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Exploring the significance of greenway concept, to assist landscape planning and design: contributions to theory from African, Asian and European case studies.

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Introduction

The need for a reliable theoretical framework has been identified as unavoidable means to validate strategies and problem solve solutions in landscape architecture. The identification of the international greenway movement as well as its significance in promoting better planning and design (Fabos, 2010; Fabos and Ryan, 2006) enriched significantly the theory to support greenway planning and design. However, the magnitude achieved by the greenway movement across the world at different scales and contexts, deserves a deeper research on the topic. To illustrate this, it is worth mentioning the increasing popularity of green-infrastructures in European Union both in the academic and professional fields (EC, 2010; Magalhães, 2012), or the fact that 55 Km of greenways have been announced to be built in the city of Shenzhen, China in 2012 (Shenzhen Daily, 2012).

Goals and objectives

The goal of this paper is to contribute and highlight the need to strengthen the theory by evaluating the degree of success of landscape plans and the design of projects in diversified geographic, cultural, and scale contexts, which can be regarded as driven by the greenway concept or paradigm. Case studies in Africa, Asia and Europe, are submitted for review in order to ascertain the significance of the greenway concept in assisting the search for adequate planning and design solutions.

Literature review on the need to progress in greenway theory

This theory is considered to be a system of ideas capable of explaining something, which in the case of landscape architecture can be synthesized in two main domains: explaining the landscape (assessment and perceptions), and supporting planning and design (problem-solving solutions).

Over recent decades, landscape planning and design have been challenged by criticism concerning the lack of strong theoretical framework (Hunt, 2000). Post-modern criticism stressed the need to complement rational landscape planning and design with creativity and public participation. Most of the theoretical research work has been directed towards the understanding of the landscape function. However, many authors also draw the attention to the theory that validates models or paradigms.

Swaffield (2002) concludes that a structure in Landscape Architecture theory can be found based on common issues. Through these issues it is possible defend that the greenway debate contributes to theory, such as: a) landscape knowledge/analysis/diagnosis as a basis for creativity; b) the need to address the three main scales of approach to landscape study (site, place and region); c) the understanding of relationship between form and processes and how phenomenology provides possibilities to better embrace the tension on landscape design and planning, and the public. Being a concept very much based on the assessment of existing

resources on the land, fostering consensus between stakeholders, greenway discussion may strongly contribute to the evolution of the theoretical structure of landscape architecture identified by Swaffield.

Greenway planning and design theory have been mainly supported by three strong principles: spatial co-occurrence of resources, benefits from connectivity, and synergistic multiple use and purposes (Ahern, 2009). Zube (1984) had argued that the landscape assessment theory should address both quantitative and qualitative data, urban and natural landscapes, and applicability to diverse scales. Further studies concluded on the effectiveness of the greenway concept as a communicative tool capable to use validated scientific knowledge with creativity, therefore fostering consensus between planners, designers and communities (Ribeiro and Dias, 2010).

In conclusion four main topics can be identified in theory: 1) sustainable resources management; 2) continuity, 3) interface with public meanings and perceptions, and 4) communication tool to obtain consensus. These topics will be explored throughout the following four case studies.

Planning and design case studies in Africa, Asia and Europe

The objective is to assess how the greenway concept has revealed to be useful in inspiring and communicating, planning or designing proposals, as well as obtaining a desirable process of landscape evolution. To pursue this goal, the authors were involved in four case studies which were selected and assessed on the degree of usefulness of the greenway concept for their success. Their selection reflects a large diversity of scale approaches (planning, design and management) within different geo-cultural contexts, though all belonging to CPLP (Community of Portuguese Speaking Countries). The following case studies were studied in three continents (Fig 1):

1. Landscape plan for the municipality of Dala (14.600,0Km²), northeast Angola, in Africa;
2. Landscape design for University Campus of Dili, East Timor (2.500,0ha), in Asia;
3. Europe mainland: Development plans and garden design in Comporta (12.500,0ha private estate in southwest coast of Portugal), in Europe mainland;
4. Historic garden restoration in S. Miguel, Azores largest island, Portugal, Atlantic Islands.



