et al., 2011; Maruani & Amit-Cohen, 2007).

This turning point was supposed to change the practise of urban planning, and land use

planning in general. According to the report of Ignatieva et al. (2011), the change has come along the 70s and 80s of last century, initiated by Ian McHarg, who identified the natural ecosystem functions and their importance to society. In the paper they further describe the implications in form of new city planning concepts, such as green urbanism and sustainability.

Towards the end of the last millennium notably in the 90s, encouraged by these new green infrastructure approaches, new concepts of urban planning strategies had been developed, notably in the USA, Canada and partially Europe. These new movements were based on the Ebenezer's Garden city model, referring to his greenbelt concept, which they transformed into greenways and subsequently blueways. The particular feature of greenways is the linear form resembling a corridor, which linked together creates an ecological network. In addition with greenbelts and greenspaces they create an extensive green infrastructure in urban environments (Ignatieva, et al., 2011; Girot, 2016).

The most recent practises will be described in following pages.

4.4.2 CURRENT ISSUES

Many papers has been written on the multiple benefits of urban open spaces, and especially green ones, and yet the development, management and upkeep pose a challenge (James, et al., 2009). Kabisch et al. (2016) and James et al. (2009) argue that this is mainly on account of the following reasons:

- limited budget
- low planning priority on local and national level
- lack of reliable and solid approaches for green space assessment
- poor cooperation between planning institutes
- growing demand for high-density development – following “compact city” model
- brownfield areas development

Promotion of green spaces in urban areas may not always yield a positive impact on its surrounding. Notably during last two decades, as a response to an increased documentation

of impacts of natural areas on public and individual wellbeing, an unequal accessibility to open space has been identified as an environmental justice issue (Wolch, et al., 2014; Kabisch, et al., 2016). Therefore, beside poor green space implementation in urban planning, the accessibility to already present natural areas pose a challenge, be it on account of spatial configuration or socio-economic and cultural differences (Thompson, 2002; Kabisch, et al., 2016; Wolch, et al., 2014).

The green space development, as a reaction to environmental justice issues, may even result in low availability of it to the very residents it was designated to benefit, due to the consequent change of socio-economic conditions of local setting, for instance by the increase of real-estate values in the vicinity of a neighbourhood park (Kabisch, et al., 2016). Such a paradox is referred to as ecological gentrification and occur mostly in low-income districts, where environmental justice issues may be more actual (Kabisch, et al., 2016; Wolch, et al., 2014). Thus, the pre-existing conditions leading to low availability of qualitative open space include, inter alia,

historical land use development, vision behind open space design, and socio-cultural differences (Wolch, et al., 2014).

To remedy such injustice, Wolch (2014) suggests the implementation of “just green enough” strategy specifically for the US setting, where outdated and inactive infrastructure would be enhanced by green design in a way as to permit local citizens higher living standards while maintaining economically friendly environment.

4.4.3 MODERN MODELS

During the past two centuries different planning models were introduced, representing various approaches to the open space functions inside or out of urbanised areas (Sklenička, 2003). In the following pages the main nine types of models will be introduced, based on classification of Maruani and Amit-Cohen (2007), these include:

- Opportunistic
- Space standards
- Park system
- Garden city
- Shape-related

- Landscape-related
- Ecological determinism
- Protected landscapes
- Biosphere reserves

4.4.3.1 OPPORTUNISTIC MODEL

Maruani and Amit-Cohen (2007) claim that such model follows a pattern where open space originates by means of occasion rather than coherent planning. Such a space emergence is therefore particular for their casual character, and often do not correspond to the citizens’ needs, nor to natural resources protection (Schenker, 1995).

For instance, such occasions may present themselves in form of donations of land to public by wealthy or ruling class, or Space left over after planning (SLOP), which was appointed to serve as open space on account of not being suitable for any other land-use, although, such areas are characterized by poor performance as open spaces either (Maruani & Amit-Cohen, 2007; Schenker, 1995; Girot, 2016).

4.4.3.2 SPACE STANDARDS MODEL

In the report, Maruani and Amit-Cohen (2007) described that such model draws on function that is defined through quantitative comparison between open space area and the relevant population of users, suggesting that the distribution of open space is derived from ratio of land unit per capita. Furthermore the authors indicated that such practice is one of the most widely implemented in urban setting, on account of its relatively low complexity, as it demands only quantitative input, and while any profound knowledge of ecological or social characteristics are unnecessary. On the other hand, such model may not assure the preservation of local natural and heritage values and may ignore the possible environmental benefits (Turner, 1992).

4.4.3.3 PARK SYSTEM MODEL

This model delivers coherent complex of open spaces that are mutually related by their functionalities, in some cases also spatially connected, in a specific geographical site (Maruani & Amit-Cohen, 2007). Originated on the end of nineteenth century, such complexes may consist of interrelated parks

and gardens, which are easily implemented in newly emerging areas designated for development (Ignatieva, et al., 2011). However, in already built urban environment the adaptation of such model may prove somewhat difficult on account of limited spatial availability caused by actual development situation. Furthermore, such model may respond to current population needs, but, on the other hand, assures limited environmental and ecological functions and conservation of natural ecosystems (Maruani & Amit-Cohen, 2007; Turner, 1992).

4.4.3.4 GARDEN CITY MODEL

Possibly the most notoriously known model constitutes a comprehensive practise in urban planning, and particularly in open space planning. This model presents open spaces as integral segments of development, relating their spatial assortment to the pattern of built up zones (Maruani & Amit-Cohen, 2007). Presented by Howard Ebenezer at the turn of nineteenth century, the model builds on socioeconomic, environmental and structural principles, which, particularly the structural one, served as an inspiration to shape-related

models, and are now regarded as a foundation stone to modern urban planning (Maruani & Amit-Cohen, 2007; Ignatieva, et al., 2011; Girot, 2016).

4.4.3.5 SHAPE-RELATED MODELS

These models include open spaces, where the shape is their very definition, which at the same time relates to the form and spatial assortment of the adjoining developed zone or of components inside of it (Walmsley, 1995; Turner, 1992). Typical examples of shape-related models are greenbelts, green wedges, green hearths and greenways (James, et al., 2009). Such models are characterised by their relatively easy application, as neither ecological nor social setting knowledge is necessary. A map or aerial images are sufficient to serve as a planning basis. Particularly greenways are easily applicable since the array of most of cities has a linear character. In addition, the shape-related models can be combined with different models (Maruani & Amit-Cohen, 2007; Walmsley, 1995).

4.4.3.6 LANDSCAPE-RELATED MODELS

In this context the word “landscape” refers to a visually perceived scenery, which is connected with strong aesthetic value of a singular topographical or hydrological natural feature. Landscape-related models are mainly used to preserve unique landscape elements, for instance mountains and rivers, from human settlement, and thus its implementation in urban environment is rather limited (Maruani & Amit-Cohen, 2007). Nonetheless, recently, with ever more accelerated urban sprawl, it is becoming popular practice for conservation of agricultural landscapes in metropolitan areas, since they are increasingly perceived as a cultural landscapes and heritage (Yahner, et al., 1995).

4.4.3.7 ECOLOGICAL DETERMINISM

Models that follow ecological determinism approach are derived from natural parameters of the land intended for development. The planning process begins with data collection and further analysis of present natural elements. Subsequently, sites recognised as of high conservation interest are preserved as

open spaces, and the rest of the plan area is designated for built-up uses, following the development requirements (Maruani & Amit-Cohen, 2007; Lewis, 2015).

There are numerous planning versions that are based on ecological approach, varying by data sets used, analysis methods and spatial extent of plan area, consequently yielding various results. The drawback of ecological planning models is their relative high complexity and elevated price, due to the data collection and processing. Furthermore the process involves participation of a stakeholder with high expertise in ecology, and therefore the result may be strongly influenced by subjective manner of its evaluation (Maruani & Amit-Cohen, 2007; Kaplan, 1984).

For instance, Low impact urban design and development (LIUDD) is a relatively new variation, originated in New Zealand, following the example of LID (Low impact development) from countries of North America. LIUDD programme was profoundly encompassed in Ignatieva's et al. report (2008), the collective found out that both strategies predominantly concentrate on delivering an environmental

solution to urban stormwater management. Moreover, in New Zealand the LIUDD programme is based on preserving and supporting specifically native biodiversity in metropolitan areas. The authors further determine the essential principles of LIUDD, which aim to deliver a sustainable community environment that complement, conserve and foster ecosystem processes, biodiversity, living conditions and cultural linkage with nature.

4.4.3.8 PROTECTED LANDSCAPES

Models protecting landscapes for their uniqueness, exceptional character or endangered value, has been integrated into legislation and regulation as a measure for conservation of natural heritage on national levels. Such systems are therefore fundamentally distinct from other models, since they provide protection from development through statutory declaration, which is rather inflexible, and thus renders areas of conservation difficult to develop. This may cause conflict of interest between conservationists and investors or other stakeholders. Although, widely implemented

in undeveloped areas, such practise may however prove somewhat inefficient in urban and metropolitan environment, since the natural habitats and resources are often degraded on account of increased stress from anthropogenic interventions (Maruani & Amit-Cohen, 2007).

4.4.3.9 BIOSPHERE RESERVES

Introduced by UNESCO, this model represents dynamic parallel to Protected landscapes models, but on regional scale. It proposes land division into three different zones: the first being centrally situated area of high level of protection, determined for conservation; the second representing a buffer zone around the first one, designated for agricultural and natural areas accessible to man; and the last one acting as a transition zone, composed of different land uses including smaller settlements (Maruani & Amit-Cohen, 2007; Reed, 2018).

