

S.O.S. – Sustainable Open Solutions to climate waterfront

(Insert the Title of your Presentation Here. Do NOT use uppercase letters only)

Pedro Ressano GARCIA, Ana Claudia OLIVEIRA, Laboratory Experimental of Architecture and Urbanism (LEAU) and Lusofona University, Lisbon, Portugal

1. Abstract

Climate change became a fascinating subject to the urban environment. Our scope is to develop a research network, associating architecture schools, urban research laboratories, local authorities and NGOs on architectural solutions to deal with the problem of the consequences of climate change, more focused on Waterfront Cities. Today, and worldwide, are already many entities working directly on issues related to the effects of extreme swings in the climatic conditions. So, why is it urgent to share, systematize and upgrade knowledge on the subject?

The effect of climate change is increasing at an abnormal rhythm which demands adaptation and transformation of vulnerable territories. In the last years, many projects were interrupted when they faced strong opposition coming either from public opinion, the media or lawsuits. Project proposals seem to address sensitive cultural values and consequently meet years of discussion, only to be put aside eventually. Such difficulties bring a loss of competitiveness on all sides, as well as decreasing quality of life for their citizens. The anterior information represents a problem within the European Community. Data related to historical and geographic records of specific waterfronts are used to construct patterns of development, feed algorithms and integrate the support of artificial intelligence to design possible future scenarios. To face the future challenges in managing, adapting and mitigating the effect brought by the increasing number of disasters, Lusofona University ULHT/LEAU has been cooperating with ten partners, from Portugal, The Netherlands, Italy, Greece, Poland and Sweden to share their best practices, including research on waterfront projects that merge equipment as well as public spaces and infrastructures, to produce and disseminate solutions, that enhance resilience. The research is carried out by four schools of architecture and urban planning, and entities working together with the worldwide market. The final result aims to produce Sustainable Operative Solutions.

S.O.S. waterfront mission is to develop affordable research environment and efficient operational tools between educational and non-academic partners by creating a Doctorate Consortium's to face the effects of climate change. The aim is to make use of the existing strategic network to enhance the research carried on in the field of urban waterfronts.

The main question folds upon the need to distinguish our study and show the added value of our project directly with some initial assumptions. The network has the objective to research in different scales such as:

- 1) Solutions for urban planning (the vast territory),
- 2) Solutions for urban projects (in a scale of the district or smaller urban facade),
- 3) Solutions for public spaces,
- 4) Architectural solutions at the building level,
- 5) The contribution of new technologies (warning devices or other) and
- 6) "Social" solutions (organization of the affected populations).

The research network reinforces the dynamic partnerships and increase the quality and technology innovations of the research, to design tools, to face the growing costs imposed by disasters. S.O.S. Climate Waterfront aims to bring excellence in research to a higher level and to improve its international position. To reach excellence requires the call for (1)

interdisciplinary and international research case studies, (2) steady sustainable research structure, (3) dissemination and open access of knowledge covered by different cultures, sciences and communities in each location.

The problem affects the citizens, the environment, and the local economy. Municipalities, stakeholders, Port Authorities and local communities are involved. Some projects that succeed in conquering public support and integrating the signs of the collective identity are included in the research. Climate change solutions can only be successful in ensuring a resilient city if they also engage citizens, educating them about climate change challenges, solutions, and fostering possible changes in lifestyles. The Doctorate Consortium is building up trans-national collaborative events with local Municipalities to produce solutions needed for waterfront cities to face climate change. The research project is supported by a Marie Skłodowska Curie Action, MSCA Grant.

2. Introduction

Urban waterfronts are facing new challenges when dealing with climate change. The problem affects the citizens, the environment and the local economy. Municipalities, stakeholders, Port Authorities and local communities often disagree upon their own needs. S.O.S. – Sustainable Open Solutions for European urban waterfronts aims to develop new solutions that emerge from the present necessities. Why is it urgent to share, systematize and upgrade knowledge on the subject?