Fig 1. Case studies location: 1-Angola, 2-East Timor, 3-Portugal mainland; 4-Azores islands

Landscape plan for the municipality of Dala, Africa

The Dala municipality is located in the high flat lands of northeast Angola (14.600Km²). The objective was to foster development supported by a sustainable use of land, grounded on natural resources and local land use traditions.

Its geology (Calaári sand formations, and Quaternary Period deposits) determined a smooth land form. In the presence of rock formations, steep slopes appeared, as well as outstanding waterfalls frequent in tropical climates. *Miombo* woods (tropical ecosystems) together with a mosaic of savana with high grass and shrubs dominate. With the presence of impervious layers, wet lands occur in high plateaus.

The natural context determines abundant water resources, from which local culture settlements depend, and that has been understood as a unique differentiating factor in Angola's richness in the context of southern Africa. Its protection under a landscape plan was explained through the delimitation of "continuous natural conservation areas" (Fig 2) that include drainage network and springs, steepest slopes, *Miombo* woodlands, and path network used by local population.

The significance of the greenway concept is demonstrated in the delineation of the natural conservation area network, and seen as a communicative tool to convey the significance of these areas for local planning authorities and communities. It is remarkable how influential it can be in a country that after 30 years of war is now promoting planning for development, under an awareness of sustainability.

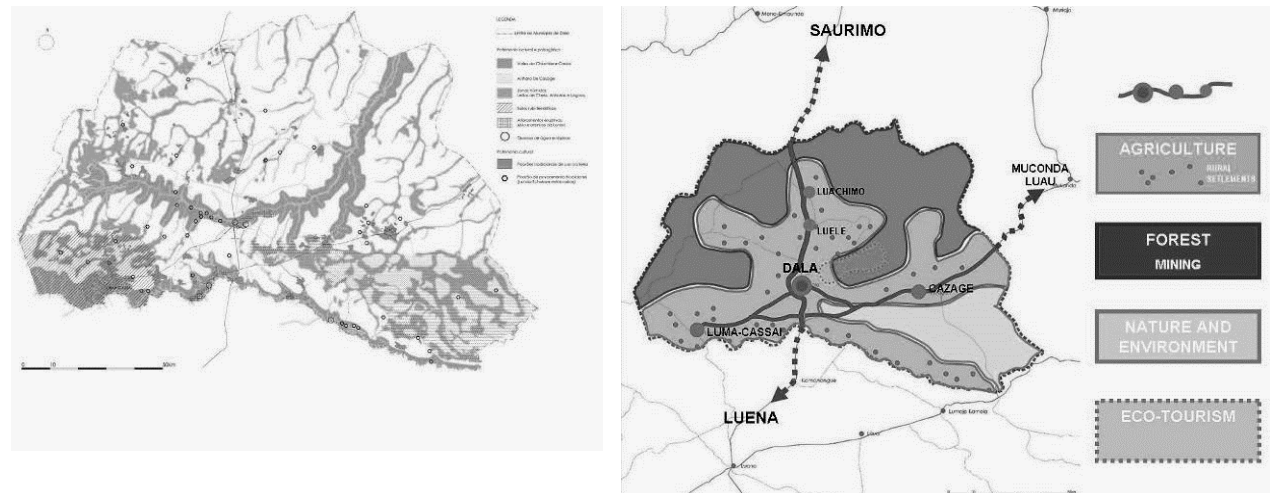


Fig 2. Dala Municipality: Natural Conservation Areas (left) and landscape plan (right)

Landscape design for University Campus of Dili; Asia

The University Campus of Dili, East Timor, intends to be a reference in education, knowledge and as an example of excellent campus planning and design, beyond the national borders.

The land morphology of the site, near Dili the capital, is composed by very steep hills, with flat flood plains, that do not show a clear hierarchy of the drainage network. The steepness of the hills restricts the possibility of construction. The flat plains used by local population for agriculture, contrasts with steep hills devoted to the forest, origin of flood hazards, with no building aptitude.