These systems are focused on delivering means of conservation of natural ecosystems and processes, preservation of culture, heritage and traditional agricultural practice, efficient management of existing resources,

and enhancement of local economic situation (Reed, 2018). Due to its relative flexibility for adaptation to local spatial, social and economic conditions, it may be more eligible for preservation of open spaces in urban environment than Protected landscape models. However, the implementation of this model has proven to be rather difficult, mainly on account of poor legislative tools, absence of comprehensible management guidelines, low participation of local population and inferior economic planning (Maruani & Amit-Cohen, 2007).

4.4.4 PLANNING OF/FOR TOMORROW

Now, there exist large variety of planning tools differing by the spatial extent of application, by the various approaches and methods, answering different challenges and yielding different results. Additionally, some urban green space that emerge are not even part of planning process.

For example, lately ever more popular unconventional method of response to low green space availability has emerged in form of urban food-growing initiatives. Coles and Costa (2018) describe such initiatives as

predominately encouraged by activists and frequently out of, or in collision with actual urban planning models. However, the dynamic potential of their implementation that embodies efficient city landscape solution that is a direct reaction to local conditions and that delivers social and environmental amelioration (Hinchliffe & Whatmore, 2006). Ultimately, such newly emerging urban agriculture models should be considered with greater relevance in current and future city planning and urban development practise, as they might be a response to possible oncoming challenges, adherent to food supply, environmental change and socio-cultural issues, associated with urbanisation (Coles & Costa, 2018; Hinchliffe & Whatmore, 2006).

Variety of current models has been presented in this diploma thesis, giving a basic insight on existing landscape planning practices, and yet, the eventual development of green spaces is poorly mapped in the context of future changes in socio-demographical and environmental settings (James, et al., 2009). Furthermore, it seems unlikely that any model would be universally applicable as to virtually

correspond to multivariate functions and needs of specific local conditions (Maruani & Amit-Cohen, 2007; James, et al., 2009). Additionally, poor institutional cooperation and inferior legislative regulations may humper the planning process. Therefore, dynamic and flexible approach is needed in order to efficiently respond to such changes, and combination of multiple models and assessment methods is necessary for successful future planning that will deliver sustainable and resilient solutions, which will sustain and promote local economic potential, cultural identity, social cohesion, public wellbeing, and at the same time protect natural resources and habitats (Ignatieva, et al., 2011; Costanza, et al., 1997; James, et al., 2009; de Groot, et al., 2002).

5 APPLICATION: CASE STUDY

5.1 THE CONTEXT

Lanzarote Dynamic square is a small-scale project competition located on the easternmost Canary Island – Lanzarote. The whole island was recognised as a Biosphere reserve by UNESCO for its particular extra-terrestrial landscape, characterised by harsh living conditions, leading to extensive biological diversification (Moreno, et al., 2017). In the island's capital – Arrecife (Figure 1), a competition for revitalisation of El Almazén square was launched, and following project is offering two competitive scenarios in response.

The city connectivity with the rest of the island is characterized by east-north direction highway, that encircles the city through two outer rings (Figure 2). However, apart from one bidirectional road running along the coastline, the access to the city itself by car is considerably limited due to mainly unidirectional road system, resulting in the former one being more frequented.

The intercity public transport, composes of bus, and is mainly accessible from a number of stations located in the outskirts of the city, with easy access to highway (Figure 3). Additionally, the intercity transport system is complemented by municipal bus system, providing four different lines and connecting the city center with minor cities and villages in the.

Although surrounded mostly by newly built structures, El Almezén square is situated in what once was a historic city center of Arrecife, while at the same time being in walking distance from the seafront (Figure 3). The seafront axis represents the main economic zone in tourism industry within the city, securing services and goods for its visitors. Moreover, most cultural events and social interactions take place around the seafront axis and within the city center. Therefore, due to the tourist amenities, cultural activities, and the pedestrian friendly character, the seafront axis, is representing the main pedestrian flow within the city.

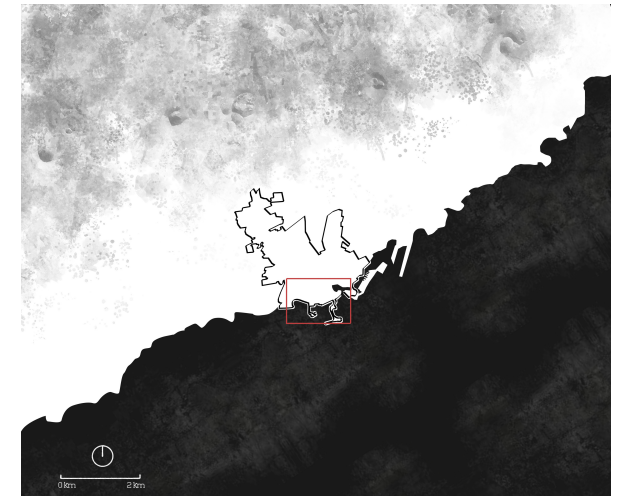


Figure 1: Study area situation within the city border, in municipal context



Figure 2: Connectivity of the study area within city context



Figure 3: Walking distance to El Almazén and its situation in pedestrian network

5.2 AREA ANALYSIS

5.2.1 OPEN SPACE ANALYSIS

Public open space is unevenly distributed over the city area, and residential and commercial areas dispose with limited and low-quality of such space. In 2015 the paved roads represented 15,1 % of surface of the urban area, while the total surface area of public open space in Arrecife was 1,54% of the total area, providing 6,41 m² per resident (Cabildo Insular de Lanzarote, 2017; Gobierno de Arrecife, 2017). Additionally, 54% of the space is situated around the waterfront, leaving the suburban area with limited quantity of public space. Such a poor performance is even more scandalous, as a great part of both private and public developable open space, meanwhile without obvious land use, is being used as parking slots (Figure 4). For another indicator of the low quality open space may serve the ratio of Natural protected areas accounting for 42,1% of the total area of Lanzarote island, compared to 0,0% in Arrecife municipality (Cabido De Lanzarote, 2018).



Figure 4 Public open space and parking distribution

5.2.2 GREEN MOSAIC AND NATIVE VEGETATION

The assessment of the existing green infrastructure highlights the missing connection between the green patches of the mosaic. The waterfront axe of greenery represents the only continuous west-east corridor, allowing the species for migration and habitat provision. The south-north connection is highly fragmented and provide limited opportunity for both migration and refugia. The connection becomes ever more fragmented towards the north, furthermore it mainly consists of alleys or solitaire trees, piercing through pedestrian concrete fabric that may not provide qualitative refuge for most of flightless species.

Even though that the study area is situated in very arid climate, green spaces in public domain are very limited and only account for 1% of the urban area, additionally the biodiversity of such areas is usually low (Cabido De Lanzarote, 2018). Vegetation of spontaneously developed character is scarce or missing and commonly found in abandoned neglected areas and brownfields of the city.

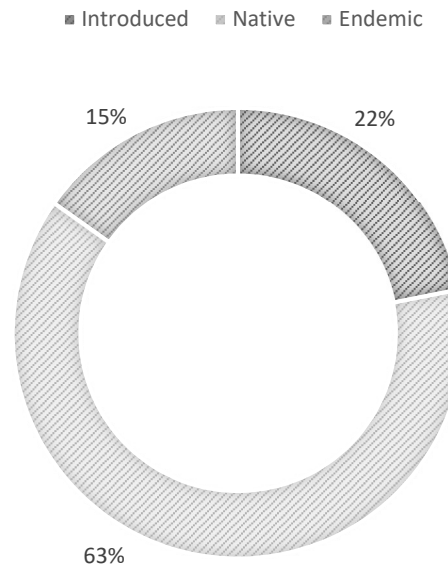


Figure 5: Insular plant species representation



Figure 6: Parque Temático

Apart from concentrated areas of public greenery, such as the seafront, arbitrary planted vegetation is sparse and constitutes mainly of non-native grown up trees and palm trees clustered into alleys, or more often solitaires, complemented by an insignificant number of green patches of private gardens (Figure 7). Lower vegetation is often composed by non-native species which suffer of unnatural conditions and demand high level of maintenance and irrigation (Figure 6). In 2014 only 66% of green space was evaluated as in “good” condition, mainly due to the necessity of high maintenance, caused by inappropriate plant selection (Cabido De Lanzarote, 2018).

And yet, Lanzarote island dispose with rich biodiversity amounting up to 2331 terrestrial species, including 478 native species and 104 endemic (Martín, et al., 2007). Figure 5 shows vascular plants accounting for 612 of these species, of which the majority is native, while vast number of 93 species is endemic to Lanzarote island (Marín & Luengo, 1998).



Figure 7: Green mosaic

5.2.3 FLOW ANALYSIS

Due to the backward road system which favours motorised transport, the inhabitants are compelled to use automobile transport around the city, resulting in livability decrease in the area. Lack, or limited and low-quality state of pedestrian zones increase the omnipresent car-use and thus enhance deterioration of public space (Figure 9). In return, this transport system demands the necessity of parking infrastructure, which furtherly consumes already limited existing open space. This leads to restriction of available space for non-motorised transport, resulting in overall qualitative and quantitative deterioration of public space and living conditions of residents.