The effect of climate change is increasing at an unprecedented rhythm which demands adaptation and transformation of vulnerable territories. In the last years a number of projects were interrupted when they faced strong opposition coming either from public opinion, the media and/or lawsuits. Projects seem to address sensitive cultural values and consequently face years of discussion, only to be put aside eventually. Such difficulties bring a loss of competitiveness on all sides, as well as decreasing quality of life for their citizens thus representing a problem within the European Community. To mitigate climate change impacts, several solutions have been proposed to reduce greenhouse gas emissions, including modern efficient energy alternatives and enhancing the use of sustainable energy sources (HASAN, *et al.*, 2018).

The creation of data on the waterfront uses historic and geographic records of specific locations to construct patterns of development, feed algorithms and integrate the support of artificial intelligence to design future possible scenarios. S.O.S. Climate Waterfront project gathers ten partners from Portugal, The Netherlands, Italy, Greece, Poland and Sweden to share their best practices, including research on waterfront projects that merge equipment's as well as public spaces and infrastructures, projects that succeed in conquering public support and integrating the signs of the collective identity. Climate change solutions are more successful when ensuring resilient urban environments. To achieve results are expected to engage citizens, educating them about climate change challenges and solutions, and fostering possible changes in lifestyles.

Transnational examples and the exchange of best practices benefit from special conditions not available in a single city or a single institution. Local experts, municipal representatives, stakeholders and international scholars are requested to work together, exchanging views, gaining new perspectives and discussing new interdisciplinary approaches, expanding and raising the level of the discussion, creating a think tank. The fundamental changes that are expected to take place in the climate system in the next decades are likely to have severe implications for the stability of the financial system (DAFERMOS, *et al.*, 2018).

Through an interdisciplinary methodology, the S.O.S. Climate Waterfront fills the gap in the understanding of how the different scales of urban and landscape planning, architectural design and technology are linked in water-related strategies and how they impact each other in the definition of preventive action plans and in the enhancement of

more conscious solutions to inform the community, human welfare and socio-economic activities along those vulnerable territorial settings of the waterfront.

3. Emergency at the waterfront

Nourishing a structured and necessary transfer of know-how and technology at several levels gives the research team to take excellence in research to the next move, enhancing a better position in the national and international research scenario. The relation between climate change and its potential effects on the stability of slopes remains an open issue (PALAZZI, *[et al.]*, 2018).

Improving the innovative nature of research towards a higher quality to reach excellence the research team focus on the urban waterfront to better prepare them to face the challenges posed by climate change. To achieve this, a steady and interdisciplinary research agenda is required, including environmental issues, smart technologies, strategies of resilience in urban design and culture. To reverse the vulnerability of urban waterfront researchers, accomplish skills and know-how towards advancing knowledge and insights on how to produce strategies; by formulating cross international and interdisciplinary solutions for the future.

European urban waterfronts are a subject of growing impact upon the citizens and businesses in terms of economic competitiveness and environmental quality. Sustainable open solutions are in the center of the debate of waterfront searching for resilient strategies in the context of difficulties stemming from environmental constrains brought by climate change. Waterfront brings together a number of different topics since it relates two different worlds: land and water. From the side of the water there are maritime transportation requirements, natural ecosystems, the necessary reduction of carbon emission, control levels of pollution and sensitive ecological areas. In land, the community, stakeholders and political leaders depend on solutions that require the collaboration of different fields of knowledge; physical, economic and social (MELLO, 2002). The community's quality of life, the environmental improvement and the increasing use of renewable energies are often in conflict with the necessary changes.

SOS Climate waterfront combines two strands of vibrant analyses—waterfront research and disaster studies. To examine specific examples of modern urban waterfronts reactions to the disaster and the disruption of urban structures and buildings. To envision how local, regional, national and international actors, both public and private collaborate to mitigate risks and enhance the resistance to face disasters.