The campus proposal for the flat areas considered the safeguard of the extensive agriculture plains, and hill reforestation, proposing a spatial pattern of the university facilities that respected the awkward and unpredictable drainage. This was achieved through a continuity of green areas along main drainage lines which includes a comfortable and raised pedestrian circulation system. The landscape assessment determined buildings to be raised from the ground, contributing to the functioning of the complex natural drainage system (Fig 3).

The greenway drainage network inspired the first university campus landscape design of East Timor. Through a greenway reflection, constrains turn into opportunities for a project following the best world standards in one of the world youngest countries (independent since 1999).



Fig. 3. Dili Campus: landscape design layout(left); the hills vs. flood plains of the site(right)

Development plans and garden design in Comporta, Europe mainland

Comporta private estate, south of Lisbon, encompasses 12.500ha, being one of the largest in Portugal. The morphology is determined by sand dune systems together with low wetlands. Over time the dune systems have been transformed in large forest areas of Atlantic pine and some wet lands in rice fields or community vegetable gardens. Development plans have been under progress in order to accommodate a growing tourism activity heading for low density and high standards in the international tourism market.

The greenway concept was used to support development plans – approved by local and national planning authorities – based on the continuity of dune systems (fig 4), to accommodate and minimize the fragmentation impact of tourist development in this highly ecologic sensitive region, foster the reclamation of the low ecological value of the landscape, due to intensive forest and rice fields production.

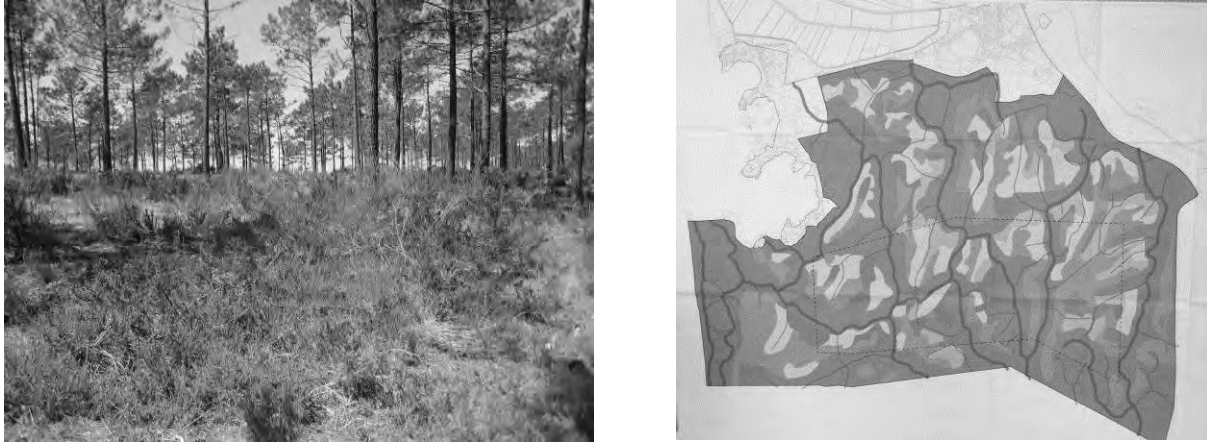


Fig 4. Production forest on dune system (left) and landscape plan for tourism development based on dune system continuity (right)

The concept of greenway in what continuity of reclaimed natural ecosystems is concerned, is also underlying sustainable landscape design. Strategies using and promoting the expansion of natural vegetation were tested in private gardens design (Fig 5), which received international recognition (Standler, 2012). This site level enabled to recover derelict land and established the continuity with the surroundings, hence the gardens constituting clusters for ecological improvement (Fig 6). Further use in high standard resorts in which quality is understood by promoters to be supported by the very natural character of the landscape, were also successful. The use of natural vegetation restoration in plans, gardens and outdoor resorts, contribute to obtaining a continuity of landscape which the increase of quality is already under progress. In line with the existing planning tools and environmental restrictions, greenway concept promotes creativity, respects site resources and strengthens landscape character.