It is not apparent if such state is a result of planning practise that responded to rise in demand for personal cars, or vice versa, if the rise of cars was enhanced by the need for autonomous motorised mean of transport as a result of existing road infrastructure and non-existing or undeveloped public transport connection. Nonetheless, the ratio of 1:0,85 cars per capita with almost 70% of personal

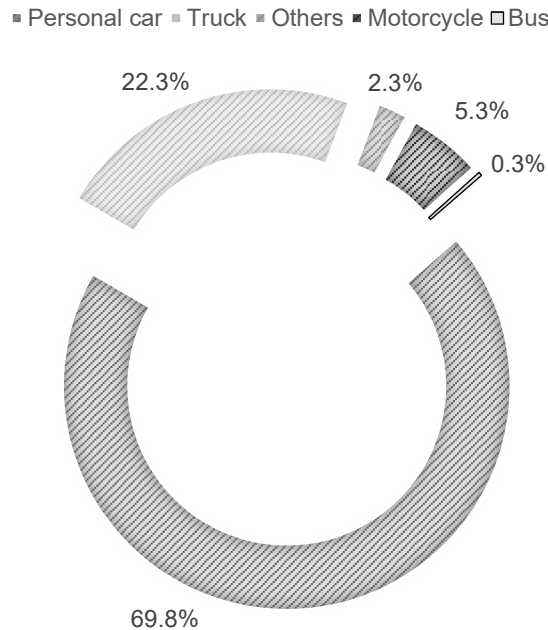


Figure 8: Vehicles representation on Lanzarote (2017)



Figure 9: Current pedestrian infrastructure (2018)

vehicles (Figure 8), compared to EU ratio of 1:0,51, indicates that the current situation demands and favours an autonomous motorised transport (Centro de Datos, 2017; ACEA, 2018). Limited city public transport does not appear to significantly affect the trends in transport, as the accessibility to public amenities located in the city are within walking distance from the outskirts (Figure 3).

In response to the current unsatisfactory traffic situation, the local government introduced a strategy - EDUSI - 'Conurban Azul', one of which targets is aiming to introduce and ameliorate pedestrian and bicycle infrastructure (Lanzarote, 2018).

Most of the traffic arriving to the city from the north-west is directed around the study site, in order to connect to the main bidirectional road running around the seaside axis (Figure 10). To diminish this flow, a change in several streets' direction is proposed. New pedestrian zone proposition thus secure the continuity of the pedestrian network and the connection to the seafront, enhancing commercial opportunities and increasing road safety and livability in the area.



Figure 10: Existing circulation and proposition of a new flow in the vicinity of the study site

5.2.4 CULTURAL HERITAGE

The following section will focus on description of cultural elements fundamental to the concept and design, as the full description of the immense Lanzarote's heritage is outside of the range of this paper.

5.2.4.1 NATURAL

The formation of the Canary Islands started at the Triassic-Jurassic turn and continue until recent history, marked by Timanfaya and Montañas del Fuego eruptions (Marín & Luengo, 1998; Galindo, et al., 2015). Volcanic land formation is singular for the landscape of Lanzarote, creating Martian like appearance and allowing for origination of unique fauna and flora. In the year of 1974, the first notion of creation of a protected natural area of the Island emerge through establishment of Timanfaya National Park (Marín & Luengo, 1998). Consequently, numerous studies begun to assess the natural environment of the island to finally culminate in 1987 with a law decree (LENAC) declaring multiple regions Natural parks and Nature reserves (Marín & Luengo, 1998). Today, 42% of Lanzarote surface is protected, and the whole

island is declared a Biosphere reserve by UNESCO, furthermore the island and the surrounding underwater reefs were proclaimed a Geopark (Galindo, et al., 2015; Cabildo de Lanzarote, 2016).



Figure 11: Montañas del Fuego in Timanfaya National Park



Figure 12: Zocos in La Gería

5.2.4.2 HUMAN

Canary Islands have long history of human settlement. Although it is not certain when the first human population occurred, the first colonisation of Lanzarote is assigned to Libyan-Berber populations, often referred to as *Maxos* (Farrujia de la Rosa, et al., 2010). It is supposed that from 1st to 4th century A.D. trade with Rome was established (Slayman, 1997). The first European colonisation of the islands came in 15th century from Crown of Castile (Marín & Luengo, 1998). Though, it is from the first culture, referred to as “culture of water” and its extraordinary hydrological knowledge, that the agriculture practice used today conserved, to continue this agricultural tradition in form of Zocos in orchards and vineyards (Marín & Luengo, 1998; García-Rodríguez, et al., 2016).

Zocos (Figure 12) are designed in a fashion to protect the plant from wind and from exceed evaporation, while at the same time harvesting humidity, and storing rainwater using tephra mulching system (Juvanec, 2012; Lassure, 2008; Tejedor, et al., 2011).

5.3 SITE ANALYSIS

5.3.1 SWOT ANALYSIS

In order to evaluate the positive and negative aspects of the study site a SWOT analysis was carried out, the outcomes of which suggest the needs of the area. The Figure 13 sums up the findings of this assessment, which is based on PEBOSCA framework that permits more complex approach, and provide more profound results and understanding of the study area. This framework stands for unified way of assessment of existing condition, and, by complex evaluation of multiple aspects, allows for sustainable planning (Berg & Nycander, 1997).

In order to better understand the spatial situation of the area, the results, depicting the strengths and weaknesses in all seven categories, are captured on the Figure 14. The Figure 15 depicts the Opportunities and strengths of the site.

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Physical	Rather flat area, easily adjustable Topography favouring non-motorised transport	Compact impervious surface Topography not favourable for rainwater harvesting from roads	Dynamic segmented surface, suitable for gravitational rainwater collection Surface material diversification, allowing water infiltration Local material utilisation	Suppression of environmentally friendly solutions in construction Disuse of rainwater-harvesting systems
Economical	Little stores, including pharmacy, café, restaurants and supermarket Accommodation opportunity Parking place provision	Abandoned stores and buildings Anaesthetic environment	Vacant stores in its imminent vicinity Rise of surrounding estate value Potential tourist attraction Temporary markets establishment	Brownfield creation Parking slots creation Product price-rise due to tourism flow
Ecological	Bird's refugia in the canopy of present trees Waste sorting collectors	Very restricted living space for wild organisms Missing linkage to green corridor Lack of natural habitats	Presence of already grown-up trees Harvesting and purification of rainwater Creation of more healthy and liveable environment	Unexploitation of full green-space potential due to inferior planning Disconnection of green spaces pattern into stable continuous green corridor
Organisational	Traffic restriction due to pedestrian zone Close to seaside, situated in city centre	Heavy traffic and imminent road system creates uninviting and hazardous environment Lack of an attractive and pedestrian-favouring connection to seaside	Large greenish street, connecting Plaza de la Constitución Reforming traffic flow to prioritise non-motorised traffic and diminish frequency of motorised transport around the study area	Disconnection with north-west part of city Incomplete design due to planning restriction Car-favouring hierarchy on surrounding roads
Social	Social interaction enhanced by creation of temporary public space Medical and social facilities	Dis-inclusion of whole demographic spectrum by limited variety of use	Enhancement of social interaction by creation of poly-functional space Increasing the safety of the area, especially for children	Low variety and quantity of cultural events Mono-functional design
Cultural	Place of occasional cultural events Cultural centre and art gallery in imminent vicinity	Insufficient variety and quantity of cultural events Unattractive and insufficient equipment for cultural events	Development of strong cultural gathering point Temporary events augmentation, such as exhibitions Reinforcement of traditions	Insufficient variety of public events, attracting only specific range people
Aesthetic	Solitaire remainders of local Architecture Street tree alley Mono-colour architecture, referring to local traditions	Old buildings replacement Architectural divergence High car concentration due to parking opportunities	Establishment of dynamic transition between heavily built-up space and green area Connection to local architecture invites to form a powerful identity of the place	Continuation of old-buildings destructive trend Street-art of uninvited artists International architecture, with no local background