The research project is developed from two approaches:

1) Develop research strategies aiming at designing policies and recommendations to meet the needs of urban waterfronts regarding public spaces, water management and selecting European best practices, to introduce researchers in public design and participatory processes on the transformation of waterfronts. The parameters that influence the transformation of the waterfront are shared with others to implement meaningful tools to deal with the production of future scenarios that integrate environmental, social, economic parameters to visualize and that encourage the community towards more participation in decision-making.

2) Develop new means of research based on historic records, geographic data, digital-methods and co-creation with local scholars to engage them actively in research activities (co-research approach). Additionally, the collected data is used to increase the identification of patterns of previous urban development on the waterfront. To visualize future progression of waterfront, depends on the development of the software produced by the team members. The new software identifies patterns of development in the past to predict future scenarios and include parameters directly related to climate change. The hypothesis produced for the future transformation of waterfronts is capable of engaging municipality representatives and especially technical staff to play a noteworthy

role and envision decision-making in the urban agenda.

The novelty of the approach is to overcome the problems that affect urban waterfronts and join efforts of specialists from different disciplines that have a recognized expertise in the subject and develop complementary research in the field of climatic transformation. The vulnerability of the waterfront and the variety of implications require a method of synthesis and to process similar situations that the present institutions do separately, the project demands an active knowledge and know-how exchange among all partners solving specific problems that emerge from each waterfront, via direct and broad discussion between experts:

Objective 1: Recognize gaps in current research, namely at geographical, historical, cultural, political and climatic among partners, to develop approaches for better understanding and enhance systematic means to relate people to the waterfront.

Objective 2: Introduce experienced researchers to foster collaboration and provide a platform where communities, public spaces and technology is addressed, based on new research fields, new forms of collaboration and new networks.

Objective 3: Upgrade the research group through enabling a stronger networking between its research staff and European top researchers.

Objective 4: Progress the cross-fertilization and interaction between researchers from different institutions and with expertise in different fields.

Objective 5: Supply structured opportunities for developing scientific and personal relations, among and beyond the Project.

Objective 6: Provide the involvement of relevant stakeholders, and the dissemination of results to scientific, academic, practitioners and policy-makers at all levels (EU, national, regional and local), media and the general public.

Objective 7: Distribute know-how on aspects of humanities-led, collaborative sustainable urban development and new insights in order to improve urban and social policies.

Objective 8: Promote the exploitation of advancements and Project results.

3.1 State of the Art

Sea level rise, high tides, storms and floods enhance the vulnerability of urban waterfront territories. The necessary transformations face years of discussions and/or lawsuits involving significant losses and costs, before cities adapting to change and effectively adapt waterfronts to climate change. Resilience is transformative and in each transformation, tries to create a stronger, improved city (YAMAGATA, 2018). In the recent years, most research projects have included regional and municipality representatives and they have highlighted the importance of thinking beyond regulations to face the present challenges. The alternative thinking or so called “out of the box”, brings the risk to open the Pandora box with all the problems involved.

Cross sectorial and interdisciplinary solutions are successful if dealing with conflict existing in every process of transformation in an environment free from current administrative procedures. However, for the future, waterfronts will need to formulate lasting solutions efficient and imaginative strategies. The necessity to create more resilient cities, increase livable public spaces, promote urban natural environments and support a sustainable urban waterfront is expected to improve healthier communities.

The necessary changes do not represent a problem. Transformation does not by definition compromise resilience. Quite the opposite, according to the Principal Researcher at the National Institute for Environmental Studies in Japan: Resilience is not a static state of a system. It is a process. A city is dynamic and is always changing. (...) Resilience is transformative, and in each transformation, tries to create a stronger, improved city's (YAMAGATA, 2018) that is, resilience itself can be understood as change. According to the United Nations Development Programme the concept of

human development is used in all research actions thus focusing on people, their skills and opportunities rather than depending only on resources or profitable income. The main goal is to expand the realm of possibilities so that urban waterfronts can adapt, transform, develop skills and opportunities to be meaningful areas for the community. It goes therefore beyond economic features, and into reflect cultural, political, environmental and social, characteristics that influence the quality of human life in the context of climate transformation. Planning a waterfront development, require the city officials or a developer to start by envisioning a network of well-connected multi-use public spaces that fit with the community's shared goals (MOSTAFA, 2017).