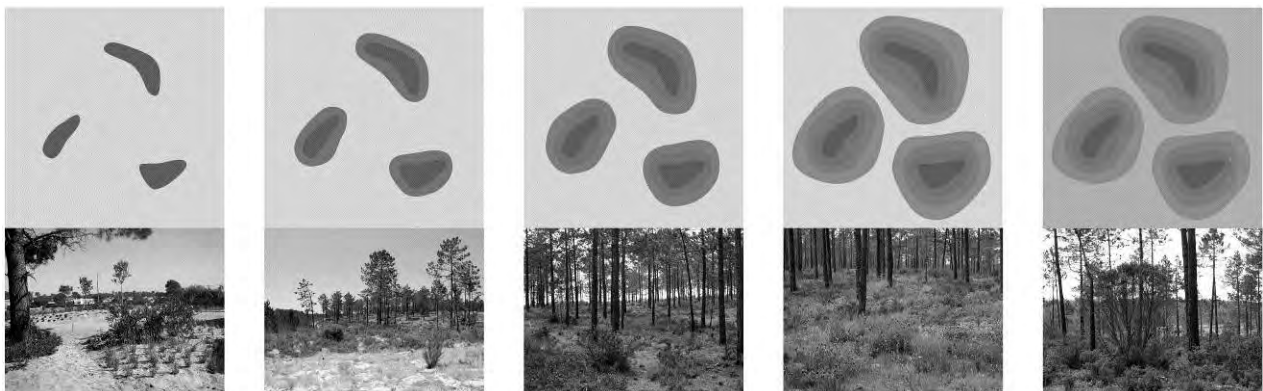


Fig 5. Clusters strategy to expand natural vegetation in landscape design from production forest (left) to more ecological sound woods (right); illustrating diagram



Fig 6. Private plot in Comporta, in which strategies of ecological reclamation were incorporated as part of garden design improving continuity with the surrounding landscape

Historic garden restoration in S. Miguel, North Atlantic Islands

Sao Miguel Island, the largest in Azores archipelago, encompasses a unique group of 19th century gardens. They were originated by a group of visionaries that fostered the development of the Island establishing contacts abroad which eventually originated an outstanding garden heritage.

As time passed these gardens went into processes of overuse, abandonment and degradation. Simultaneously, official authorities recognized their artistic value and potential for tourism attraction, which led to restoration processes. The case study includes two parks in the Island capital Ponta Delgada: Antonio Borges Garden (public park) and Santana Garden (Headquarters of Regional Government).