Figure 13: Table of SWOT analysis of the study site

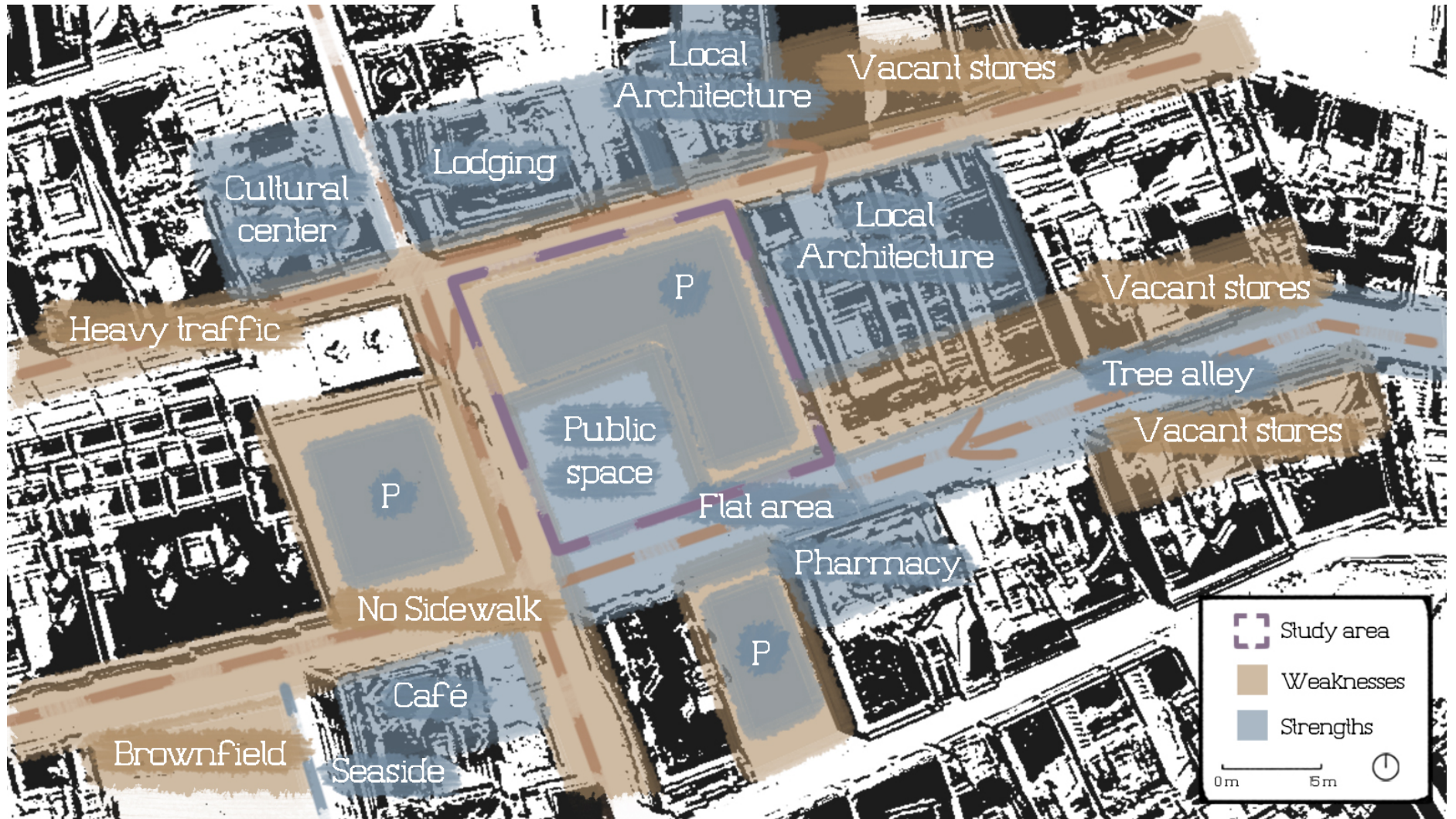


Figure 14: Spatial expression of Strength and weaknesses

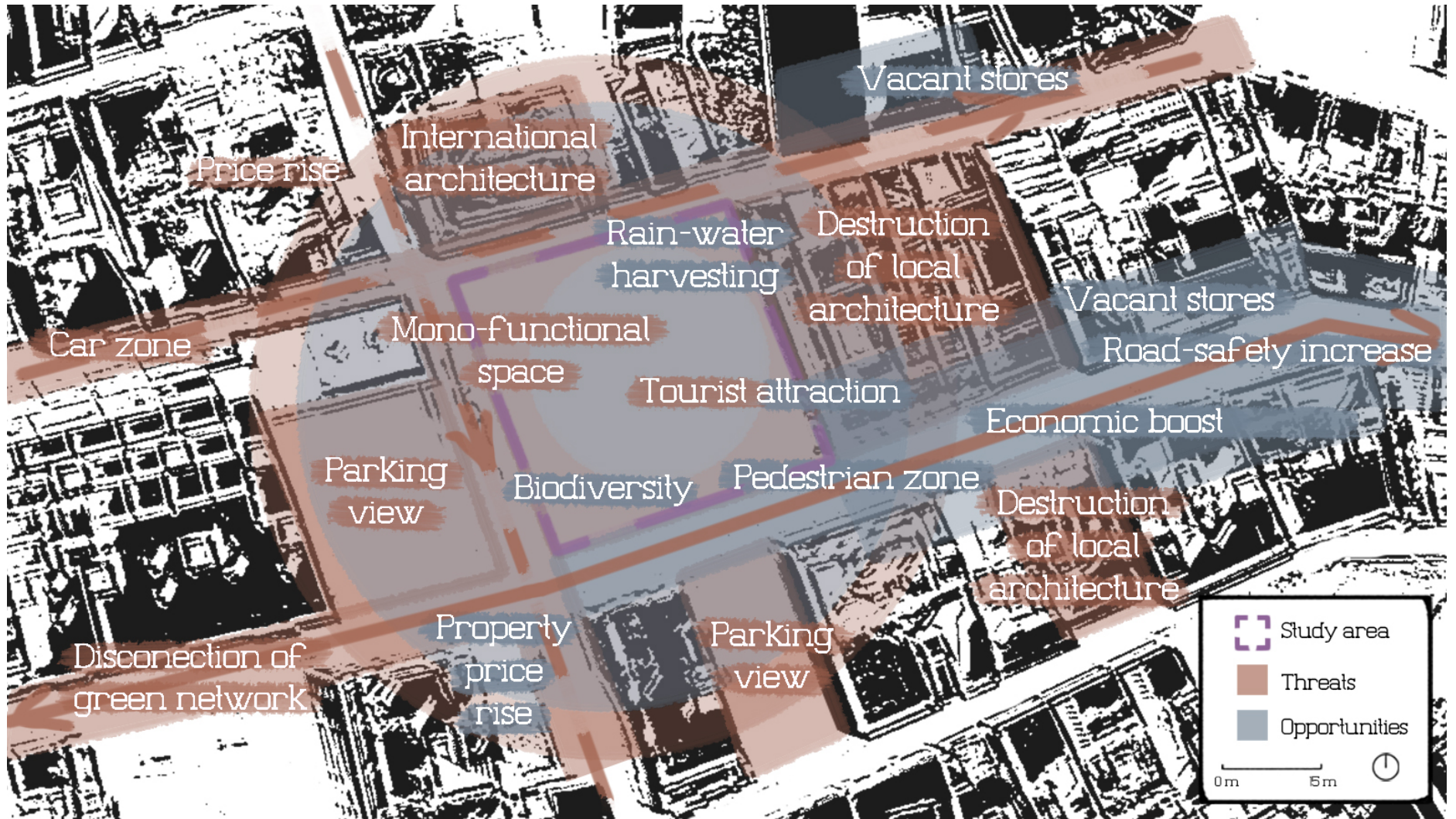


Figure 15: Spatial expression of Opportunities and Threats

6 DESIGN

6.1 NATURE-SPRAWL - SCENARIO I.

6.1.1 CONCEPT

After thorough analysis of local conditions and culture, a concept emerged that connects to Lanzarote's congenial landscape shaped by both nature and human. The ocean's passive, unyielding and perpetual power opposed by active, brisk and transient human action that shape the local landscape inspired me to transpose this interaction to the man-made aspect of the island. Nature-Sprawl emerged as a response to harsh preconditions of the island, dominating both man and wildlife, who have to endure in order to survive, but instead of competing with each other, the concept reflects the willingness to live in commensality.

Thus, the vision is to relate to past and inspire the future coexistence of man and nature in a sustainable manner.

6.1.2 DESIGN

The design breaks down the static urban fabric, and transforms it through dynamic reintroduction of natural elements and organic forms into the city, this change is inspired by local natural and anthropogenic phenomenon. The perpetual power of nature to destroy, create and reform is represented by the ocean (Figure 16), which is transformed into undulating wooden pergola, invoking the unrelenting and organised sea surface dimpled by waves, the pulses of the heartbeat of nature. Further attention is drawn towards the opposing brisk and perishable human action, which is symbolised by linear forms and artificial materials, and their spatial connection to the surrounding urban fabric.

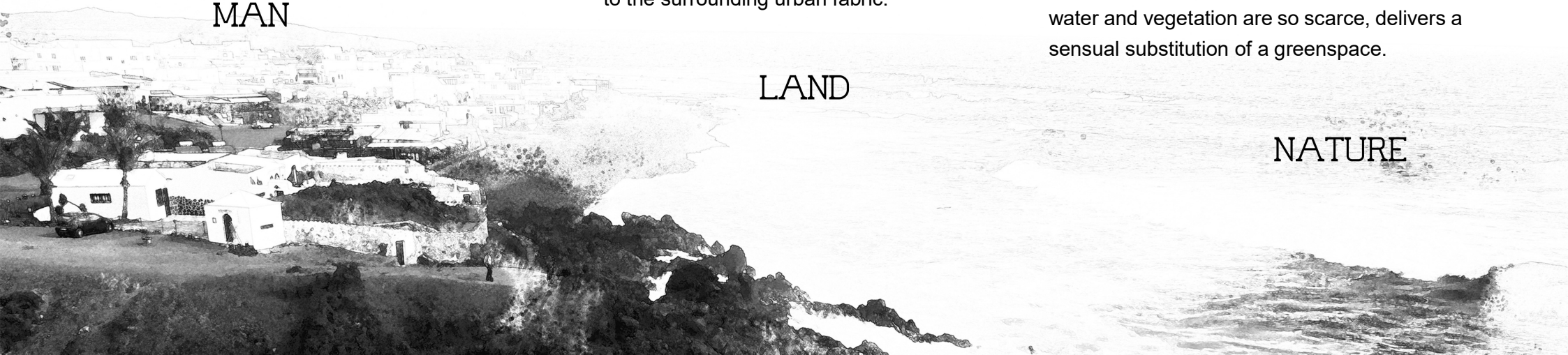
The land, a medium for mutual interaction between human and nature, inspire the possible symbiosis through dynamic transition of forms and materials, and the mutual interplay between them. The stylistic expression of symbiosis is therefore inspired by the singular natural land formations located in Timanfaya National Park, featuring numerous volcanic puy called Montañas del Fuego (Figure 11), and Zocos (Figure 12), man-made land forms congenial to the island's agriculture practice. The design express this natural and anthropogenic conformity via defining the spatial situation by volcano like islands piercing through urban fabric.