One of the central challenges is how commit with citizens and waterfront territories where opportunities for educating cities can be offered for everyone. It is directly linked with equality, sustainability inclusiveness cohesion and education for peace. Educative cities promote, policies and democracy, integrated and lifelong learning education based on knowledge on how modern cities recover from disasters (CAMPANELLA, 2005).

The research project is in line with the European Commission proposal for increasing climate-related expenditure. Since 2010 EWWUD (GARCIA, 2017) has produced research, published five books and exhibited results, considering that it is strategically important for waterfront investment to be climate-resilient.

3.2 novelty inter/ multidisciplinary

SOS Climate waterfront builds a new multidisciplinary collaboration network involving top European research institutions in architecture, urban design, regional planning and landscape architecture articulated within existing networks in specific fields of expertise – to better understand the impacts of climate change in urban waterfronts and explore them from social, environmental, educational, technological and urban design perspectives. The research project is innovative by bringing together high profile scholars from complementary disciplines and geographies, academic experts and researches to work with municipalities, local actors and stakeholders, and together develop new concepts, formulate and communicate innovative design proposals (GARCIA, 2017).

Urban waterfronts are challenged by human, educational and urban development that cannot be comprehensively tackled by traditional approaches. The co-creation concept for urban waterfronts is a concept that fundamentally differs from traditional public engagement approach, as it focuses on the collective influence and responsibility of all stakeholders by creating the public good (SMANIOTTO, 2017).

SOS Climate waterfront focuses on the expanding potential of networked society to exchange information, education and spatial related issues, aiming to share strategies, policies and improve civic engagement in cities. It will increase the views on co-creation experiences and step up innovative research methods and techniques supported by exchange of knowledge and digital systems. Due to the nature of the topics, only an interdisciplinary research approach can reinforce staff capabilities and the profile of ULHT and partners. The network will provide an ideal environment to emerge knowledge on co creation and co-research and can be considered itself as a co-creation ecosystem. This will enable the development of approaches to community education programmes with tools, workshops, and publications that explain complex processes and/or policies for specific/targeted audiences.

3.3 knowledge sharing to achieve innovative objectives

The ground-breaking nature of the project comes from the methodology we have been testing since 2010 by bringing together municipality representatives, environmentalist, designers, geographers, cultural agents and researchers to exchange knowledge and cooperate in finding solutions and define strategies. The methodology to meet those established goals includes, in particular for the transfer of knowledge, joint initiatives for capacity building, and trans-national collaborative activities. The selected parameters cover a wide range of data resulting from human activities and environmental conditions. The costs involved to mitigate and adapt are significant and covers a broad range of expertise. To process data from different fields of knowledge and interpret their consequences it is necessary to exchange data and to cross references with other experts. The various developing countries in Asia like China, Malaysia, South Korea, Singapore etc. are developing their infrastructural facilities at an exponential rate (PUROHIT, *[et al.]*, 2015).

The problem of the waterfront has been developed by each partner participating in the project. It has been address from complementary perspectives, economic, cultural, data management, social and environmental. The diversity of themes covered by the partners is crucial for the success of the project. Expertise, exchange of interdisciplinary knowledge with others lead to a broader perception in the field of interest of a particular waterfront. The exchange is oriented to include preliminary research of selected waterfront, following three major guidelines; historical, cultural and geographical records. After the workshop edition, the dissemination of results is able to reach broader audiences, planning and designing adaptation programs and strategies, considering aforementioned variables help to increase the efficiency of efforts (JAMSHIDI, *[et al.]*, 2018).