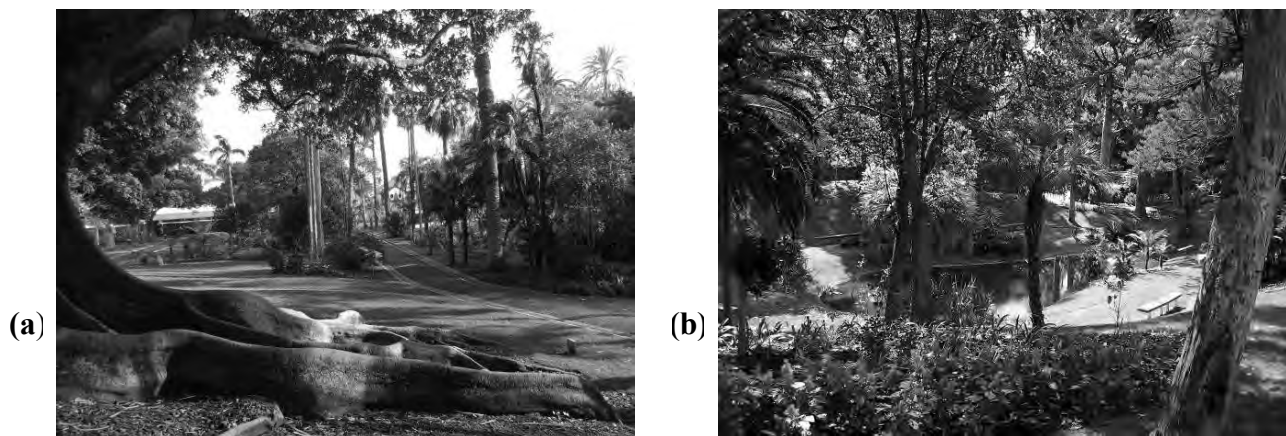


Fig 7. Antonio Borges public park: (a) Alleys view; (b) View towards lake

The Greenway concept can be recognized both in the delineation of strategies for restoration, mainly in what concerns to vegetation, drainage and visual continuity which eventually were crucial to explain the outcomes of the restoration process to regional authorities. The restored gardens together with well maintained gardens or under the same process can constitute a network of historical sites to be visited in continuity. Some of them even occur along lake

margins or main roads (such as the two referred parks) making possible a sequence of pedestrian visits, therefore becoming a powerful tourist product in which the concept of greenway can be perceived.



Fig 8. Santana Presidency garden: (a) Parterre view; (b) View towards lake

Discussion and conclusions

The case studies were analyzed in the context, of the greenway concept impact and the outcome of planning and design processes as summarized in table 1.

Table 1. Case studies analysis: impact and outcomes of the greenway concept

CASE STUDIES	SPECIFIC CONTEXT	GREENWAY CONCEPT IMPACT	OUTCOME EVALUATION
Dala Landscape Plan, Africa	<ul style="list-style-type: none"> - Rich natural resources - <i>Chokoe</i> culture - Portuguese influence - Independency: 1975 - 30 years civil war 	<ul style="list-style-type: none"> - Assessment of ecosystems continuity - Land use plan supported by natural areas network - Recent planning efforts 	<ul style="list-style-type: none"> - Communication tool with authorities and public - Influential to recent planning processes
Campus of Dili landscape design, Asia	<ul style="list-style-type: none"> - Context drainage - <i>Maubere</i> culture - Portuguese influence - Indonesia occupation - Independency: 1999 	<ul style="list-style-type: none"> - Drainage assessment - Campus design - Recent planning efforts 	<ul style="list-style-type: none"> - Communication tool with authorities - Contemporary excellent project in line with national expectations
Development and design, Comporta, Europe	<ul style="list-style-type: none"> - Coastal dune system - Forest production - Large private property - Recent tourist pressure 	<ul style="list-style-type: none"> - Ecosystems assessment - Tourist landscape plans - Strategies for landscape restoration 	<ul style="list-style-type: none"> - Turning restrictions into creative opportunities to improve landscape
S. Miguel historic parks, Atlantic Islands	<ul style="list-style-type: none"> - Volcanic Atlantic Islands - Significant 19th century parks heritage - Increase of tourism 	<ul style="list-style-type: none"> - Restoration procedures based on continuity - Garden network for tourism experience 	<ul style="list-style-type: none"> - Protecting unique heritage and promoting development opportunities

Two main conclusions are drawn from the reflection on greenway concept influence on theory.

The first concerns the usefulness of the greenway concept as far as it underlies methods for landscape assessment, proposal decisions and the achievement of a consensus between the involved stakeholders. This can be seen across 4 case studies in three continents.

In parallel, complementary conclusions arise from each case study. In Dala Landscape Plan (Angola) the concept's potential was also remarkable to deal with a recent planning system that aims at the Country's development. In Dili Campus (East Timor) the concept enabled to turn constraints into opportunities, bringing the Campus project into a high standard level in line with the expectations of the country. The environmental and planning restrictions in Comporta Estate (Portugal) became a means for planning and design creativity, through an approach inspired by the greenway concept, enabling to set up landscape restoration processes with successful results. Finally greenway as a way of design thinking added to clarifying restoration methods and to foster a unique garden network, preserved for future generations and for touristic development. These global and complementary conclusions for each case show the viability and advantages of the greenway concept both as a way of thinking and an instrumental tool. The awareness of this potential should be understood as an opportunity to inspire and deepen the greenway theory, advantageous for professional practice and research.

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