Finally, this proposal delivers a dynamic, polyvalent public space that enhance social inclusion, support cultural interaction, secure ecological values and in environment where water and vegetation are so scarce, delivers a sensual substitution of a greenspace.

MAN

LAND

NATURE



6.1.3 FORMS AND MATERIALS

The Urban-nature gradient is represented on every instance, through the choice of material, forms, position and the mutual relation between them.

White concrete symbolises traditional calcareous paint, used to protect the building from sunlight (Marín & Luengo, 1998), turning them into shiny landmarks in monochrome landscape of volcanic sediments. Furthermore, it reutilises the material leftovers from demolished buildings and surfaces.

Corten steel reaches to encompass the colourful spectrum of volcanic minerals and ferruginous compounds, and to connect the urban with the natural environment, through dynamic play of elliptical forms.

Wood is used as an essential natural component, demonstrating this metaphor through its origin and organic forms that oppose to the linear forms of concrete. Together with volcanic boulders and sediments they emblem the natural mass and challenge the urban fabric through naturalistic sensation and complex organic forms.

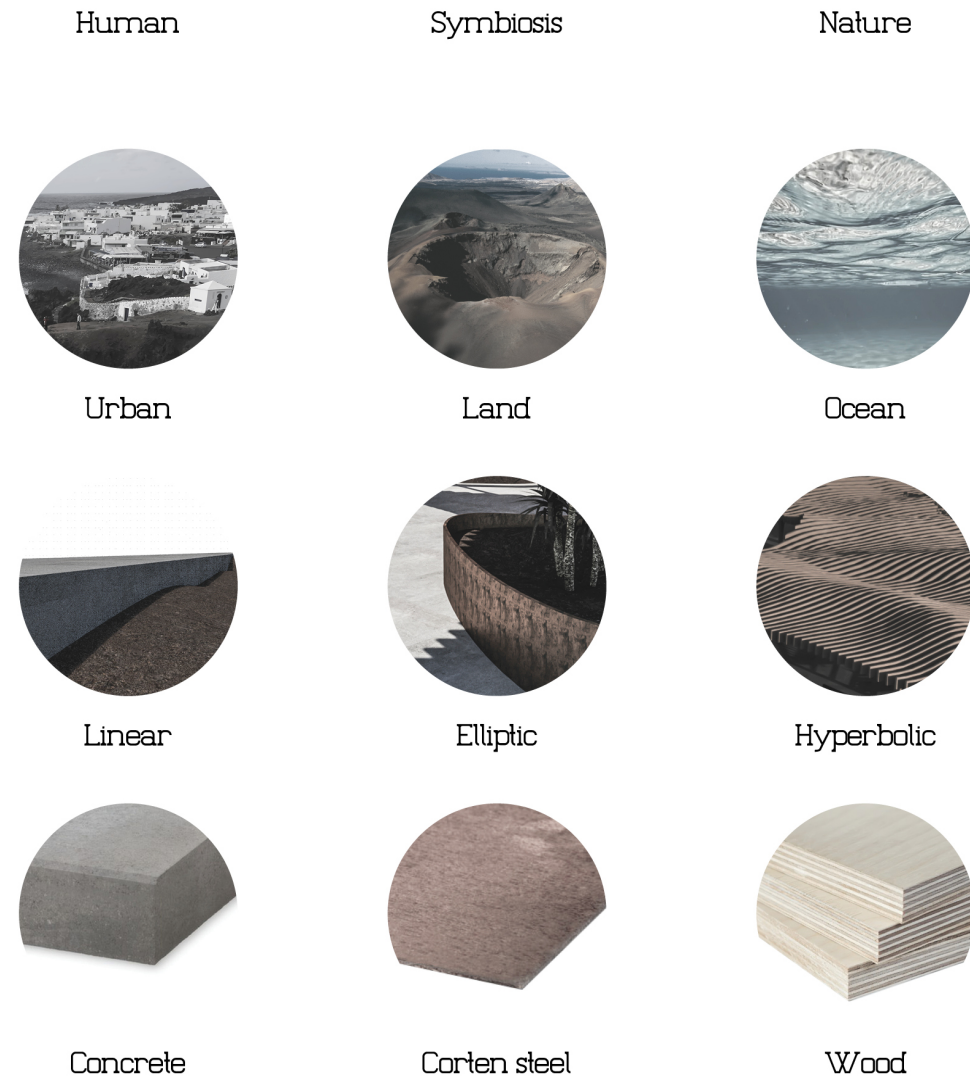


Figure 16: Concept scheme

6.1.4 PLANTING PALETTE

Ecological aspirations of the design are embodied by the choice of plant species for the planting palette, which is composed by endangered species native to Canarias or endemic to Lanzarote, and *Ficus microcapra* already present grown up tree (Figure 18). The plants are chosen with regard to their drought resistance, and on their blooming period, in order to allow for a manifold visual and sensual experience throughout the year (Figure 17).

Additionally, rainwater harvesting is supported through falling surface gradient towards the vegetative islands, where soil filtration, tephra mulching and underground water tank aim to compensate water deficit in dry periods (Figure 19).

The conformity of man and nature is symbolised by the land forms themselves, such effect is reached through the fusion of volcanic forms and Zocos. The visual expression of integrity and sustainability mingle with the proven functionality of Zocos as successful planting systems for local conditions.

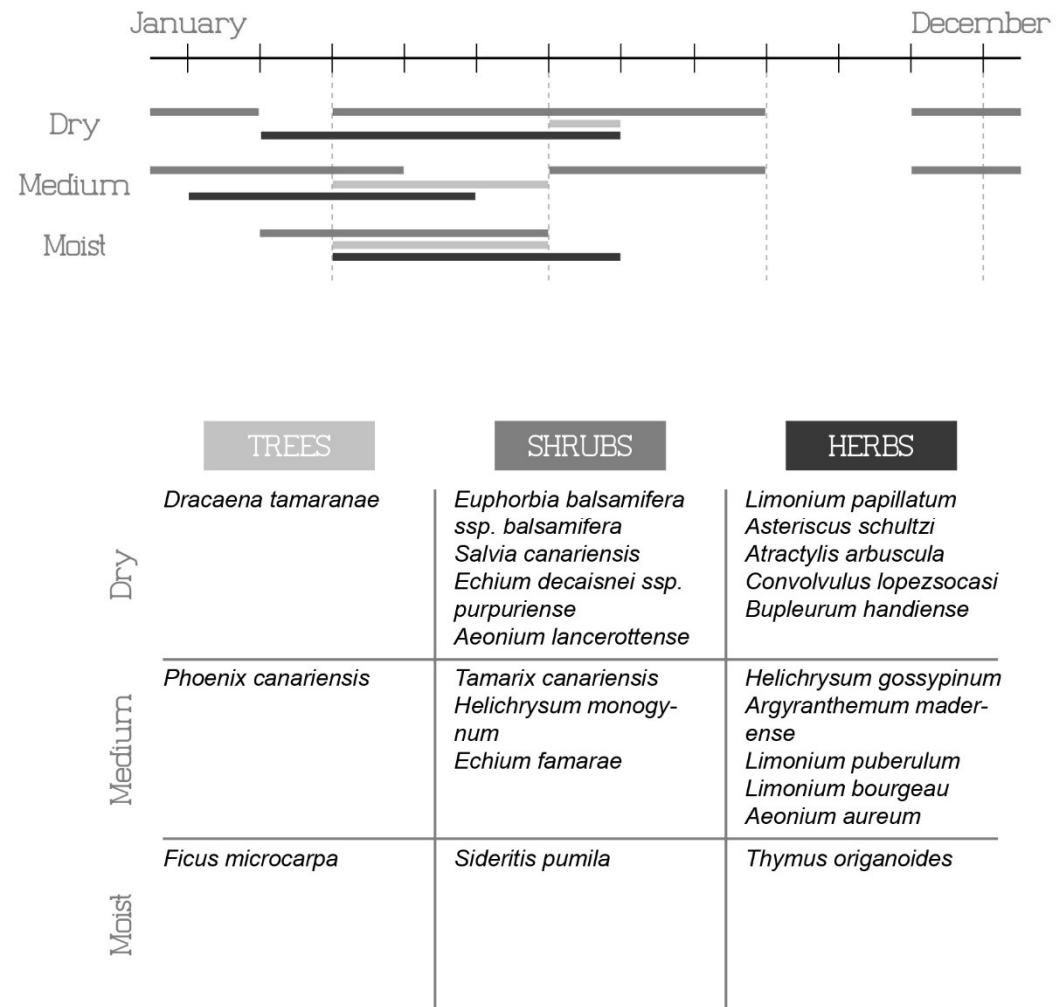


Figure 17: Planting palette with water requirements of each specie and blooming period of each group

Beside functional values, such as public health promotion and rainwater purification, the design aims to deliver aesthetic value through strong visual experience. Equally utility value derived from ecosystem services is on the other hand balanced by ecological values provided for local wildlife. Educational boards installed around the plaza's entrances aim to increase public awareness about the numerous benefits greenspace provide both to human and wildlife populations.