To imagine the future, it is necessary to understand the past through the historic records available, that provide background on previous conditions. The geographic data is fundamental to relate urban territory with natural territory, as the water currents shape the landscape and the fluvial or/and maritime activities. Waterfront activities are essential for the construction of collective memory and operate as a tool for identity of the community. The cultural influence has a deep influence in the opinion of the communities and the political leaders. Historical urban and geographical research contributes to a rigorous evaluation of particular waterfront potentialities: a way for products distribution, fishing activities or others cultural valences. With climate change it is difficult to predict the impact on waterfront areas as they are vulnerable and their resilience depend on competent but fragmented studies. S.O.S. Climate waterfront methodology allows to strengthen collaboration, to investigate new techniques, to cross references and learn to access to specific instruments and/or methods.

Workshops; the participation in the workshops brings together the interdisciplinary team that integrate permanent staff, scholars and researchers cooperating with the scientific committee. To engage the present debate, the scientific committee invites external consultants and professionals from partner institutions to integrate the research group participating in the workshop. Each workshop addresses one specific waterfront location. A transnational multidisciplinary perspective contributes for the necessary integration of the local waterfront urban environment. The cooperation with experts coming from international partner institutions provides the opportunity to develop a set of local proposals. During the event participants exchange views, gain new perspectives on the researched topic, discuss new approaches of resilience and have the opportunity to test their methods in an international environment.

Conferences gather local experts, municipal representatives, partners and international scholars to share them researches on urban waterfronts. This is useful to exchange

mutual visions and common practices, which constitute a relevant tool for future research. Conferences are designed to disseminate the knowledge produced to the wider audience of policy-makers, stakeholders, environmental associations, local communities, media, and the general public and to improve the skills of its staff. The research community promotes the active participation in international science and technology related conferences by providing the framework to include host presentation of papers from external guests previously selected.

This is an important output for the research proposal since communication is oriented towards different audiences.

The overarching methodological framework is backed by the concepts of co-oriented and adaptive and comparative research. The scientific strategy encompasses measures for stepping up and stimulating scientific excellence and innovation capacity. This includes the development of research design and digital tools to playfully engaging companies and communities in research activities and create opportunities to gather with specialist to collect the results of them researches.

- Dissemination and outreach activities - S.O.S. Climate waterfront research community promotes the scientific and public dissemination of the outcomes and findings. A website operating as a knowledge platform will be set at an early stage organized towards providing easy access to knowledge and know-how around the project's key areas and issues detected within the topic. It will also serve as central for social media activities. Further dissemination efforts include publications in relevant/indexed journals, policy briefs, studies reports, booklets and cooperation with other organizations, programs, networks, operating in the areas related to the project. The benefits from creative and innovative solutions contribute for most desirable sustainable development of urban waterfront in Europe. ISOCARP, is expected to list institutions that will continue to provide an international interdisciplinary vehicle for dissemination of results.

Cultural institutions, urban design exhibitions and art festivals have been actively involved in the dissemination of previous results of the waterfront topic. The creation of a body of knowledge on the subject of waterfronts that contribute to the identification of long and short term solutions is sustained by the edition of the web based material, production of documentaries, oriented towards the different audiences and publication of books. Everything is the central outcome of the research. The investment in communicating to reach new audiences through web tools, social networks and local media intends to disseminate and bring for public awareness, solutions that transform the waterfronts and the lives of their communities if local actors converge efforts and collaborate. It plays an important role in this process, because they influence the public opinion to think differently and attract the public interest to support the necessary transformations.

Our previous publications succeed to influence local administrations to take in consideration the results thus the challenges now facing climate change are required to receive feedback from local and international partners and the results of a comprehensive set of field observations, surveys and controlled laboratory experiments demonstrated that the waterfront suction, which remained thus far unexplored in soil mechanics (SASSA, [et al.], 2013).