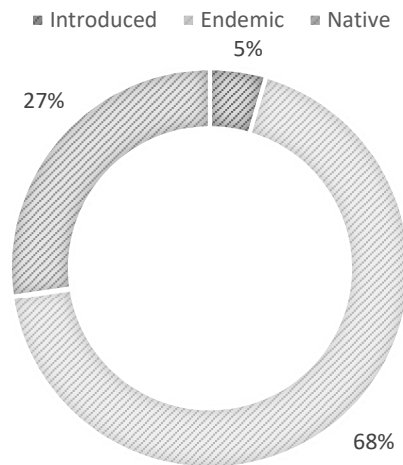


Figure 18: Distribution of represented species based on their status on Lanzarote by Arechavaleta, et al. (2010)



Figure 19: Estimated water saturation situation of vegetative islands

6.1.5 MASTERPLAN AND SPATIAL SITUATION

The Figure 21 explains the spatial situation of the plaza. The majority of the space, marked as Interaction zone, is designated to creation and enhancement of social exchange, to support local social ties. This zone invites the visitors to casual contact and offers numerous external stimuli from contemplation of vegetative islands till interaction with the surrounding zones.

Game zone is an essential part of the design, as one of the goals is to provide an opportunity for social inclusion of the whole demographic spectrum. Offering both sportive and intellectual forms of entertainment by provision of table tennis and chess tables. In times of cultural event, the street furniture may facilitate the accommodation of larger public.

Family zone complements the game zone by providing space for infantile games in safe car-free area. Located next to vegetative island it is designed to provoke the children curiosity and attract its attention towards unprecedented natural world in middle of dense urban environment.

Educational zone familiarise the public with upcoming events, as well as increase public awareness on the importance for and dependence of humanity on quality and quantity of natural zones.

Serene zone provides the anonymity and tranquillity for its users. Allowing to concentrate on compelling sensations of colours, forms, textures and sounds, or to simply deliver relief from urban stress inside its pleasant ambiance.

Parking zone is focusing on support of local economy, by provision of temporary stationing spot for food van or truck. During cultural events, it is meant to answer the surplus in the demand for refreshment.

Poly-functional zone represents the fundamental piece of the plaza. Designed to host cultural events, such as movie projections, concerts, temporary markets and exhibitions, it equally provides space for spontaneous action in-between these events.

The whole situation is completed by Vegetation Islands whose function has been closely described in Planting palette section.



Figure 20: Public amenities of the plaza

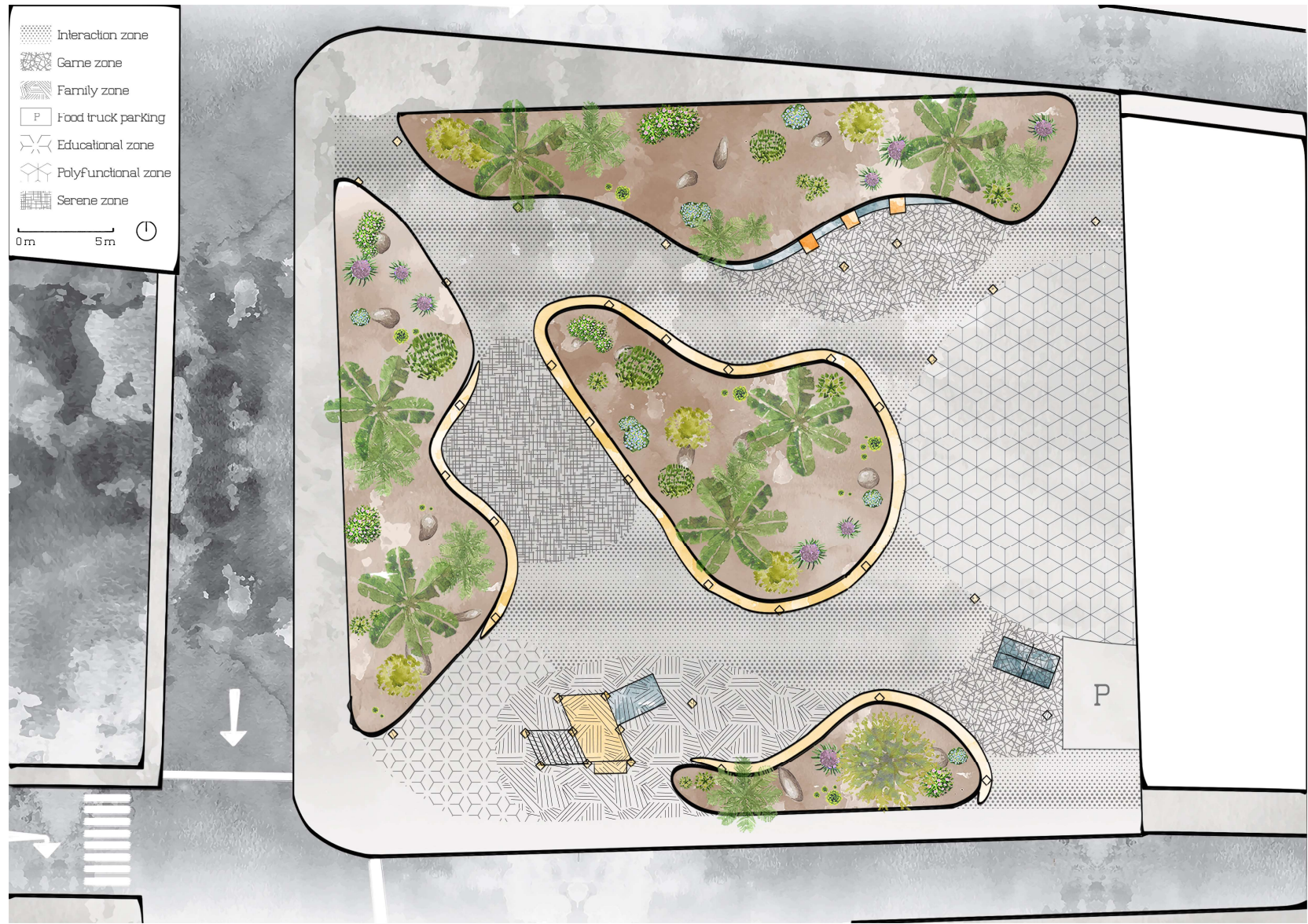


Figure 21: Master plan depicting spatial organisation of the plaza



6.1.6 VISUALISATIONS

In order to describe the *Genius loci* of the design several explicit visualisation accompany the proposal. These facilitate the comprehension of space and flow and communicate the concept. (Figure 22- 24)

Figure 22: Main view on the plaza



Figure 23: Northwest entrance to the plaza



Figure 24: View towards northwest entrance

6.2 SHORE-BREAK – SCENARIO II.

6.2.1 CONCEPT

The idea has emerged from the unique human-sea relationship originating from local geologic and climatic conditions. Lanzarote's strong connection with the omnipresent ocean dictates the rhythm of life on the volcanic island. Its passive, unyielding and perpetual power to shape the local conditions and landforms was behind the inspiration to transpose this vast force to the man-made aspect of the island.

Shore-break, is the place where the power of the sea meets the land (Figure 25). The movements of the waves sculpt the coast as they “break” and form the cliffs. Fragments of stone fall to the shore and diffuse onto the coast.

The thorough analysis of the local culture decided the orientation of the square linking to the manmade land forms of zocos in La Gería, the congenial agricultural practice of Lanzarote.