The activities develop a strategy to maintain the cohesive and sustainable collaborative network beyond the Project S.O.S. Climate waterfront scientific strategy is focused on four main research lines:

- 1) environmental planning for climate change, the influence of geographic and historical factors on the construction of the new territories over the water. To illustrate the precarious condition and the complexity existing at the waterfront, the analytical cartography will inform several stakeholders and citizens about the artificial landfill and the risks associated with extreme swings in climatic conditions.

2) economic impact. The unsuccessful implementation of the necessary transformation for waterfront sites is simultaneously affected by discontinuous and contradictory decisions lead by politicians. Such situations conduct to by an extensive waste of effort. The economic costs are significant and represent a large percentage of the necessary investments thus highly permeable to political short term decisions. Consultants for this project have been involved technically but not politically at the waterfront transformation process.

3) cultural influence and public space the top-down approach, based on desk-based macroscopic diagnostic and prospective analyses, plans and projects, has prevailed in urban development planning and decision making, thus neglecting the fact that the present city dynamics and future options depend on the changing presence, character and activity of a great number of individual and institutional actors as development stakeholders. This is especially evident in waterfronts, one of the most valuable and indeed unique urban area.

4) data management. The team will collect data to produce visual animations of possible scenarios that envision the vulnerability of waterfronts when exposed to climate change. This has been done by local institutions integrating geographic data. To envision the implications of future projects, management of public spaces that merge equipment's as well as squares, gardens and road structures, data will cover previous projects and future scenarios. The development of possible waterfront urban scenarios using technology spreads a wider understanding regarding waterfront transformations. It is innovative to use material from different fields of knowledge to simulate new outputs. Data related to historic and geographic records will feed the information of specific waterfront development. The information regarding the transformation of the built environment will allow the identification of patterns of development.

Such information will be used to feed algorithms and trace the storyline to speculate on climate change effects. Also, using patterns is useful to integrate the support of artificial intelligence to visualize future possible scenarios. Though speculative this is useful for researchers to be in dialogue with citizens, practitioners, decision makers and engage them in innovative solutions. It is not the cities that can be intelligent, but the societies that inhabit them that must be prepared (OLIVEIRA, 2017).

3.4 participating organizations

The achieved results since 2010 have revealed that the project is innovative by bringing together scholars to conceptualize and formulate design proposals to be brought forward for discussion, some present solutions in a new methodology that engage citizens, and their representatives. The research focus on changes affecting both, the city and the port are neither strictly private (investors 'concern) nor public, but are rather collective responsibility.

Indicators show that the methodology is effective within the local context. The results become a reference to coach the dialogue between residents, governmental institutions and investors. It will be necessary to consolidate the network of exchange knowledge since common topics were found with other partners:

LUSOFONA UNIVERSITY - Portugal

POLITECHNIKA GDANSKA - Poland

ARISTOTELIO PANEPHISTIMIO THESSALONIKIS - Greece

UNIVERSITA DEGLI STUDI DI FIRENZE - Italy

INTERCULT PRODUCTIONS EK - Sweden

GDANSK MIASTO NA PRAWACH POWIATU - Poland

CHAMBER OF COMMERCE - Portugal

FUNDACJA RIVER//CITIES PLATFORM - Poland

INESC ID – INSTITUTE OF COMPUTER SYSTEMS - Portugal

CPO Noord-Holland (CPONH) – The Netherlands

Conclusion

The working plan of S.O.S Climate Waterfront was discussed and approved by all team leaders. The agreement about the number and dates of visits as well as about visiting persons is established according to their profile (MNG, ER, ESR) and specialization. All the partners agree that the project is feasible regarding both implementation of the tasks formulated and the timeframe. The tasks assigned to each participant are designed according to the work plan in order to meet their expertise and focus in the field of their scientific and scope of interests. Furthermore, the partners welcome knowledge sharing in the structure of the S.O.S. Climate Waterfront project provides a good opportunity to expand their field of research/expertise and enhance scientific innovation of their institutions. The collaboration in the project is profitable for all the members.