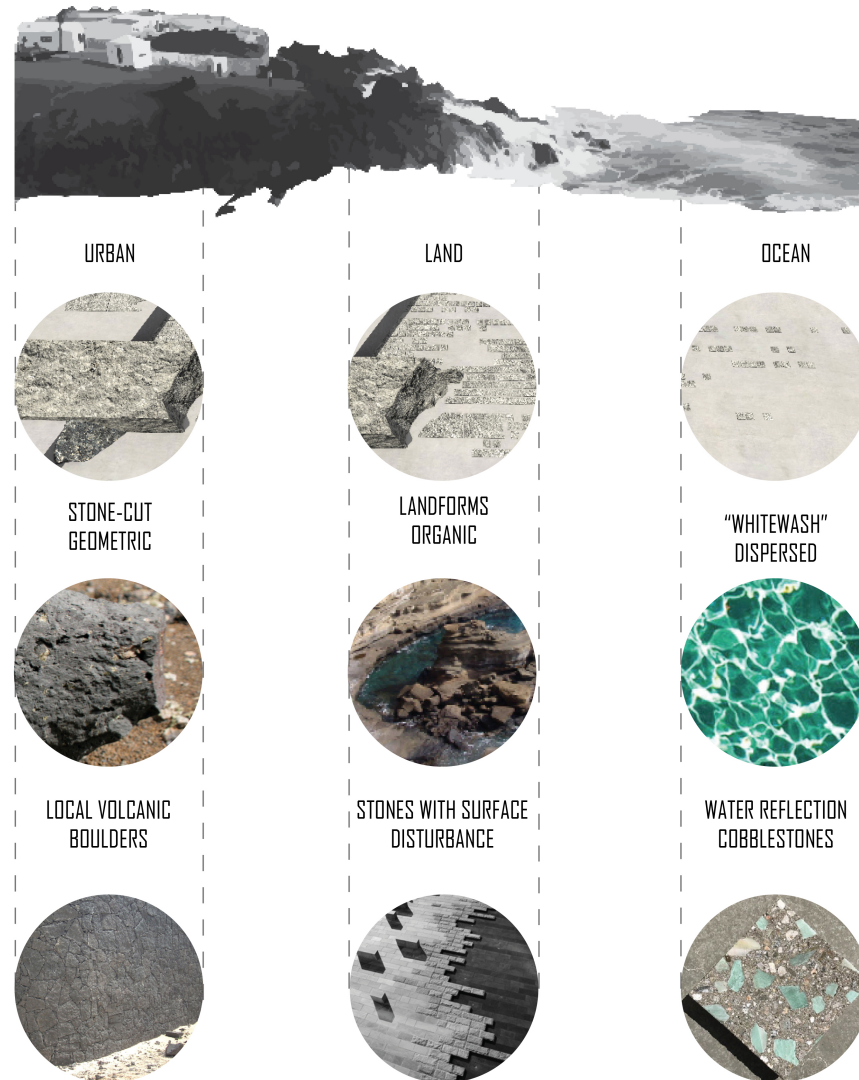


Figure 25: Concept scheme

6.2.2 DESIGN

The design links to the different phases of the wave and its interaction with the dynamic volcanic coastline (Figure 25). Melting both the power and lively presence of the sea and transposing it to the social and environmental issues, it promotes the access to the healthy open space in the city of Arrecife. The project enhances the quality of life and increases the economic potential of the area by providing a flexible polyvalent space that can be adapted for various uses.

The elevated terrace directs the flow around the square and invokes the notion of urban oasis through its centric shape. The form reflects the historic connection between man and the land as it is shaped as local manmade landforms – zocos. Essential for the human survival in the harsh natural environment of the island, now transposed to serve to escape from the unrelenting nature of the urban environment. To secure the access to each visitor, the terrace offers a ramp on both ends.

The vertical dimension is extended by volcanic boulders, shaped by both man and sea, adding another level to spatial organisation. Symbolising the coastal reefs on one end formed by the sea as it restlessly breaks over them, on the other end the volcanic boulders represent the opposing human energy to form and shape the land. This geometrical form invites to interaction, as it provides space for sitting and relaxation.

The ocean is represented through the changing density and quantity of glassed tiles, integrated in the concrete surface, creating the feeling of whitewash dispersed over the eroded coastal reefs.

The natural volume of the proposal is completed by small vegetated islands scattered around the outer perimeter of the terrace, creating the ambiance of peace and attracting by their colourful and odourful palette.

6.2.3 MATERIALS

The reutilisation of previous materials is an essential part of sustainable design

(Zimmermann, 2011). Covering most of the surface, the concrete is locally produced and an economic way to assure durable cover. Its porous nature allows for rainwater harvesting and storing in subsurface water tanks.

Volcanic stone, chosen for its long tradition as a construction material of buildings, supports the local economy, while linking to the history.

Glass tiles, made from recycled glass, offer an effective transition of materials and expressively formulate the visual relation with the volcanic rocks.

6.2.4 PLANTING PALETTE

The green mosaic of forms, textures and colours creates vegetated islands that approach the natural beauty of Lanzarote's arid landscape. The design is inspired by the surrounding natural beauty that has been transposed into the urban environment. The concept for the planting palette symbolises the qualities of the underwater coral reef structures. The plants thus represent the connection between the graphic forms of the coral organisms and the indigenous

vegetation found on the island. As the site is located within a coastal scrub plant habitat, two factors are particularly important to take into account: salt spray and dryness. Therefore only adapted native species, with exception to the *Ficus microcarpa* and *Jacaranda mimosifolia* already existing on the site, were chosen (Figure 26), with attention has been paid to secure whole year blooming through the whole year (Figure 27).

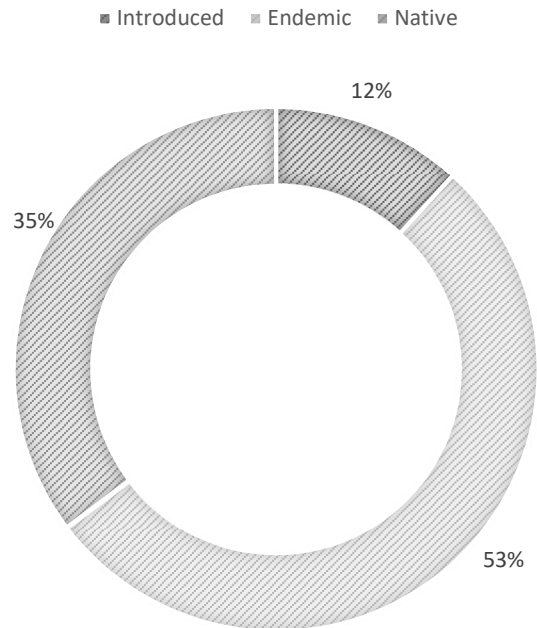


Figure 26: Distribution of represented species based on their status on Lanzarote by Arechavaleta, et al. (2010)

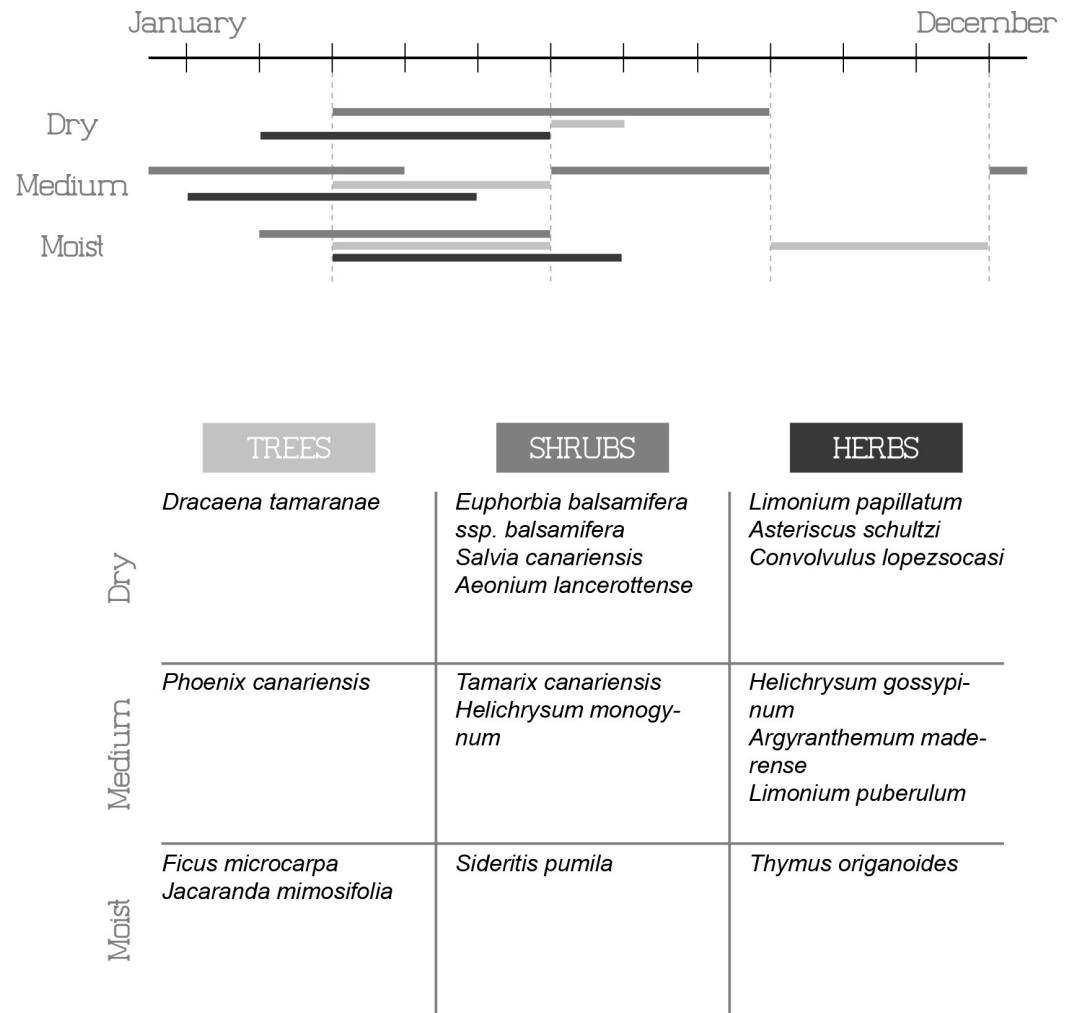


Figure 27: Planting palette with water requirements of each specie and blooming period of each group

6.2.5 MASTERPLAN AND SPATIAL SITUATION

The main axis of the proposal is based on the centric shape of zocos, which consequently define the identity, the flow and zoning of the square. This amphitheatre-like form symbolises an oasis, embodies both the power and liveliness of the sea and water, and transpose it to the social flow. Thus a performance area is delineated, capable of hosting temporary exhibitions, markets or concerts. Furthermore, in period when no cultural events take place, the empty space is meant to serve as a place of game and spontaneous events.

Economic zone promotes the surrounding business, by provision of space for their clientele. Being spatially separated from the rest of the square, and offering welcomed shade in summer heat, the area is dedicated to attract potential clients and promote the publicity by delivering pleasant surroundings.

A portion of the existing wall located on the east side of the site is transformed into a children's play area. This includes safety

ropes and foot stones attached to the wall. Resilient play surface on the ground ensures the safety of the climbers. The play-wall is found only on the bottom of the wall to avoid interference with video projections. On the other part of the wall, movie projections are encouraged by spatial situation of the wall due to its visibility from the central amphitheatre.