A strong consortium with unique combination of expertise will implement the S.O.S. Climate Waterfront (academic and non-academic). All partners work at the forefront of their discipline areas and have well-known scientific and leading reputation, thus ensuring research excellence. The consortium will train new researchers, expand research competencies in innovative design, partner with private sectors in research projects, thus providing substantial opportunities for real world testing of the research and introduce creative/innovative practice research methodologies to a new generation. The project will develop interdisciplinary and multi-sectorial competences that will have significant impact on leading researchers that will be experts in the assessment of waterfronts environmental adaptations and will provide successful water resilient strategies. Beneficiary will also be staff, practitioners, policy makers. S.O.S.'s extensive dissemination (website, media web, books, exhibitions, conferences, scientific articles,) will ensure that the results achieved are open-access and are widely shared.

References:

- CAMPANELLA, T. J., L. J. Vale - Introduction, The Cities Rise Again, in *The Resilient City, How Modern Cities Recover from Disaster*. New York: Oxford University Press, 2005.
- Dafermos, Y.; Nikolaidi, M.; Galanis, G. - Climate Change, Financial Stability and Monetary Policy. *Ecological Economics*. ISSN 0921-8009. Vol. 152 (2018), p.219-219 - 234.
- GARCIA, P.Ressano - *Waterfront Migrations – Cascais'*, 2017, EWWUD – European Workshop in Waterfront and Urban Design, DAU-ULHT & Câmara Municipal de Cascais. Lisbon: ULHT Lisbon, 2017.
- Hasan, Mohammad Mehedi; Wyseure, Guido - Impact of climate change on hydropower generation in Rio Jubones Basin, Ecuador. *Water Science and Engineering*. ISSN 1674-2370. (2018).
- Jamshidi, Omid, [et al.] - Vulnerability to climate change of smallholder farmers in the Hamadan province, Iran. *Climate Risk Management*. ISSN 2212-0963. (2018).
- Expo'98 – City or Island?: *Jornal dos Arquitectos*. 2002, n.º 205.
- Mostafa, Lobna A. - Urban and Social Impacts of Waterfronts Development, Case Study: Jeddah Corniche. *Procedia Environmental Sciences*. ISSN 1878-0296. Vol. 37 (2017), p.205-205-221.

- OLIVEIRA, A. Claudia - CLIMATE SMART CITIES: Green Architecture and Sustainability applied on buildings. Evaluation systems in 'blank' smart cities and 'converted' smart cities. Lisbon University - Lisbon School of Architecture Lisbon University - Lisbon School of Architecture 2017.
- Palazzi, Elisa, [et al.] - Implications of climate change on landslide hazard in Central Italy. SCIENCE OF THE TOTAL ENVIRONMENT. ISSN 0048-9697. Vol. 630 (2018), p.1528-1528-1543.
- Purohit, A. A., [et al.] - Effect of Mega Bridge on Hydro – morphodynamics of Waterfront Facilities in Wide Estuarine Harbours- A Sustainable Development. Aquatic Procedia. ISSN 2214-241X. Vol. 4 (2015), p.341-341-348.
- Sassa, S., [et al.] - Ecological geotechnics: Role of waterfront geoenvironment as habitats in the activities of crabs, bivalves, and birds for biodiversity restoration. Soils and Foundations. ISSN 0038-0806. Vol. 53, n.º 2 (2013), p.246-258.
- SMANIOTTO, Costa C. & Madanian, S. - A model for evaluating a greenbelt planning in the city of Qazvin (Iran) using MICMAC method. Modeling Earth Systems and Environment. Springer International Publishing. ISSN 2363-6203. Vol. 3, n.º 4 (2017), p.pp 1503–1513.
- YAMAGATA, Yoshiki, Ayyoob Sharifi - Resilience-Oriented Urban Planning – Theoretical and Empirical Insight. Switzerland: Springer Cham, 2018.