The terrace offers vertical change in the otherwise flat design, and thus supply space for recreation and social encounter. It promotes the social ties creation by playful and stimulating ambiance.

The design proposal integrates the present vegetation and expands it through the use of the same species. These small vegetated islands encircle the oasis and create natural barrier between the open space and the surrounding road.

The flow through the area proposes a pedestrian network connection to nearby seafront through the continuation of pedestrian flow, arriving from the east.

6.2.6 VISUALISATIONS

The visualisation accompany the proposal, in order to evoke a real feeling of the place, thus the design is more palpable. This form facilitates the expression of motifs, spatial organisation, scale, use and the flow around the place. (Figure 29- 31)

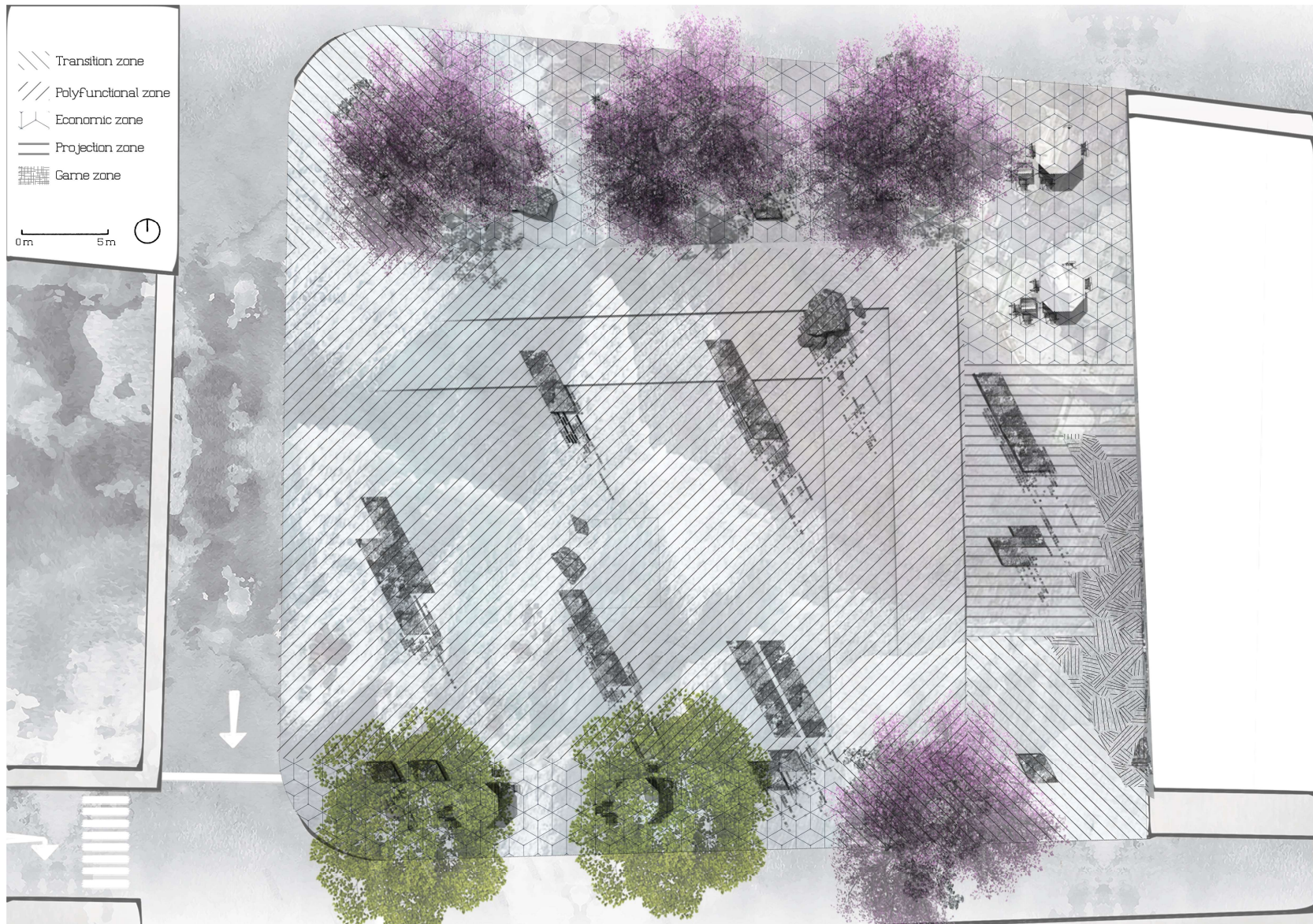


Figure 28: Masterplan and spatial organisation of the square



Figure 29: Main view on the square



Figure 30: View on the playground and economic zone



Figure 31: Night view from the west towards the projection wall

7 DISCUSSION

Based on the system of values proposed by Berry (1976), the estimation and comparison of both proposal is possible. Though the use of these evaluation tools may be only limited in the case of proposal assessment, as the system of values was created to evaluate existing sites. Additionally, field analysis would have possible assured more relevant results, but assessment of numerous and extensive literature has sufficiently substituted the absence. Thus, based on the literature review, study site analysis, and schematic proposals, the following may be estimated.

The assumption that both proposals would positively influence the utility value of the site, ascribed by local residents, can be made. Derived from the lack of qualitative and quantitative open space in radius of 10 walking minutes in the north area of the city and touristic nature of the seafront in the south. Furthermore, the property price of real-estates located in the vicinity of the site would be expected to increase (Sander & Polasky, 2009), due to scarce natural character of the open space.

The two scenarios propose a more sustainable practice, and therefore the functional value is estimated to increase. Promotion of rainwater filtration and harvesting, together with encouragement of non-motorised transport system, would thus increase the functional value through public health promotion (Berry, 1976).

Aesthetic and contemplative values would increase for both proposals, due to precedent character of the site, providing view only on parking slots and cars, thus creating unsatisfying environment. From qualitative and quantitative aspect, the first scenario delivers more extensive greenery and higher biodiversity, thus seems to offer more appealing views than the second one, therefore higher aesthetic may be ascribed to the former (Maruani & Amit-Cohen, 2007).

By offering space for relaxation, play, outside activities, and relief from urban stress, the two proposals are estimated to increase the Recreational value of the place (Radford & James, 2013; Berry, 1976). The current state allows for constrained recreational use, additionally to hazardous and busy aspect of

surrounding roads. Since both proposals dispose with Game zone, and polyvalent zone, but first scenario delivers an additional Serene zone, the positive impact is expected to be more significant in the case of the first scenario, as it offers more opportunities for recreation.

The current state of the site offers very limited habitat function, whence either of the proposals, increasing the proportion and quality of green space, enhance this function (de Groot, et al., 2002). Furthermore, on account of promotion of endangered native species conservation, which both proposals attempt, the Ecological value may significantly improve. While the native species of Lanzarote in the second scenario represent 88% of introduced plants out of which 81% are enlisted as endangered, the ratio for the first scenario is 95% native and 91% endangered (Martín, et al., 2007). Thus the latter assures higher increase of Ecological value.

Finally, it can be presupposed that both scenarios would have had a significant positive impact on economic, social and environmental growth.

8 CONCLUSION

During the last decades the urbanisation trend has an increasing tendency. Its impacts are numerous, resulting in more densely populated and built environment, urban-sprawl, in abandonment of rural areas and overall deterioration of open space, and the ecosystem services associated with it on an urban-rural gradient.

The recent shift in planning towards more sustainable practise offers several way how to face this phenomenon. One of them is redevelopment and revitalisation of existing neglected areas and brownfields in urban matrix. This thesis represents one example of such practise, delivering two proposals in response to redevelopment competition of a neglected public open space launched by local authority of Arrecife.

This project serve as a visionary indicator of a possible sustainable redevelopment of the city. In otherwise stressful and hollow urban environment the project showcase the promotion of public health and wellbeing, by encouraging non-motorised transport and by reintroducing everyday contact with natural

environment for its visitors. By offering space for interaction it promotes social exchange, and through introduction of numerous external stimuli it enhances social ties and inclusion. Furthermore, the provision of public space for cultural events facilities the social inclusion and provides a platform for the development of local cultural identity.

The project shows through the introduction of rainwater management system an environmental aspirations may be attained. The harvest and purification of precipitation collected from the square and surrounding streets and, instead of limited potable - mostly transformed from seawater, the use of the collected rainwater for irrigation of green areas during dry periods. Additionally, a connection of green corridors may be initiated through the creation of natural and semi-natural habitats, promoting conservation of endangered plant species.

It is not clear if the project have attained the whole economic potential, as the proposed business opportunities, apart from temporary markets and introduction of food-truck initiative, follow the very same pattern as may

be seen in the rest of the city. This means boulevards providing space for restaurants, cafés and small shops with considerable part of revenues coming from tourist flow on the island.

This project envisages the possible change in small-scale urban planning for the future sustainable city development. Though the existing favourable precondition, particularly the willingness of local stakeholders and authorities, might have permitted the launch of the redevelopment competition. It would be interesting to compare if such initiative would be successful in Czech Republic in a setting with less public engagement.

This thesis focus to entice and motivate architects, planners, developers and other stakeholders to see a complex sustainable redevelopment as not only beneficial, but fundamental for the long-term wellbeing of local and global populations of human and wildlife.

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